Element F: Recommended Watershed Management Measures

Improving water quality within Hog Inlet and Dunn Sound Creek will require proactive and creative management practices amongst a multitude of stakeholders, both public and private. This element outlines recommended strategies to consider implementing in the watershed. The set of recommendations included in this element were developed based on the existing conditions observed in the watershed by the planning team as well as an analysis of the available SC DHEC water quality data reviewed in **Element D**. Findings from the microbial source tracking study conducted in the fall of 2016 were also helpful in determining appropriate management strategies to employ in various locations throughout the watershed.

This element is structured to distinguish various types of Best Management Practices as well as highlight considerations that need to be evaluated during BMP selection. The first section of this element outlines each of these key factors. In the second half of the element, specific BMP recommendations are outlined with notes evaluating the key factors that should be addressed during the implementation process.

I. Best Management Practice Location

One of the basic variables in Best Management Practice implementation is locating them within the watershed. A simple distinction is whether a BMP can be applied watershed-wide or if a particular BMP is site specific. The distinction is explained in further detail below:

Watershed-wide BMPs: These recommendations can apply to the entire watershed or at least a large portion of it. As an example, a goal could be to reduce pet waste as a source of bacteria. A possible implementation measure could be to increase public awareness regarding the water quality concerns related to pet waste in sensitive shellfish habitats such as Hog Inlet and Dunn Sound Creek. If implemented, the BMP measure would apply across the entire watershed. Another example could be to encourage property owners to install rain barrels at their place of residence or business to help reduce stormwater runoff volumes from their properties. An activity could be to host community workshops where attendees could purchase a rain barrel at a significantly reduced price. Technically, this BMP example would not apply across the entire watershed as there are very few buildings on Waties Island; however for the purposes of this watershed plan, this classification will be used as it could be applied across a large portion of the Hog Inlet Dunn Sound Creek watershed.

Site Specific BMPs: Many BMPs target site-specific locations within a watershed where an identified source of bacteria is present, a unique opportunity exists, or siting requirements limit the number of available locations to implement a particular type of BMP. As an example, a BMP recommendation to connect known failing septic systems to the centralized sewer system would obviously be limited to the street or building where the need is identified. An additional BMP example is to establish a shellfish restoration site within the estuary. Candidate sites will need to be prioritized based on a number of factors including access, marsh vegetation, hydrology, expectations of long-term benefit, etc.

II. Structural Best Management Practices vs. Non-Structural Practices

Effective watershed management involves all types of innovative strategies. Two broad categories of BMPs are described below.

Structural Best Management Practices: This category of management strategies are typically physical infrastructure devices or practices. Sometimes they can be stand-alone BMPs or be a sequence of BMPs within a larger drainage basin.

Non-Structural Best Management Practices: This category of management strategies focuses more on community level policy changes or public outreach efforts intended to change behavior or influence action to improve water quality. An example of a non-structural BMP would be to enforce a pet waste ordinance.

Oftentimes, the implementation of structural BMPs can be encouraged by the use of non-structural BMP mechanisms. As an example, a local government can encourage homeowners to install a BMP device such as a rain barrel by reducing their annual stormwater fees for a specified period of time.

III. Barriers to Implementation

With any watershed improvement project or activity there may be factors that must be addressed to ensure successful implementation. The following is a list of common constraints that may influence the feasibility of various BMP ideas.

Installation Costs: Stormwater and sewer utility infrastructure projects can entail significant capital costs. The long-term value to the direct beneficiaries and the community at large must justify the expense. It can be helpful to identify multiple reasons for a proposed project besides just water quality improvements. As an example, connecting sewer to residences with failing septic systems can eliminate a public health risk and improve the quality of life for those directly benefitting. In many cases, strong evidence from available water quality data can also enhance the merit of a proposed infrastructure project. When comparing one BMP alternative with another, the long-term costs associated with the project must be accounted for.

Maintenance Burden: Once a BMP is installed, resources may still be needed to ensure that it is being regularly maintained and functioning properly. Before installation is finalized, it should be clear as to who the maintenance responsibility falls on. If it is the local government, then funding should be included in the annual stormwater department budget. Stormwater department staff should be certain that recurring costs should be properly budgeted for if the proposed BMP will require an expensive specialized piece of equipment to maintain the BMP. Appropriate training should be offered to homeowners associations or individual homeowners who bear the responsibility of BMP maintenance.

Property Access/ Owner Agreements: Oftentimes the ideal location for a structural BMP is on private property or land owned and maintained by a state agency such as SC DOT. These circumstances will require a property easement which will likely require proactive communication with the property owner. A full explanation as to the purpose of the project and the extent of the area to be used for the BMP should be provided. Property owner willingness will inevitably vary, therefore identifying multiple alternative sites can be helpful if the preferred site becomes unfeasible. Since roadway corridors are common locations for stormwater management devices, a partnership with SC DOT should be pursued to ensure that necessary encroachment permits are obtained in a timely manner.

Site Limitations: As part of the due diligence of implementing any structural BMP, evaluating site conditions such as soil type, seasonally high water table level, and drainage patterns is critically important. The effectiveness of several different types of stormwater BMPs varies considerably depending on these factors.

Public Acceptance: A desired outcome of the planning process is to generate public interest and concern with water quality issues facing Hog Inlet and Dunn Sound Creek. Many of the BMPs included in the watershed plan require some level of public participation or buy in. The public survey distributed at the beginning of the planning process indicated that the respondents did support efforts to improve water quality, however willingness to support individual BMPs varied considerably. Utilizing this information, some BMPs might require further public outreach and education in order to garner the necessary support.

Partnership Commitments: Most, if not all, of the BMPs recommended in this watershed plan require some level of partnerships in order to come to fruition. Diverse stakeholders can contribute a variety of resources to a project including local knowledge, scientific expertise, volunteer time, available property, funding, etc. Therefore, it is important from the outset to determine what partnerships are needed for a project to commence and be sustainable.

IV. Implementation Timeframes

The management strategies outlined in this element each require their own specific partnerships and resources in order to be implemented in the watershed. For some initiatives, many of the resources already exist or are easily available. All that is needed is a committed lead entity to ensure that the effort is being executed and monitored. Other strategies entail more extensive capital improvement projects requiring larger funding sources. These types of projects may take up to ten years or longer to fully implement. Although the proposed "long-range" projects may seem like an unlikely wish list, documenting the project need in planning processes such as this one is a key initial step in obtaining the necessary support to having these projects come to fruition. Horry County and North Myrtle Beach should consider incorporating projects recommended in this watershed plan into future updates of their respective Capital Improvement Plan and Comprehensive Plan processes.

Immediate- Within three years: BMPs that can be implemented in this timeframe generally have few barriers to implementation and the resources such as funding, and/or committed partners, are reasonably available. BMPs that can be implemented within a short period of time following the adoption of the plan help to generate momentum for implementing other recommendations included in this watershed plan. These BMPs can also serve as demonstration sites providing public education opportunities on the purpose of each device and how it relates to the overarching goals of the watershed plan.

Intermediate- 3-5 years: In an ideal world, all of the BMPs recommended in this watershed plan would be started and finished within a few years. In practicality, implementation resources are not unlimited and many factors need to be addressed before a project can move forward. Providing realistic timeframes on each BMP recommendation is important in order to avoid false expectations when advocating for various watershed management strategies. Often, projects that can be completed in an intermediate timeframe may be relatively simple in scale and design but still require an allocation of funds, committed partners, and identified suitable sites.

Long-Range- Over 5 years: These BMPs are often very large in scale and entail significant capital investments, lengthy permitting processes, and/or widespread public support. The Cherry Grove canal dredging project is a prime example of a long-range project.

The next section outlines BMP strategies aimed at reducing bacteria loads entering Hog Inlet and Dunn Sound Creek or provide indirect benefits that will help improve the overall ecological health of the local estuary.

V. Watershed Wide Best Management Practices

The following section outlines best management practices that can and should be encouraged across the entire watershed. Most of them involve public education and outreach initiatives designed to influence individual behaviors and actions to protect the watershed.

