

Beaufort County



Special Area Management Plan

Beaufort County Special Area Management Plan

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December 2002



A publication of the SC Department of Health and Environmental Control pursuant to National Oceanic and Atmospheric Administration Financial Assistance Award Number NA97OZ0198 provided by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management of the National Oceanic and Atmospheric Administration

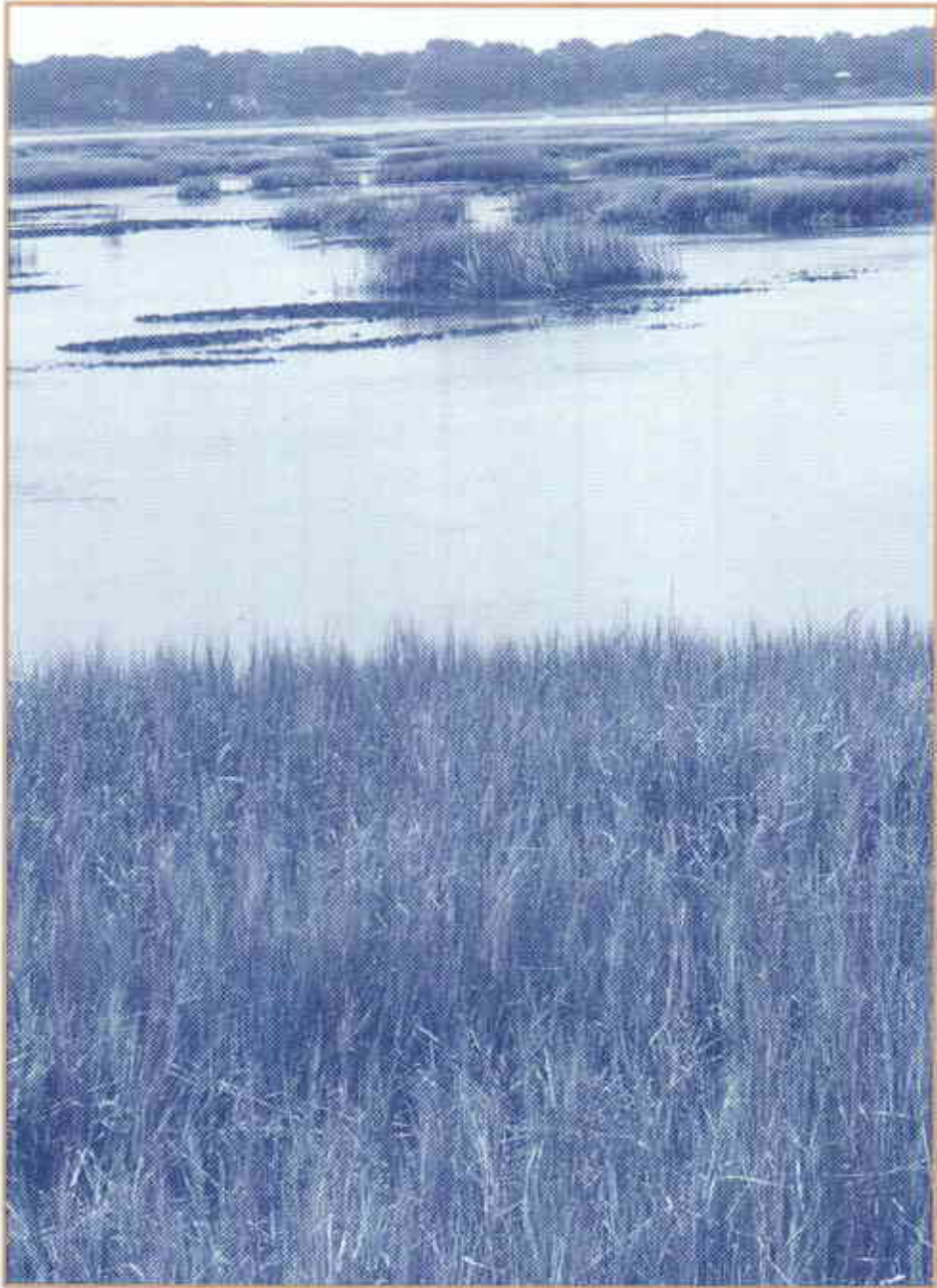


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Foreword

In 1997, under the leadership of Bill Marscher and Sam Passmore, the Clean Water Task Force (CWTF) published *A Blueprint for Clean Water: Strategies to Protect and Restore Beaufort County's Waterways* (Clean Water Task Force. 1997. *A Blueprint for Clean Water: Strategies to Protect and Restore Beaufort County's Waterways*. South Carolina Coastal Conservation League, 71 pages, plus Appendices). In this seminal report, two-years in preparation, the CWTF offered over 50 steps that needed to be accomplished for protecting the natural environment and water resources of Beaufort County. Of the many recommendations, ten were chosen for special attention. It was concluded by the CWTF that if the Beaufort County citizenry and public officials, at all levels, did not accomplish these ten steps to clean water, the gradual decline of their near-pristine waterways was inevitable.

With the encouragement of Sen. Ernest F. Hollings and Gov. David Beasley, Doug Bryant, Chester Sansbury, and David Chestnut of the South Carolina Department of Health and Environmental Control, Chris Brooks and Debra Hernandez of the Office of Ocean and Coastal Resource Management, and with scientific advice from Bob VanDolah, Ph.D., and Fred Holland, Ph.D., of the South Carolina Department of Natural Resources and Geoff Scott, Ph.D., of the National Oceanic and Atmospheric Administration (NOAA), and in close cooperation with Beaufort County, the towns of Beaufort, Bluffton, Hilton Head Island, and Port Royal, Jasper County, the Lowcountry Council of Governments, stake-holders involved with the Beaufort County estuarine system, and the CWTF the Beaufort County Special Area Management Plan (SAMP) was born. With funding of 1.2 million dollars from NOAA, the SAMP was designed to produce a comprehensive and effective management plan to address stormwater and other sources polluting the waters of Beaufort County, and to identify the necessary actions to prevent further degradation of county waters. This has been accomplished, and now, the next and final step in the SAMP process, that of the implementation of the SAMP recommendations, must be undertaken.

