



Mississippi Gulf Coast Water Stakeholder Analysis

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Cover Page

Corrin Wendell

The Plan for Opportunity

The Plan for Opportunity is a collaborative planning project intended to guide the economic growth and development of the Mississippi Gulf Coast and to improve housing, employment and transportation opportunities throughout the region. The three year planning process will be guided by the Constituency for a Sustainable Coast (CSC), a stakeholder working committee including city and county leadership, key community and public partners, and residents of the region. The water subcommittee is charged with examining how the region's water resources can be used to support increasing economic competitiveness, support existing communities, leverage federal investment and value communities and neighborhoods. To support the work of the water subcommittee, this stakeholder analysis has been undertaken to provide important perspectives on the challenges and opportunities facing the water resources.

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Introduction

A stakeholder assessment was conducted to gain local knowledge into relevant resources, challenges, and opportunities for the waters of the Mississippi Gulf Coast. To simplify the stakeholder assessment, stakeholders were looked at and grouped by their various roles throughout the water cycle. Stakeholders throughout the Mississippi Gulf Coast area—natural resources, passive users, active users, consumers, utilities, education, research institutions, advocacy groups, and government/regulatory agencies—were interviewed between June and October 2011 to compile a comprehensive understanding of the Gulf Coast’s current water resources and their future needs and desires. This analysis summarizes efforts to engage in discussions around water resources as part of The Plan for Opportunity. It is clear, based on the timing of the stakeholder engagement, that the people of the Mississippi Gulf Coast have been impacted by the Deepwater Horizon oil spill. This raised the public’s awareness of issues related to water quality and has encouraged them to consider how to ensure that the waters of the Mississippi Gulf Coast can be used to support the many needs of the community. This incident created an opportunity for the region to engage in a dialogue around the importance of water to the region and how the region wishes to use it in the future. The ideas, perceptions and comments are those of the stakeholders and may not be factual.

Purpose

The goal of the engagement effort was to understand the continuous cycle of water and to look at how stakeholders interact with water and each other throughout the water cycle. The Mississippi Gulf Coast’s water resources present a particular complexity with its plentiful aquifers, fresh water rivers, bayous, estuaries, the Mississippi Sound, barrier islands, and the Gulf of Mexico. Individuals and organizations directly involved in and affected by the water cycle are the best sources to explain the issues and opportunities affecting the Mississippi Gulf Coast’s regional waters. These stakeholders provided insight into understanding the data included in the Mississippi Gulf Coast Water Resource Assessment. They also provided the context



Source: Corrin Wendell

Sailing is a popular recreational activity on the Mississippi Gulf Coast.

for the water element within The Plan for Opportunity, detailing changes throughout the region, future challenges, and future opportunities.

Methodology

The first step in understanding the water cycle was to concentrate on the relationships between the land and the water in its most natural state as a natural resource. Meetings were held with representatives from state parks, National Forests, wildlife refuges, and mitigation banks. These individuals provided insight regarding how water is protected at sources.

The second step was to identify the passive water users who minimally impact the water. Stakeholders involved at this level are primarily eco-tourism groups, yacht clubs, bayou tours, beach rentals, kayak rentals, beach shops, beach tourists, recreational fishers, and waterfront walkers.

The third step identified the active users of the water who have a significant impact by utilizing water or altering a waterway/

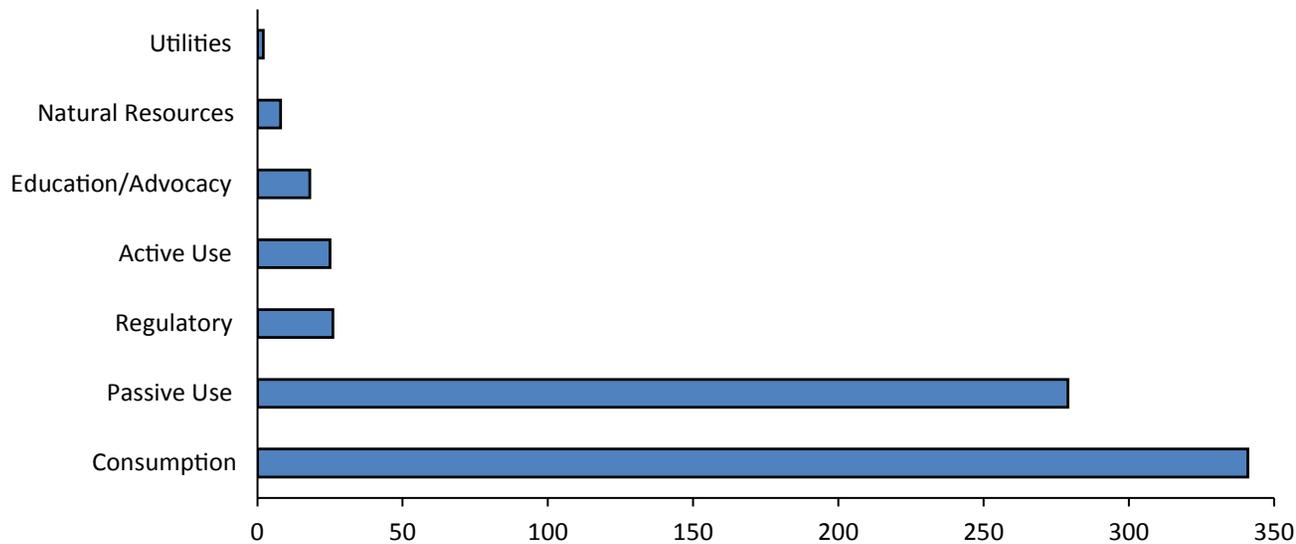


Figure 1
Number of stakeholders engaged by group

Source: *Mississippi Gulf Coast Value Survey*

Note: A number of stakeholders can be associated with multiple groups. Stakeholders were classified based on their primary role for the purposes of the interview questions.

source. Stakeholders engaged include charter boat captains, ferries, boat storage facilities, bait shops, boat repair/retail shops, energy producers and processors, ports/industry, transportation, harbor masters, developers, and consumers.

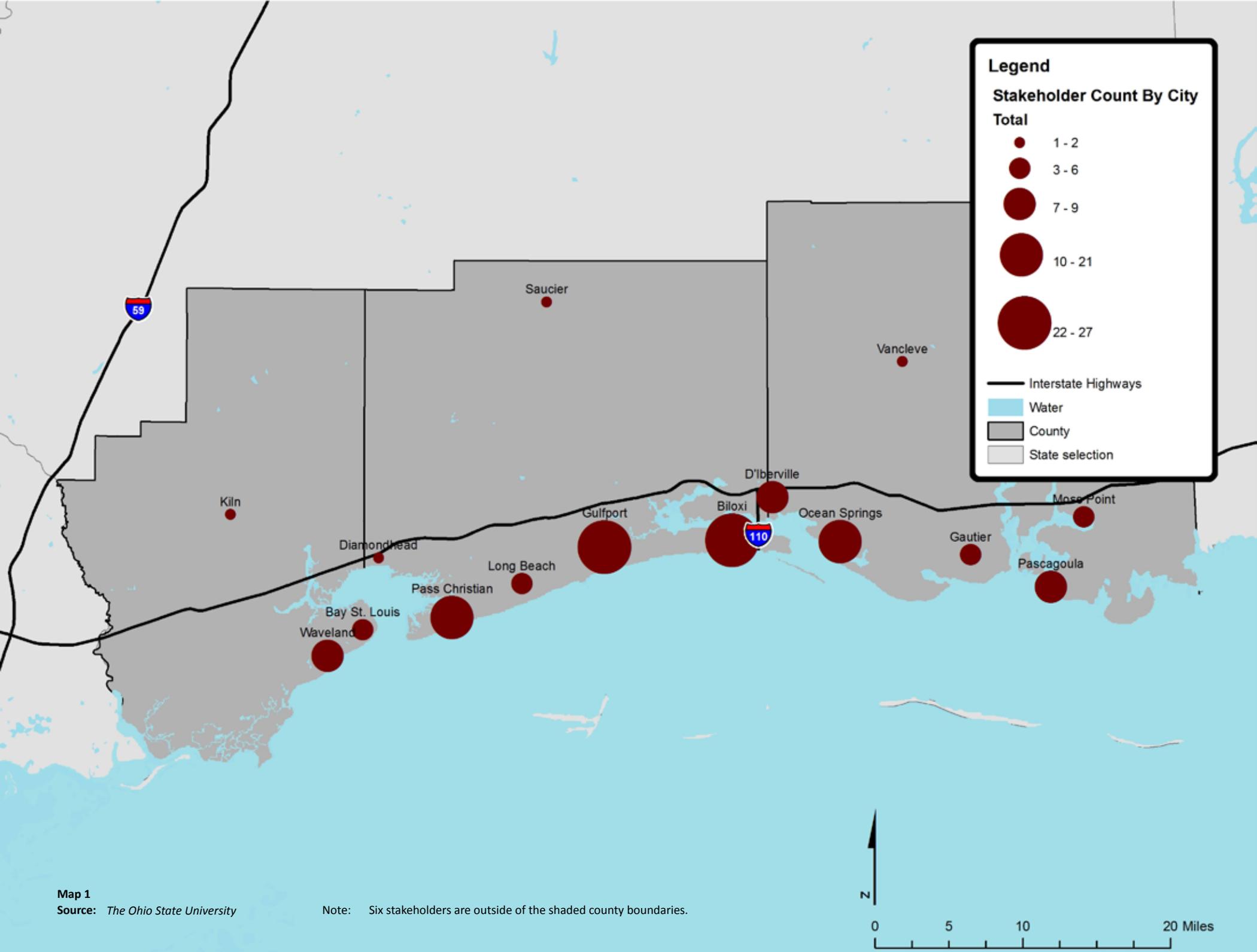
The fourth step was to identify consumers of water. These are residents and retailers who purchase the water for use. The primary difference between consumers and active users is that consumers typically receive and dispose of their water through built infrastructure. Active users are typically impacting the water by being on a body of water or using open water. Stakeholders included golf clubs, laundry services, casinos, ice sellers, and residents.