Recommendation F-1: Increase efforts to discourage people from feeding birds and wildlife. Feeding wildlife can attract large populations of animals to urbanized portions of the watershed, where stormwater runoff can exacerbate the transport of bacteria sources into the estuary. Appropriate signage in public parks and other areas can help deliver this outreach message.

Anticipated Timeframe: Immediate and ongoing.

Potential Barriers: Public Acceptance. Feeding birds and animals can seem innocent; however, if left uncontrolled, issues with nuisance wildlife in developed portions of the watershed can arise and contribute to bacteria sources entering the watershed. Making the general public aware of this connection between this behavior and the impact on the environment can be challenging and require creative and targeted messaging.

Recommendation F-2: Continue to make proper pet waste disposal a priority public outreach initiative by enforcing local ordinances and maintaining existing pet waste stations throughout the community. The City of North Myrtle Beach has been proactive in addressing this issue. The City of North Myrtle Beach has installed and maintains pet waste stations at 48 locations across the community. Pet waste should be one of the most preventable sources of bacteria affecting water quality in the estuary.

Anticipated Timeframe: Continue existing efforts.

Potential Barriers: Maintenance of disposing and refilling bags at each pet station. Also public acceptance can be an issue. Outreach initiatives should be highly visible and focus messaging on the link between dog waste and the fecal coliform bacteria impairments within the estuary. Messaging should also be directed towards visitors to the area who likely have less familiarity with coastal ecological issues including water quality threats to local shellfish areas.

Recommendation F-3: Work closely with Horry County Animal Control Center and nearby animal shelters, such as the Humane Society of North Myrtle Beach, to periodically assess known areas with feral cat populations. As needed, pursue a spay-neuter and release program with the assistance of grant programs such as Petsmart Charities to ensure that feral cat populations remain level.

Anticipated Timeframe: Presently, feral cat populations are stable; however, this is a common issue along the Grand Strand. Once every three years, a general assessment should be conducted to determine if any management actions are required.

Potential Barriers: It is nearly impossible to completely eliminate feral cat colonies from urbanized neighborhoods. There are also public perception concerns related to managing colonies without harming individual cats. Spay, neuter and release programs have shown to be a humane and effective way to manage feral cat populations.

Recommendation F-4: Initiate a campaign to encourage property owners to secure their trash cans and dumpsters. In a windshield survey of the watershed at the beginning of the planning process it was evident that a large percentage of dumpsters were unsecure. This can attract nuisance wildlife such as raccoons and opossums in large groups. Dumpsters are typically located in parking lots or side streets which commonly experience runoff conditions following a storm event. These dumpster sites can easily become a source of bacteria if nuisance animals are frequently congregating in and around them. Stakeholder groups to contact and work with on this initiative include homeowner and property associations, particularly at high density condominium complexes, commercial businesses, and various municipal departments.

Figure F-1: Open and unscreened dumpsters can attract nuisance wildlife. Dumpsters are often located in parking lots with extensive impervious surfaces. As a result, dumpster sites can become sources of bacteria. While individually small, cumulatively can be an issue across the watershed.

Anticipated Timeframe: Immediate and ongoing. It will take a full year of concerted effort to identify and make contact with each entity in this targeted stakeholder group. In order for the campaign to be effective, periodic reminders perhaps once a year would be helpful.

Potential Barriers: Partnership commitments. With such a large inventory of dumpsters and trash cans throughout the watershed, it is difficult to reach out to all of the relevant contacts to make this campaign successful. An appropriate strategy could be to approach one targeted group at a time.

Recommendation F-5: Promote the installation of rain barrels and cisterns on private residences and businesses. Investigate strategies to distribute rain barrels at a discounted price. Target willing and interested audiences such as Keep North Myrtle Beach Beautiful volunteers or homeowners associations. Rain barrels are a simple and effective means of reducing stormwater runoff volumes from an individual property. The more rain barrels installed across the watershed the greater the cumulative impact.

Anticipated Timeframe: Immediate and periodic.

Potential Barriers: Partnership commitments. The key to success in implementing this recommendation will depend upon a commitment from a vendor which will supply the rain barrels at an attractive price point. In addition, these programs draw more attention when spotlighted at a public event and/or with endorsement and support of homeowners associations which can provide the pertinent details directly to the residents.

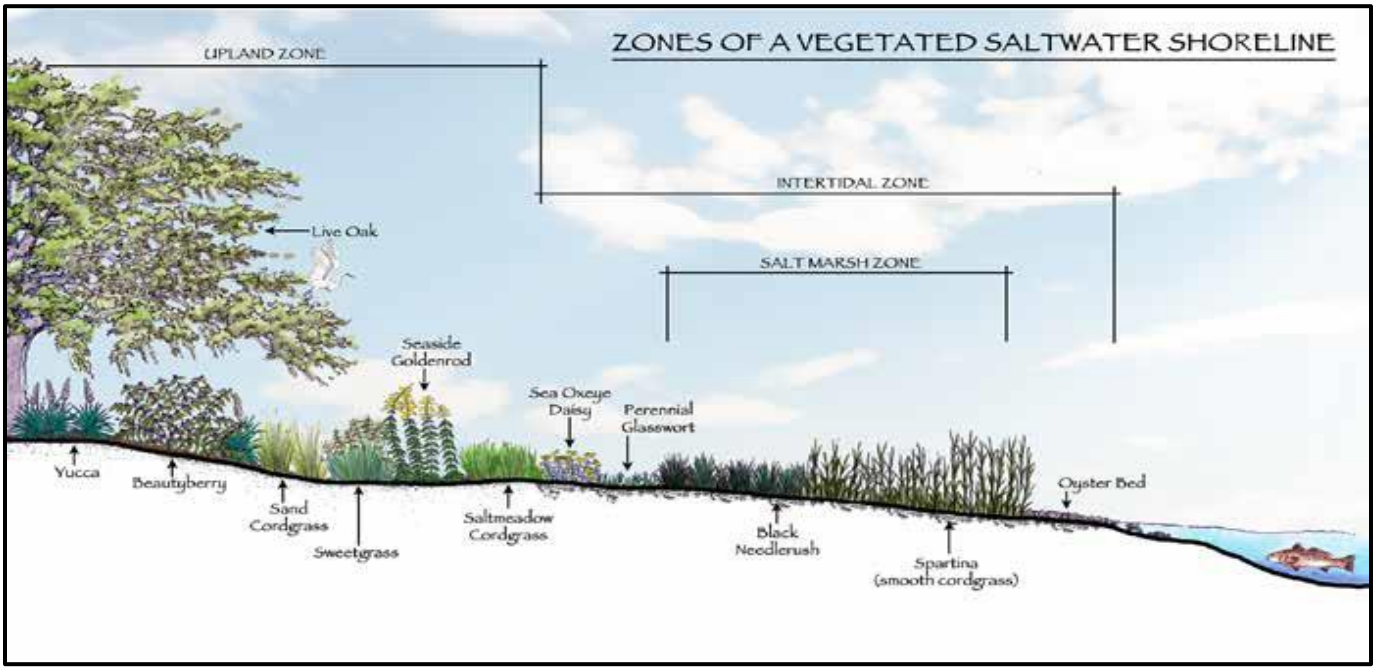
Figure F-2 Typical rain barrel setup for a small to medium sized residential building or a small commercial building.

Recommendation F-6: Consider regulatory and/or incentive based strategies to encourage property owners to establish a vegetated buffer along estuary shorelines as well as stormwater ponds and ditches. Vegetated buffers

help stabilize shorelines and decrease erosion. If the buffer is wide enough it can help filter stormwater prior to discharge into the receiving waterbody or stormwater pond. A well established buffer can also discourage waterfowl from congregating near ponds, thereby reducing the potential of essentially a direct source of bacteria into the estuary.

Anticipated Timeframe: Intermediate

Potential Barriers: Public Acceptance. In the real estate, restaurant, and accommodations markets, there is a high demand for waterfront properties. There are inherent challenges in convincing property owners to establish a vegetated buffer if there are perceptions that the waterfront views will be detracted or direct water access would become limited. There is also a perception that vegetated buffers are themselves unattractive. Property owners should be educated that proper design and alternative plant options can enhance the visual appeal of the shoreline site. Below is an illustration from Clemson University Extension Service depicting a healthy shoreline along a saltwater marsh habitat.