Above all, it must be remembered that this report is only a guide for the restoration and protection of the waterways of Beaufort County. The recommendations will serve county citizens and its waterways only if implemented. The implementation of these recommendations and strategies, as they are enumerated herein, is now the responsibility of Beaufort County Council with the cooperation and assistance of the local municipalities, and Jasper County.

Executive Summary

In 1995, following the closure of 500 acres of shellfish beds, a forward looking group of concerned citizens created the Beaufort County Clean Water Task Force. They envisioned the continued loss of not only marine resources, but also of natural areas of the county, the very places where they live, work, and find renewal. Seeking a means to prevent the further degradation of county waters and the region's natural resources, the group, with the assistance of the South Carolina Department of Health and Environmental Control Office of Ocean and Coastal Resource Management, received funding from the National Oceanic and Atmospheric Administration to implement a Special Area Management Plan (SAMP) for the county. Initiated in 1999, the SAMP encompassed a wide range of topics and activities: more advanced stormwater controls and management, wastewater management and septic systems, water quality monitoring, boating, and the education of the public about buffers, hazardous wastes, landscaping, septic tanks, and boating. After three years of effort the following recommendations, formulated by the contractors and grantees with guidance from the SAMP Oversight Committee and Board of Technical Advisors, form the basis for action to protect the unique water resources of the lowcountry of Beaufort County.

Flooding, water pollution, and other stormwater problems in the county are being aggressively addressed through the Stormwater Utility. Accepted by county voters, this management program has been implemented and will provide a comprehensive stormwater management approach to address flooding and stormwater quality issues and solutions.

The environmental health of Broad Creek was the primary concern as the Town of Hilton Head Island addressed stormwater, septic systems, and recreational usage of the creek. All aspects of the plan are interrelated. The land uses affect the quality and quantity of stormwater runoff, that in turn impacts the water quality of Broad Creek, that impacts the wildlife habitat both in the water and along the shoreline. The impacts on the wildlife in turn impact the enjoyment of the creek for recreation and fishing on the creek. This management plan was adopted by the town council as an appendix to the town's Comprehensive Plan, and implementation of the plan's 57 recommendations has begun.

