Element I: Potential Funding Source Evaluation

Clean Water
State Revolving Fund

ELEMENT I: Potential Funding Source Evaluation

As illustrated in **Element H: Watershed Management Measures**, improving water quality and protecting Murrells Inlet's estuary resources will entail continual management efforts requiring a dedication of financial and personnel resources. The economic value of Murrells Inlet's salt marsh exceeds $720 million according to the *Economic Activity and Marsh Valuation* report prepared by CCU's Center for Economic and Community Development. The natural beauty and services provided by the estuary makes it the focal point of the Murrells Inlet economy having positive impacts on real estate values, the fisheries industry, local restaurants, and the tourism industry. As a result, in 2012 Horry and Georgetown counties generated an estimated $27.4 million in retail sales tax, hospitality fee, and accommodations tax revenues from the 29576 zip code. Investing in initiatives to preserve the long-term ecological health of the Murrells Inlet estuary will undoubtedly continue to provide substantial economic benefits to the community.

The purpose of this element is to provide guidance on the potential funding mechanisms that may be pursued as plan recommendations move forward and are ultimately implemented. The element investigates numerous funding possibilities, including several grant programs which have very specific focus areas. The long-term approach is to seek support from a diversity of local, state, federal, and private sources in order to minimize reliance on a single funding source.

Potential Funding Sources from Local, State, and Federal Agencies

US EPA: Under provisions set forth in the Clean Water Act and other federal legislation, the US EPA fulfills its agency's mission in part by administering grant programs intended to help protect water quality. Many of the grant opportunities are passed on to the states, most often overseen by SC DHEC here in South Carolina. These funding sources are outlined in the next section. Below is a list of grants awarded directly through the EPA.

- **Targeted Watershed Grant:** Initiated in 2003, this grant program is designed to encourage successful community-based watershed management approaches. The grant is intended to be awarded to communities with a broad array of engaged stakeholders and can be utilized on implementation projects to address wetland restoration, fish habitat projection, stormwater management initiatives, and public education and outreach, etc. More information can be found at: http://water.epa.gov/grants_funding/twg/initiative_index.cfm#state

- **Environmental Education Grant:** With annual funding between $2 and $3 million dollars, this grant program sponsored by EPA's Environmental Education Division awards grants to help support environmental education projects to enhance public awareness and knowledge of environmental issues. More information can be found at http://www.epa.gov/enviroed/grants.html

- **Clean Vessel Act Grant Program:** This program directs grant money towards the construction, renovation, operation, and maintenance of pumpout stations for recreational boaters and also for educational programs that inform boaters of the importance of proper disposal of their sewage. Funds are administered through the Sport Fish Restoration and Boating Trust Fund.

SC DHEC: Many of the federally established environmental programs administer grants through state environmental control agencies, which is principally SC DHEC here in South Carolina. Below is a list of common water quality management grant programs on the state level.

- **319 grants:** These funds are typically allocated to communities to address non-point source pollution issues. Periodically 319 funds have been utilized to develop community watershed plans such as this one.

- **Clean Water State Revolving Loan Fund:** This program serves as an infrastructure bank, whereby communities can secure low-interest loans to initiate capital improvement projects. They have more commonly been utilized for wastewater treatment practices but are also used to address non-point source pollution problems.

United States Army Corps of Engineers (USACE): The Army Corps' has many agency responsibilities related to water resource management. Their primary project focus areas include navigation, flood risk management, recreation, wetland mitigation, and shore protection. The Murrells Inlet jetties were constructed by the USACE and dredging projects require permit approval from the Army Corps.

- **206 Aquatic Ecosystem Restoration Program**: Established under the Water Resources Development Act of 1996 this cost-share program generally address problems resulting from past manipulation of the hydrology in and along bodies of water, including wetlands and riparian areas.

- **Estuary Restoration Act**: The purpose of this program is to promote the restoration of estuary habitat, provide assistance for and promote efficient financing of estuary habitat restoration projects, and to develop and enhance monitoring, data sharing, and research capabilities.

County Governments: Both Horry and Georgetown Counties assess a stormwater utility fee to administer the respective stormwater departments and associated infrastructure projects.

Private Foundations: Another potential source of funding is through the non-profit sector. There are several environmental organizations which support local environmental stewardship projects. There are also a few private foundations which support a variety of projects in the Horry and Georgetown County area.

- **National Fish and Wildlife Foundation:** This non-profit organization was created by Congress in 1984. It is structured to direct public conservation dollars to the most pressing environmental needs and matches those investments with private funds. The four focus areas of the organization are birds, freshwater fish, wildlife and habitat, and marine and coastal systems.

  - **Five Star Restoration Program**: This is one of the main grant programs administered through the National Fish and Wildlife Foundation. This program provides challenge grants and technical support to enable community-based restoration projects focused on stream and wetland restoration.

  More information can be found on their website at: http://www.nfwf.org

- **Bunnelle Foundation:** Francis Bunnelle created this charitable foundation in 2000 to support various causes serving Georgetown County. The focus areas of the foundation are:

  - Addressing the root causes of poverty
  - Meeting basic human needs
  - Promoting economic vitality
  - Environmental conservation
  - Encouraging positive youth development.

  The foundation has previously supported projects in Murrells Inlet sponsored by Huntington Beach State Park and Murrells Inlet 2020. More information on grant opportunities can be found at: http://www.bunnelle.org

- **Petsmart Charities**: PetSmart provides financial support to communities that have identified areas with animal welfare concerns. Petsmart focuses specifically on pet adoption and spay/neuter programs. Residents have identified multiple feral cat colonies whose populations can be better through a spay/neuter program. Coastal Carolina University received a grant to conduct a spay/neuter initiative on their campus in 2014. More information on grant opportunities can be found at: www.petsmartcharities.org.

Grants.gov: Updated grant announcements from all federal agencies is provided on Grants.gov This website should be consulted on a regular basis as implementation efforts proceed.

Element J: Public Outreach and Education Resources

ELEMENT J: Public Education and Outreach Resources

Through a number of initiatives including Murrells Inlet 2020's involvement as an education provider in the Coastal Waccamaw Stormwater Education Consortium and their leadership in establishing a volunteer monitoring program, the Murrells Inlet community has been proactive in protecting local water quality. The impetus for developing this watershed-based plan was driven by public concerns about a 2011 SC DHEC Annual Update for Shellfish Management Area #04 which resulted in a Restricted classification for harvesting areas in the southern portion of the watershed. The concern was heightened because this section of Murrells Inlet is predominately surrounded by undeveloped land owned by Huntington Beach State Park and Brookgreen Gardens.

In April 2012, the Murrells Inlet Volunteer Monitoring Program hosted an annual luncheon to recognize the volunteer water monitors and to review the data trends dating back to the inception of the program. An action item proposed at the meeting was to pursue the development of a watershed-based plan to thoroughly assess the historic data trends and coordinate short-term and long-term management strategies needed to improve water quality conditions within the watershed. Significant efforts have been made to engage residents in the development of this watershed-based plan. A steering committee consisting of business owners, long-time residents, volunteer water monitors, and other entities was organized to share local knowledge about Murrells Inlet and to provide feedback on proposed management strategies to implement in the future.