Recommendation F-7: Utilize resources of the City of North Myrtle Beach's Tree City USA program to strategically locate native trees and shrubs in areas that provide optimal stormwater management benefits or stabilize erosion near estuary or pond shorelines. Create an inventory of tree plantings and develop a 5-10 year plan of areas within the watershed to prioritize for new plantings.

Anticipated Timeframe: Intermediate and periodic.

Potential Barriers: Installation costs and maintenance burden. There are expenses involved with purchasing street trees and allocating staff time to oversee a large-scale urban forestry program. The ideal approach would be to make incremental investments and seek out grant opportunities to supplement the Tree City USA program.

VI. Site Specific/ Neighborhood Scale BMPs

The following section outlines best management practices that are intended to be implemented in specific locations within the watershed. Many of the recommendations focus on infrastructure improvements and habitat restoration projects. The catchment area(s) where the BMP is proposed is indicated under each recommendation.

A. Sanitary Sewer Extension

The majority of the commercial corridors and residential neighborhoods in the Hog Inlet/ Dunn Sound Creek watershed are connected to the North Myrtle Beach sanitary sewer system. The most recent force main sewer line extension made sanitary sewer available along Little River Neck Road to as far as the Myrtle Beach RV Resort. Several existing buildings and neighborhoods along with recent new developments have connected to the sanitary sewer system. However there

remain several buildings and streets in that area that have not connected to the main sewer line on Little River Neck Road. While sewer service is provided throughout the Cherry Grove Beach area, it is suspected that there may be a few isolated houses that never connected to the system and still rely on their own onsite septic system. Further investigation may be warranted to identify which residences in this area are not connected to the sewer system and work with the property owners to explain available options.

Recommendation F-8: Continue efforts to connect residences to North Myrtle Beach's centralized sanitary sewer system particularly along Little River Neck Road. Seek funding sources such as Community Development Block Grant (CDBG) or 319 Grant programs that may assist those who cannot afford the connection costs. If connecting to the sanitary sewer system is not feasible, explore other options such as septic system repair or replacement.

Anticipated Timeframe: Intermediate. It will likely take longer than 3 years to connect most of the candidate residences and businesses to the sanitary sewer system, however this effort should commence within 3 years with substantial progress achieved within 5-10 years.

Potential Barriers: Installation costs, public acceptance, property owner agreements.

Catchment Areas: Hill Street, Little River Neck-Marsh Side, Little River Neck- Waterway Side.

Recommendation F-9: Inventory residences within the Cherry Grove Beach area that still rely on a septic tank. Discuss costs and benefits of connecting to the sewer line or options to upgrade septic system with property owners of identified residences.

Anticipated Timeframe: Intermediate. Fortunately the microbial source tracking study revealed that no significant human sources bacteria were suspected in Cherry Grove. However, to completely eliminate the potential source, action should be taken as failing septic systems are encountered.

Potential Barriers: Installation costs, property owner agreements.

Catchment Areas: East Cherry Grove, and to a lesser degree Sea Mountain Hwy to 11th Ave. North.

Recommendation F-10: Continue maintaining the existing sanitary sewer system to ensure all components including pump stations and sewer lines are structurally sound and properly functioning.

Anticipated Timeframe: Immediate and ongoing. Regular inspection and maintenance of the entire sanitary sewer system should continue. A phased upgrade schedule should be implemented to replace older components within the sewer network.

Potential Barriers: Operation and maintenance costs. While ongoing maintenance can entail significant operational funds, the costs of responding to unanticipated malfunctions can be much more costly.

B. Septic System Management

It is possible that a fair percentage of the properties served by onsite septic systems have suitable site conditions for an onsite septic system and have no immediate need to connect to the sanitary sewer system. However, these property owners still have a responsibility to regularly inspect and properly maintain their septic systems. Below are recommendations on how North Myrtle Beach and Horry County can assist homeowners with ensuring that their septic systems are functioning properly.

Recommendation F-11: Inventory properties known to have existing septic systems and conduct preliminary site analysis on septic tank suitability based on soil types and water table level. Conduct periodic workshops with property owners demonstrating how septic systems function and provide guidance on inspecting and maintaining septic systems. Share information regarding who to contact if the system begins malfunctioning, and resources available to replace the septic tank or connect to the centralized sewer system.

Anticipated Timeframe: Immediate and ongoing.

Potential Barriers: Public acceptance and installation costs associated with septic system replacement or connection to sewer system.

Catchment Areas: Hill Street, Little River Neck- Marsh Side, Little River Neck- Waterway Side.

Recommendation F-12: Develop a comprehensive incident response plan to address occurrences of known septic system failure. Provide the public with a mechanism for reporting septic system complaints within their neighborhoods. Utilize a combination of enforcement strategies and incentive tools to remediate failing septic systems. As part of an assessment of each individual residence, inspect all plumbing fixtures for leaks which may be resulting in a higher than normal loading rate on the septic system drain field.

Anticipated Timeframe: Dependent upon receipt of complaints of failing septic systems.

Potential Barriers: Remediation costs, especially if the number of failing septic systems discovered is very high.

Catchment Areas: Hill Street, Little River Neck- Marsh Side, Little River Neck- Waterway Side.

C. Stormwater Infrastructure Improvements

As discussed at length in **Element C**, the predominant transport mechanism for bacteria entering the estuary is via stormwater runoff. Continued growth is anticipated in the watershed area, particularly along Little River Neck Road. As stormwater management technologies have advanced, implementation of LID principles should be encouraged and opportunities for retrofitting areas with conventional stormwater infrastructure should be evaluated.

Recommendation F-13: Construct an ocean outfall to divert stormwater entering the estuary at Sea Mountain Hwy near Cecelia St. offshore. The outfall would divert stormwater primarily from the Surf Golf and Beach Club as well as a portion of Sea Mountain Hwy. The Hog Inlet Microbial Source Tracking Study indicated a strong correlation between bacteria levels and freshwater inputs during wet weather events at the SMH sampling site.

Anticipated Timeframe: Intermediate. This project is currently on the City of North Myrtle Beach's capital improvements plan and is scheduled to commence within 2-3 years.

Potential Barriers: By far the biggest hurdle is the capital costs necessary to construct the outfall.

Catchment Areas: Sea Mountain Hwy to 11th Ave North, and a portion of East Cherry Grove

Figure F-3 View of the sediment box and piping of the shoreline section of an ocean outfall project in Myrtle Beach. The large scale nature of this type of stormwater infrastructure project entails significant capital costs.

Recommendation F-14: Identify candidate stormwater ponds for the installation of floating wetland devices. Floating wetlands have become more widely accepted stormwater management practices, providing many water quality benefits including reduction in nutrient levels, total suspended solids, and pathogenic bacteria. They also provide habitat for aquatic species. Many of the ponds within the watershed have brackish waters making plant selection for the floating wetland device challenging. The 39th Ave North pond could serve as a good demonstration site to help determine widespread applicability throughout the watershed.

Anticipated Timeframe: Intermediate.

Potential Barriers: Site limitations, installation costs, and maintenance requirements**.** The biggest initial hurdle is determining whether the brackish nature of many of the stormwater ponds are suitable for the installation of a floating wetland. A demonstration site would help managers determine design considerations and appropriate plant selection prior to widespread application of floating wetland BMPs in the future.

Catchment Areas: Initially, pursue the installation of a floating wetland at the 39th Ave N pond as a demonstration site, which is located in the East Cherry Grove catchment area.

Figure F-4 Example of a floating wetland stormwater BMP application.

Recommendation F-15: Utilize available mechanisms to continue installing pervious surface parking lots and streets throughout the watershed. As a long-term goal, install pervious pavement on the last 50-100 ft sections of each of the dead end streets in the Cherry Grove Beach area. The drainage system within the Cherry Grove Beach area does not have a conventional curb, gutter, and drainage ditch storm sewer system. Instead, during storm events, precipitation runs off as sheet flow across the landscape, particularly along impervious surfaces. By retrofitting the dead end streets with pervious pavement, stormwater runoff would have a better chance of infiltrating into the ground surface prior to reaching the estuary shoreline.