The fifth step of the assessment categorized utility companies and their roles in the water system. They are responsible for producing the water and returning water back to the environment. These stakeholders included utilities companies.

Other stakeholders included those responsible for researching, educating, advocating, and regulating water. These included public and private institutions, non-profit organizations, and government officials.

Stakeholders were contacted to identify data for the assessment and to gather public opinion on critical needs to be addressed. The water subcommittee also provided contact information for additional stakeholders.

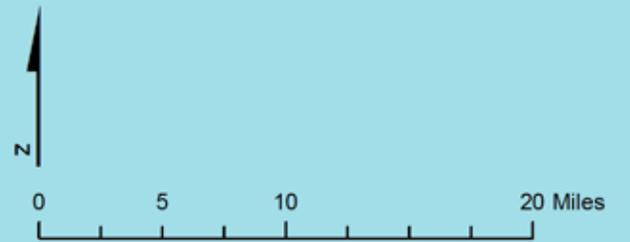
Stakeholder interviews and meetings were set up via phone and email from late August through early September of 2011 to be held the week of September 5th-11th. Later interviews and follow-up meetings were held the week of December 7th-13th. Many interviews with stakeholders led to additional contacts and further interviews. Additionally, the research team had many interactions with residents and visitors throughout their stay in the Gulf.



Map 1

Source: The Ohio State University

Note: Six stakeholders are outside of the shaded county boundaries.





During the interviews, stakeholders were asked to explain their interaction with water and how they were affected by recent events and other issues dealing with perceptions of the Mississippi Gulf Coasts' waters. Besides considering what problems they faced, stakeholders also were asked to identify their needs, goals, desires, future challenges, and opportunities throughout the Mississippi Gulf Coast region.

As part of this stakeholder analysis for the water assessment in the Plan for Opportunity, the commercial seafood industry is minimally discussed, however the food systems subcommittee has addressed seafood and can be found on the Plan for Opportunity website.

Findings

Results of this analysis are organized by the stakeholders' position in the cycle as natural resources, passive users, active users, consumers, utilities, education/advocacy, and regulatory. There are numerous stakeholders who are interconnected with each other as well as the water resources of the region. While there are overarching topics that broadly cover each stakeholder, there are

also categories to help classify stakeholders into appropriate groups for analysis. We acknowledge many stakeholders fall into one or more categories, for the organization of this report; we identified one category of which we felt represented the stakeholder. Subcategories include nature conservation, eco-tourism, service providers, retailers, recreational users, infrastructure, developers, farmers, residents, government, research institutions, advocacy groups, and educators.

Natural Resources

Nature Conservation

Parks - The interviews with the park staff members of coastal Mississippi revealed that open spaces and green areas are valued by the community. They provide city beautification areas and opportunities for residents and visitors to gather, interact, enjoy, and recreate in the natural environment. Like many communities in the region, the City of Ocean Springs continues to expand parks to provide more recreational opportunities for adults and children. The desire for incorporating water into park systems is very evident in this region because canoeing and kayaking were

indicated as being the most popular recreation activity in a public survey by the Southern Mississippi Planning and Development District. Stakeholders identified the need for more public swimming pools to provide recreational activities for youth. Ocean Springs Department of Parks and Recreation does not maintain too many sites with water access and considers the lack of public swimming pools the biggest need in regards to water recreation.

Other stakeholders spoke of the impact of Katrina and the BP Deep Horizon oil spill. There were mixed opinions on how impacted certain parks were by each of these events, although this could be explained by their varying proximity to the beach and/or the general location of the stakeholder. Some parks are just beginning to reopen for the first time after Katrina while others are as prosperous as they have always been. Stakeholders within a RV park believe the water to be in acceptable quality for both recreational fishing and crabbing.

Forests/Wildlife Areas - The wildlife areas are responsible for ensuring wildlife habitat is sustainable and well maintained; these areas are also used for educational purposes. Most areas were established to protect habitats that support wildlife populations facing threatened and/or endangered status. The greatest concerns to wildlife areas are generated from private landowners adversely impacting the land on or near the protected areas. Private development causes habitat alterations, increased sedimentation and pollution, and uncontrolled fires. Additionally, outdated development pollutes the water by failing septic systems leaching into the ground.

Public education and outreach efforts, including extension work, focus discussions on proper land management practices and the value of conservation and restoration. Education of the public includes all ages, with an increased attention to youth education. Stakeholders believe educating youth will create the greatest positive change; they believe young people are more accepting of change and will eventually become the decision makers of the future.

Wildlife areas are also valuable because they improve water



Source: Gulf Coast Research Lab

Bird watching is a common activity in the waters of the Mississippi Gulf Coast.



Source: Miaoyun Zhou

The Pascagoula River is home to a diverse mix of plant and wildlife species. Large trees blown down by Hurricane Katrina can still be observed along the banks of the Pascagoula River.

quality by acting as natural filtering systems for creeks and bayous. Restoration projects aim to improve the condition of the environment. These projects include stream bank stabilization, improvement of buffer and sediment control through planting of native grasses and trees, and volunteer clean-up within riparian areas. Prescribed fires are also utilized to help control invasive species, reduce the amount of forest litter, and encourage new plant growth.

Mitigation Banks - The purpose of establishing mitigation banks is to compensate for negative impacts of development on aquatic resources, such as wetlands (wetland mitigation banks) and streams (stream mitigation banks). According to The Nature Conservancy, one of the main goals of the banks is to create large, contiguous areas of wetlands. The transfer of liability to a third entity has many advantages, such as minimizing uncertainty over whether the mitigation will be successful, assembling financial resources, and the efficient use of limited expertise in project monitoring and maintenance. An example of the need would be the Mississippi Department of Transportation (MDOT); they buy the greatest number of credits in wetlands mitigation banks in the state. MDOT will occasionally fund a new mitigation project, but do not have the resources or expertise on their own to create and maintain the bank property. As new development occurred following Hurricane Katrina, mitigation banks were utilized to compensate for the loss of wetlands due to new development. Currently, construction of municipal buildings in some communities requires mitigation credits. Another important aspect of mitigation banks is the protection of water resources or blueway corridors. Mitigation banks can provide public access for water recreation, such as the Old Fort Bayou mitigation bank where kayakers and boaters can experience the land and water being conserved in a blueway corridor.

While there have been thousands of acres that have been mitigated, there is concern that land is being lost faster than it can be restored elsewhere. Mitigation banks use a grading system to give different scores to the different ways a bank property is created (restoration, enhancement, and preservation) with restoration having the highest score and preservation lowest. The concern raised by mitigation banks, in terms of the grading



Tourists Interview

Tourism accounts for a significant portion of the Mississippi Gulf Coast economy, and supporting it requires understanding the desires of tourists. Tourists who visit the Mississippi Gulf Coast generally come from surrounding Gulf states, though some come from as far as Kansas and Wyoming, and most have visited the Mississippi Coast before. Still, Mississippi's tourism industry is built on the two prongs of casino gambling and water-related activities, which subsequently yield diverse opinions about issues confronting Mississippi's waters.

Approximately 25 percent of the tourist respondents stated casinos and gambling as their primary interest in the region, slightly more (30 percent) indicated they were attracted to that area because of the water and natural beauty. Overall, feelings about the water were equally mixed. Some respondents felt the water was in good condition, despite the recent storm and past disasters. Others felt the water and beaches were inferior to those located in Florida, Alabama, and other locations. The remaining 45 percent of respondents stated their reason for visiting the Mississippi Gulf Coast was not due to the water, and they had no opinion on the matter.

Tourists identified a number of ways to improve their experience on the water. Ideas regarding access to Mississippi waterways included building more boat launches on the Biloxi River, chartering midnight cruises, and adding more boat slips to marinas. People were also concerned about the physical appearance of the beaches, suggesting that the frequency of beach cleaning and raking be increased and that efforts be taken to make the water bluer. Tourists felt that emergency telephone booths should be added to the beaches, beach management should remain at the county level, and vacant lots either need to be developed by businesses or turned into community gardens. 12 percent of respondents felt no improvements were necessary.

Ultimately, those tourists whose primary coastal activity is gambling do not have as strong opinions about the Mississippi Gulf Coast as those who purposefully visit the area to enjoy the Gulf waters. These results suggest that there is already a significant portion of tourists who would like to see improvements made to the Mississippi Gulf Coast in order to improve the tourist experience. Additional efforts can then be made to further engage casino goers to participate in water-related activities.



Source: Miaoyun Zhou

McCoy's River and Swamp tours provided by the Pascagoula River Audubon Center allow visitors to view and learn about birds in their habitat.

system, is that they think preservation should have the highest score while the U.S. Army Corps of Engineers does not. The reason for this approach by mitigation banks is the qualitative difference between naturally occurring and artificial wetlands. It is extremely difficult for people to duplicate a naturally occurring wetland and get all of the same benefits. In this whole process, the Army Corps, one of the members on the Interagency Review Team, is the regulatory agency. The mitigation bank does not have much power of enforcement. When development takes place, the developers need to get a permit from the Army Corps. If the unavoidable impact is approved and the mitigation bank approach is to be used, then the number of credits that needs to

be purchased will be determined.