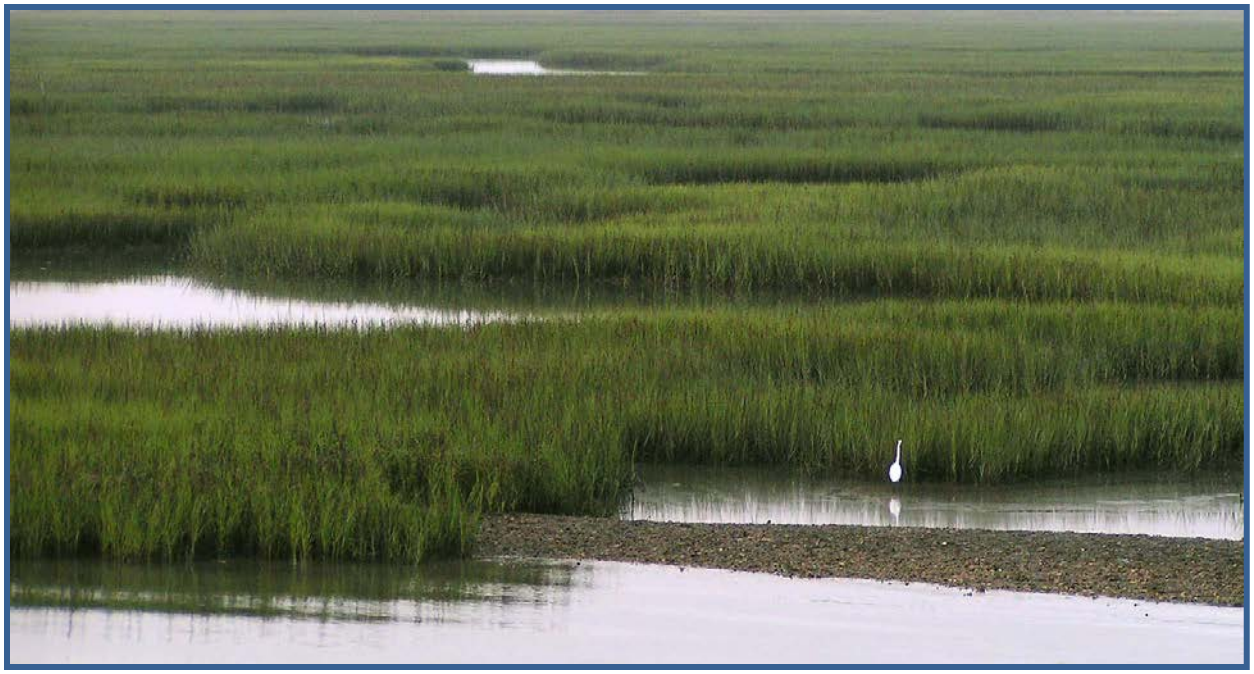

Figure J-1 *The Murrells Inlet community has proactively sought to protect the estuary's natural resources. (Photo courtesy of Murrells Inlet 2020)*

Building public awareness regarding water quality issues in Murrells Inlet and to encourage practices to prevent further degradation is an important and desired outcome of this watershed-based plan. Residents and visitors can have a tremendous influence, positively or negatively, on the long-term protection of local shellfish habitat and other natural resources that are unique to Murrells Inlet. This element provides information regarding existing public outreach programs and resources that are being utilized in the Murrells Inlet area. This element then explores additional possibilities to expand public education and outreach efforts in the watershed. The element focuses specific attention to framing public outreach messages for targeted audiences, such as restaurant owners, tourists, homeowners, pet owners, non-English speaking residents, and boat owners.

Existing Public Outreach Initiatives

There have been several effective programs aimed at addressing local and regional water quality issues in Murrells Inlet and coastal South Carolina. Similar to water quality monitoring programs, local communities have limited financial and personnel resources that they are able to dedicate to public outreach initiatives. Therefore it is most efficient to coordinate resources between various management entities in order to share costs and maximize the potential reach. Regular coordination of resources also ensures that efforts are not unnecessarily duplicated and that proposed initiatives can be vetted and shared across multiple jurisdictions as appropriate. Below is an overview of many of the existing programs and initiatives that have been vital in educating the public on water quality issues, both locally and throughout the region.

- ***Murrells Inlet 2020:*** Formed in 1997, this non-profit organization strives to improve infrastructure and beautification, provide environmental education, and preserve the creek and the traditions surrounding it. http://www.murrellsinletsc.com/

Murrells Inlet 2020 is engaged in the following activities and outreach efforts focused on public education and environmental stewardship of the Murrells Inlet estuary.

  - *Volunteer Water Quality Monitoring-* Murrells Inlet 2020 has been an integral partner in establishing and supporting the Volunteer Monitoring program in the watershed. Volunteers collect samples at eight different locations twice monthly throughout the entire year. This ongoing activity has proven to be an invaluable resource to both Horry and Georgetown counties. In addition to fulfilling obligations under the state's MS4 permitting program, the data collected has helped prioritize management efforts in the watershed. It is also an excellent hands-on learning opportunity for residents who desire to protect the water quality in Murrells Inlet. The community-based volunteer monitoring efforts in Murrells Inlet and on the Waccamaw River have been recognized both regionally and nationally as model programs.

- *Murrells Inlet 2020- The Village Scene, Inlet Happenings/Chowder Talk* Murrells Inlet 2020 maintains a website and distributes a monthly newsletter and a weekly email newsletter as a means of public communications announcing local events and community projects. Both of these resources are useful in sharing reports on the Volunteer Monitoring Program and other local environmental initiatives. Murrells Inlet 2020 also hosts semi-annual Chowder Talk public meetings, which highlight recent accomplishments, upcoming initiatives, and local issues including topics related to water quality.

- *Spring Tide-* 2013 was the 22nd annual event, making it South Carolina's biggest and longest running one day community cleanup. The event involves hundreds of volunteers and relies on support from numerous local restaurants and other sponsors. The effort engages residents in an environmental stewardship activity aimed at increasing individual and community pride in Murrells Inlet's natural resources.

Figure J-2. *Volunteers removing litter from the inlet during the 2013 Spring Tide event. (Photo courtesy of Murrells Inlet 2020)*

- *Golden Oyster Award-* As a way to publicly recognize the conservation efforts of local businesses and residents, Murrells Inlet 2020 has established the Golden Oyster Award for Environmental Stewardship in honor of Dr. Pat Worrell. Any resident can nominate an individual or business for this award which is announced at Murrells Inlet 2020's Spring Chowder Talk. A plaque honoring the Golden Oyster Award recipients is installed on the Marshwalk, providing lasting public recognition of their community stewardship contributions.

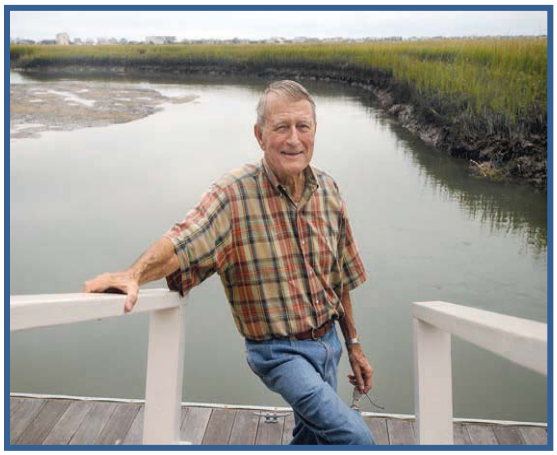

Figure J-3 *2013 Golden Oyster Award Winner Jim Wilkie (Photo courtesy of Coastal Observer)*

- ***Waccamaw Watershed Academy- Coastal Carolina University***. The Murrells Inlet community has a strong ongoing partnership with Coastal Carolina University, located nearby in Conway. Probably the most notable collaboration is with the technical support for the volunteer monitoring program, which has been in place since the spring of 2008. Coastal Carolina University faculty were also integral in the data analysis work involved in the development of this watershed plan. More information about the research and public outreach work of CCU's Waccamaw Watershed Academy can be found at https://www.coastal.edu/wwa/ Results from the Volunteer Monitoring program can be also be accessed through this site.

- ***Coastal Waccamaw Stormwater Education Consortium***- Founded in the spring of 2004, the Coastal Waccamaw Stormwater Education Consortium (CWSEC) serves to help local municipalities in Horry and Georgetown counties fulfill their public education and outreach requirements under South Carolina's Small Municipal Separate Storm Sewer System (SMS4s) permit program. The majority of the Murrells Inlet watershed, with the exception of the very southern end in Georgetown County, falls within the Myrtle Beach Urbanized Area MS4 permit boundary. The overarching goals of the Consortium's work are to:

  - *Maximize efficiency and effectiveness through coordinated and collaborative stormwater education activities.*
  - *Using a regional watershed approach, help member SMS4s meet NPDES Phase II stormwater permit requirements for public education and outreach and public involvement/participation.*
  - *Provide and exchange technical information and expertise on innovative stormwater best management practices and supporting funding opportunities.*
  - *Improve watershed and stormwater awareness in target audiences that informs decision-making and promotes behavior change to address water quality impairments.*
  - *Continue to serve as a model for collaborative stormwater education and involvement throughout the state of SC and beyond.*

  Murrells Inlet 2020 serves as one of CWSEC's Core Education Providers along with Coastal Carolina University's Waccamaw Watershed Academy, Clemson University's Carolina Clear, North Inlet Winyah Bay NERR, SC Sea Grant Consortium, and the Waccamaw Riverkeeper program. The Consortium has established itself as a vital and effective public education resource for communities along the Grand Strand area. CWSEC reaches its targeted audiences through a wide variety of activities and initiatives including BMP demonstration workshops; presentations at schools, civic groups, homeowners associations, etc; newspaper

and television media coverage; and through volunteer activities such as cleanup projects, and water quality monitoring.