Anticipated Timeframe: Long-term.

Potential Barriers: Installation costs.

Catchment Areas: East Cherry Grove, Seas Mountain Highway, Hill Street, Little River Neck- Marsh.

Recommendation F-16: Work with property owners who keep livestock on their land to ensure that sources of bacteria from agricultural runoff are minimized. Provide consultation to interested property owners on Best Management Practice techniques and seek grant assistance for implementation strategies that may entail upfront capital costs.

Anticipated Timeframe: Intermediate.

Potential Barriers: Installation costs, property owner agreements.

Catchment Areas: Primarily Little River Neck- Marsh and Little River Neck- Waterway.

Recommendation F-17: Work with the Army Corps of Engineers to investigate the possibility of opening a second ocean inlet through Cherry Grove. Historically, there was an inlet between 39th Ave N and 42nd Ave N in Cherry Grove. The inlet closed as a result of natural hydrological processes and major tropical storm events, most notably Hurricane Hazel in 1954. The Army Corps of Engineers oversees restoration projects such as this one through the Section 206 Aquatic Ecosystem Restoration and the Estuary Restoration Act programs. Details about this funding source are provided in **Element H**. Restoring the second ocean inlet site at this location would improve the daily tidal circulation of the southern half of Hog Inlet. This daily flushing of high salinity ocean water would likely help lower fecal coliform levels especially in the upper reaches of the estuary.

Anticipated Timeframe: Long-term.

Potential Barriers: Installation costs, site design.

Catchment Areas: East Cherry Grove.

D. Oyster Reef Restoration

Studies have shown that there has been a loss of 85% of oyster reef habitats throughout the world over the past century. Product demand and coastal landscape changes along the South Carolina coast have put local oyster reef habitats at risk as well. There are many benefits to protecting the oyster reef habitats that exist in Hog Inlet and Dunn Sound Creek and identifying areas within the estuary that would be prime candidate sites for restoration. Oyster reefs help to stabilize shorelines, filter the water column, and serve as a critical nursery area for other marine species. Below is an overview of two programs in our region that can provide resources needed to pursue local initiatives in Hog Inlet and Dunn Sound Creek.

Coastal Oyster Recycling and Restoration Initiative (CORRI): Supported by Coastal Carolina University faculty and students, CORRI is an innovative partnership-based program designed to collect recycled oyster shells and then utilize the shells to reestablish oyster reefs in our regional estuaries. Since the program was initiated in 2013, CORRI has established oyster reef restoration sites in six tidal creeks throughout the Grand Strand including one in Hog Inlet. The success of the program is contingent upon a commitment from participating restaurants to separate the oyster shells from the rest of their daily waste stream. The program also relies on volunteers to bag the collected shell and assist on work days to place the shell at the selected restoration site.

SC DNR, SC Oyster Restoration and Enhancement Program (SCORE): SC Department of Natural Resources (SC DNR) manages a similar volunteer based program across coastal South Carolina. There is an oyster shell collection trailer located off of Sea Mountain Hwy where residents, visitors, and businesses can drop off their used shell, which is then used for future restoration sites. SC DNR has established 40 restoration sites throughout the state since 2001, however no sites have been located in Hog Inlet/ Dunn Sound Creek.

Figure F-5 Volunteer group working with the CORRI program to place bagged recycled oyster shells in Hog Inlet to restore the oyster reef habitat in this part of the estuary.

Recommendation F-17: Create partnerships with local restaurants and seafood businesses to establish a shellfish recycling program in the greater Little River/ Cherry Grove area. Through the recycling program, raise public awareness regarding the ecological role of oyster reefs in salt marsh habitats and the need to protect and restore local reefs.

Anticipated Timeframe: Immediate and ongoing**.** An oyster shell recycling program would be a highly visible initiative that would help garner attention to other aspects of the watershed planning effort. It might take five or more years for the recycling program to reach its maximum potential but it should be manageable to begin the initial steps of formalizing commitments within the first two years of the adoption of this watershed plan.

Potential Barriers: Partnership Commitments. This effort is highly dependent on commitments from restaurants and seafood markets/grocers to recycle oyster shells.

Recommendation F-18: Work with oyster reef ecology experts at Coastal Carolina University and other resource agencies such as SC Department of Natural Resources to identify appropriate restoration sites within Hog Inlet and Dunn Sound Creek. Recruit volunteers and schedule restoration work days on a yearly basis if possible. Work with the SC DNR SCORE program to establish a restoration site in Hog Inlet and Dunn Sound Creek especially if the oyster shell drop off trailer is being actively utilized.

Anticipated Timeframe: Intermediate and ongoing. Efforts between the CORRI program and the SCORE program should be coordinated. Restoration site selection should also factor in the oyster reef and marsh restoration project that is planned as part of the Cherry Grove canal dredging project mitigation agreement.

Potential Barriers: Partnership commitments and site limitations. An active dialogue between representatives from SCORE and CORRI will help to ensure that available resources are maximized and well coordinated. Restoration site selection is dependent upon adequate access and suitability in terms of tidal flow and established shoreline areas.

Recommendation F-19: As SC DHEC monitoring stations indicate that fecal coliform water quality standards are being attained, petition SC DNR to maintain shellfish beds within Hog Inlet and Dunn Sound Creek as state shellfish grounds for recreational harvest only. A consensus sentiment amongst public stakeholders during this watershed planning process was that the best strategy to ensure long-term sustainability of the oyster reef resources would be to limit commercial harvest and carefully permit recreational harvest. This would help preserve the cultural value of the oyster beds to the residents of the Cherry Grove/ Little River Neck area and position the community for ecotourism benefits associated with recreational shellfish harvesting opportunities.

Anticipated Timeframe: Intermediate. The formal petition to SC DNR is dependent upon the attainment of the water quality standards at the SC DHEC monitoring stations. As water quality trends improve, a dialogue between local watershed stakeholders and representatives from SC DNR's Shellfish Management Program should commence.

Potential Barriers: Public Acceptance. While there is initial public support to have the shellfish beds and Hog Inlet and Dunn Sound Creek designated as state shellfish grounds, sustained leadership and advocacy will likely be necessary to ensure that the designation request is granted by SC DNR.

The next element highlights additional Best Management Practices that focus on public outreach initiatives to educate residents and visitors on water quality issues concerning the Hog Inlet estuary and engage them in stewardship activities to preserve local natural resources.

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Element G: Public Outreach and Education Resources

A major point of emphasis throughout this plan is to convey to all stakeholders that in order to improve water quality in Hog Inlet and Dunn Sound Creek, a multifaceted management approach must be pursued. With that in mind, everyone that visits, lives, or works in the watershed has a role to play in achieving successful outcomes towards this ultimate goal. This element profiles organizations that can provide resources to assist with public outreach and educational efforts in the community. This element also provides specific guidance on various stakeholder groups where targeted messaging or outreach could improve the desired reach. Finally, a list of specific recommended public outreach and education strategies is outlined, focusing on the roles that the public can play in improving water quality within the Hog Inlet and Dunn Sound Creek watershed.

I. Public Education Resources

Below is a list of local and regional organizations that can provide resources needed to develop an effective public outreach and education program:

A. Keep North Myrtle Beach Beautiful: Supported by the North Myrtle Beach Parks and Recreation Department, a local chapter of Keep America Beautiful is engaged in education programs and stewardship activities to enhance the environment and quality of life in the North Myrtle Beach community. There are several opportunities for residents to get involved with Keep North Myrtle Beautiful, a few of which are outlined below:

- Keep North Myrtle Beach Beautiful organizes numerous clean up events at different times during the year. In the spring, the city participates in the Great American Cleanup, known as the largest community improvement program in the nation. Each September, a Beach/Creek litter sweep event is held as part of South Carolina's largest one-day volunteer cleanup, now in its 28th year.
- Keep North Myrtle Beach Beautiful maintains an Adopt-a-Park or Beach Access program which assigns volunteer groups to a location that is to be cleaned up twice a month in the summer and once per month through the remainder of the year.
- Keep North Myrtle Beach Beautiful has a strong partnership with five local schools to establish a Keep America Beautiful Kids youth affiliate. An after school club meets monthly to organize various educational and volunteer activities at their respective schools and in the community.