The assessment of the Okatie sub-watershed provided a basis for understanding stormwater flow and impacts and served as a pilot project for the remainder of the watersheds of the county. Critical elements included: an understanding of present water quality conditions in the watershed, the effectiveness of stormwater management design and operational practice in the watershed, how to improve stormwater standards for new developments and evaluate growth boundaries, how to reduce existing flooding and water quality impacts, and how to minimize economic and social losses. Recommendations and a design were made for a stormwater conveyance and treatment system for the Okatie River Bridge to collect and treat stormwater prior to its entering and impacting the marshes and tidal creek nurseries of the Okatie sub-watershed. In addition, it was recommended that all new bridge construction in the county provide for stormwater collection and treatment systems for the bridge approaches and the bridge.

Executive Summary

A workshop was convened of experts and citizens to assist the Beaufort County Planning Department with the technical bases for setting the characteristics for the River Protection Overlay District Ordinance in order to provide adequate protection for county receiving waters. The working groups recommended two distinct geographic areas in each watershed: the area of the watershed that drains to the headwaters, and a variable width of land that drains directly to the critical area, but is in no case wider than 500 feet. Within the district, recommendations for the appropriate setbacks were a 100-foot forested buffer in the headwater watersheds, and a 100-foot buffer, 50 managed and 50 natural/forested, in the remainder of the watershed. It was also suggested that stormwater runoff from developments throughout the district should be treated to a water quality level that would equal that from a development of 10% imperviousness.

Because of a rapidly growing population, expected to double by 2020, the issues of wastewater disposal and on-site disposal systems (septic tanks) in the county were addressed. Direct disposal of treated wastewater into county waterways is no longer an option for Beaufort County. To improve centralized wastewater system operations, land application of treated wastewater in the county is encouraged. This project, developed by the Beaufort/Jasper Water and Sewer Authority, provided a map of appropriate land application sites. It was recommended that the county prioritize all land application sites, select and acquire sites, and improve the wastewater land discharge program. A large portion of Beaufort County is rural and will not be served by central wastewater facilities. Indeed, citizens of several areas wish to remain without sewers and instead utilize septic systems. Recommendations for the rural areas on septic systems are to: enact inspection and maintenance standards by establishing a wastewater management district that addresses all septic systems in the county, enact a comprehensive on-site wastewater disposal management plan for the county, enact innovative standards for on-site wastewater disposal, enact standards for household appliances, and adopt a manual of alternative on-site disposal systems.

Coordination of water quality monitoring activities within the county, currently conducted by federal, state, and local agencies, is necessary. It was recommended that the county explore and evaluate the possibility of using the Land Uses—Coastal Ecosystem Study (LU-CES) web-enhanced, geographic information system (GIS)-based database management and information system research effort as a vehicle to place the data collection, management, quality assurance/quality control, and documentation responsibilities for county-wide water quality monitoring in the hands of geographers and experts at the university level.

An evaluation of boating in the county provided a boating management plan with numerous recommendations for implementation. The plan provides a current inventory of major boating access facilities (marinas, boat ramps, and docks), a review of regulations that guide development of these facilities, identification of environmentally sensitive areas, identification of waterway use conflicts, and finally, recommendations to address environmentally sound policies, improved boater education, and increased enforcement of boater regulations to promote safe use of county waters. Recommendations include expansion of marinas and boat landings, dry storage marinas, the creation of no discharge zones for outstanding resource waters, sewage pump-out facilities at all marinas, and the establishment of a Beaufort County Waterway Committee of stakeholders, with the mission to facilitate and implement management of the waters through consensus building of users and boater education.

Executive Summary

The information and knowledge gained from the SAMP is being disseminated to the general public in an easily understandable form. The goal is to improve and protect the water quality in Beaufort County through an educated and involved public. Unless people are informed and participate in various activities related to water quality protection, needed changes in county policy will not occur. Citizen Shoreline Watch, a collaboration with the Low Country Institute and the Friends of the Rivers was initiated to advance this concept. Educational materials complement existing outreach and education efforts that focus on non-point source pollution. These include a number of brochures and compact disc (CD) publications: buffer function and maintenance, on-site disposal systems standards and maintenance, household hazardous waste disposal, three brochures on boater education and safety programs, two brochures and an interactive CD on homeowner landscape care, and three brochures on recreational opportunities and shellfish and wildlife protection in the Broad Creek area. In addition, two oyster shell recycling sites for oyster restoration projects have been established in the Town of Hilton Head Island and the necessary equipment for shell handling acquired for the program. These brochures and CDs are being widely distributed to citizens within Beaufort County. In addition, copies are being placed in all city, county, and academic libraries in the county.