This regional resource has been useful for a number of initiatives within Murrells Inlet, including spreading awareness about this watershed planning effort and providing support to the Murrells Inlet Volunteer Monitoring Program. More information about the CWSEC can be found at: http://cwsec-sc.org/

- ***North Inlet- Winyah Bay National Estuarine Research Reserve***- Situated in Georgetown County, this protected area consisting of 18,916 acres of maritime forest, and tidal marsh is one of 28 designated reserves within the National Estuarine Research Reserve System. Scientific research focused on coastal ecology and coastal management issues has benefitted communities throughout the Southeast, including Murrells Inlet. As an example, NOAA supported a study through the Urbanization and Southeastern Estuarine System (USES) initiative. This research project utilized Murrells Inlet as a case study to analyze the effects of urbanization on coastal estuaries in comparison to North-Inlet, which is a relatively undisturbed estuarine system.

  In addition, the North Inlet- Winyah Bay NERR is a leader in public outreach activities, both on the reserve property itself and externally to schools and other entities throughout the region. One of their programs is specifically geared towards grades K-12 students. Classroom activities vary from presentations on estuaries, water quality, and environmental awareness to science fair judging and career day events. Field trips are also offered on the reserve property.

  The Reserve also oversees a Coastal Training Program, which focuses on encouraging stewardship and sound management of our precious coastal resources. The intended audience for this program is local elected and appointed decision makers and professionals in relevant land use management fields, such as stormwater managers, planners, engineers, and developers. Workshops have covered topics such as LID implementation, wetlands identification and regulations, and flood hazard management. Finally, the Reserve has a stewardship program, offering classes to become a certified Winyah Master Naturalist, along with several other hands-on species monitoring and habitat management projects.

More information about research activities and public outreach initiatives supported by the North Inlet-Winyah Bay NERR can be found at: http://www.northinlet.sc.edu/

- ***Carolina Clear- Clemson University-*** Another partner that oversees several statewide public education initiatives is Clemson's Carolina Clear program. They work closely with communities and the stormwater education consortiums across South Carolina to identify public education needs and then prioritize programs and mass media campaigns to maximize the public awareness impact. Two successful examples of programs developed by Carolina Clear are the Carolina Yards program and the "We ALL Live Downstream" mass marketing campaign. More information about resources available through Clemson's Carolina Clear program can be found at: http://www.clemson.edu/public/carolinaclear/

- ***Georgetown County Water and Sewer District and Grand Strand Water and Sewer Authority-*** Both of the sewer utility districts that provide service to the Murrells Inlet area have a significant infrastructure network in place to meet the wastewater treatment needs of the community. There are a few operation and maintenance issues that necessitate public awareness and support. The avoidance of fats and grease from the wastewater stream is critical to minimizing the occurrence of Sanitary Sewer Overflows (SSOs). Another potential cause of SSOs is excess stormwater entering the system from residents who open their cleanout access outlets during major rain events. Both districts can utilize their agency websites and via bill inserts to alert residents to these and other household best management practices. While both districts use automated alarm systems for many of their pump stations, they also rely on the general public to report concerns indicative of a pump station failure or sewer pipe leak. The Grand Strand WSA website is http://www.gswsa.com/ and the Georgetown County WSD website is http://www.gcwsd.com/

- ***Coastal Conservation Association and other civic groups:*** The Coastal Conservation Association is an advocacy organization consisting primarily of recreational fisherman and outdoor sports enthusiasts who recognize the need to protect and restore coastal natural resources. There is a state chapter in South Carolina that has done exceptional education and conservation work in Murrells Inlet. They have partnered with other civic groups such as the Rotary Club to participate in SC DNR's SCORE oyster restoration projects. They have also volunteered to conduct other needed restoration or field survey activities to help fulfill the objectives outlined in this plan. More information about their various initiatives and upcoming events can be found on their website at: http://www.ccasouthcarolina.com/

- ***Friends of Huntington Beach State Park***- As noted in several other elements within this plan, the southern end of the Murrells Inlet watershed is characterized by protected open space areas, most of which are located within Brookgreen Gardens and Huntington Beach State Park. Established in 2003, the Friends of Huntington Beach State Park is a volunteer stewardship group, which strives to provide quality outdoor recreation and educational opportunities, while sustaining the integrity of the park's natural and cultural resources.

Target Populations for Specific Outreach Efforts

This next section is an overview of recommendations for targeted outreach to various population groups that live, work, or visit Murrells Inlet. Each group utilizes Murrells Inlet differently or is affected by water quality conditions in varying degrees, therefore public outreach strategies need to be designed and disseminated in an efficient way to reach all of these stakeholder groups.

Table J-1, Public Outreach and Education- Target Population Groups

Group	Education Needs
Full-time Resident Homeowners	➢ Encourage local residents to get involved in environmental stewardship activities such as the Murrells Inlet Volunteer Monitoring Program, Annual Spring Tide, etc. ➢ Educate homeowners on ways they can reduce their own impacts on water quality in Murrells Inlet. Simple efforts such as tree planting, proper pet waste disposal, installation of rain barrels, and sustainable landscaping practices can all make a difference in minimizing negative impacts associated with stormwater runoff. ➢ It is important to make all full-time residents aware of this planning effort. Community support will be necessary for several of the short-term and long-term recommendations that are outlined. In addition, the plan has a tremendous amount of information about the Murrells Inlet watershed making it a useful educational resource.

Homeowners Associations	➢ Homeowners Associations can help protect water quality in a number of ways especially with issues concerning pet waste removal, neighborhood-scale tree planting, and stormwater retention pond and ditch maintenance.
Residents Relying on Septic Systems	➢ There are not many residences relying on septic systems in the Murrells Inlet watershed, however those that exist need to be properly maintained to avoid future problems. Direct outreach should be pursued with these homeowners to ensure that they have an adequate understanding of existing laws and best practices pertaining to septic systems. ➢ A proactive approach in addressing existing septic systems enables homeowners to extend the effective use of their system and be aware of alternative wastewater treatment options as they become either feasible or necessary in order to protect water quality and public health.
Pet Owners	➢ Pet waste is one of the most preventable sources of bacteria in the Murrells Inlet watershed. It is important to make pet owners aware of the impact of pet waste on water quality in Murrells Inlet and hold them responsible for proper disposal of their pet's waste.
Visiting Tourists	➢ One of the main focuses of an educational campaign geared towards tourists, many of whom visit because of the natural beauty of the area, is to remind visitors of the environmental sensitivities of the local watershed. Visitors have their own role in ensuring the long-term protection of the Murrells Inlet estuary. Leave no trace and pet waste pick up practices should all be promoted.

Elected and Appointed Government Officials	➢ A critical target audience is the key decision makers, who hold elected office or represent local or state management agencies. Elected officials are expected to address constituent concerns regarding a wide variety of issues. A challenging reality is limited personnel and financial resources, requiring a prioritization of the most important community needs. Educating local decision makers about water quality concerns is important so that they are better able to understand the social, economic, and environmental implications of their actions or inactions on water quality related topics.
Recreational Fishermen/Boaters	➢ Fishing and boating are popular activities in Murrells Inlet and the surrounding area. Given their active use of Murrells Inlet, both groups have a significant stakeholder interest in protecting the water quality and natural resources within Murrells Inlet. Watershed managers rely on their cooperation by complying with regulations pertaining to bilge discharges, shellfish harvesting, and boat wake zones. Boaters and fishermen also have an important role in reporting fish kills, spills, and other illicit activities.
Oyster Harvesters	➢ Another critical steward of our local shellfish resources are the harvesters themselves. It is important to collaborate with both recreational and commercial harvesters to ensure that the shellfish stock remains sustainably productive and safe for the public to consume. A few of the needed outreach focus areas to shellfish harvesters are the following: ➢ The applicable laws in designated commercial permit areas and state/recreational harvesting grounds. ➢ Current water quality classifications in each of the shellfish harvesting areas within Murrells Inlet.