B. Keep Horry County Beautiful: Horry County also has a very active local chapter of the Keep America Beautiful Program. Coordination of activities between each chapter might be beneficial to maximize resources and end results. The Keep Horry County Beautiful chapter has a Community Cleanup Program which engages local organizations and citizen groups in regular cleanup events at designated areas. Organizing a cleanup group in the Little River Neck area would be worth pursuing. Several respondents to the watershed plan survey indicated the presence of significant litter along Little River Neck Road.

C. Coastal Waccamaw Stormwater Education Consortium (CWSEC): In 1999, the US EPA expanded the Municipal Separate Storm Sewer System (MS4) permit program to a second phase requiring approximately 6,700 smaller urbanized areas to obtain NPDES permit coverage for their stormwater discharges. North Myrtle Beach and the urbanized portions of Horry County along with several other coastal communities within the Grand Strand area were included under the MS4 Phase II program at that time. There are six minimum control measures that permittees must address with a heavy emphasis on public education and involvement. In an effort to maximize the efficiency and regional impact of these efforts, the CWSEC was formed in 2004

with support from Atlantic Beach, Surfside Beach, Conway, Myrtle Beach, Briarcliffe Acres, Georgetown County, Horry County, and North Myrtle Beach. Today, the CWSEC maintains a website, http://cwsec-sc.org/ providing information about stormwater related issues and news and events within the Grand Strand region. The Consortium also works with the participating jurisdiction members, as well as regional education provider partners, to plan and coordinate events and activities based on needs and issues identified by the Consortium. The CWSEC is a valuable resource to utilize as public education strategies are identified in the Little River Neck and Cherry Grove Beach communities.

D. Carolina Clear: A public service initiative of Clemson University, the mission of Carolina Clear is to educate communities about the significance of South Carolina's water resources and the role they play in the state's economy, environment, and overall quality of life. Numerous public outreach campaigns and programs are organized to raise awareness of stormwater related issues with the goal to change behavior that can have a positive impact in improving water quality. Specific focus areas include:

- Training responsible entities such as homeowners associations, property management companies, and waterfront residents on maintaining community stormwater ponds. Guidance on how to prevent and address common problems such as aquatic weeds, fish kills, shoreline erosion, poor water quality and nuisance wildlife is provided.
- Carolina Yards is a popular program across the state which encourages residents to create healthy, watershed-friendly landscapes by taking simple steps such as installing rain barrels for onsite irrigation, reducing runoff, selecting native plants, and proper use of lawn fertilizers.
- The South Carolina Low Impact Development (LID) Atlas is a tool used to highlight examples of specific sites which incorporate LID techniques. The LID Atlas serves as a way to provide recognition to entities for instituting conservation measures such as LID while also providing a database of project examples that developers and property owners can refer to when considering various LID options. The LID atlas is a joint effort between Carolina Clear, National NEMO Network (Nonpoint Education for Municipal Officials) SC NEMO, SC Sea Grant Consortium, and Clemson University's Center for Watershed Excellence.

The Carolina Clear website serves as an extensive information hub with factsheets, YouTube videos, and guidance documents that make for a great starting point in learning more about water quality issues that affect the state's waterways and possible solutions that can be applied within our communities. http://www.clemson.edu/public/carolinaclear/

II. Public Survey Results

A public survey was distributed in the Spring of 2016 to gauge stakeholder knowledge of the Hog Inlet- Dunn Sound Creek watershed and their level of concerns with regards to water quality and shellfish resources within the estuary. The full results are included in **Appendix E**.

The survey, along with public meeting attendance sheets, enabled the planning team to identify the various audiences that are engaged in the planning process and prioritize their concerns as implementation efforts commence.

There were also some public outreach and education needs that became obvious in a review of the survey results. Below are a few observations from the survey with some corresponding public outreach strategies.

- Question 4 asked respondents whether they thought water quality conditions have improved or degraded over the past decade. Nearly 50% of the respondents indicated that they were unsure/don't know. During discussions at a public meeting on October 25th, 2016 attendees elaborated, stating that resources such as SC DHEC's monitoring data were not readily available, making it difficult to determine whether water quality was improving or not. This indicates that a more deliberate effort to publicize SC DHEC data and reports is warranted as an initial step in informing the public of local water quality conditions.

- Question 7 asked respondents to indicate their willingness to implement various stormwater management practices, such as rain barrels, pervious pavement, rain gardens, etc on their own private property. Over 80% of private property owners who responded to the question indicated that they either already have BMPs installed or could be interested in installing BMPs. However a large portion of these respondents mentioned that their willingness is dependent on costs and maintenance requirements. Hosting homeowner workshops could be an effective way to explain various options to consider and provide specific cost and maintenance information so that homeowners can determine which BMPs are best suited for them.

Figure G-1 Resident providing the planning team insight on observed water quality concerns within the Hog Inlet estuary.

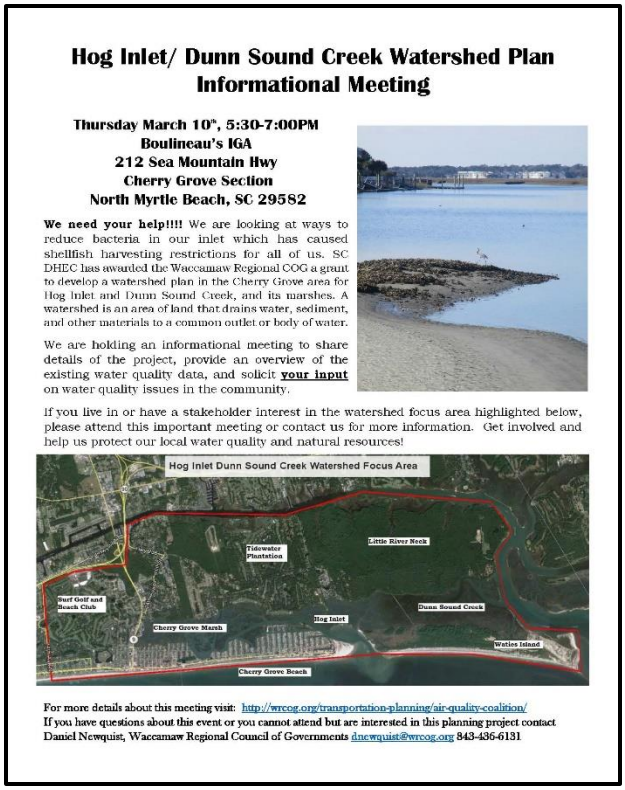
III. Targeted Outreach Messaging

The Hog Inlet/Dunn Sound Creek estuary supports numerous water-based activities attracting diverse stakeholders who value the estuary for varied reasons. There are also residents in the community who own dogs or rely on septic systems that have specific responsibilities to protect water quality within the watershed. This section spotlights different stakeholder groups within the watershed. Public outreach messaging can be tailored to each of these groups based on their typical activities or specific roles in water quality protection efforts.

A. Long-time Residents: Numerous residents who participated in our public meetings and completed our survey, indicated that they have been residents of the area for over twenty years. These residents can serve as a great resource of historical information about the estuary. Some long-time residents and visitors have intimate familiarity with the estuary and can identify changes that have been observed over time. The planning team needs to utilize the local knowledge of this stakeholder group and encourage their continued participation in future implementation activities.

B. Seasonal Residents: A large percentage of homeowners within the greater Little River Neck and Cherry Grove area are part-time residents or recent transplants from across the country. Coastal South Carolina has a unique natural environment with ecological sensitivities that may not be familiar to many residents who are not native to the region. Providing educational opportunities to this stakeholder group can help build local awareness of water quality issues and hopefully translate into continued engagement in various watershed protection activities and initiatives.