The mitigation banks would like to see greater regulation of the sites chosen, with involvement from the local counties to help protect local interests. They raised the concern that mitigation is not happening where it is needed most and that ambiguity in the regulation allows this to continue. The mitigation banks also need regulations for dry upland areas that may not be easily evidenced as needing wetland protection and habitat protection for threatened or endangered species. Preserving endangered species and critical habitats is not the initial or major goal of mitigation banks, but they do pay attention to it if the issue is

Recreational Fishing Interviews

From the pre-dawn hours to long after night falls, people are fishing in Mississippi's saltwater, brackish water, and freshwater bodies. The majority of recreational fishers, who were interviewed, indicated fishing several times each week, some also indicated fishing nearly every day. 34 percent of the respondents caught trout, followed by redfish (25 percent), flounder (11 percent) and mullets (9 percent). Many casually admitted they would take whatever came along (19 percent). With few exceptions, those who were out fishing enjoyed it primarily as a recreational activity, and nearly all (91 percent) ate what they caught.

The fishers' experiences on the water presented divided concerns regarding necessary improvements and threats to their way of life. When asked if they had noticed a change in the water's condition, recreational fishers had mixed reactions: 20 percent stated the condition of the water had improved since either Hurricane Katrina or the BP Oil Spill, 15 percent indicated water quality had deteriorated in relation to those disasters, and 15 percent stated no change in water conditions. More respondents (23 percent) thought that pollution was a greater threat to this recreational activity than oil spills (14 percent) or overfishing (11 percent).

Source: *Brittany Kubinski*



present. Since this would be a separate goal, the fund for doing this will not come from the maintenance fund, but rather come from grants provided by U.S. Fish and Wildlife Service, for instance. The mitigation banks would also like to see more education about their purpose and importance in region.

Passive Use

Eco-tourism

Bayou/River Tours and Kayak Rentals - New infrastructure, tourist centers, marinas, fishing piers, and land-built casinos erected after Hurricane Katrina have all helped the tourism industry grow in the last five years by offering more diversity in activities for tourists. For example, bayou and river tours have been expanding on the coast. It consists of businesses that take locals and tourists on sightseeing excursions in natural environments. Currently, the greatest concerns of these businesses are regional marketing and advertising to attract more customers. Businesses identified the need for more signage to direct people to water access points and along the tours themselves. They also raised concerns about the limited number of public access points and water quality. Eco-tourism businesses are in support of land

banks near the water and blueways because they provide more access. Besides kayaking and boating, birding is a popular activity and part of eco-tourism. The greatest threat to birding is habitat loss. Habitat loss from development as well as Hurricane Katrina threatens the continued success of birding. Visitors expressed difficulty in finding birding locations, suggesting additional signage or improved signage may eliminate confusing and appropriately direct visitors to designated areas.

Many of the eco-tourism-related businesses support each other although they might be in direct competition; they see it as investing in the industry and creating long-term interest among eco-tourists. Several eco-tourism businesses expressed the desire to have a separate eco-tourism council to help them better express their needs and achieve common goals. Business owners have also mentioned that economic impact of their businesses is hard to account for, as usually calculations are done through nights spent by a tourist in a hotel, known as "heads and beds" formula. This approach does not always work for eco-tourists because they might stay at a campsite but they still spend money on local food, souvenirs, rental equipment, etc. Eco-tourism owners would like to develop connections with casinos and draw in casino patrons. If they could use the casinos to set up



Source: Jacob Mercer

Beach Goers and Bridge Walkers

Mississippi's beaches and bridges offer residents and tourists spectacular vistas of the Gulf Coast, and it also gives them unique perspectives on the health of the coast, its businesses, and its ecosystems. Of 64 surveyed individuals, half said that walking along the beach or bridge was a regular activity: 21% said it was a daily activity, and another 29% replied that it was at least a weekly activity.

Because so many respondents regularly take advantage of the beaches and bridges, their perception of the Coast's waterways is an integral component of the public opinion regarding water resources. The view of the water was important to nearly 40% of respondents, while only 28% said that it did not matter to them and their activities. Despite that double-digit difference in opinion, respondents did not believe one way or the other that the water's conditions had deteriorated. Nearly as many respondents believed that there had been no deterioration (33%) as those who believed that there was some degradation (31%) or had no response at all (36%).

Because watersheds exist independently of municipal boundaries and county lines, it is important to understand how the size of watersheds is perceived by people. When asked about the size of the area that should be included in efforts to improve Mississippi's Gulf Coast waters, one out of five (20%) respondents said that the three counties directly along the coast constituted the pertinent region. A smaller segment of respondents (16%) replied that only the beaches and lands immediately north of Interstate 90 should be included in such action areas, whereas barely 10% of respondents said that these areas should include land north of the three coastal counties. Despite these responses, however, a plurality of all beach goers and bridge walkers (40%) chose not to answer these

questions, which suggests that education on the issue could help significantly move public opinion.

When asked to consider the variety of threats to coastal rivers, bayous, and waters, respondents overwhelmingly identified trash and littering and their single largest concerns (30%). Urban water run-off (11%) and agricultural fertilizers (11%) were also identified as large threats. Other concerns that registered few responses were illegal industrial discharge, soil erosion, hurricanes, oil spills, rising sea level, global warming, and development too close to the shoreline.

Given the large portion of respondents who negatively view trash and littering, it makes sense that 38% of respondents also believe that they can take personal efforts to improve coastal waters, even though 20% of respondents did not think their individual actions were constructive and 42% of respondents didn't have an opinion one way or the other. In line with these responses, respondents mostly agreed (11%) that their best personal effort would be collecting debris and refuse on the beaches, and that the best regional effort would focus on keeping beaches free of trash (9%).

Results from these surveys show that the opinions of those who use beaches and bridges for recreation or fitness activity are significantly influenced by the perception of debris and garbage in the area. While trash is a largely recognized concern, there is both disagreement and a lack of opinion on other issues such as water quality and the appropriate area for action.

the casinos' visitors on eco-tour excursions, it could be a win-win situation for both the casinos and eco-tourism industry. Casinos would get customers staying longer in their hotels and the eco-tourism businesses would have more customers directed to them for business. Eco-tourism businesses also noted that being able to rent watersport equipment on Ship Island, which is currently not permitted, would be helpful for the growth of their industry on the Gulf Coast.

Service Providers

Yacht Clubs - Yacht clubs are an important part of the history of the region. The yacht clubs located along Mississippi's coast are some of the oldest in the country; in fact, the Pass Christian Yacht Club is the second oldest in the United States. All of the clubs along the coast were impacted by Hurricane Katrina in some way. They have rebuilt and are focused on expanding membership back to pre-Katrina levels. The clubs benefit from long-term members that are a mix of local residents, snow birds, and residents from Louisiana. The yacht clubs are greatly concerned about attracting the population back to the coast. In addition, they note there is a need for more harbors with slips for larger boats.

Retailers

Beach Rentals - The Harrison County Sand Beach Authority permits beach rentals between March and November. Beach rental companies have been impacted by Hurricane Katrina, the economy and the BP oil spill. They have experienced a reduction in business, and the clean-up following the oil spill limited the locations users could recreate. Due to a contractual agreement, the beach rental businesses were required to remain open during the oil spill and consequently lost a great deal of money. Along with the disasters, concerns over culverts on the beaches and the lack of lifeguards were mentioned as some possible deterrents for beach goers. Until tourists return to the area, beach rentals will be a struggling business. Beach vendors believe the region needs to focus more on marketing the region's beaches and other recreational opportunities to help improve the image of the coast and to attract more tourists.

Dive and Bow Shops - Dive shops offer scuba diving lessons, certifications, and equipment rentals. Rig diving is a growing recreational opportunity in Mississippi. Most of their diving students are local, and many come from the Air Force base. There was a substantial decline in business after the oil spill, but business is currently picking up. They believe the media negatively influenced the perception of Mississippi water, and the quality of the water is acceptable in their opinion. The Mississippi River flooding in the spring and summer also affected diving as it pushed fish even further from the shore. Typically, divers must travel at least 30 miles away from the coast for optimal conditions, which makes it less ideal than places such as Florida, where one must only travel half a mile. The high cost of gas deters many divers from diving. The Mississippi Department of Marine Resources along with the Mississippi Gulf Fishing Alliance have a program called 'Rigs to Reefs' which utilizes old oil rig equipment to encourage the growth of reefs. The dive shops indicated that more reefs still need to be created in order to provide acceptable habitat for fish, which will in turn increase fishing, scuba diving, and business.

The Bow Shop is primarily a bow hunting shop with their most popular equipment being bows and arrows. They have been in business for approximately ten years, their busy season occurs between August and February. Only one percent of their customers do any bow fishing so the opportunity in this area of their business is limited. Most customers buy their bows to hunt mammals on the land such as deer and small game like rabbits or squirrels. Customers are a mix of locals and tourists. While the hurricane impacted business, the current recession has left customers with limited funds available for recreation. They believe the greatest problem concerning the local economy is the investment of money and resources into big business rather than supporting small businesses. This has made it difficult for businesses to stay competitive and provide affordable prices.

Active Use

Service Providers

Charter Boat Captains - Charter boat captains offer residents and tourists' boat rides in the Sound and Gulf for several hours



Source: Jennifer Evans-Cowley

Local fishers rely on retailers for their fishing supplies.



