A Case Study in Watershed-Based Plan Development and Implementation for the May River Watershed in Bluffton, South Carolina

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Abstract. The Town of Bluffton, South Carolina was a one square mile coastal village until it experienced exponential growth in the early 2000s, and today is approximately 54 square miles. Until this recent growth, few sources of possible impairments to water quality were recognized within the watershed, and even fewer within close proximity to the river itself. In 2007, the Town was told by the S.C. Department of Health and Environmental Control (SCDHEC) that fecal coliform levels in the May River headwaters were increasing and in 2009 the river received a shellfish harvesting classification down-grade. In response to this down-grade, the Town of Bluffton, with Beaufort County and stakeholders, committed to take action to restore shellfish harvesting in the river and to prevent further degradation to the river. Following the U.S. EPA (EPA) guidelines for developing watershed plans, Town staff worked for nearly a year with consultants, Beaufort County, topic experts and local residents to develop the May River Watershed Action Plan which was adopted by Town Council in November 2011. The May River Watershed Action Plan:

- provides a strategy for assessing problems and implementing solutions to restore shellfish harvesting in the May River;
- provides a strategy for assessing and implementing preventative measures to protect the May River from future degradation; and
- identifies opportunities for land purchase, conservation easement purchase, and public, private and public/private opportunities for retrofit projects.

This case study outlines how the Town implemented the EPA's planning process; the lessons learned during the development of the May River Watershed Action Plan for use by other communities faced with a similar need; the immediate results of implementing the plan; and a number of short-term results that have been achieved.

INTRODUCTION

This case study documents the development, initial implementation and results of a watershed-based plan for the May River Watershed (HUC 3060110-03) in response to rising fecal coliform levels. It serves as a real-world example of the EPA approach to develop a restorative watershed plan (EPA, 2008). This process and the lessons learned are pertinent for both coastal and interior water resource managers whose goal is to develop a comprehensive approach to either prevent, or respond to, a Clean Water Act Section 303(d) listed waterbody. In South Carolina alone, SCDHEC states that there are 1,108 Total Impairments among 920 Impaired Sites within the state's waterways (draft SCDHEC, 2014).

BACKGROUND

The Town of Bluffton, located in southern Beaufort County, South Carolina, is a coastal community with strong ties to its local waterbody, the May River. The May River is a regionally significant waterbody for a number of reasons. First, the river contains numerous

Figure 1. Bluffton region and May River location.

natural resource populations that are directly harvested and utilized by local and regional residents. Second, the aesthetics and views of the May River waterbody increase the popularity of the area for continued commercial, residential, and tourist visitation and growth, thus tying the Town's economic conditions directly and indirectly to the river. Finally, the river provides a sense of community character and pride that is locally and regionally recognized.

The May River watershed is located within the jurisdictions of the Town of Bluffton and Beaufort

County, where it bisects the Town's jurisdiction (Figure 1). The Town of Bluffton was one square mile for over 130 years until 1987 when the Town annexed additional parcels into its jurisdiction. Today Bluffton is approximately 54 square miles and one of the largest municipalities in South Carolina. However the majority of this growth occurred within the first decade of 2000. The annexations resulted in substantial residential development, resulting in land use being converted from substantial acreage of pine crops to residential subdivisions with increased impervious surface and associated stormwater runoff.

In 2007, SCDHEC told the Town that fecal coliform levels in the headwaters of the May River were increasing. In 2008, in response to this increase, the EPA and SCDHEC designated the May River as a priority and threatened watershed, thus making it eligible for EPA Clean Water Act Section 319 grant funding. In 2009 the Town developed an initial watershed plan which was awarded an EPA 319 grant by SCDHEC for implementation to reduce the fecal coliform levels. Despite initial implementation, in the fall of 2009 the river received its first-ever shellfish harvesting classification down-grade in the headwaters due to high fecal coliform levels (Figure 2).

Figure 2. Shellfish bed closure in the May River.