C. Local Businesses: Restaurants, seafood markets, grocery stores, and other retail shops and businesses interface with the general public every day and can be great partners in watershed planning efforts. As a small example, Boulineau's IGA in Cherry Grove Beach kindly allowed the planning team to utilize their meeting room to host two public outreach events during the planning process. Several businesses allowed the planning team to post flyers of these events in their storefront windows. Business partnerships



Hog Inlet/ Dunn Sound Creek Watershed Plan
Informational Meeting

Thursday March 10th, 5:30-7:00PM
Boulineau's IGA
212 Sea Mountain Hwy
Cherry Grove Section
North Myrtle Beach, SC 29582

We need your help!!!! We are looking at ways to reduce bacteria in our inlet which has caused shellfish harvesting restrictions for all of us. SC DHEC has awarded the Waccamaw Regional COG a grant to develop a watershed plan in the Cherry Grove area for Hog Inlet and Dunn Sound Creek, and its marshes. A watershed is an area of land that drains water, sediment, and other materials to a common outlet or body of water.

We are holding an informational meeting to share details of the project, provide an overview of the existing water quality data, and solicit **your input** on water quality issues in the community.

If you live in or have a stakeholder interest in the watershed focus area highlighted below, please attend this important meeting or contact us for more information. Get involved and help us protect our local water quality and natural resources!

For more details about this meeting visit: http://wrcog.org/transportation-planning/air-quality-coalition/
If you have questions about this event or you cannot attend but are interested in this planning project contact Daniel Newquist, Waccamaw Regional Council of Governments dnewquist@wrcog.org 843-436-6131

Figure G-2 Example of a public meeting flyer. Local businesses were very generous in distributing this to their customers.

should continue to be pursued with efforts such as oyster shell recycling, rain barrel installation, public outreach campaigns and other stormwater BMP improvements.

D. Residences with Septic Systems: Homeowners who rely on septic systems for their wastewater treatment needs should be cognizant of the potential public health and environmental risks that could occur if they are not properly maintained. Homeowners should be familiar with the exact location of their septic systems, as well as early indications of a malfunctioning system. They should also ensure that items that can clog their system or chemicals that disrupt the biological processes of a septic system are not disposed of when flushing toilets or using kitchen and bathroom faucets. As part of the inspection process, watershed managers should assist homeowners with assessing plumbing fixture leaks which may be over-taxing the septic system drain field. Finally, watershed managers need to work closely with these residents to assist them with septic system inspections, opportunities to repair or replace their systems, or connecting to the centralized sewer system at a reasonable cost.

E. Pet Owners: A common source of bacteria in most developed watersheds are household pets. It is important for pet owners to be cognizant of the connection between pet waste in the environment and the water quality implications on local shellfish resources. North Myrtle Beach has been proactive in installing pet waste stations in public areas to encourage pet owners to dispose of their pet waste properly. Responsible pet ownership is critical in minimizing this preventable source of bacteria in Hog Inlet.

F. Tourists: A challenging stakeholder group to engage with is the sizable seasonal tourist population. Collectively this stakeholder group can have a significant impact on the local environment. Families and individuals may only be visiting the area for a long weekend or a single week so the window of opportunity to convey important messaging pertaining to water quality issues in the Hog Inlet estuary is limited. The interpretive signage at Heritage Shores Nature Preserve is a great example of impactful messaging that effectively educates the public on the natural resources present within the estuary. Signage accompanying most of the pet waste stations throughout the area also conveys the importance of proper pet waste disposal in North Myrtle Beach and Horry County. Where possible, watershed managers should develop partnerships with real estate companies and other businesses who frequently interface with tourists to distribute pertinent information on local water quality issues within Hog Inlet and Dunn Sound Creek.

G. Recreational Fishermen and Boaters: These stakeholder groups are both direct users of the estuary who generally have a strong familiarity with the watershed. During the planning process, several residents recalled a time when shellfish resources were abundant and harvesting oysters was a local tradition. The interest in restoring oyster reefs within Hog Inlet appears to be very strong. These public stakeholders can be great allies in advocating for water quality improvements and assisting in future stewardship activities to protect and enhance local fishery resources. Cherry Grove Boat Landing on 53rd Ave N is a very popular boat launch with access to Hog Inlet. Signage should be prominently displayed to convey the importance of observing no wake zones in Hog Inlet. The Cherry Grove Boat Landing is a suitable site for additional interpretive signage that describes the estuary habitat and the water quality issues that impact local shellfish management.

IV. Recommended Public Outreach and Education Strategies

The following section outlines public education activities to consider as part of a comprehensive watershed management plan in the Hog Inlet-Dunn Sound Creek watershed.

Recommendation G-1: Inventory existing interpretive signs focused on natural resources within the Cherry Grove and Little River Neck area. Heritage Shores Park is an example where an effective and comprehensive interpretive sign package has been implemented. Identify other potential sites, perhaps in close proximity to pet waste stations, beach access areas, boat landings, parking lots, and other public areas. Important messaging could include oyster reef ecology and the importance of clean water quality conditions, potential bacteria sources within the watershed, and strategies and behaviors that individuals can participate in to support water quality protection efforts in the community.

Recommendation G-2: Work with the Horry County School District to educate students about the ecology of the Hog Inlet estuary and the concerns related to bacteria impairments within designated Shellfish Harvesting Areas. Partner with Keep North Myrtle Beach Beautiful to work with their established youth affiliate school partners to organize educational programs and hands-on stewardship activities in the community.

Recommendation G-3: Engage local residents in watershed restoration activities such as oyster reef restoration projects sponsored by CORRI or SCORE. CORRI relies on local business support to recycle oyster shell and community volunteers to bag the shell and place them at identified suitable restoration sites.

Recommendation G-4: Work with SC DHEC to disseminate information relevant to the Hog Inlet/ Dunn Sound Creek estuary in a timely and efficient manner. As the primary regulatory agency for water quality in the State of South Carolina, DHEC is responsible for numerous management and enforcement decisions that impact the use of the watershed for shellfish harvesting or other recreational purposes. Items that should be made readily accessible are the annual shellfish reports for management area 01, sanitary sewer overflow incident reports in the watershed, and resources to help improve water quality such as 319 non-point source pollution grant opportunities. In addition, seek permission from DHEC to supplement their shellfish harvesting restriction signs with educational signage that explains the possible sources of bacteria causing the restrictions along with information that citizens can use to improve local water quality.

Recommendation G-5: As Best Management Practices are implemented, utilize resources such as the Carolina Clear online LID Atlas and the Coastal Waccamaw Stormwater Education Consortium newsletter to share details of the project and the water quality benefits expected from each BMP.

Recommendation G-6: Host workshops with homeowners associations and the local business community to demonstrate various stormwater BMP options and factors that need to be considered prior to final selection, including site suitability, installation costs, and maintenance costs and requirements. In several communities along the Grand Strand Coastal Waccamaw Stormwater Education Consortium has offered assistance with some of these outreach efforts often with the support of undergraduate interns from Coastal Carolina University. Hog Inlet watershed partners should work closely with CWSEC to pursue these opportunities.

Recommendation G-7: The watershed plan implementation committee should identify candidate demonstration BMP sites as opportunities to bring attention to existing water quality issues in Hog Inlet. Selected demonstration sites should be reasonably accessible to the public and provide information regarding the purpose and function of the BMP. As suggested in Recommendation G-1 above utilize interpretive signage to convey information about a particular BMP application.

Recommendation G-8: Host workshops with property owners relying on septic systems to meet their wastewater treatment needs. Explain the importance of properly maintaining septic systems to ensure public health risks are minimized and nearby water quality is protected. Provide information on resources available to ensure that their septic systems are regularly inspected. Also, proactively pursue grant opportunities or other funding sources to assist homeowners with the costs of repairing or replacing septic systems or connecting to the centralized sewer system.

Recommendation G-9: Work closely with the Keep America Beautiful Chapters in North Myrtle Beach and Horry County on activities that fall within their core scope that will help improve water quality conditions in the estuary. Share information regarding water quality issues and management activities in the Hog Inlet watershed at sponsored community cleanup events. Additionally, establish a Community Cleanup Program along Little River Neck Road.

Recommendation G-10: Participate as an exhibitor to display information about the Hog Inlet watershed at community events in the Cherry Grove, Little River, and North Myrtle Beach area. Target events that draw environmental stewards such as the annual Beach Sweep/Creek Sweep, Great American Cleanup, and the Natural Awareness Festival. Partner with CWSEC to utilize the Enviroscape Model to educate citizens on watershed dynamics and the impacts of stormwater runoff on water quality in nearby waterbodies.