Source: Brittany Kubinski

Flounder gigging is a popular evening activity along the Mississippi Sound.

at a time. They often provide customers the ability to relax and reach points offshore they would not be able to access without their own boats. Fishing is a common part of the charter boat service as they provide a license, fishing poles, bait, and cleaning of the catch. Charter excursions can be expensive, costing up to \$1,000 per day. High prices are a result of increased cost of oil and fuel.

Hurricane Katrina and the BP oil spill have negatively impacted business, even causing some charter boat captains to go out of business. Many customers stopped renting charter boats due to the media's coverage/perception of the water resulting from the oil spill. Charter captains have witnessed signs of sick fish, which they think could be caused by the oil spill. High insurance rates have also prevented reconstruction near the coast so not as many people have moved back to their homes after Katrina. The loss of population due to this reason has hurt the charter boat industry.

The charter boat captains identified opportunities for expansion of business. They believe more regional marketing is needed in order to promote more tourism. In addition, one charter captain identified a niche market in the charter boat industry with focus on providing more access and boating opportunities to persons with disabilities or persons of any age with limited mobility. Currently, it is not easy for persons with disabilities or mobility limitations to get down to the water or to reach the barrier islands. Currently, there is one operation that ferries people back and forth to Ship Island; there is the possibility that an additional charter boat could be designed to board people in wheelchairs and adapt to other universal access features.

Bait Processors - The Killer Bee Bait Company is a shrimp processor who buys their shrimp at a variety of docks. They then process the shrimp for seafood consumption or frozen bait. They sell bait to almost every chain and business in the southeastern U.S. including Wal-Mart, marinas, Bass Pro Shop, Cabelas, 7/11, Publix, and Sam's Club. This business was heavily impacted by Hurricane Katrina and the oil spill. They are concerned about oil on the bottom of the Sound and Gulf being stirred up by storms and harming the quality of shrimp. Competition in the region in seafood processing is high with many seafood processors located



Source: *Brittany Kubinski*

in the area.

Bait Shops - Hurricane Katrina and the oil spill caused many bait shops to temporarily go out of business while they rebuilt. The hurricane caused more of a long term impact as it destroyed many shops completely, which needed to be rebuilt. The oil spill shut down business for a couple of months because people were not allowed to go in the water to catch bait fish. They also raised concerns about the proposed salt dome project, which they feared would impact shrimp from a potentially increased salinity level. Bait shop owners complained about strict regulations stipulating that live bait can be sold only from permanent locations, preventing bait shops from being mobile and delivering live bait directly to the consumer. Bait shop owners feel permanent structures constrain them from being able to sell live bait, limiting their customer outreach, and missing out on opportunities with potential customers. The regulation is in place to prevent one bait seller from selling out of a truck directly in front of another owner's permanent structured bait shop. If live shrimp bait is sold immediately after they catch the shrimp, the bait shops would not have to store the shrimp, and the consumer would get the

product they most desire immediately. They see an opportunity to expand business by being able to deliver bait directly to customers on docked boats and at the piers.

Water Dependent Ancillary Businesses - There are a wide variety of ancillary businesses that are dependent on the needs of the users of rivers, bayous, the Sound, and the Gulf in order to operate. Examples of water dependent ancillary businesses interviewed include: boat repair, maintenance, equipment upgrades, tugging, towing and storage, dredging, salvaging, disaster clean-up, and shipbuilding. The business owners explained their clientele is diverse, varying from local recreational boaters to government agencies such as the Mississippi Department of Environmental Quality, Mississippi Department of Marine Resources, and the park services. They each have unique circumstances to their own business and this primarily relates to how they were impacted by the disasters that have occurred in the region over the last decade. For example, some businesses were able to take advantage of the disaster and become involved in clean-up processes.

In addition to Hurricane Katrina and the BP oil spill, there were

general concerns about how polluted the water might be from wastewater treatment plants. Others have felt since the oil spill the quality of water has improved to a higher quality than before the oil spill. Since water is important to these businesses, they would like to see an increase in marinas, dry dock storage, larger man-made reefs to increase seafood populations, and reducing the financial burden from insurance put on businesses along the coast. The water dependent companies felt these factors would improve their business and the economy of the coast. For example, some companies would like to see the barrier islands upgraded by expanding the islands and adding trees to protect the coast from future hurricanes.

Developers - Some developers carefully consider water resources as part of their developments, such as Florence Gardens. They have elevated bike paths and sidewalks to prevent wetlands from being disturbed, and they have incorporated forests and green open spaces to provide natural habitats and protect stream corridors. Integration of low impact development techniques such as minimizing curbs and gutters to reduce storm water runoff and encouraging onsite retention of storm water minimizes the impact on the region's bayous and streams. Others efforts are focused on water reuse, from rainwater collected in rain barrels for reuse, to the collection of grey water for recycling. Several developers are using rain sensors on sprinkler systems that reduce water consumption, the sensors detect when it is raining and restrict the use of the sprinklers.

Transportation - Companies manufacturing concrete bridges and other transportation related structures are dependent on the water for the concrete mix. They may also use waterfronts and waterways for access to water transport of the structures. They use considerable amounts of water for the concrete mixes and to mist the aggregates with sprinkler system which maintain moisture levels for satisfying specification requirements. Concrete businesses also use water for steam curing the concrete. Due to the nature of their business, which has engineering specifications for concrete mixes, there is not a significant opportunity to reduce water consumption; however due to the price of water there is an incentive to not waste water. A local manufacturer of concrete bridges and other structures, indicated that the

company is dependent on access to water based transportation to move concrete structural pieces by barges/tugboats to the construction destination. Not having this capability would be very detrimental to the business, not only because of cost but due of the logistics and ease of using barges. The Army Corps dredged the channel they use after Katrina and do not foresee the need to carry out additional dredging or other port improvements in the near future. Overall the major concern regards the ability of maintaining affordable water prices and ensuring channels are regularly dredged.

Ports/industry - The location of ports and the proximity of the industries located near them is an important part of the water dependent economy in Mississippi. There are three principal ports along the Gulf Coast: the Port of Pascagoula, the Port of Gulfport, and the Port of Bienville. The first two are coastal ports while the Port of Bienville is an inland port on the Pearl River. All of the ports have their own drinking water and wastewater treatment facilities. Pascagoula spent \$25 million to increase their water supply and Gulfport is building new stormwater treatment plants as part of its expansion project.

Dredging is a significant concern of all the ports and the waterways. They would like to see channels dredged deeper to accommodate larger vessels and more shipping traffic. In Gulfport, the channel is currently at 33 feet and is authorized to go to 36 feet; they would like to see it dredged to 45 feet to accommodate larger vessels. At the Port of Bienville, the mouth of the Pearl River is only 6 feet, but they believe it needs dredged to 14 feet. A major problem with getting shipping lanes dug deeper is that the Army Corp of Engineers has to approve of the dredging and typically funds the projects. Money for dredging is scarce and the federal harbor trust fund has been diverted to other national projects or priorities.

The Port of Gulfport is in the middle of an expansion, including elevating the port to 25 feet above sea level. The Port of Pascagoula and Bienville, on the other hand, have not done any forecasts or been able to analyze themselves for sea level rise due to the expense of undertaking a study and the high costs associated with implementation of mitigation measures. The Port

of Pascagoula does not believe the collected fees will be sufficient in supporting the costs of upgrading their facilities. Gulfport is also considering expanding railroad and truck access to the port in order to better service global customers.

The Port of Gulfport emphasized the importance of elevating regional recognition as a major tourism destination. Once they are more widely recognized as a tourist destination, it may be possible to attract cruise ships to the Port of Gulfport.

Harbors - Harbor masters have seen their facilities rebuilt following Hurricane Katrina. This included elevated structures, such as restrooms and fueling stations. This has made fueling somewhat less accessible. The key issue identified by harbor masters is the increased number of large boats. Currently, the slips do not have the capacity to properly handle large sized boats and consequently potential customers are turned away. Harbor masters view this as an economic problem and loss of revenue as boats are forced to use slips in neighboring Gulf states. They believe more slips need to be built to support recreational and commercial fishers, but recognize the high cost of construction per slip. They also identified conflicts between yacht clubs and recreational and commercial boaters regarding access to water. Pass Christian has tried to address this by offering more options for different types of boaters. Both Pass Christian and Gulfport are expanding their harbors to add additional boat slips to address demand.

Energy - While oil and natural gas have for a long time been a part of the history and economy of the region, a new potential energy source is methane hydrates. It is naturally occurring in the shallow shelf environments of the Gulf. The Mississippi Minerals Institute believes this may be commercialized within the next 10-15 years. The Mississippi coast may expect to see additional pipelines built in the Gulf transporting methane hydrate to Chevron in Pascagoula for refining. The Minerals Institute raised the issue of permitting natural gas drilling in state waters. They believe this represents a significant economic opportunity and would minimally impact the aesthetics of the water. They pointed to the Alabama coast as an example of how the Mississippi coast could benefit. This could be more beneficial than investment in wind energy as wind



Source: Ming Sheng

Natural gas drilling is an important activity in the Gulf of Mexico.

turbines could pose a negative aesthetic perspective for tourism generation.

Consumption

Service Providers

Laundry Services - The hotels and casinos along the gulf coast, from Mobile to New Orleans, present an opportunity for laundry companies to provide service to this sector of the local and regional economy. A laundry service company in Harrison County indicated it launders approximately 70,000 pounds per day of items from hotels and casinos in Mississippi as well as from Mobile and New Orleans. These businesses utilize a great deal of water and ensuring high efficiency in water use is essential for reducing operating costs. In addition, all used water (wastewater) must be treated and regularly tested. Reducing water use also reduces the amount of wastewater and associated costs. The laundry company indicated that high efficiency models of continuous feed washers



Lawn and Garden Care

A focus group was held with ten residents who were homeowners that often treat their lawns and gardens with fertilizers and herbicides that can runoff the property with storm water, impacting water quality. An online survey was distributed to homeowners associations throughout the Mississippi Gulf Coast. The survey inquired about the lawn maintenance practices of persons responsible for maintaining the yard at their place of residence. The responses included options for practices that can be categorized as more environmentally preferable.