Purpose and Objectives

“To Protect and Restore the Waterways of Beaufort County”

In 1995, 500 acres of shellfish beds in Beaufort County were closed to recreational and commercial harvesting. This small number was added to the approximately 31,000 acres already closed to the taking of shellfish in the county. But, small as the 500 acres were, a group of Beaufort County citizens took this news as a call to action. These citizens felt that if the shellfish resources of the county were in trouble, that much more was or soon would be in jeopardy. They envisioned the loss of not only marine resources, but also of the natural environment, the places where they live, work, and find renewal. From this group, 14 highly concerned citizens, seeking a means to prevent the further degradation of county waters and the natural environment, created the Beaufort County Clean Water Task Force (CWTF). In their final report, *A Blueprint for Clean Water, Strategies to Protect and Restore Beaufort County’s Waterways*, the CWTF offered over 50 steps to be taken for protecting the natural environment and water resources of the county. Based on expert evaluations and consideration, ten of these recommendations were noted for special attention. It was concluded by the CWTF that if the Beaufort County citizenry and public officials, at the municipal, county, state and federal level, did not accomplish these ten steps to clean water, the continued decline of their near-pristine waterways was inevitable. The CWTF intended to focus on stormwater controls, wastewater management in rural areas, water quality monitoring programs, boating, and public education. To address even one of these issues was daunting, so with the assistance of several state agencies, funding was obtained from the National Oceanic and Atmospheric Administration (NOAA) for a Beaufort County Special Area Management Plan (SAMP).

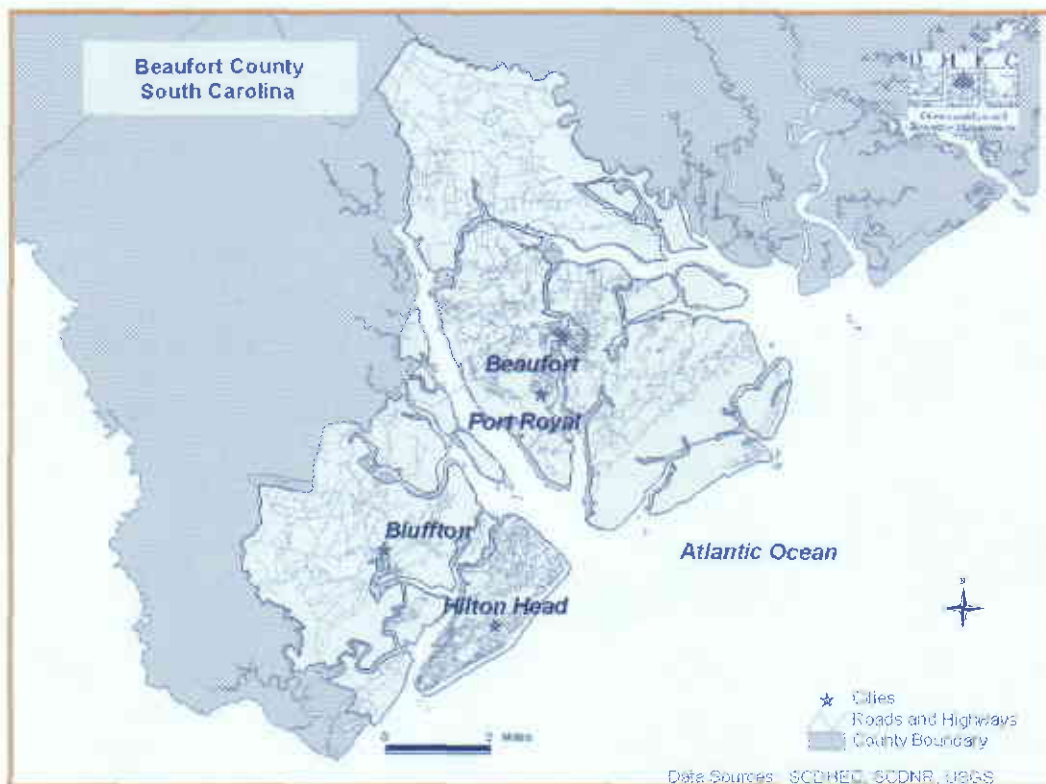
The SAMP process provides a framework for the management of cumulative impacts that threaten a specific water body or geographic area. The Beaufort County SAMP is a comprehensive and effective management plan that addresses stormwater and other sources affecting the waters of Beaufort County. It identifies the necessary actions needed to prevent further deterioration of county waters and to achieve the primary objective of the SAMP, the protection of water quality in Beaufort County. The plan encompasses a wide range of topics and activities: more advanced stormwater controls and management, wastewater management and septic systems, water quality monitoring, boating, and the education of the public about buffers, hazardous wastes, landscaping, septic tanks, and boating. The SAMP has laid a foundation for the application of the recommended water management policies and strategies. As the plan is being implemented, it will help balance the needs of the community with the management and protection of the water and natural resources of the county.