While recreational contact is still permissible, rising fecal coliform levels can be an indicator of the deterioration of the overall health of a watershed since an increase in this pollutant is often associated with an increase in other pollutants including sediments, nutrients, and potentially viruses. In response to this degradation of water quality, the Town of Bluffton, in conjunction with Beaufort County and local citizens, voluntarily committed to take action to augment the existing 319-funded watershed plan to develop an updated, comprehensive May River Watershed Action Plan. This expanded plan would include both structural and nonstructural Best Management Practices (BMPs) to restore shellfish harvesting in the river, as well as include measures to prevent further degradation in the May River. Adapting the EPA guidelines for watershed plan development (EPA, 2008), Town staff worked for nearly a year with consultants, Beaufort County, and local residents to develop the May River Watershed Action Plan (AMEC, 2011). Town Council adopted the May River Watershed Action Plan (Action Plan) by Resolution in November 2011.

PROJECT GOAL AND OBJECTIVES

Clearly the immediate goal of the planning process was to develop a comprehensive watershed management plan. However, as the Town and consultants worked through the EPA watershed management plan development steps, detailed below in “Methods,” identifying and keeping the ultimate goal of the Action Plan in mind was instrumental in guiding document development.

The goal of the May River Watershed Action Plan is to restore shellfish harvesting within the headwaters of the May River and protect the river from future degradation. To achieve the goal the objectives for the Action Plan include:

- providing a strategy for assessing problems and implementing solutions to restore shellfish harvesting in the May River;
- providing a strategy for assessing and implementing preventative measures to protect the May River from future degradation;
- identifying opportunities for land purchase, conservation easement purchase, and public, private, and public/private opportunities for retrofit projects;
- establishing priorities, identifying funding opportunities, coordinating specific partners and

policies (i.e. ordinance changes), and establishing timelines such that the Town can use this information as a business plan to be implemented with other Town annual Capital Improvement and Budgeting programs; and

- serving as a template for other area watershed action plans within the Town’s jurisdiction.

The Action Plan utilizes the significant amount of available information, gathered previously over many years, regarding the watershed and the May River itself. It also incorporates lessons learned from previously implemented actions and Best Management Practices within this watershed and similar watersheds to develop a strategy with specific short-, medium-, and long-term actions for measurable water quality improvement. The May River Watershed Action Plan allows the Town of Bluffton to have earlier implementation of projects for short term results and develop community-supported long-term strategies to return the May River Watershed to full shellfish harvesting status.

METHODS

Adapting the guidelines set out by the EPA for developing watershed plans, the Town worked through each of the following steps detailed further below:

Set Goal and Initial Objectives

The ultimate goal of the May River Watershed Action Plan is to restore shellfish harvesting throughout the May River and to protect the river from future degradation. However, identifying measurable objectives across various time frames is an important component in the Action Plan’s development. One of the biggest threats the Town recognized to any watershed improvement or protection plan is taking early meaningful steps. Often the full list of projects needed to completely restore and protect a watershed can overwhelm the decision-making process and prevent any improvement from taking place.

Therefore, the Action Plan priority projects have been identified with respect not only to their anticipated performance, but also to their rate of implementation. The rate of implementation becomes an important factor as the cumulative loading reductions will be higher due to earlier implementation of projects. A timeline for all Action Plan projects and programs has been identified and allows for the proper policies, partnerships and funding mechanisms to be developed for successful implementation.

Environmental Inventory

Conducting an environmental inventory of the watershed is an integral step in the planning process. Many historical and current data sets may be available and a thorough literature search including water quality sampling reports, land use data, and wetland coverage can provide key information.

A wealth of previous and current environmental data for the May River watershed exists from a number of independently-conducted, and town-sponsored, monitoring programs and studies. These monitoring programs and studies include the SCDHEC - Shellfish Management Area 19 monitoring data (Monday, 2007-2012), the SC Estuarine and Coastal Habitats Assessment Program (Van Dolah, et. al., 2006), May River Baseline Assessment (Van Dolah, et.al., 2004), May River Waterbody Management Plan (Kiernan, 2008), Water Quality Concerns in the May River (Bergquist, 2010), as well as an on-going, weekly, water quality monitoring program for fecal coliform “hot spot” identification. This program was initiated by the Town in 2008 in partnership with the University of South Carolina Beaufort - Gateway Campus and Beaufort County.

These data and reports characterize the watershed and its changes over time, thus identifying potential areas to implement structural and non-structural BMP retrofits and preventative measures.