	➢ The need to sustain shellfish habitat. Participate in programs such as SC DNR's SCORE restoration program. ➢ An idea that has been shared by multiple stakeholders is the creation of an apprenticeship program that mentors young residents interested in the fisheries trade. Providing hands-on education and training to young residents on how to manage shellfish resources in a sustainable manner will help ensure the long-term health of the oyster reef ecosystem and retain the economic value of the local shellfish trade.
Shellfish Consumers	➢ Seafood remains in high demand in restaurants all along coastal South Carolina and is a major aspect of our local culture. The continued availability of shellfish products is contingent upon protecting local water quality and sustaining healthy clam and oyster reef habitats. The end consumer has a role in supporting efforts to protect water quality and be conscious of the habitat where shellfish are grown and harvested.
Restaurant Owners	➢ Murrells Inlet is known as the "Seafood Capital of South Carolina", and the restaurant industry has helped to shape this cultural identity of Murrells Inlet. Local restaurants have a large stake in maintaining this reputation and are therefore an essential partner in sustaining the local shellfish resources. Active participation in oyster shell recycling initiatives and SC DNR's SCORE shellfish habitat restoration program is one way they can contribute to this shared community goal. In addition, restaurants cater to a large number of visiting tourists.

Commercial Businesses	➢ Besides restaurants, Murrells Inlet has several other types of businesses, many of which are tied to the region's tourism-based economy. **Element H** promotes the creation of an Inlet-Friendly Business Program to encourage local business owners to participate in various stewardship activities. Involvement from the business community can help Murrells Inlet become known as a model ecotourism destination.
Non- English Speaking Population	➢ Another area of concern is making sure the non-English speaking population is fully aware of the restrictions regarding shellfish. If this population is unable to read and interpret sign postings related to shellfish closures they are at heightened risk of consuming shellfish with high bacteria levels. One strategy could be to place multilingual interpretive and enforcement signs in prominent locations such as the Marshwalk, Huntington Beach State Park, public boat landings, and the shellfish recycling sites.

Recommended Public Education and Outreach Strategies and Objectives

The following is a list of recommended public education and outreach strategies focused on the need to protect shellfish habitat areas and water quality in the Murrells Inlet watershed. These strategies complement the recommendations outlined in **Element H: Watershed Management Measures**.

Strategy J-1: *Continue to build upon existing partnerships to educate residents and visitors about the need to protect the water quality in Murrells Inlet and the natural resources that are unique to this community.*

Objective 1A: Keep stakeholders informed as watershed management initiatives are pursued. Maintain a list of contacts of all stakeholders who were involved in this planning process. Create a mechanism for tracking the implementation of plan recommendations and update interested individuals and entities as plan implementation milestones are met.

Objective 1B: Ensure that Murrells Inlet 2020 remains an integral partner as a designated education provider with the Coastal Waccamaw Stormwater Education Consortium.

Figure J-4 *Public meeting to share information about the watershed plan and to solicit feedback on BMP ideas. (Photo courtesy of Daniel Newquist, Waccamaw Regional COG)*

Objective 1C: Seek out new partnerships where possible such as homeowners associations, civic groups, Friends of Huntington Beach State Park, Brookgreen Gardens, and others.

Strategy J-2: *Maintain an active and visible pet waste disposal campaign in Murrells Inlet.*

Objective 2A: Prominently display reminders about regulations applicable to pet waste disposal and the importance as it relates to water quality protection.

Objective 2B: Continue to maintain pet waste stations that are located in several prominent areas including the Marshwalk. Identify additional places where pet waste stations may be needed.

Objective 2C: Work with real estate companies to educate vacation renters on the need to pick up pet waste. Remind visitors that reducing bacteria loads from pet waste and other sources is important in protecting the public health of shellfish consumers and recreational uses of our coastal waters.

Figure J-5: *Pet waste outreach materials provided by Clemson's Carolina Clear Program*

Strategy J-3: *Investigate opportunities to have permanent public awareness interpretive signs installed at prominent locations within Murrells Inlet.*

Objective 3A: Create an inventory of locations where environmental awareness signs already exist. Create a list of desired interpretive signs by type and location based on the impact the proposed sign can have on meeting the education needs for each targeted population group listed in **Table J-1**.

Objective 3B: Pursue space within the new Murrells Inlet Community Center where public education materials can be displayed.

Objective 3C: Work with entities such as Brookgreen Gardens, Huntington Beach State Park, and local marinas to discuss the feasibility of installing temporary or permanent public education materials at their respective locations.

Strategy J-4: *Encourage resident involvement in hands-on volunteer opportunities in the Murrells Inlet watershed.*

Objective 4A: Recruit additional residents to get involved with the Murrells Inlet Volunteer Monitoring program. This program has been a tremendous resource to both Horry and Georgetown counties in their respective watershed management efforts. These volunteers are knowledgeable environmental stewards of the Murrells Inlet watershed.

Objective 4B: Develop an adopt a stream or watershed program that corresponds to the main tidal creeks adjacent to the eight volunteer monitoring sites.

Objective 4C: Continue to promote the annual Spring Tide event hosted by Murrells Inlet 2020. These types of volunteer events draws positive attention to the environmental and economic importance of protecting Murrells Inlet.

Objective 4D: Recruit additional volunteers to assist in oyster shell recycling and reef habitat restoration through programs such as SC DNR's SCORE program and Coastal Carolina University's Coastal Oyster Recycling and Restoration Initiative (CORRI).

Objective 4E: Work closely with the Coastal Conservation Association and other local civic groups such as the Rotary Club to organize community volunteer activities such as shellfish habitat restoration, litter cleanup, public awareness surveys, etc.

Figure J-6 *Volunteers with the Coastal Conservation Association working on an oyster reef restoration project. (Photo courtesy of the Coastal Conservation Association)*

Strategy J-5: *Utilize both traditional media outlets as well as emerging technologies to increase public awareness regarding water quality issues affecting Murrells Inlet.*

Objective 5A*:* Direct attention to the online pollutant source mapping tool developed by Coastal Carolina University. This tool was utilized during the planning process to allow the general public to share their water quality concerns at specific locations within the Murrells Inlet watershed. This interactive tool could serve similar purposes during future planning or survey initiatives.

Objective 5B: Utilize social media websites such as facebook to share announcements regarding volunteer opportunities, news from the Volunteer Monitoring program or other water quality management initiatives in Murrells Inlet. Coordinate social media announcements with other partner stakeholders.

Objective 5D: Continue to utilize public outreach slogans such as "Litter Makes Us Crabby", which has proven effective in the past.

Strategy J-6: *Educate property owners on ways to reduce impacts of stormwater runoff during significant rain events.*

Objective 6A: Simple strategies such as the installation of rain barrels, rain gardens, pervious pavement, and appropriate trees can help reduce the rate of stormwater runoff from individual lots ultimately making a significant difference on a neighborhood and community wide scale. Explaining the benefits of these practices and directing homeowners to convenient and affordable resources entails a sustained outreach effort.

Objective 6B: Install demonstration projects at public facilities and parks. As MS4 permit holders, each county has a leadership responsibility to ensure that local waterbodies are meeting the state water quality standards. Each county can serve as a model for progressive watershed management by incorporating Low Impact Development and other best management applications into the design of public parks and facilities.

Strategy J-7 *Explore opportunities to educate the public on water quality issues at all appropriate local community events.*

Figure J-7 *Murrells Inlet hosts numerous community events throughout the year including an annual oyster roast. These events are good public outreach opportunities. An educational display board highlighting findings included in this plan has been created for this purpose (Photo courtesy of Murrells Inlet 2020)*

Objective 7A: The annual Spring Tide event has been a successful volunteer cleanup effort. Continue to grow the Fall Haul event now in its third year, which coincides with SC DNR's statewide RiverSweep/BeachSweep campaign held the third weekend of September shortly after the peak tourism season.

Objective 7B: Continue to host annual Volunteer Monitoring Program data workshops to present the findings to the volunteer monitors and to other interested stakeholders, including the local media.

Objective 7C: Continue to use the semi-annual Murrells Inlet 2020 Chowder Talk events as a way to highlight watershed management accomplishments and share announcements regarding upcoming initiatives.

Objective 7D: Work with local event organizers to seek opportunities to setup educational displays focused on water quality initiatives in Murrells Inlet.

Strategy J-8: *Develop a targeted educational campaign directed at the tourist population.*

Objective 8A: Tourism is one of the core sectors of the local Murrells Inlet economy. The waterfront views, natural beauty, and the variety of outdoor recreation opportunities are the key elements that make Murrells Inlet a popular draw. A worthwhile endeavor would be to brand Murrells Inlet as an ecotourism destination and establish sustainability goals among the key stakeholders in the local tourism industry. An existing example is the designation of Morse Park Landing as a South Carolina National Heritage Corridor site. More information about this statewide natural and cultural tourism initiative can be found at http://www.scnhc.org Murrells Inlet should also evaluate the potential for similar designations with the Southeast Coast Saltwater Paddling Trail, www.secoastpaddlingtrail.com

Objective 8B: A key to reaching out to tourists is to partner with businesses such as restaurants, outdoor excursion companies, and real estate companies that regularly interact with visitors. Providing educational materials through these outlets is an effective means of reaching the largest number of visitors.