Twenty-five percent of homeowners look for green products when they shop for their lawn. Over 50 percent of homeowners surveyed use a lawn fertilizer with weed killer from a national brand on their yards. Most of the homeowners responded to behavior, preferences and environmental awareness questions in a way that indicates they were or would be inclined to take actions regarding their lawn care that protects the environment but when talking to the providers we found that most homeowners do not make requests for organic fertilizers and weed killers. Homeowners may be inclined to purchase organic weed killers, compost or use rain barrels, and take actions to conserve water and protect the region's water resources if they were better informed on the effects of their actions and if purchasing environmentally friendly products was easier or more popular. For example,

homeowners responded that they assume that if a weed killer is sold at a home improvement store then it will not harm the environment.

A telephone survey of 15 lawn and garden care providers throughout the Mississippi Gulf Coast was conducted. Lawn and garden care providers are knowledgeable about the types of fertilizers and chemicals that are used on their customers lawns. They are also aware of the portion of their customer base that requests organic or natural lawn care products. The chemicals and fertilizers used on lawns are a common source of contaminants through storm water runoff. This survey served to provide a better understanding of the preferences of consumers and the range of sustainable services that lawn care providers offer. When surveying the lawn and garden care providers about the fertilizers and weed killers their customers request we found that while some companies have not received any requests for organic products, some are already using organic on 15 to 20 percent of their customer's yards. Both the homeowners and lawn and garden care companies mulch grass clippings into the ground to rejuvenate the soil. Most of the homeowners surveyed do not compost in their backyards or use rain barrels, though many of the lawn and garden care providers compost or would compost if a compost facility was nearby.

Source: Miaoyun Zhou

utilizing 0.8 to 0.9 gallons of water per pound of laundry (versus the current 1.5 gallons per pound) have been developed and promise to improved water savings. However, the most efficient smaller single batch models currently available use 2.5 gallons per pound. Laundry service companies need single batch washing machines to properly service specialized laundry items that cannot be cleaned in a continuous washer. Currently all hospitals in the gulf coast and throughout the state send their laundry to

out of state facilities as none of the laundry services companies in Mississippi are certified to manage healthcare laundry items. In order to service the healthcare sector it will likely require laundry companies to expand their operation. The healthcare sector presents an opportunity for expanding services in the gulf coast and creating additional jobs. Ultimately, companies must have access to process water at affordable rates in order to be successful.

Golf Courses - Golfing is a popular recreational sport for residents and tourists. Year-round and part-time residents comprise the majority of golf club members. As both year-round and part-time residents have been slow to return to the area, membership has declined. The decline in tourism has impacted the golf courses and they are hopeful tourism will increase in the near future. Golf courses require large amounts of water to maintain their greens and fairways. The Pass Christian Isles Golf Club reduced their water expenses by having its own water well. Well water is used to fill a pond, which also receives most of the storm water, further minimizing the need for extracting well water. Putting greens are irrigated with water from the pond almost daily. Fairways are watered less often and kept more natural to minimize maintenance and water use. The golf club additionally uses wetting agents to help putting greens retain moisture and increase water conservation. The use of pesticides and herbicides is kept as minimally as possible. The Gulf Club is interested in learning more about opportunities for environmentally safer options, such as compost, to reduce use of water, pesticides and herbicides. The Gulf Club considers the long-term success of the club is dependent on the ability to build housing in the city and increase the number of residents.

Ice Warehouse - The Pass Purchasing Co. is an ice manufacturer and ice warehouse that services commercial fishers. The ice is non-food grade and the fishers use it to keep their catch cold while on the water. A shrimping boat will typically buy 45 blocks of ice at a time. A block of ice weighs 320 pounds. The majority of business occurs during the summer months from May to August. This business is not only water intensive, as they require freshwater to make the ice, but also energy intensive with electricity expenses being higher than water. During the winter, the business turns off its ice making machines to save electricity. They consider that the success of their business is highly dependent on maintaining a healthy ecosystem which supports productive fisheries, which ultimately supports a healthy seafood industry.

Casinos –The Imperial Palace casino has an energy and environmental committee responsible for innovation and cost control. They are open to considering new ideas to reduce water consumption and storm water. For example, they considered using

solar energy to heat their pools but it was ultimately deemed too expensive. The casino is exploring alternative rooftop uses of parking garages which will minimize impervious surface and capture rainwater for productive purposes. They would like to see local governments be receptive to innovative ideas and partner with the casino on more creative projects.

Farmers - Farming takes place in the rural areas north of the cities along the coast. Farmers mainly raise free roaming livestock within pasture boundaries. They also sell wood/lumber harvested from forestland and grow alfalfa and grass to support livestock. Farmers are concerned there may one day be rules limiting the number of cattle that can pass through open water. This would prevent farmers from moving cattle to natural, open source fresh water such as a stream, which is preferred by cattle over tank-sourced water pumped from an aquifer. They would prefer regulations that would allow more than 20 animals in open water at one time. One farmer recommends the Port of Pascagoula expand its exports of lumber to allow for the transportation of logs downstream (on the Pascagoula River) to the Port, rather than only being shipped out of New Orleans. The farmers believe the technology used to control the amounts of fertilizer and irrigation used on a field are good, but are not evolving quickly enough. Technology implementation is not keeping up with the increased demands for conservation practices and increased regulations leveled against agriculture. Farmers raised concern about the adequacy of the water supply if there is another drought and where farmers could get water from if this were to happen. They are receptive to conservation practices and grass swales and setbacks.

Resident Surveys

A survey of 230 residents was conducted by the Gulf Regional Planning Commission in September 2011, to gather feedback about their concerns, goals, needs, and desires related to the Mississippi Gulf Coast's water resources. Participants were first asked about the water related issues in their neighborhood. When asked about the quality of water and sewer infrastructure, 33.6 percent indicated it is of good quality, while 44.1 percent felt it is of average quality. The quality of the water in rivers, bayous,



Source: *Tatiana Parfenova*

Waterfront Property Owners Share Their Opinions

In September, a survey was mailed out to property owners immediately adjacent to a water body in the three coastal counties. Fifty property owners responded with the majority of owning property near a bay, bayou or the Mississippi Sound. Most of them have lived on the coast 20 or more years and have owned their property for 15 or more years. The majority of the respondents indicated that the properties were either, their year round residences, weekend/vacation homes or undeveloped. They chose these properties because they enjoy being near the water, the view of the water and water related activities. Most use the water for activities including boating, fishing, crabbing, swimming and bird watching.

The survey asked the respondents to indicate how their experience with the water could be improved. Property owners want their waters to be cleaner, less polluted and for noise to be better regulated. Respondents were mixed in their opinion about whether water quality is improving, staying the same, or declining. When respondents thought it was declining, they think this is due to an increase in debris, sewage, trash and pollution in the water. One respondent indicated that 40 years ago she used to go swimming with her children in the water near her property, but now she would never take her grandchildren swimming there. Yet, others believe their water is fine for swimming.

Almost all of the property owners reported that their property has flooded in the past and they believe it could flood again. Some property owners have installed bulkheads and elevated structures on the property to minimize their flood risk. Property owners believe that if sea level rise occurs they would lose the use of their property.

In a separate question, the survey also asked property owners what they felt the biggest threats were to the water and how to address them. Most indicated that erosion, loss of natural habitat and pollution were the biggest threats. In order to address these threats respondents suggested better education, monitoring and enforcement of regulations. They believe that the region should better enforce pollution laws and regulations, limit storm water drainage into the waters, control sewage leaks, and regulating large industrial operations.

bays and other locations was considered to be of good quality by 40.8 percent of participants, while 42.3 percent thought the water quality was average. When asked about the quality of their drinking water, 44.2 percent believed they have good water quality, while 36.8 percent believe their water quality is average. When asked about these same issues at the regional level, participants believe the quality of water in the rivers and bayous is better than in their neighborhood, while they believe the region's water and sewer infrastructure and drinking water are lower quality than in their neighborhood.

The participants in the survey were extremely familiar with the term sustainability, indicating it should address both the natural environment and the economy within the context of planning. The majority of respondents feel planning is an important tool for improving the communities, and those involved should work together towards common goals.

Utilities

Infrastructure

Drinking/Fresh Water - Regulatory changes by USEPA in the 1980s that established stricter water quality standards, led to the creation of a county-wide utility authority in Harrison County and in each of the other five coastal counties. This has led to greater information sharing and coordination of projects in each county.

As drinking water wholesalers, the utility authorities resell water to the local municipalities and the unincorporated part of the counties. Hurricane Katrina resulted in a loss of customers for the water systems. Due to development moving north of Interstate Highway 10, there was demand for expansion of infrastructure. Federal funding has allowed for expansion of service and preparation for new customers that will come in the future. Because of this expansion, there are many places where customers are low in numbers and pipes have to be flushed regularly to remove stagnant water.