One of the most striking occurrences noted is that stormwater lagoon discharges as a whole are low in fecal coliform concentrations. However, when these discharges leave the outfall structures and enter the stormwater outfall ditches, the fecal coliform concentrations can increase by ten-fold (Ahern et. al., 2012). While the mechanism by which this phenomenon occurs is still not completely understood, the results have been documented in both the Ahern, et. al. (2012) study as well as within the Town’s on-going weekly water quality monitoring program.

Social Inventory

Equal in importance to conducting an environmental inventory is conducting a social inventory of stakeholders. This group should include representatives of a variety of perspectives to develop community involvement and buy-in to the plan.

This broad-spectrum approach for the Town included representatives from the general public, community leaders, developers and subject-matter experts (both public and private sector). After these individuals were identified, the Town engaged them in various activities

including committees, workshops, and advisory groups, ensuring community engagement in the process of the Action Plan’s development.

Additionally, when a draft of the document was completed, an evening public meeting was held to garner wide public review and comments. This draft was also vetted by the Town’s Water Quality Technical Advisory Committee comprised of water quality experts from NOAA, EPA, USGS, USACOE and state university representatives. Comments from both meetings were documented and utilized to refine the final version.

Design an Implementation Program

To show activity and dedication to improving water quality conditions, the Town developed an initial watershed plan directed at reducing fecal coliform sources. The initial plan was submitted to SCDHEC in response to a Request for Proposals (RFP) for a U.S. EPA 319 grant. In 2009, SCDHEC awarded the Town a 319 grant which included over a dozen projects. Several of these projects were chosen based upon their common use by other communities. These 319-funded immediate actions included:

- rain barrel/rain garden program,
- septic system inspections/pump outs,
- pet waste stations,
- social marketing campaign,
- unified development ordinance overhaul based on watershed management principles,
- bird roosting deterrents, and
- stormwater BMP pilot project retrofit.

Again, these projects were implemented to not only improve water quality within the May River and its watershed immediately, but to also show action, raise community awareness to the problem, and involve the community in several of the solutions.

Develop Watershed Action Plan

With the assistance of previously identified stakeholders, consultants, governmental and non-governmental partners, the available information and recommendations from the multiple studies previously conducted were synthesized into the May River Watershed Action Plan from December 2010 to November 2011. The final document incorporates structural and non-structural BMPs, as well as restorative and preventative measures. Town Council adopted by Resolution the May River Watershed

Action Plan in November 2011 and formed a permanent Advisory Committee in June 2012. The Committee is tasked with advising and guiding the Town on future and existing projects and strategies aimed at restoring shellfish harvesting in the May River. Their responsibilities include the following:

- reviewing and evaluating actions based on policy changes presented by Town staff;
- reviewing and evaluating actions based on targeted or proposed projects presented by Town staff;
- reviewing and evaluating actions based on partnership opportunities presented by Town staff;
- reviewing and evaluating actions based on funding opportunities presented by Town staff;
- offering experience, knowledge, expertise and guidance advancing the overall goals of the Action Plan; and
- any other applicable items deemed necessary.

Implement the Watershed Action Plan

With short-term, mid-term and long-term projects identified in the Action Plan, implementation began immediately with the smaller projects included in the 319 grant. These accomplishments are summarized in the “Results” section.

Simultaneously, based on prioritization procedures developed in the Action Plan, four initial restorative BMP projects have been identified. These projects were identified as priorities based upon weekly fecal coliform “hot spot” monitoring results, potential fecal coliform loading reduction after a BMP retrofit, available funding and land access.

Measure Progress and Make Adjustments

The Action Plan is a living document and is expected to be updated periodically by staff as the identified strategies and tactics become implemented and further developed. It should be noted that as this document is updated, additional studies and other work products are expected. These work products will be added as appendices or may be included as references to external sources (e.g. monitoring databases, websites). This ensures that future work products will be incorporated in this Action Plan and can be properly utilized, that interested parties can see the technical basis for the recommended strategies and tactics, and will prevent the document from becoming overly cumbersome to the point that it is no longer easy to use.

RESULTS

The results of the process are varied and on-going. Most notably, the Action Plan itself was developed with community input, adopted by Town Council as a guiding document, and is currently being utilized by the Town to guide both structural and non-structural BMP implementation. The document and its supporting appendices may be found at: <http://www.townofbluffton.sc.gov/government/Pages/ordinances.aspx>.