Objective 8C: Work directly with Brookgreen Gardens and Huntington Beach State Park, both popular local tourist destinations, to develop educational displays and/or programs to spotlight the need for continued protection of the natural resources within Murrells Inlet. As these landmarks are both known for their scenic natural beauty and have existing educational programs and resources, they could be ideal partners in specific public outreach efforts focused on water quality and shellfish management in Murrells Inlet.

Figure J-8 *Huntington Beach State Park has a nature center which hosts numerous activities to educate visitors about the local ecology. (Photo courtesy of Huntington Beach State Park)*

Strategy J-9: *Provide guidance and assistance to homeowners relying on septic systems to ensure that they continue to function properly.*

Objective 9A: Coordinate outreach activities with EPA's septic smart week initiative. This can serve as a yearly refresher to residents regarding proper septic system maintenance and warning signs of malfunction. Information on EPA's septic smart initiative can be found online at:
http://water.epa.gov/infrastructure/septic/septic-smart-week-2013.cfm

Objective 9B: Hold periodic workshops with residents to inform them of the options and costs associated with connecting to the centralized sewer system versus long-term septic system maintenance and eventual replacement. Coordinate these efforts with Georgetown County WSD, Grand Strand WSA, and SC DHEC.

Strategy J-10: *Coordinate all public outreach efforts into a comprehensive, community-wide mass media campaign aimed at promoting individual stewardship practices to protect Murrells Inlet.*

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Element K: Long-term Water Quality Monitoring Needs

ELEMENT K: Long-term Water Quality Monitoring Needs

An integral tool in long-term adaptive watershed management is having a comprehensive water monitoring program in place. Water quality monitoring provides critical data essential to water resources management decision making processes. While monitoring does entail a dedication of time and resources, it provides the scientific data used to develop and design watershed management initiatives or projects. Water resource managers utilize monitoring programs to identify areas with elevated contaminant levels and draw better conclusions as to what the source of the pollutants could be. Monitoring also provides watershed managers with an important evaluation tool to assess the effectiveness of remediation and prevention efforts.

The effectiveness of a monitoring program is highly dependent on the long-term collection of accurate representative samples. Consistent sampling provides data users and ultimately key decision makers the ability to assess trends over time. Data continuity is also important in detecting situations where future samples indicate sudden and noticeable deviations from typical water quality conditions within a waterbody.

This long-term monitoring plan identifies future needs to enhance existing water quality monitoring efforts and outlines a logical protocol on how the data obtained can be optimally utilized.

Existing Water Quality Monitoring Resources

The two most comprehensive monitoring programs active in Murrells Inlet are SC DHEC's shellfish monitoring program and the Murrells Inlet Volunteer Water Quality Monitoring Program. A thorough trend analysis of data collected by these programs is included in **Element D**. The SC DHEC monitoring program is used to update the status of shellfish harvesting classifications, which has regulatory implications on what areas are allowed to be harvested in a given period of time. The Volunteer Monitoring Program is designed to assess the contributions of tributaries carrying land-based stormwater runoff into the estuary. The baseline assessment outlined in **Element D** helped to prioritize areas of primary concern, which in turn informed the evaluation of recommended Best Management Practices outlined in **Element H**. The SC DHEC monitoring data and the Murrells Inlet Volunteer Monitoring program will continue to be essential resources in guiding future watershed management efforts in Murrells Inlet.

Identification of Gaps in Available Data Sources

Throughout this planning process, the steering committee searched and reviewed numerous data sources to gain a better understanding of the hydrology, historic weather trends, land use changes, wildlife habitats, and water quality conditions in Murrells Inlet. Through our extensive analysis, several potential data needs that could

be utilized in future management decisions were discovered. The identification of these data gaps is vital in determining necessary investments in long-term monitoring within Murrells Inlet.

- **Wildlife Populations**. One of the main potential sources of fecal coliform contamination identified in the Murrells Inlet TMDL is contributions from local wildlife populations. During the community stakeholder meetings, observations on waterfowl and other wildlife species were solicited. There was a notable emphasis on the prevalence of small mammals such as feral cats and raccoons in residential neighborhoods and the presence of waterfowl species in several stormwater ponds. Representatives from Huntington Beach State Park also described recent population shifts for species such as red fox and coyote in the southern portions of the watershed. In addition, other committee members suspected that wild hogs have begun to inhabit this portion of Georgetown County as well.

Figure K-1 *Raccoons and other small mammals are abundant in both the undeveloped southern end of the watershed as well as in residential areas in Murrells Inlet. (Photo courtesy of Murrells Inlet 2020)*

The steering committee reviewed GAP analysis data produced by the US Fish and Wildlife Service which seeks to estimate various wildlife populations based on the given habitat of a particular area. The data provided were primarily focused on the list of state and federal Rare, Threatened, and Endangered species that inhabit South Carolina. In addition, the data were published at an ecoregion scale, which precluded analysis at the scale needed for the Murrells Inlet watershed.

It would be beneficial to collect a comprehensive survey of existing wildlife populations at least once every ten years, perhaps on a county level. This information would be beneficial to multiple entities and would enable watershed managers in Murrells Inlet to account for population changes in waterfowl species, native species such as deer and raccoon, and nuisance species such as wild hogs. In the meantime one strategy being pursued is the use of microbial source tracking to identify human and non-human sources of bacteria that are entering local waterways. Having an accurate estimate of bacteria loadings from wildlife species is important in determining whether to focus management strategies on eliminating preventable bacteria sources as opposed to minimizing the transport of wildlife bacteria sources off the land to minimize downstream water quality impacts in shellfish habitat areas.

- **Rain Data.** An environmental variable that influences both single fecal coliform sample measurements and long-term trends is rainfall patterns. The baseline assessment of water quality trends included in **Element D** utilized the rain gauge at Brookgreen Gardens to evaluate the correlation of wet weather trends on fecal coliform levels. This rain gauge represents the longest continuous data set in general proximity to Murrells Inlet. It is also utilized by the National Weather Service and SC DHEC as part of their respective programs.

Figure K-2: *Rain intensity and duration can vary considerably in the Murrells Inlet area. Given the known correlation between rain patterns and observed fecal coliform levels, having accurate precipitation data is very useful (Photo courtesy of Murrells Inlet 2020)*

During steering committee discussions, there were some limitations noted by solely using the Brookgreen Gardens rain gauge for data analysis purposes. These limitations are summarized below:

- An obvious limitation is that the Brookgreen Gardens rain gauge is actually located outside of the delineated boundaries of the Murrells Inlet watershed and is approximately 1.5 miles from the closest SC DHEC monitoring station in Murrells Inlet.

- By relying on a single rain gauge, water resource managers are dependent upon the responsible entity to measure precipitation totals on a daily basis and have the data accessible in a timely manner. Having multiple rain gauge sites helps limit data gaps and correct for any measurement or recording errors.

- A unique aspect of the Grand Strand area is that weather patterns are highly variable over a small geographic area, even between the immediate coastline and slightly inland towards the Waccamaw River, where the Brookgreen Gardens rain gauge is located. Summer weather patterns are unpredictable as thunderstorms can produce heavy rain in one area and very little or no precipitation just a short distance away. It would be beneficial to expand the number of rain gauge stations along the immediate coast extending from the Garden City Beach portions of the watershed to Huntington Beach State Park in Georgetown County. A

weather station was recently installed at Crazy Sister Marina near the Marsh Walk.

- **Soil Samples:** As mentioned in other elements, siltation has been commonly observed in many areas of Murrells Inlet, causing gradual but noticeable changes in local hydrology and the navigability of several creeks within the inlet. The sediments that get transported to the estuary can have direct impacts on shellfish and other aquatic species habitats. Fecal coliform are able to bind to soil particles and contribute to bacteria loads entering the inlet. Often, the levels of bacteria present in the sediment loads are not observed until they become resuspended in the water column after a disturbance from boat wakes or following dredging activity. As of yet there are no comprehensive studies in Murrells Inlet where soil bacteria sampling has been conducted. Sampling soils in areas where there may be a suspected source of bacteria could lead to targeted management or remediation efforts. It would also be worthwhile to analyze spoils following future dredging projects to determine to what extent bacteria are being harbored by sediments entering Murrells Inlet.