The utility authorities raised the issue of the wide disparity in usage between the summer and winter months due to lawn care

and swimming pools. They identified very limited conservation occurring to minimize water consumption. They report the general attitude of the public is that there is more than enough water, and there is no need to be concerned about conservation. They do work with customers encouraging them to check for leaking sinks, toilets, and faucets when customers are concerned about higher than normal bills. Although the county utility authorities are still negotiating prices, they will sell it at lower rates than what the cities currently pay. The utility authorities will charge a flat rate to the cities, but cities will decide on what rate to charge customers. Here is an opportunity to use variable rates to try and control water consumption so that the aquifer will continue to be as plentiful tomorrow as it is today. In areas with high growth, such as the Orange Grove area the demand for water has outpaced the supply capacity.

Wastewater/Stormwater - Harrison County is in the process of moving households from septic to a county wastewater system. This will reduce septic leaching and groundwater contamination. Most of the sewage is collected and treated at their wastewater treatment plants and then the treated and cleaned wastewater is discharged into the Gulf. The Hancock County Utility Authority is actively working on a similar project, tying households into the distribution system in order to improve water quality in the Pearl River. The county utility authorities do regular testing on wastewater to check for possible pollutants. The opportunity to have cleaner open water can be created by further encouragement, access, and funding to put more people on public sewers rather than old, leaching septic systems. Additionally, sewage seepage should not affect the environment due to limits on how pollution levels are monitored. There are no combined sewer overflows and any contaminants that leak from the system are taken care of by dilution.

During storms, the amount of stormwater flowing into the wastewater plants triples or quadruples in Harrison County. In certain locations along the Sound, this has been problematic because stormwater can be linked to beach closures in the areas around the culverts disposing of the stormwater. Wastewater does occasionally enter into rivers and streams, too, as a result of leaking septic tanks. Stormwater managers would also like to see



Source: *Tatiana Parfenova*

Culverts release stormwater into the Sound.

more wetland mitigation taking place to help filter stormwater before it reaches rivers, bays and other open water locations. Management of stormwater could be improved, along with a better electronic inventory of culverts, road right-of-way drainage, stormwater connectors and outfalls, etc. More funding and data collection can help isolate the most critical areas in need for infrastructure improvements. The utility authorities identified that implementation of mitigation measures could reduce stormwater impacts. More water would be filtered naturally and not go through a stormwater management system and potentially reduce the pollution impacts.

Regulatory

Service Providers

Insurance Companies - The president of an insurance company in Coastal Mississippi spoke about the lingering problems in the insurance industry since Katrina and the beginning of the economic recession in 2008. Even though there have been high

insurance rates in Mississippi following Katrina, his company has not made any income because of the stock market decline. One of the biggest problems with insurance and Katrina was that companies paid huge amounts of money for catastrophic loss. A solution this insurance company president would like to see is better coordination between the Federal flood insurance program and private insurance companies' wind policies. An individual homeowner could only collect what the house is worth. Coordination could lead to reduced costs of insurance, reduce litigation and speed the processing of claims. This will also create more competition and increase capacity on the Mississippi Coast and enhance the ability to settle claims and bring more companies back to the Coast. Another solution is to combine flood and wind on one policy, but he feels it is unlikely to ever happen.

Customs Broker – A marine freight business raised four key issues that they see related to their business of customs brokering; they were: port expansion, Hurricane Katrina, a Federal Free Trade Agreement, and more transportation infrastructure. Hurricane Katrina severely dampened business because it destroyed all of the infrastructure and closed the port. With the lost business, they hope the solution will be the continual expansion of the Port of Gulfport. It would provide better paying port jobs, trucking jobs, and potentially ancillary industries such as warehousing, distribution centers as well as limiting costs associated with trucking it overland to another distribution center. Another problem is that there are not enough exports going out of the Port of Gulfport to Central America because of the duties put on marine trade. By removing the duties, it would increase the pay to companies in Mississippi.

Government

Planning/Consulting - Natural Capital Development, Inc., is an environmental consulting and project management firm in Ocean Springs specializing in natural and water resources management and cultural ecology. Recently, they worked with the Mississippi Department of Marine Resources (MDR) on the potential for using Special Area Management Plan (SAMP) for an inland project between the cities of Ocean Springs and Gautier. SAMPs are intended as a planning tool for conservation and sustainable



Source: *Tatiana Parfenova*

People write down the FEMA message on the wall.

development of coastal areas (ports, industrial areas, urban waterfronts, and shorefront access areas), and its proposed use for an inland location is an innovative application supported by the land owners of Ocean Springs and Gautier.

SAMPs can provide a streamlined process for planning, permitting, economic development, conservation, and overall land stewardship. By doing the necessary preliminary studies and coordinating regulatory agencies and jurisdictions, the time to issue permits could be reduced from 180 days to 30 days, for example. Conducting the environmental studies necessary and preparing the plan can cost up to \$1 million. Currently, the process of developing the SAMP is stalled, possibly due to the lack of the necessary funding or need to determine how to administratively process the funding for this new idea. All stakeholders involved in the development of this inland SAMP are supportive of moving forward. Determining potential sources of funding and partnerships for this and other SAMPs could result in positive economic development and environmental stewardship. Natural Capital Development believes that updating the Coastal Zone Management Plan and including flooding in its checklist of items to consider for wetland evaluation will assist in more effective

planning efforts in the future.

Local - The local levels of government (city and county) raised many concerns about problems they see along the entire coast. For example, they noted that consumers are not interested in water conservation. During the recent drought there was little effort to conserve water. They believe that the flat water utility rates in some communities do not encourage conservation. They also raised concern over beach renourishment and highway sand removal. They recognize a need for harbor expansions allowing both commercial and recreational boats to operate.

Local officials desired to have common flood prevention strategies and consistence in requirements such as allowing fill or not. There is confusion among builders and the public who don't understand why there are differences between communities. They believe in part that the public needs more education on issues such as flood mitigation and stormwater and on the requirements in communities.

Stormwater is one of the biggest concerns that local governments face, but affordability of infrastructure is an issue. There are many ideas about how to reduce runoff, but mixed feelings on whether it would work or not. A case in point would be implementing pervious pavement. D'Iberville and Moss Point feel like this is a positive solution, but Ocean Springs has concerns based on its experience with expense and overuse. Public officials raised concerns about the use of asphalt due to leaching chemicals during hot weather, with the chemicals washing into the stormwater system during storms. They identified opportunities for adding stormwater grates and detention ponds to help manage the material and pollution from stormwater. They raised concern about the beach closures due to stormwater runoff. Closure of the beaches impacts local tourism.

Sand has to be removed by the Mississippi Department of Transportation's street sweepers and dump trucks. Suggestions have been to move the roads closest to the beach further inshore or to lower than amount of sand along the seawall. One solution is to allow local governments to assess stormwater fees as part of the development process, to mitigate the stormwater impacts

of growth. Local governments also raised a desire to increase development density to reduce the land area covered by buildings and minimizing stormwater runoff.

Another concern of local government is insurance. The high insurance along the coast, led to a shift in development patterns in the region. For example, large waterfront lots are being split into smaller lots. Local governments raised concerns about how this will change the coastline. They recommended that all-perils insurance be instituted in the state to aid in reducing insurance costs. They believe it would also stimulate new development. They also recognize that the public has a difficult time understanding the National Flood Insurance Program and how mitigation efforts can result in lower insurance prices. They recommend further community education.

State - The State government plays a central role in many water issues that are facing the Gulf Coast. Some of these issues include: flood and recharge area mapping, oyster reef planting, climate and sea level rise planning, coastal resiliency, nutrient monitoring, storm shelter, construction and maintenance of structures, public awareness, brownfields management, planning, and forestry. We spoke with several branches of government, such as the Mississippi Department of Environmental Quality, the Mississippi Department of Marine Resources, the Office of the Mississippi State Climatologist, the Mississippi Emergency Management Agency, the Mississippi Department of Mineral Resources, and the Mississippi Forestry Commission.

The Mississippi Department of Environmental Quality's (MDEQ) Coastal Basin Coordinator, and others within MDEQ, and the Mississippi Department of Marine Resources (MDMR) have been working with the Gulf of Mexico Alliance (GOMA), EPA, the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force), and the Gulf Coast Ecosystem Restoration Task Force. Mississippi leads the Nutrients (MDEQ) and Coastal Resiliency (MDMR) Priority Issue Teams within GOMA. MDEQ is also partnering with other Federal and State resource agencies, non-governmental organizations, and academic institutions. Through partnering and leveraging resources, Mississippi's partners are coordinating to improve water quality in the Gulf by



Source: Corrin Wendell
A US Coast Guard ship in Port of Pascagoula.

working together to reduce hypoxia and nutrient loading in the Gulf of Mexico and build better coastal resiliency. MDEQ and their partners are also targeting and restoring areas affected by the oil spill. On the coast, MDEQ faces problems with stormwater and urban runoff; they are engaging in non-point source education to combat this problem. Further non-point source education is needed to address this challenge. In addition, storm water management and septic tank failures are other issues that need to be addressed in order to improve water quality. For brownfield sites, adding impervious surfaces could reduce water contamination from these polluted sites. MDEQ is collaborating with partners on water quality and brownfields issues.

The Mississippi Emergency Management Agency (MEMA) is responsible for helping communities and counties update their local mitigation plans every five years and meet state and federal requirements. They have also spent a great deal of time on hardening structures by putting in better water and sewer systems, electrical generators, upgrading community center/fire stations, and making more safe rooms/shelters. The conflict with safe rooms is that MEMA and the Red Cross have different requirements for what a safe room or shelter should be. They needed to coordinate

ideas to help each other out.

MEMA also works with floodplain management for the state and uses Flood Insurance Rate Maps (FIRM) maps. Although this does not apply to the three coastal counties, many maps are outdated by 20 to 30 years due to a lack of funding. The three lower coastal counties all have FIRMs from 2009.

