

WATERSHED PLAN IMPLEMENTATION CHALLENGES FOR SMS4S IN MURRELLS INLET

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Abstract. The Murrells Inlet Watershed Plan (WRCOG, 2014) was crafted by a group of key stakeholders with community support and guidance to address fecal coliform bacteria loading in shellfish harvesting waters. While at times the planning process was both confusing and contentious, stakeholders debated the interpretation of the data analysis and ultimately concluded that the primary pollutant sources were wildlife and domestic animals. Stakeholders also concluded that the loads from these sources were being delivered to the estuary via a landscape that includes a network of surface drainage ditches and subsurface pipes so that water detention on the landscape has been largely short-circuited.

Armed with this information, plan participants devised management measures that considered several strategies, including: 1) utilize an end-of-pipe/ditch solution that addresses pollution nearest the discharge point; 2) generally reduce volume and flow and/or increase retention/detention across the landscape to reduce the pollutant load; and 3) use education and outreach such as pet waste cleanup campaigns. With geographic constraints, limited opportunities exist to incorporate detention basins into the landscape. Besides the construction of stormwater wetlands as a detention basin in one location, the existing conditions pushed the stakeholders towards the concept of intercepting and reducing pollutant loads with devices not initially designed for use in high-flow drainage pathways. Other strategies include incentivizing the use of low impact development devices and employing education and outreach campaigns.

As implementation progresses, the steering committee must track plan implementation and evaluate the effectiveness of management measures. Local funding must also be leveraged against grant funds to enable implementation.

INTRODUCTION

Watershed planning has become increasingly emphasized in a variety of disciplines, including stormwater management, resource conservation and stewardship, and water resource management. Granting and resource management agencies have largely adopted the watershed approach and have published guidelines and manuals to assist communities with watershed planning efforts. These helpful documents, which provide needed structure and organization to the watershed planning process, belie the difficulties and challenges of explaining and managing water resources in the face of competing interests within human society. Furthermore, plan development is only part of the process. Implementation of watershed plans provide significant challenges to those tasked with carrying out plan recommendations and management measures.

BACKGROUND

The Murrells Inlet Watershed Plan (WRCOG, 2014) was crafted by a group of key stakeholders with community support and guidance. Murrells Inlet is a coastal community that strongly identifies with its salt marsh and its natural resources. The Murrells Inlet watershed includes portions of Georgetown and Horry Counties, encompassing 9,313 acres. The South Carolina Department of Health and Environmental Control (SCDHEC) estimates that the watershed contains 3,108 acres of habitat suitable for shellfish production. Currently, 2,217 acres (71%) of shellfish habitat is approved for shellfish harvesting based on water quality testing at 25 locations throughout the watershed. The economic and cultural underpinnings of the

community are inextricably linked to the salt marsh and its resources.

Yet, the salt marsh is exposed to fecal coliform bacteria that has resulted in some oyster beds being closed to harvesting for violations of water quality standards for shellfish harvesting. As a result, SCDHEC issued a Total Maximum Daily Load report (TMDL) that included pollutant load reductions allocated to the Small Municipal Separate Storm Sewer Systems (SMS4) within the Murrells Inlet Estuary watershed, namely Georgetown and Horry Counties (SC DHEC, 2005). The TMDL identifies non-point sources as the main contributor but does not, however, identify specific pollutant sources or strategies for mitigating pollutant loads. Those tasks are left to the local communities and require considerable effort and financial support.

The State of South Carolina National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Regulated SMS4s that became effective January 1, 2014 now requires SMS4s to implement monitoring and management measures to address impairments for waters with approved TMDL reports and for those listed on the 303(d) impaired waters list. In an effort to address these impairments prior to the issuance of the new SMS4 permit, the Murrells Inlet community engaged in watershed planning in 2012 with grant funding from the SCDHEC 319 Grant Program for Watershed-Based Plan Development. The stakeholder-based planning process was led by the Waccamaw Regional Council of Governments and Murrells Inlet 2020, a community cultural and environmental preservation group.

The effort lasted one and a half years and involved considerable debate and data analysis. An initial effort led to the collection of possible pollutant sources from community members based on their local knowledge of the watershed landscape. This was paired with detailed analysis of decades of water quality data and rainfall information. While at times the planning process was both confusing and contentious, stakeholders debated the interpretation of the data analysis and ultimately concluded that the primary pollutant sources were wildlife and domestic animals. Stakeholders also concluded that the loads from these sources were being delivered to the estuary via a landscape that includes a network of surface drainage ditches and subsurface pipes so that runoff detention on the landscape has been largely short-circuited. Human sources were eliminated as a contributor with the exception of rare accidental discharges.