Long-term Monitoring Strategies and Objectives

This section outlines a set of recommended strategies and corresponding objectives to continue to maximize the utility of monitoring as an integral part of future watershed management decision making processes.

Strategy K-1: *Continue to review and analyze monitoring data collected by the SC DHEC Shellfish Monitoring Program.*

Objective 1A: The SC DHEC monitoring data and annual shellfish reports have the most significant regulatory implications on watershed management within Murrells Inlet. These data are used to classify shellfish harvesting designations throughout the state. The project partners should regularly analyze the data and inform relevant stakeholders about key trends. The Annual Shellfish Management Area 04 Report is a good reference that lists changes in shellfish classifications.

Objective 1B: Work with SC DHEC staff to evaluate the possibility of developing a Conditionally Approved shellfish classification protocol in portions of Murrells Inlet. These areas would be limited to SC DHEC monitoring sites that are meeting water quality standards the majority of the time and are only exceeding standards in predictable conditions including 24 hour rainfall patterns. A candidate area for the Conditionally Approved shellfish classification could be the southern end near Huntington Beach State Park, which seems to be influenced by the periodic release of freshwater into the salt marsh at the main road causeway.

Objective 1C: Remain attentive to new monitoring requirements that may be mandated by the SMS4 stormwater permit program or through other environmental regulations. Also be aware of any changes to water quality standards implemented by SC DHEC or the FDA National Shellfish Sanitation Program. As an example, the

updated SMS4 permit, effective January 1st, 2014, required new monitoring requirements and assessment provisions for those waters with an approved TMDL.

Strategy K-2: *Continue to invest resources in the Murrells Inlet Volunteer Monitoring Program.*

Objective 2A: Maintain efforts to recruit new volunteers to participate in this monitoring program. One of the primary goals of this program is to educate residents about water quality issues in Murrells Inlet. Since the inception of the program in 2008, the volunteer monitoring program has been an effective way to enhance community stewardship of the Murrells Inlet estuary.

Objective 2B: Maintain a strong collaborative partnership with both counties and Coastal Carolina University to ensure that the program continues to provide quality data in a timely manner. Solicit input from all partner entities on ideas to expand monitoring to new sites and when initiating special projects, such as upstream monitoring studies.

Objective 2C: Provide updates to community residents about the results and trends of the volunteer monitoring data. Continue hosting an annual data workshop with the volunteers and other relevant stakeholders. In addition, other avenues for sharing data results such as the Murrells Inlet 2020 Chowder Talk series and the Village Scene and Inlet Happenings newsletters should be pursued.

Objective 2D: Ensure that there is continued funding available to maintain a permanent volunteer monitoring site at the Woodland Drive Pond in Garden City.

Strategy K-3: *Maintain a comprehensive approach in the prioritization of monitoring resources.*

Objective 3A*:* Ensure that there are a sufficient number of rain gauges actively recording precipitation totals in Murrells Inlet. During the development of the baseline assessment for this plan, it was recognized that there were limitations in the available rainfall data in Murrells Inlet. The only rain gauge with an adequate period of record is located at Brookgreen Gardens. Given the intermittent nature of rainfall along the Grand Strand coast, it would be beneficial to install additional rain gauges in Murrells Inlet. Initial efforts could be made to participate in the CoCorahs program, which seeks volunteer residents and businesses to collect and report daily rainfall totals at their sites.

Objective 3B: Conduct periodic wildlife surveys every ten years to get a sense of current species populations and where habitats may be expanding. This information can be very useful to account for background bacteria levels in the watershed. Cost-sharing arrangements should be pursued since this survey would benefit multiple stakeholder entities.

Objective 3C: A valuable output of this planning project is a complete delineation of all the subwatersheds draining into the Murrells Inlet estuary. As a result, targeted monitoring can be conducted to assess potential bacteria sources in a defined subbasin location. Initial monitoring upstream of the Bike Bridge, HS, and BHR volunteer monitoring sites helped to identify BMP opportunities in the Georgetown County portion of the watershed. It also helped determine an action plan for initiating microbial source tracking in the southern end of Murrells Inlet. This type of monitoring approach utilizing the subwatershed delineations is recommended for future initiatives.

Figure K-3: *The subwatershed delineations have already been utilized to establish the framework for the upstream monitoring initiative in Georgetown County.*

Objective 3D: As part of this planning process, a land use change and curve number analysis was conducted to characterize the drainage characteristics in the subwatersheds which flow into Murrells Inlet. To continue to have an accurate sense of local drainage patterns it is recommended that this type of assessment is conducted on a routine basis, perhaps once every ten years.

Objective 3E: Conduct a comprehensive soil analysis, including the presence of fecal indicator bacteria, at strategic locations throughout Murrells Inlet. The goals of this project would be to identify the extent to which bacteria binds to various soil types and which areas in Murrells Inlet are experiencing the most pronounced erosion and siltation. This study should be timed with any future dredging activities that are

scheduled to correlate the data obtained in upstream locations with sediments that are removed from the estuary.

Objective 3F: To better understand the hydrodynamics of the Murrells Inlet estuary system consider conducting a dye or marker test to determine exact flow paths from the upper tidal creeks through the main channel out to the Atlantic Ocean. This type of study would also provide insight on the spatial and temporal influence of tidal flushing throughout the estuary.

Objective 3G: Use site-specific monitoring as a tool to evaluate the success of watershed projects or initiatives that are pursued in Murrells Inlet. Pre- and post-project monitoring can be particularly useful in determining the effectiveness of structural BMP projects, where certain water quality benefits are expected. Monitoring following other types of projects such as dredging could also provide very useful information.

Objective 3H: Continue to collaborate with research institutions such as NOAA, Coastal Carolina University, University of South Carolina, Clemson University, North Inlet –Winyah Bay NERRS and others to pursue research opportunities to expand knowledge regarding the water quality, natural resources, and coastal processes affecting the Murrells Inlet estuary.

Objective 3I: Continue to use microbial source tracking as a tool in identifying specific bacteria sources in the watershed. The steering committee recommended using microbial source tracking to determine whether there are any human source contributions from sewer lift stations, which are generally located in low-lying areas near tidal creeks.

Objective 3J: Maintain a data archive specific to Murrells Inlet that is readily accessible to watershed managers, elected officials and other decision makers, and to other stakeholder interest groups. The archive should be reviewed and updated annually or as otherwise needed. Information resources that should be added to the archive include:

- SC DHEC monitoring data and annual shellfish reports
- Murrells Inlet Volunteer Monitoring annual reports and presentations
- SC DNR SCORE project updates
- News media reports on watershed initiatives including Spring Tide event, Volunteer Monitoring, etc.
- Scientific research projects from state and federal management agencies and local universities.
- Engineering reports of major infrastructure projects led by Army Corps of Engineers, SC DOT, Grand Strand WSA, Georgetown County WSD, Horry County, Georgetown County, or other relevant agencies.
- Updated mapping including Shellfish Harvesting Classification, land use change, etc.

- Case studies about various watershed initiatives from other regions that may be applicable to Murrells Inlet.

Objective 3K: Knowing that other coastal communities face the same challenges of protecting their shellfish harvesting areas, it would be beneficial to share information and experiences with other management entities across the state on an ongoing basis. There are likely numerous examples of effective BMPs and lessons learned that neighboring communities could potentially apply in their own water quality management efforts. During this planning process, the steering committee consulted with stormwater managers from the Town of Bluffton who have undertaken similar efforts to address fecal coliform impairments in Shellfish Harvesting Areas in the May River watershed.

Objective 3L: Maintain a long-term adaptive management approach and review plan on a regular basis and update as needed.