MEMA would like to see local government use forms other than traditional media to share news and information. Local government has utilized the outreach of the internet and other social media forms. MEMA would like communities to create an improved method of determining the benefit of tax revenue versus water damage and insurance costs. There is too much repetitive flood property damage. With continued practices such as those taking place by MEMA, the Mississippi Gulf Coast would be able to better prepare in the event of future hurricanes striking the northern Gulf coast.

The Mississippi Department of Marine Resources (MDMR) identified the planting of additional oyster reefs as critical to prevent overharvesting in the future. MDMR has created wetland

models to determine where development should and should not occur. They are working to protect wetlands because they value the natural processes which they provide, such as filter the water. MDMR also stated the Mississippi Gulf Coast benefits from the title of the National Heritage Area Designation. This designation also extends to the National Parks Services (NPS). The NPS can focus efforts on locations that are important to the Gulf Coast's natural resources, history, culture, and recreation. A National heritage area can be a driving force to bring new people to experience, enjoy, and spend money in Mississippi. MDMR would like to see businesses engage in more ecosystem stewardship. Another problem MDMR did not like was that the urgency of rebuilding after Katrina which led to missed opportunities for long term projects such as pedestrian-oriented planning; now current public transportation is limited. Pascagoula and Jackson County are buying land to create a "Historic Pathway." This is an opportunity to use riverfront property to gain open public access to waters for recreation and transportation.

Federal Government

US Coast Guard (USCG) - The USCG have considerable responsibility in protecting local coastal waterways. One of the items that the Coast Guard is concerned with is foreign ships dumping bilge in the water and not properly separating oil from water. They propose improved inspections of foreign ships in order to help protect the water quality of the Gulf of Mexico and the Mississippi Sound. They also raised concern over the lack of regulation for boat maintenance and safety for fishing boats. They believe further oversight would ensure the protection and health of fishers. The Coast Guard also raised concern about oil tankers taking shortcuts, rather than using the Intracoastal Waterway. This results in tankers running aground and requiring the USCG to move the fuel from the tanker to another ship and use machinery to remove the tankers. They believe heavier fines and more manpower for the Coast Guard would improve the situation. The Coast Guard has required more training for fishermen to help address this problem.

Stennis Space Center - The Stennis Space Center occupies 38 percent of the land in Hancock County, with a buffer zone extending



Source: *Tatiana Parfenova*

Wetland at Stennis Space Center buffer zone



Source: *Jennifer Evans-Cowley*

Trash washing ashore from people's activities, industry vessels and oil rigs has become a more prominent problem.

six miles around Stennis's perimeter. NASA is responsible for its own onsite wetland mitigation. Some of the wetlands are being converted back to Savannah Forest and will help create a greater physical barrier between the Stennis and the public. Stennis also utilizes low impact development construction techniques, such as the installation of pervious surfaces, in order to better manage stormwater runoff from its network of roads and parking lots. Officials at Stennis are not currently concerned about sea level rise but do anticipate they will experience impacts in the future, and are planning accordingly. Even though Stennis does not need levees, NASA officials believe Hancock County needs them in order to protect against flood water from Lake Pontchartrain in Louisiana. The Space Center is also concerned about potential flooding from the Pearl River. It is vital to the Space Center to continue having an abundant water supply for their rocket tests and to guard against overconsumption. Stennis uses a large amount of water drawn from both groundwater and their canal system; using approximately 66 million gallons of water to cool engines during rocket tests. Stennis is concerned about the long term availability of a reliable and clean water supply.

U.S. Army Corps of Engineers - The U.S. Army Corps of Engineers' (USACE) states their purpose is primarily in risk reduction. As part of their risk reduction project in Mississippi, the Army Corps is working on the Mississippi Coastal Improvement Program (MSCIP), which is a regional comprehensive infrastructure plan currently under review by Congress. The total cost to complete the comprehensive plan is estimated at \$1.3 billion. However, Congress, at this time, has only allocated \$400 million. This means they do not have funding for many of their proposed projects including Forest Heights Levee improvements and the High Hazard Area Risk Reduction Program (HARP) which involves the acquisition of approximately 2,000 tracts of land in high risk of being damaged by future storm surges.

Funding shortages and delays have created a public relations issue, as citizens have a perception that the USACE develops plans that they are unable to execute. To battle funding issues, they are working with the counties to generate new source of revenue for mitigation projects such as addressing bilge and upgrading the levee system for a 250-year flood event, and expansion of the Port

in Gulfport.

However, the MSCIP program is a groundbreaking endeavor in the USACE because the purpose and vision of the program differs from the Mobile District and the USACE as a whole because their focus isn't on exclusively building or servicing infrastructure to mitigate risk, but developing methods to reduce risk long term.

Education/Advocacy

Research Institutions

Universities, government agencies, and research laboratories undertake work that focuses on improving the sustainability of the Mississippi Gulf Coast. This is accomplished through a number of areas of focus. Funding to support sustainability research was universally identified as a key issue. For example, NOAA has had to scale back data collection from 240 to 140 days per year. The research institutions identified a need for the public to understand climate change. They raised concern that the public does not realize the importance of climate change because they perceive that it will not impact them in their lifetime. A 2012 survey on Gulf Coast Climate Change found that 60 percent of coastal Mississippians perceive that the climate is very or somewhat different than in the past. More than half of the respondents believe that air temperatures have increased. Forty percent of the respondents believe that the changes in climate have been somewhat or very negative, while 39 percent believe that the changes have had neither a negative nor positive effect.¹ Research institutions suggested tools such as conservation easements could be used to protect the public from sea level rise. They recommend investing in moving infrastructure now to protect lives and property to the greatest degree possible.

There was a call for state regulations to help increase oyster production. There was concern raised about over harvesting, habitat alteration, and fish population declines. There was some concern raised about perceptions of aquaculture in the state.

The issue of trash washing ashore from industrial vessels and oil rigs was raised as a concern. The Marine Education Center

School Children Plan for Water Resources

Every year, the fifth grade students in Ms. Linda Foster's classroom at Taconi Elementary School in Ocean Springs Mississippi spend several months building their own ideal community, complete with paper houses, roads, and bike lanes. To help prepare them for this project, we led the children in a discussion of the hydrological cycle called "the life of a raindrop". They were introduced to new concepts such as, aquifers, transpiration, and water runoff, explaining how water flows above and below ground.

While the students were considering the effects of the hydrological cycle, they were also introduced to the concept of zoning. They recognized the need to separate buildings and uses, and were quick to differentiate residential purposes from commercial and industrial. They discussed why people prefer to keep certain types of businesses and industry away from their homes, and they debated how close amenities like parks and hospitals should be located to other uses.

In order to tie together the concepts of watersheds and zoning, the students divided into three groups, and each group was given a map of the neighborhood around Taconi Elementary. The children were required to consider both the needs of the community and the environment when making planning decisions. They followed instructions

how to zone the map with different uses. Then they placed houses, apartment buildings, post offices, water parks, supermarkets, malls, and other buildings on their map in the appropriate zones. Finally, they had to decide where to place a landfill and an industrial fish processing plant. The students had to solve the dilemma of placing these uses around schools, homes, and beaches and bayous. Additionally, the children were required to communicate with each other and make decisions as a group, they were encouraged to listen to everyone's ideas and consider all options before making final decisions.

After the three groups presented their different plans and decisions, the students discussed why and how they wanted to protect their communities and natural resources from landfills, industrial plants, and other sources of pollution. They all recognized the need to protect their water resources by creating enough green space that could be used as parks and as natural buffers for the waterways. By the end of class, the students decided on areas where they would like to see greater green spaces along the waterways in Ocean Springs in order to protect the water resources in their community.

Source: *Bridget Troy*



is studying when peak trash levels occur. There is also concern about illegal dumping of trash, vehicles, and appliances into bayous and streams. Research institutions raised the issue of the need to educate the public about the impacts of pollution and fostering cultural change in attitudes about littering. This includes educating everyone from children to seniors. Research institutions believe that collaborating to develop educational information with consistent messaging will help implement ideas and concepts that should increase sustainability of the water resources in the region. This would include education on hazard resilience, healthy

ecosystems, safe seafood, and coastal development. The populace needs a better understanding of science and the impacts science has on their communities. A benefit of the BP oil spill was that for the first time, citizens could understand through the media how the currents in the Gulf of Mexico and their actions would impact other areas like in North Carolina.

While many of these research institutes work together and with many government agencies, they feel like their needs to be one singular voice speaking for all of the Gulf Coastal States. They



Source: Jennifer Evans-Cowley
Residents attending the Biloxi Seafood Festival were asked to share their thoughts on water quality on the Mississippi Gulf Coast.

encourage regional collaboration across the northern Gulf states to create consistency in actions to improve the conditions on the Gulf Coast.

Sea level rise was another issue raised by research institutions along the Mississippi Gulf Coast. Some of the problems raised were the people of the communities are not ready to talk about or deal with sea level rise because it is viewed as a “slow moving disaster.” It is not likely to happen in a day or a week so people do not consider it a problem yet. Even though too strict building codes has probably spurned economic development, higher quality building standards have started to solve the problems associated with protection from storm events. Another significant problem is that sea level rise is not addressed in many communities’ mitigation plans and there is very little planning for storm surge. The research institutions solution is to be proactive with studies on sea level rise by communities hiring GIS Specialists to analyze its impacts now. Ocean Springs is already doing this, but solutions will need to be put into future plans. Another possible solution to

address sea level rise in mitigation plans and increase awareness is to get FEMA to require sea level rise on flood insurance maps by working with the coastal counties of Mississippi. If it is on the maps, communities should more easily be able to identify where and how much damage may occur from sea level rise.