To date a number of activities, projects and programs have been completed and are on-going throughout the watershed including:

- 175 (55-gallon size) rain barrels installed;
- 16 rain gardens installed;
- 98 septic system maintenance/repair service calls;
- 10 pet waste stations installed in public areas;
- 6 trash cans in Old Town historic district installed;
- 5 Doggie Dooley pet septic systems installed;
- 1 manure management plan and riparian buffer garden installed;
- RV/campground waste management plan developed;
- unified development ordinance overhaul based on watershed management principles adopted, including a stormwater volume control requirement;
- animal waste ordinance completed;
- social marketing campaign completed including development of “Neighbors for Clean Water” brand, website and Facebook page;
- on-going construction site sediment and erosion control inspection program;
- on-going ditch maintenance and enhancement program;
- on-going easement acquisitions and negotiations for access to properties;
- on-going water quality monitoring program funded by the Town via stormwater utility fees;
- transfer of a minimum of 1,300 residential units, which prevents an additional 146 acres of impervious surface, out of the May River headwaters region via the Transfer of Development Rights Ordinance; and
- installation of 1.25 acre stormwater lagoon to reduce fecal coliform concentrations at an identified “hot spot.”

DISCUSSION

Several of these accomplishments warrant further discussion. The Unified Development Ordinance (UDO) revision based upon watershed principles adopted a Growth Framework map which illustrates the Town's desired growth areas that coincide with regions best suited to accommodate growth within the watershed. The areas outside of the growth nodes are the ones most important for the siting of the preventative measures identified in the Action Plan. These measures may include fee simple purchase of land, conservation easements, purchase of development rights or the transfer of development rights.

The ability to transfer development rights within its jurisdiction provided the mechanism for the Town to allow the transfer of the 1,300 residential units out of the headwaters into a reserve "bank" for allocation elsewhere within the Town. This action prevented an additional 146 acres of impervious area in the headwaters of the May River. Another preventative measure is the encouragement of Low Impact Development designs using incentives such as reduced application fees and review times.

Based upon the results of the on-going weekly sampling program and an aquifer storage and recovery well discharge study (Ahern, et. al., 2012), a technical change in the UDO was made in the stormwater chapter. Currently, the Town and Beaufort County require stormwater volume control for all new development to be equal to pre-development conditions through on-lot controls. This approach helps to reduce pollutant loads by reducing runoff volume. The Town's stormwater ordinance may be found at: <http://www.townofbluffton.sc.gov/Documents/izone.pdf> in Article 5.10 (Town of Bluffton, 2011).

Currently the Town is negotiating an access easement with a residential subdivision to implement a second SCDHEC-awarded 319 grant. This retrofit project is aimed at reducing stormwater volume by using existing stormwater lagoons for irrigation in common-area property. Thus, the storage capacity within the lagoons is increased.

The Town is also negotiating a wetlands restoration/ditch modification project with another private landowner. This project will be the first of several to improve water quality in receiving waters by modifying the ditched channels through wetlands. Data from the weekly monitoring program suggest that the wetland ditches (conveyances) are themselves the sources of fecal coliform, instead of serving as a treatment for reduction (Ahern, et. al., 2012). Additionally, the ditches bypass the infiltration and evapotranspiration

benefits offered by wetlands. Reconnecting the flood plains of these ditches is considered to be another mechanism for stormwater volume reduction.

The two-pronged approach of the Action Plan to be both restorative and preventative is encapsulated in each of these projects and policies.

CONCLUSION

Throughout the process of developing the May River Watershed Action Plan, there have been a number of lessons learned which are of use to others who are about to embark on a similar project. These include:

- The EPA Watershed Planning Guidelines are just that – guidelines. Adapt the process to work for your situation and community.
- Do not underestimate the power of stakeholders in the process. Identify and engage them early.
- Technical expertise is invaluable, but plain communication (education) is key.
- Involve all pertinent internal departments (public works, planning, engineering, stormwater, etc.) and other jurisdictions.
- Show early action for credibility.
- Identify potential funding sources (establishing a Stormwater Utility, grants, etc.).
- Be patient. This detailed Plan took one year to develop after over 4 years of studies, activities and a more generic, initial watershed plan.

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