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Element L: Integrative Watershed Management

ELEMENT L: Integrative Watershed Management

The previous elements in this watershed plan discuss a wide variety of specific watershed topics as they pertain to the Murrells Inlet estuary. Many of the topics overlap and are interrelated and must be considered holistically in long-term watershed management efforts. This chapter provides three matrix tables to summarize locations, costs, water quality benefits and an implementation timeframe for the recommended BMPs. **Table L-1** provides details of the structural BMPs that have been recommended for the priority subwatersheds outlined in Element F. **Table L-2** outlines the anticipated water quality benefits and cost considerations for small-scale BMPs or administrative BMPs that apply across the entire Murrells Inlet watershed. Finally **Table L-3** provides a timeframe for BMP implementation with notes concerning implementation feasibility. These tables serve to summarize the BMPs recommended in this watershed plan. More detailed BMP descriptions and purposes can be found in **Element H**. Also note that all of the public awareness and education recommendations are found in **Element J.**

Table L-1 provides estimated load reduction benefits for structural BMPs recommended in Element H. The first step is to estimate the bacteria load from each of the drainage areas from each of the listed priority subwatersheds. This was calculated utilizing the time of concentration and flow rate information for each subwatershed outlined in **Table A-1**. As emphasized throughout the plan, bacteria loads vary tremendously based a number of factors including dry or wet weather conditions, mobile nature of bacteria sources, seasonal population trends, etc. Therefore, it should be noted that the pollutant loads are merely estimates and will be influenced as these conditions change. The 80% removal rate goal was selected based on targeted load reduction rates outlined in the 2005 Murrells Inlet Fecal Coliform TMDL and the bacteria removal rates that can be expected from the structural BMPs that were selected. Cost estimates are included based on proprietary quotes and on similar constructed stormwater pond projects previously installed in Georgetown County.

Table L- 1: Priority Subwatershed Summary Structural BMP Matrix									
Subwatershed	**Potential Bacteria Source(s)**	**Area (acres)**	**Flow rate (cubic feet/second)**	**Estimated Bacteria Load Concentration (cfu/100ml)**	**Estimated Total Daily Bacteria Loads (cfu/day)**	**80% Target Load Reduction (cfu removed per day)**	**BMPs**	**% Load Reduction Anticipated**	**Cost Estimate**
Melody	➢ Waterfowl ➢ Wildlife ➢ Pet Waste ➢ Sewer pump stations	633.0	58.6	36	3.20E+14	2.56E+14	Install floating wetlands at Woodland Drive Pond and in Tupelo Bay, Melody Gardens, Bermuda Bay, and Oceanside Village	Traditionally used to remove nutrients. Pilot site needed.	$16,370 to install three 10x20ft modules (proprietor quote)
							Install bacteria filter inserts in catch basins in Tupelo Bay, Bermuda Bay, and Melody Gardens neighborhoods	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
							Install bacteria filter strip devices along roadside ditches on Woodland, Calhoun, Vista, and Seabreeze.	Center for Watershed Protection estimates 80% removal	$1,200- 160lf of 8” prefilled strip. (proprietor quote)
Pine	➢ Waterfowl ➢ Pet Waste ➢ Sewer pump stations/ Atlantic Ave crossing	190.4	98.9	36	8.71E+14	6.96E+14	Install bacteria filter strip devices along roadside ditches on Cypress, Pine, Oak, and Atlantic.	Center for Watershed Protection estimates 80% removal	$1,200- 160lf of 8” prefilled strip. (proprietor quote)
							Install a floating wetland at Pirate Cove Pond	Traditionally used to remove nutrients. Pilot site needed	$16,370 to install three 10x20ft modules (proprietor quote)
							Install bacteria filter inserts in catch basins at Murphy’s Law shopping center	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
Salters	➢ Waterfowl ➢ Pet Waste	144.5	156.7	36	1.38E+15	1.11E+15	Install a floating wetland at Salters Cove Pond	Traditionally used to remove nutrients. Pilot site needed	$16,370 to install three 10x20ft modules (proprietor quote)
							Install bacteria filter strip devices along roadside ditches in Salters Cove neighborhood	Center for Watershed Protection estimates 80% removal	$1,200- 160lf of 8” prefilled strip. (proprietor quote)
Point Dr.	➢ Waterfowl ➢ Wildlife ➢ Pet Waste ➢ Sewer pump stations ➢ Septic Systems- Waterford Oaks	433.7	97.2	36	8.56E+14	6.85E+14	Install bacteria filter strip devices along roadside ditches along Walmart, Jamestown, and Jensens	Center for Watershed Protection estimates 80% removal	$1,200- 160lf of 8” prefilled strip. (proprietor quote)
							Install floating wetland in Point Drive Canal	Traditionally used to remove nutrients. Pilot site needed	$16,370 to install three 10x20ft modules (proprietor quote)
							Install bacteria filter inserts in catch basins at Kroger’s and Walmart shopping center parking lots	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
Rum Gully	➢ Waterfowl ➢ Pet Waste	243.2	48.4	36	4.26E+14	3.41E+14	Install floating wetland in Rum Gully ponds	Traditionally used to remove nutrients. Pilot site needed	$16,370 to install three 10x20ft modules (proprietor quote)
Sunnyside	➢ Waterfowl ➢ Pet Waste ➢ Septic Systems- Melton Ave	231.9	70.9	26	4.51E+14	3.61E+14	Install bacteria filter inserts at catch basins along Sea Marsh Road	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
Garden City Pier N	➢ Waterfowl ➢ Pet Waste ➢ Sewer- Atlantic Ave. crossing	67.2	Overland Flow				Install bacteria filter inserts in catch basins along Dogwood/Atlantic	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
Dogwood N	➢ Waterfowl ➢ Pet Waste	42.6	Overland Flow				Install bacteria filter inserts in catch basins along Dogwood	Center for Watershed Protection estimates 80% removal	~ $300 per insert, varies by size and design (EPA reference and proprietor quote)
Mariner/Wesley	➢ Wildlife ➢ Feral Cats ➢ Pet Waste	408.9	106.2	16	4.16E+14	3.32E+14	Installation of a vegetated stormwater pond	80% removal based on existing vegetated pond in Murrells Inlet.	$34,000 per pond acre x 1.5 acres= $51,000
Vaux Hall	➢ Wildlife ➢ Feral Cats ➢ Pet Waste	171.1	86.3	16	3.38E+14	2.70E+14	Installation of a vegetated stormwater pond	80% removal based on existing vegetated pond in Murrells Inlet.	$34,000 per pond acre x 1.5 acres= $51,000
Bike Bridge	➢ Wildlife ➢ Septic Systems- Tupelo Rd	508.0	102.5	16	4.01E+14	3.21E+14	Installation of a vegetated stormwater pond	80% removal based on existing vegetated pond in Murrells Inlet.	$34,000 per pond acre x 1.5 acres= $51,000

Table L-2 highlights several non-structural and watershed-wide BMPs which are recommended in Murrells Inlet. An exact load reduction estimate is difficult to quantify for many of these BMPs however the anticipated water quality benefits are described in the table.

Table L-2 Non-Structural and Watershed-Wide BMPs Expected Water Quality Benefits and Cost Estimates		
BMP	**Expected Water Quality Benefits**	**Cost Estimates/Considerations**
Pet Waste Stations	Direct reduction in bacteria loads. Increased public awareness and stewardship. The existing stations have been well utilized and provide an effective strategy to reduce pet waste load reductions.	Typical cost is $150 to $200 to install each station. Georgetown County has six stations in Murrells Inlet. The addition of six stations in Horry County would cost ~$2,000. Bags cost approximately 5 cents each. In 2012, 12,000 bags were used at the six stations in Georgetown County. Annual expected costs to maintain six new stations would be ~$600.
Rain Barrel Installation	Indirect benefits include a reduction in stormwater runoff rates and volumes which is a primary bacteria transport mechanism in the watershed	According to Clemson's Carolina Clear Program, a typical 50-60 gallon residential rain barrel can cost as low as $35-$45 through conservation organization initiatives. With a target goal of installing 100 per year, the annual cost would be $3,500-$4,500. Homemade rain barrels can be constructed for as low as $20 a piece. An individual purchase at a retail home and garden center can exceed $150 per rain barrel.
Tree-Planting	Primary indirect benefit is to help reduce stormwater rates and volumes	In-kind donations. Partner with local non-profit Trees for Tomorrow.
Feral Cat Spay/Neuter Program	Moderate population size of existing feral cat colonies which in the long-term will lead to a direct reduction in bacteria loads.	Pet Smart Charities offers a free-roaming cat spay/neuter grant assistance program with awards up to $200,000 for a two-year initiative.
Dumpster and Trash Can Maintenance Campaign	Discourages wildlife from urban areas within the watershed. It is important not to attract wildlife near shoreline areas to minimize direct bacteria loads in the Inlet.	Can be incorporated into existing water quality awareness efforts.
Shellfish Habitat Restoration Projects	Oysters and other shellfish species have a very important ecological role in estuarine environments. From a water quality perspective, their reefs help stabilize shorelines areas, which reduces erosion. They also help to filter and circulate water.	US Army Corps of Engineers estimates that oyster reef construction costs approximately $10,000 per acre using oyster shell as the base material. Costs are reduced with the use of volunteers to replant oyster shells. Local shellfish recycling efforts may also help to reduce costs.