PROJECT APPROACH

Armed with this information, plan participants were faced with the challenging task of devising Best Management Practices (BMP) that address both the major sources and the aggressive pollution reduction estimates established in the TMDL, which cannot solely be met by conventional practices such as pet waste outreach campaigns. This led to the consideration of devices manufactured to specifically address bacteria as a pollutant in stormwater runoff (i.e. nonpoint sources).

Overwhelmingly, bacteria-specific mitigation practices have been designed for application in specific geographic locations within small drainage areas with lower flows. Given that Murrells Inlet pollution sources are widespread and are primarily delivered to the receiving waters via a highly modified drainage network that accompanies development, extensive application of these devices was deemed impractical and unlikely to target pollutant sources. Furthermore, anecdotal evidence suggests that the high-flow pathways serve to concentrate wildlife, so that upstream BMP application would not target one of the primary pollutant sources. Therefore, SMS4s aimed to consider alternative strategies, including: 1) utilize an end-of-pipe/ditch solution that addresses pollution nearest the discharge point; 2) generally reduce volume and flow and/or increase retention/detention across the landscape to reduce the pollutant load; and 3) utilize education and outreach such as pet waste cleanup campaigns.

PROJECT STRATEGIES

The first strategy requires either radical modification (e.g. retrofitting) of the drainage system or application of BMP technology in untested, high-flow settings for which the technology was not initially designed. Retrofitting the drainage system poses challenges due to space limitations around existing structures, while the feasibility of untested technology across the landscape requires pilot studies to prove efficacy.

Based on research of bacteria removal methods, the stakeholders determined that the ideal strategy is to maximize retention on the landscape by incorporating detention basins into the drainage system. In Horry County, however, the drainage is handled primarily along the roadside ditch network which cannot physically accommodate retention basins. In Georgetown County, the

drainage network primarily concentrates higher flows in larger canal-style ditches that run between lots. With geographic constraints, limited opportunities exist to incorporate detention basins into the landscape. One location in Georgetown County lends itself to the creation of stormwater wetlands to function as a detention basin, which is one of the plan’s priorities. Besides this location, however, the existing conditions pushed the stakeholders towards the concept of utilizing technology that has not been tested in these high-flow conditions. This includes the deployment of bacteria media filter strips in roadside drainage ditches in Horry County (Figure 1) and in between-lot canal-style drainage ditches in Georgetown County and the installation of floating treatment wetlands in in-line detention ponds (Figure 2) to intercept and reduce the pollutant loads.

The second strategy utilizes widespread implementation of Low Impact Development (LID) techniques to increase retention across the landscape. This strategy includes the use of devices such as rain gardens or bioretention swales, as well as rain barrels or cisterns. Due to the current lack of specific local or state requirements for using LID, this strategy will rely heavily on voluntary participation. Therefore, education and incentives will need to be used cooperatively to establish interest and confidence in this approach among homeowners.

The third strategy addresses education and outreach campaigns to change behavior of target audiences. An example of such an effort is a pet waste outreach and cleanup campaign, perhaps in concert with the establishment of pet waste ordinances. Many communities around the country have instituted this approach, including those along the Grand Strand. The Coastal Waccamaw Stormwater Education Consortium, supported by its member SMS4s, has been developing a pet waste cleanup campaign during the last two years. SMS4s and education partners have installed pet waste cleanup stations in numerous public spaces. Challenges are that pet waste is only a partial contributor to the water quality problem and that campaigns are difficult to link directly with measurable water quality improvements.

FUTURE DIRECTION

As watershed plan implementation moves forward, SMS4s will have to use a strategic approach to determine effectiveness of BMPs in addressing the water quality

impairments. Continued support and expansion of existing monitoring programs conducted and overseen by Coastal Carolina University’s Environmental Quality Laboratory, including volunteer monitoring, will be needed to evaluate the impacts of BMPs. Generally, BMPs are targeted in areas where long-term monitoring data exists to be able to track trends. An approach must be devised to use resources efficiently to best meet monitoring needs, which may include additional volunteer and/or technical staff effort.

Watershed plan implementation is a long-term endeavor that will require considerable financial and personnel commitments by SMS4s. A watershed plan implementation steering committee, composed of key stakeholders, will serve to oversee and track plan implementation. Local funding sources may be leveraged against grant funds to boost implementation by evaluating pilot studies for BMPs or strategies that have not been tested widely. This strategy will allow the watershed plan steering committee to evaluate the effectiveness of BMPs before prematurely expending resources.



Figure 1. Bacteria media filter strips and one of several target sites along roadside ditches.



Waccamaw Regional Council of Governments, 2014. 2014 Murrells Inlet Watershed Plan: A Community-based Management Plan to Address Fecal Coliform Impairments in Local Shellfish Harvesting Areas. Submitted to SC DHEC, Columbia, South Carolina, April 2014.

Figure 2. Floating treatment wetlands and target site at in-line detention pond.

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