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Element H: Future Monitoring Needs

The removal of shellfish harvesting restrictions in Hog Inlet and Dunn Sound Creek is contingent upon meeting the fecal coliform standards at as many of the nine SC DHEC monitoring sites as possible. The more sites that meet the standard, the greater the area that can be designated as Approved for shellfish harvesting. Since monitoring data is the primary determinant in the designation and ultimate management of shellfish resources in Hog Inlet and Dunn Sound Creek, a regular review of published SC DHEC data is important. As SC DHEC's annual shellfish reports are released, observations such as any drastic increase or decrease in fecal coliform levels should be noted. If any alarming results occur, it may warrant the need to shift the priority of monitoring sites from the rankings outlined in **Element D**.

In addition, monitoring is the primary tool in determining progress made in achieving the goals outlined in this plan. If a significant decrease in fecal coliform levels is observed following the installation of a particular stormwater management practice, then water resource managers may want to consider other locations to install the same type of BMP.

Along with the SC DHEC shellfish monitoring program, Coastal Carolina University also provides monitoring program services, including both sample collection and data analysis. Below is a brief profile of some of their resources that may be useful in future monitoring efforts within the Hog Inlet/ Dunn Sounds Creek estuary.

I. Coastal Carolina University- Environmental Quality Lab:

An invaluable resource to watershed managers within the Grand Strand region is Coastal Carolina University. One of the services they provide is a SC DHEC certified Environmental Quality Lab. The lab has been utilized by local communities in a number of ways. Below is an outline of a few examples of the monitoring services that Coastal Carolina University's EQL has to offer which may be worth considering in the Hog Inlet/ Dunn Sound Creek watershed. Depending on the nature and purpose of the monitoring project, Coastal Carolina University staff will often serve in a technical advisory role in addition to collecting and processing water samples.

A. Bacteria Source Tracking: As noted in **Element C**, there are numerous potential sources of bacteria that can enter the Hog Inlet/ Dunn Sound Creek estuary. Determining the precise source of the bacteria can allow water resource managers to narrow their management focus to address the issue directly. Monitoring technologies such as qPCR can determine the animal origin of the bacteria detected in the water sample, distinguishing whether the bacteria originates from a human, canine, avian, or other animal source.

In the fall of 2016, Horry County and North Myrtle Beach hired CCU to perform a microbial source tracking study in the Hog Inlet- Dunn Sound Creek estuary. A full description of the study is provided in **Element D.** Water resource managers should utilize this study as a baseline for future monitoring efforts in the watershed. One of the clear findings was that the bacteria entering Hog Inlet does not appear to be from human sources. This means that while continued maintenance of the sanitary sewer system and residential septic systems are extremely important, no urgent action is needed to mitigate issues from these two potential sources. In the future, a follow up microbial source tracking study could be designed to utilize other tracers to detect signals of other species such as canine or avian that are potential sources of bacteria in the watershed. Presently CCUs Environmental Quality Lab does not have the capacity to detect feline sources of bacteria, but it may be feasible to develop the proper feline assay in the future.

B. Volunteer Monitoring Program: Under the direction of Coastal Carolina University faculty and staff, volunteer monitoring programs have been successfully established along the Waccamaw River, Murrells Inlet, and in Surfside Beach. Horry County has been a main partner in the Murrells Inlet and Waccamaw River volunteer programs, which were established in 2008 and 2006 respectively. The volunteers collect water samples twice monthly at each monitoring site. The parameters monitored are tailored to the specific concerns of each waterbody. In the case of Murrells Inlet, which would be most similar to Hog Inlet/Dunn Sound Creek, the parameters measured are dissolved oxygen, temperature, salinity, conductivity, pH, nutrients, turbidity, and E. Coli. Coastal Carolina University maintains a website, which makes the data available for review and analysis: http://bccmws.coastal.edu/volunteermonitoring/index.html

II. Future Monitoring Recommendations:

Below are recommendations on utilizing monitoring resources to further understand the water quality conditions and hydrological dynamics of the Hog Inlet/Dunn Sound Creek estuary. This section also outlines recommendations on using

monitoring data to evaluate the success of individual projects and track the overall progress of implementing this watershed plan.

Recommendation H-1: Establish a standing watershed plan implementation committee. The committee should consist of the primary watershed plan partners including Waccamaw Regional COG, North Myrtle Beach, Horry County, and Horry Soil and Water Conservation District. Other stakeholders should be included as implementation proceeds and new partnerships are developed. Meetings should be held as needed but at a minimum the committee should convene twice annually. The objective of the committee should be to monitor progress on all aspects of the watershed plan. On a consistent basis the committee should review available water quality data from SC DHEC and other sources to assess current water quality conditions in the estuary. The committee should also remain alert to case studies in other watersheds where positive results following watershed management actions have been observed.

Recommendation H-2: On a periodic basis, perhaps every 10 years, initiate a microbial source tracking study in Hog Inlet and Dunn Sound Creek. In order to accurately compare results, the same sites sampled during the 2016 microbial source tracking study should be utilized. In subsequent studies carefully analyze and compare trends from the initial 2016 study to determine if various animal sources of bacteria have been eliminated or have become more pronounced within the estuary. Additional sites could be added to the scope of the study as BMP implementation moves forward. Presently, microbial source tracking is the most useful and reasonably available monitoring tool to investigate the species of origin of bacteria present within the water column.

Recommendation H-3: Monitor the establishment of the oyster reef at the selected Cherry Grove canal dredging mitigation site. This restoration site should provide insight of favorable conditions for oyster reef production within the Hog Inlet estuary.

Recommendation H-4: Consider conducting a sediment assessment study in the Hog Inlet/ Dunn Sound Creek estuary. Sedimentation is a known transport mechanism of bacteria and other non-point sources of pollution in aquatic environments. If possible, collect samples from the recent Cherry Grove Canal dredging project as part of a baseline study of pollutant concentrations in the sediment profile of the estuary. Similar to the microbial source tracking study, it would be helpful to conduct a sediment survey once every ten years if feasible.

Recommendation H-5: Consider initiating a volunteer monitoring program in the Hog Inlet estuary. There are several community benefits to instituting a volunteer monitoring program. First, data is generated on a continuous and consistent basis at sites selected by the main program sponsors, typically local governments. This data can be especially useful in detecting abnormal levels of bacteria or another water quality parameter. A volunteer monitoring program can be particularly useful in assessing the effectiveness of recently implemented best management practices. In addition, the volunteer monitoring program is an excellent approach to meet the public education and engagement measures outlined in the MS4 stormwater permit. It is a hands-on interactive experience that brings concerned citizens directly to the estuary to learn about local water quality issues. The samples collected by volunteers informs watershed management decision making processes. Coastal Carolina University has provided lab analysis and onsite technical support to volunteer programs along the Waccamaw River, Murrells Inlet and in Surfside Beach.

Recommendation H-6: Work with SC DHEC and other management agencies to improve the accuracy and availability of precipitation data in the Cherry Grove Beach/ Little River Neck area. Rain events are known to influence bacteria levels measured at SC DHEC monitoring stations depending upon the severity of the storm event and the timing of the sample collection date. During the data analysis portion of the watershed planning process a review of the precipitation data collected at the designated NOAA weather station found that the data set was incomplete. For the 2015 data set, several months had multiple days with no weather observation data reported. As an example, only ten days were reported in February 2015. As a result, the planning team was unable to correlate bacteria measurements at the SC DHEC monitoring sites with a corresponding rain event during the watershed planning process. In the long-term, the lack of a reliable weather observation station in close proximity to the estuary would also be problematic if portions of Shellfish Management Area 01 were ever designated as Conditionally Approved, where precipitation data is used as one of the primary management criteria.

At the moment, the most reliable source of weather data to utilize in the watershed is the water quality and weather station located at the Cherry Grove Fishing Pier, managed as part of Coastal Carolina University's Long Bay Observation

System. Watershed managers from North Myrtle Beach and Horry County should utilize data available from this weather station and ensure that long-term support is provided for continued operation.

The next element identifies funding sources that may be pursued to facilitate the implementation of Best Management Practices recommended in this watershed plan. Opportunities to support supplemental watershed management activities such as public outreach and future monitoring are also discussed.