Inlet Dredging	Improve salt water exchange in areas of Murrells Inlet, which have become silted in over time. An adequate salt water/freshwater balance can help moderate fecal coliform levels.	If Georgetown County upland disposal site is utilized the expected cost of mechanical dredging would be $10-20 per cubic yard.
Revise TMDL	A more accurate TMDL that accounts for the specific load contributions from each of the identified bacteria sources is critical to select appropriate BMPs in the watershed.	Will require dedicated personnel resources from SC DHEC to complete a full TMDL revision.
Inlet Friendly Business Program	Incentive program to encourage local businesses to adopt practices to help protect water quality and raise public awareness.	Modest staff time (~100 hours per year) for sponsoring organization anticipated once program is established.
Sewer District/County Stormwater Coordination	Sharing information among sewer districts and county stormwater departments can help alert one another to problems that may be occurring to efficiently address fecal coliform contributions.	No additional costs expected
Environmental Law Enforcement Coalition	Better coordination among the various management and enforcement agencies can help to prioritize enforcement needs within the watershed, which may change from year to year.	No additional costs expected
Reinstitution of Conditionally Approved Shellfish Classifications	Allows management of shellfish resources based on more recent water quality conditions rather than taking a year to year approach.	Contingent upon sufficient personnel resources in SCDHEC's Shellfish Program
Designate northern portion of Murrells Inlet as a shellfish habitat restoration area	The northern end of Murrells Inlet has chronically high levels of fecal coliform. Restoring and protecting oyster reef habitats will improve water filtration, which in turn is anticipated to reduce fecal coliform levels.	Minimal administrative costs anticipated. Restoration costs will vary from year to year.
Shoreline Buffer Incentive Program	Shoreline buffers can help stabilize shorelines, reduce erosion rates, and remove pollutants prior to discharge into the inlet. Reducing sedimentation will diminish a primary transport mechanism for bacteria.	Minimal administrative costs anticipated. Only additional costs for property owners would be if initial native species plantings were desired.
Establish Estuary Protection Overlay Zoning District	Would establish requirements and incentives to incorporate stormwater management BMPs in the site design for new development and retrofit projects. Could significantly mitigate hydrological changes often associated with urban development by reducing erosion and promoting stormwater retention, infiltration, and rain harvesting. `	County stormwater and planning department staff time to develop ordinance language.

Table L-3 provides a snapshot of the anticipated implementation timeframe for each of the recommended structural and Non-structural BMPs. Notes are provided to outline any additional considerations that may influence the expected timeframe.

Table L-3 Best Management Practices- Implementation Schedule						
BMP	**Location/Target Audience**	**Within Two Years**	**3-5 Years**	**5-10 Years**	**10+ Years**	**Notes**
Structural BMPs						
Floating Wetlands	**Melody Subwatershed**- Tupelo Bay, Melody Gardens, Bermuda Bay, and Oceanside Village. Also at the Woodland Drive Pond **Pine Subwatershed**- Pirate Cove Pond. **Salters Cove Subwatershed**- Salters Cove Pond **Point Dr. Subwatershed**- Point Drive Canal **Rum Gully Subwatershed**- Rum Gully neighborhood ponds.	Select and install at pilot site ✓			Complete installation and evaluate need at other sites. ✓	Initially install at one location as a demonstration site before widespread application across the watershed.
Catch Basin Inserts	**Melody Subwatershed**- Tupelo Bay, Bermuda Bay, and Melody Gardens neighborhoods **Point Drive Subwatershed**- Wal-Mart parking lot **Sunnyside Subwatershed**- Sea Marsh Road **Garden City Pier N Subwatershed**- install along Dogwood/Atlantic (inlet protection)		✓			Additional locations should be evaluated periodically.
Bacteria Media Filter Strips	**Melody Subwatershed**- roadside ditches along Woodland, Calhoun, Vista, and Seabreeze **Pine Subwatershed**- roadside ditches along Cypress, Pine, Oak, and Atlantic **Salters Subwatershed**- roadside ditches in Salters Cove neighborhood **Point Drive Subwatershed**- roadside ditches along Walmart, Jamestown, and Jensens **Dogwood N Subwatershed**- roadside ditches along Dogwood.	Select and install at pilot site ✓			Complete installation and evaluate need at other sites. ✓	Initially install at one location as a demonstration site before widespread application across the watershed.
Drainage Ditch Modification	**Sunnyside Subwatershed**- Introduce series of small weir steps along Van Buren rd. **Mariner/Wesley Subwatershed**- Expose existing stream and ditches to sunlight and at small natural steps to promote retention as land allows.		✓			Ditch within Mariner/Wesley drains through private property, which may extend implementation timeframe. Conservation easement incentives should be considered.
Constructed Wetland/Vegetated Pond	**Bike Bridge Subwatershed**- On Murrells Inlet 2020 property **Vaux Hall Subwatershed**		✓			Proposed site in the Vaux Hall subwatershed is located on private property, which may extend implementation timeframe. Conservation easement incentives should be considered.
Parking Lot Bioretention	**Pine Subwatershed**- Murphy's Law Shopping Center **Point Dr. Subwatershed**- Krogers Shopping Center			✓		
Watershed Wide BMPs						
Pet Waste Stations	Currently, there are six pet waste stations maintained in Georgetown County. Prioritize new installations in Horry County.	✓				Evaluate the need for new stations every 2-3 years.
Rain Barrel Installation	Businesses, public buildings, and homeowners	✓				This should be an ongoing effort. Target goal of 100 new installations per year.
Tree Planting	Shorelines, parking areas, street corridors, and interested residents and Homeowners Associations	✓				This should be an ongoing effort. Target goal of 1,000 new tree plantings per year. Local non-profit Trees for Tomorrow planted 2,400 trees in their first year as an organization.
Feral Cat Spay/Neuter Program	Focus on areas with known colonies with property owner permission		✓			Grant opportunities are available through Pet Smart Charities.
Dumpster and Trash Can Maintenance Campaign	Particularly important near waterfront areas.	✓				Particular emphasis should be made to empty trash cans daily during peak summer season.

Shellfish Habitat Restoration Projects	Identify priority locations in a 5 year strategic plan	✓				Organize at least one restoration project with the assistance of volunteer groups on an annual basis.
Inlet Dredging	Sedimentation has restricted navigation and affected tidal flow exchange in several portions of Murrells Inlet				✓	
Non- Structural/Administrative BMPS						
Revise Murrells Inlet TMDL			✓			Critical task needed to implement effective structural BMPs based on an accurate load reduction estimate by bacteria source.
Inlet-Friendly Business Program			✓			Refer to the City of Conway as a good example nearby.
Sewer District/ County Stormwater Department Coordination	Any pertinent information about locations of major infrastructure improvement or sanitary sewer overflow incidents.	✓				Coordination should be ongoing. Relevant data or information collected by the respective stormwater departments should be reciprocated and passed on to the sewer districts as well.
Organize an Environmental Law Enforcement Coalition			✓			This coalition should consist of relevant local, state, and federal agencies including but not limited to the US Coast Guard, SC DHEC, SC DNR, Huntington Beach State Park, Horry and Georgetown Counties.
Reinstitute Conditionally Approved Shellfish Classifications in Murrells Inlet	Principally in the southern end near the freshwater impoundment at Huntington Beach State Park			✓		State-level funding and personnel resources is the biggest obstacle preventing sooner implementation.
Designate northern portion of Murrells Inlet as shellfish habitat restoration area				✓		The concept behind this proposal is to restore the natural functions and ecological services of oyster reef and marsh habitats in this portion of Murrells Inlet. The reefs would provide filtration and water circulation which would help improve water quality conditions. Harvesting would remain restricted to protect public health.
Shoreline Buffer Incentive Program	Mostly applies to properties along the Murrells Inlet waterfront but should also be promoted for properties adjacent to stormwater ponds, canals, and creeks.			✓		
Establish Estuary Protection Overlay Zoning District	An inherent challenge is the multijurisdictional nature of the Murrells Inlet watershed, requiring mutual agreement and coordination in order to implement watershed-wide.			✓		The provisions included in the zoning overlay district would be tailored to enhance water quality protection in Murrells Inlet. Focus areas could include the incorporation of pervious surfaces, utilization of rain harvesting devices, shoreline buffer establishment and/or appropriate landscaping designs.