Advocacy Groups

Advocacy groups work to support, raise awareness, and sponsor various campaigns across the coastal region of Mississippi. These groups often focus on specific issues but share an overarching interest in the health of the environment of the Gulf Coast. Interests addressed by advocacy groups include: public outreach/education, habitat loss, development, conservation, environmental justice, and social vulnerability.

The Gulf Island Conservancy spoke specifically about wetland preservation, removal of bulkheads, limiting the expense and environmental impact of dredging, protection of seagrass beds, increases in regulation and fines, creation of more conservation areas, improvements to local water treatment plants, decrease in EPA permit allowances, decrease in overfishing, better management of storm water run-off and improved approval, placement, and rejection of development projects. Most importantly the Gulf Island Conservancy pointed out these issues have not changed over the past 20-30 years, problems remain today because they have not been adequately addressed and continue to create negative impacts. They advocate for addressing these issues.

Many advocacy groups believe infrastructure development activities have compromised the water quality of the coast. Human activity alters waterways and limits natural pathways allowing marshes, wetlands, and streams to directly connect to the Gulf. The lack of this feature creates environmental problems such as habitat loss, decrease of water quality, altered levels of sediment and salinity, plant disturbance, stream bank erosion, and increased coastal vulnerability. The organization, Coastal Rivers, has identified problems caused by land-based and marine-based debris. For example, Styrofoam contamination causing harm to wildlife, particularly when ingested.



In addition to advocating for water and environmental improvements, many groups are also advocating for improving physical health and mental wellbeing through nature, creating family eco-tourism opportunities, expanding and connecting trails (from city to urban and natural areas), and creating accessible blueways. Many groups advocated for improved signage, but they are concerned about the cost of funding for new signs and the need to change/over cover the signs as water conditions change during certain weather systems. Septic tanks were also a concern because they would prevent having a constantly accurate message about water quality.

The Audubon Society wants to use eco-tourism as means of supporting economic development. They are doing this through bird/habitat conservation, educational outreach, and policy. By incorporating nature back into society, they believe this will improve the economy and the water resources of the region.

The Mississippi Center for Justice discussed the challenges facing vulnerable communities, such as those living in flood prone areas and those reliant on septic tanks. They advocate for more mitigation and risk prevention to ensure the socially vulnerable are protected from flooding and storms.

Many advocacy groups, such as the Audubon Society, work on similar outreach campaigns as educational institutions, such as the Marine Education Center. These organizations feel personal environmental advocacy is strengthened through education. There is a call for the populous to have a greater understanding of environmental processes, awareness of interconnections in ecosystems and whole-system thinking.

Next Steps

The effort to build a sustainable regional water cycle depends on the individuals involved at each step of the process. The stakeholder analysis provides a context for the Mississippi Gulf Coast's regional waters through the water cycle, but the analysis is simply a glimpse into a complex system. Outreach is an ongoing effort; however, by continuing dialogue about the region's waters and fostering relationships among stakeholders, the region will move towards sustaining the waters. The results of this water stakeholder analysis have been shared with the water subcommittee. This group is using the information provided by stakeholders to aid in shaping recommendations. It was clear to the subcommittee that the region cares about its water resources and has clear ideas for how to improve the region.

Appendix: List of Participating Stakeholders

List of Stakeholders

The following is a list of people and organizations that participated in the stakeholder analysis. Numerous participants fit into more than one category. Each participant was classified in only one category based on the key role in which they shared their perspective. In certain cases, those interviewed asked not to be named or were individuals independently operating and a specific affiliation was not needed, for example individual fishers.

Natural Resources

- Buccaneer State Park
- Land Trust for the Mississippi Coastal Plain
- McLeod RV Park
- Mississippi Sandhill Crane National Wildlife Refuge
- National Park Service
- National Park Service: Rivers, Trails & Conservation Assistance Program
- Ocean Springs Parks & Leisure Services Department
- Red Creek Wildlife Management Area
- The Nature Conservancy
- Wetland Solutions Mitigation Bank

Passive Use

- Beach Rentals
- Beach Visitors
- Biloxi Yacht Club
- Club Caribbean Dive Shop
- Coast Transit Authority
- Da Beach House



Source: *Ming Sheng*
Old Fort Wetland Mitigation Bank



Source: *Angel Arroyo-Rodriguez*
Kayaking on Davis Bayou

- Eco Tour of South Mississippi
- Gulf Coast Convention and Visitors Bureau
- Gulf Coast Heritage Trails
- Hancock County Tourism Development
- Hancock County Tourism Welcome Center
- Jackson County Economic Development Foundation
- McCoy’s Swamp and River Tour
- Ohr-O’Keefe Museum of Art
- Pascagoula River Audubon Center’s twilight tours
- Pass Christian Yacht Club
- South Coast Paddling Company
- The Bow Shop
- Waterfront Walkers
- Wolf River Canoe Employee



Source: Angel Arroyo-Rodriguez

Recreational fisher catches a black drum at the “rock pile” pier in Bay Saint Louis.

Active Use

- Adventure Charters and Dive
- American Trucks
- Bait Shop Owners
- Bay Saint Louis Public Works
- Bayou Marine, Inc.
- City of D’Iberville Public Works
- Colle Towing employee
- Darrin’s Auto and Marine
- D’Iberville Water and Sewer
- Florence Gardens
- Gulf Coast Pre-stress Concrete, Inc.
- Gulfport Public Works Department



Source: Alex Beim

Florence Gardens includes low impact infrastructure features that minimize stormwater runoff.

- Heald Marine
- Killer Bee Bait
- Landscape Logistics
- Mississippi Mineral Institute
- Mississippi State Port Authority
- Mitchell Marine, Inc.
- Mystic Angel Charter
- Neel Schaffer Engineering
- Pass Christian Harbor
- Pass Christian Mayor and Planner
- Point Cadet Mariana
- Port of Bienville
- Port of Gulfport
- Port of Pascagoula
- Recreational Fishers
- Simpson and Costelli Engineering
- Shrimp Dealers/Tours

Consumption

- Gulf Coast Laundry Services
- Imperial Palace
- Jackson County Farmers
- Palace Casino Employee
- Pass Christian Isles Golf Club
- Pass Purchasing Co.
- Residents



Source: *Corrin Wendell*
Ingalls Shipyard in Pascagoula



Source: *Angel Arroyo-Rodriguez*
The Mississippi Department of Transportation works with the Sand Beach Authority to remove sand that blows onto US Highway 90.

Utilities

- City of Long Beach Utility Partner Department
- Hancock County Utility Authority
- Harrison County Utility Authority
- West Jackson County Utility District

Regulatory

- Army Corps of Engineers
- City of Biloxi
- City of D'Iberville
- City of Gulfport
- City of Moss Point
- Gulf Coast Business Council Insurance Committee
- Hancock County Supervisor
- Harrison County Hazard Mitigation
- Harrison County Sand Beach Director
- Irwin-Brown Gulfport Company
- Jackson County
- Mississippi Center for Justice
- Mississippi Department of Environmental Quality: Basin Coordinator
- Mississippi Department of Environmental Quality: Beach Monitoring Coordinator and Supervisor
- Mississippi Department of Environmental Quality: Brownfields
- Mississippi Department of Environmental Quality: Office of Land and Water



Source: Corrin Wendell
US Coast Guard in Pascagoula



Source: Miaoyun Zhou
The Audubon Society's little yard is designed to demonstrate natural plant growth in backyards.

- Mississippi Department of Environmental Quality: Solid Waste Policy, Planning & Grants Administrator
- Mississippi Department of Marine Resources
- Mississippi Department of Marine Resources: GIS Specialist
- Mississippi Department of Mineral Resources
- Mississippi Emergency Management Agency
- Mississippi Forestry Commission
- Mississippi State NFIP Coordinator
- Natural Capital Development
- Ocean Springs Planning Department
- Office of Mississippi State Climatologist
- Southern Mississippi Planning and Development District
- Stennis Space Center Emergency Director
- Stewart, Sneed, and Hewes Insurance
- United States Coast Guard

Education/Advocacy

- Auburn University Extension
- Audubon Society
- Coastal Rivers
- De Soto National Forest Sautier Experiment Station
- Disability Connection
- Grand Bay National Estuarine Research Reserve
- Gulf Conservation Coalition
- Gulf Islands Conservancy
- Gulf of Mexico Alliance
- Mississippi Center for Justice



Source: *Brittany Kubinski*
NOAA's Pisces II research vessel



Source: *Pei-Yu Chiang*
Taconi Elementary School's teachers focus on sustainability in the classroom.

- Mississippi Gulf Coast Community College, Perkinston Campus: Landscape Management Technology Instructor
- Mississippi State University: Coastal Research and Extension Center
- Mississippi State University: Hancock County Extension Director
- Mississippi-Alabama Sea Grant Consortium
- National Oceanic and Atmospheric Association
- Northern Gulf Institute
- Sierra Club
- Steps Coalition
- Taconi Elementary 5th grade Teacher
- University of Southern Mississippi: Gulf Coast Research Laboratory
- University of Southern Mississippi: Marine Education Center
- Women of the Storm



Source: *Miaoyun Zhou*

Grand Bay National Estuarine Research Reserve

1. Louisiana State University, & Mississippi-Alabama Sea Grant Consortium. (2012). 2012 Gulf Coast climate change survey executive summary (Rep.).