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Element I: Potential Funding Sources

As noted in **Element F- Watershed Management Recommendations**, one of the most immediate barriers to implementing projects and initiatives is the availability of funding for installation costs as well as expenses related to maintaining stormwater infrastructure. In Hog Inlet and Dunn Sound Creek, it is important to view watershed protection as an investment in local estuary resources which provide tremendous cultural and economic value to the Little River Neck and Cherry Grove Beach communities. The costs of implementing BMPs should be weighed against the loss of shellfish resources available for harvest. This element explains some of the economic benefits of watershed protection. An overview of various funding opportunities and financing strategies is also included.

I. Economic Benefits of Water Quality Protection

The coastal resources of the Grand Strand region attract hundreds of thousands of visitors every year, creating one of the most robust regional tourism economies on the East Coast. One of the main draws for people is the natural scenery including the expansive beach and tidal estuaries such as Hog Inlet. This coastal environment offers numerous outdoor recreation opportunities including swimming, sunbathing, fishing, boating, birding, and shellfish harvesting, among others. Numerous economic sectors benefit from this tourism-based economy including real estate, hotels, restaurants, retail businesses, arts and entertainment, etc. Cherry Grove Beach and the Hog Inlet estuary are ecologically sensitive resources that must be protected to ensure that they are a sustainable component of the regional tourism economy.

The remainder of the element explores potential funding sources that may be pursued to successfully implement the recommended management strategies outlined in **Element G** and in other sections of this watershed plan. It should be noted that this is not an exhaustive list of funding options. A regular review and evaluation of currently available opportunities is part of sound watershed management.

II. Local Government Funding Options

A. Stormwater Utility: Due to the construction, operation, and maintenance costs associated with managing a community drainage system, local governments, including both Horry County and North Myrtle Beach, have instituted stormwater utility fees. The stormwater utility provides a revenue stream to account for the costs incurred by various stormwater projects and programs. Horry County instituted an annual stormwater fee in 2000, while North Myrtle Beach approved theirs in 2007. The utility is structured to assess each property with a fee based on the approximate area of impervious surface. The City of North Myrtle Beach generates an annual budget of roughly $2,000,000 through the assessment of approximately 11,000 properties within the municipal boundaries.

III. State of South Carolina Funding Resources

A. SC DHEC- 319 Nonpoint Source Pollution Grant Program: The EPA recognizes nonpoint sources of pollution from stormwater runoff as the number one contributor to water pollution in the United States, ultimately establishing the Section 319 program as part of the federal Clean Water Act Amendments of 1987. As a strategy to help identify and reduce these pollutant sources, SC DHEC directs funding through the Section 319 program to support local community efforts to implement innovative stormwater management practices in impaired watersheds. The EPA and SC DHEC require an approved watershed plan as one of the main eligibility criteria for this grant program. Becoming eligible for this particular grant program is one of the immediate benefits of the Hog Inlet- Dunn Sound Creek Watershed Plan to Horry County and the City of North Myrtle Beach. More information can be found on the Environmental Grants and Loans webpage on SC DHEC's website: http://www.scdhec.gov/HomeandEnvironment/BusinessesandCommunities-GoGreen/EnvironmentalGrantsandLoans/

B. SC DHEC- Clean Water State Revolving Loan Fund: Local governments and water/sewer utility providers can secure low interest loan rates, as low as 1.0%, through the state revolving loan fund. The revolving loan fund supports

many types of infrastructure improvement projects, including sewer line and pump station upgrades as well as stormwater infrastructure projects that address known non-point source pollution concerns. More information can be found on the Environmental Grants and Loans webpage on SC DHEC's website: http://www.scdhec.gov/HomeandEnvironment/BusinessesandCommunities-GoGreen/EnvironmentalGrantsandLoans/

C. Community Development Block Grant (CDBG): The SC Department of Commerce administers the CDBG program allocation funded by the US Department of Housing and Urban Development. There are several categories of projects, including community infrastructure which typically comprises the largest percentage of the available funding. The objective of the community infrastructure project category is to address health concerns, meet regulatory standards and ensure community sustainability. One of the intentions of the CDBG program is to make improvements in neighborhoods or communities where at least 50% of the direct beneficiaries are low to moderate income households. Drainage and sewer projects are both eligible projects which could be pursued in the Hog Inlet- Dunn Sound Creek Watershed. More information can be found on their website at: https://www.cdbgsc.com/

D. South Carolina Sea Grant Consortium: Created in 1978, the SC Sea Grant Consortium is nationally certified under the National Sea Grant College Program and receives its support primarily from NOAA and the US Department of Commerce. Under its current FY2018-21 strategic plan, the Consortium focuses its programmatic efforts on five critical issue areas: the coastal and ocean landscape, sustainable coastal development and economy, hazard resilience in coastal communities, sustainable fisheries and aquaculture, and scientific literacy and workforce development. To achieve the goals outlined in the strategic plan, Sea Grant administers grant programs to fund research, outreach, and education projects. Information on current RFPs and other Sea Grant Consortium activities can be found on their website at: http://www.scseagrant.org/

IV. Federal Grant Programs

A. Army Corps of Engineers- Restoration and Enhancement Grants: The Army Corps oversees the Section 206 Aquatic Ecosystem Restoration and the Estuary Restoration Act programs. The Section 206 program generally involves some manipulation of a water body to restore it to its previous natural hydrologic condition. Historically, there was an ocean inlet into Cherry Grove Marsh at present day 39th to 42nd Ave N in Cherry Grove. The Section 206 program could potentially assist with reestablishing an ocean inlet connection near that location to help improve the tidal exchange and circulation throughout the southern half of Hog Inlet. The Estuary Restoration Act program has supported a variety of projects including oyster reef restoration site establishment. The Section 206 and Estuary Restoration programs both entail a 35% non-federal cost share formula. Information about potential project funding can be found on the Charleston District webpage at: http://www.sac.usace.army.mil/

B. US EPA Environmental Education Grants Program: Over the past 25 years, the EPA has placed a significant focus on public education and environmental stewardship activities across the country. In FY 2016, the program awarded roughly $3.5 million to over 3,600 grant recipients, most commonly local governments and educational institutions, to

enhance their environmental awareness initiatives. For more information including current grant opportunities visit: https:// www.epa.gov/education/environmental-education-ee-grants

C. US EPA Five Star and Urban Waters Restoration Grant Program: The Urban Waters Federal Partnership which is managed by the National Fish and Wildlife Foundation supports comprehensive watershed restoration projects which incorporate on the ground management activities, public education and outreach, post-project maintenance and monitoring, and strong community partners. More information can be found at: https://www.epa.gov/urbanwaterspartners

D. NOAA- Coastal and Marine Habitat Restoration Program: The main approach of this program is to recognize that habitat protection and restoration are critical for sustainable commercial and recreational fisheries. The program supports projects that utilize a habitat-based approach to conserve key marine species and promote healthy and resilient coastal ecosystems. Previous grant cycles have funded oyster restoration projects. More information can be found on NOAA's website at: http://www.habitat.noaa.gov/funding/coastalrestoration.html

Grants.gov is a useful online resource to keep track of funding announcements from all federal agencies.

V. Private Foundations

A. PetSmart Charities: Reducing bacteria loads from feral cat and stray dog populations is a challenging task. One of the most viable long-term solutions is to gradually reduce the size and reproduction rate of known colonies. Petsmart supports local initiatives in addressing this issue by awarding grants to governments or animal welfare organizations to institute trap, spay, neuter and release programs. The program is harmless to the animals and a proven means to keep feral cat colony populations from growing unsustainably. Petsmart has recently awarded grants to Coastal Carolina University in Conway and Coastal Animal Rescue in Murrells Inlet to institute programs to address this issue in their respective communities. More information on their grant programs can be found at: https://www.petsmartcharities.org/

It is important for watershed managers to pursue a diversity of funding sources as implementation activities move forward. Relying on a single funding source is very risky as many grant programs phase out depending on the current priorities of state and federal agencies. One of the main objectives of the watershed plan implementation committee should be to regularly review and assess potential funding sources that may support eligible projects in the Hog Inlet watershed.

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