Description of the Project Area

Rich in natural and cultural resources, Beaufort County includes many islands, rivers and creeks, and a variety of habitats that encompass 691 square miles of which 113 are water. First settled by the Spanish in 1514 and chartered by the British in 1711, Beaufort is the second oldest town in South Carolina. The area experienced great prosperity in the eighteenth century as indigo and rice plantations thrived, and Sea Island Cotton also brought incredible wealth to the area prior to the Civil War, due in part to the favorable climate and fertile lands of the area. During the Civil War, Northern missionaries began the "Port Royal Experiment," creating schools for the formerly enslaved Africans. One of the most well known and historically significant of these schools was the Penn School, now known as the Penn Center on St. Helena Island. Its mission is to "preserve the unique history, culture and environment of the sea islands by serving as a local, national and international resource center." Beaufort County is also home to three major military installations: the Parris Island Marine Corps Depot, the Marine Corps Air Station, and the Naval Hospital.

Tabby ruins, historic forts, elegant homes, majestic plantations, and Gullah culture and cuisine are reminders of Beaufort's 500 year history. It is a recreational oasis also. Fishermen troll the back bay waters, cast nets for crabs, toss lines from docks and beaches, or head offshore for game fish. Plump, flavorful oysters abound in county waters, and shrimp boats can often be seen gliding past the waterfront with the day's catch.

The 1990 population per square mile of land was approximately 149 persons. By 2000, the population was estimated to be 224 persons per square mile, an increase of 75 persons per square mile in just ten years. Beaufort County is developing at an unprecedented rate, and it is predicted that the population of the county will double from that of the 1990 population by the year 2020.



SAMP Organization

The SAMP project spanned 42 months, beginning in April of 1999. Many of the initial project activities were preparatory in nature, and were designed to ensure widespread participation, the sufficiency of the information base, and the effectiveness of activities and expenditures in achieving the project's goals. The first year focused on information acquisition and the identification of specific monitoring needs to address the issues facing the water resources of Beaufort County. During the second and third years, projects were completed, assessments of management alternatives and the development of specific components of program management for the watershed were completed. In the final six months, the focus was on the synthesis of the project components into functional stormwater and wastewater management plans, including the development of long-term implementation mechanisms.

The SAMP was conducted by project staff under the direction of Steve Moore of the South Carolina Department of Health and Environmental Control (DHEC), Office of Ocean and Coastal Resource Management (OCRM). A number of DHEC bureau and divisional staff were also involved throughout the process. The Beaufort SAMP Oversight Committee served as the focal point for SAMP activities. This committee established the priorities, goals, and objectives of the SAMP, represented their organizations, and advocated the work of the SAMP within their organizations. Primary activities included the development of mechanisms to address and /or improve stormwater management, onsite wastewater disposal systems, water quality management practices for area drainage plans, wastewater discharges, and marina locations and boat discharges. A Policy Advisory Committee served as advisors to the Oversight Committee on SAMP direction and goals, provided a sounding board for SAMP recommendations, and informed their organizations of SAMP projects and events. And finally, the Board of Technical Advisors provided technical advice in their areas of expertise and reviewed and commented on draft reports and recommendations. Because many of the work elements fell within the purview of other agencies and entities, OCRM contracted for the preparation of many components of the SAMP. Work plan development and work element review were accomplished with the assistance of the Oversight Committee, representatives from state and local agencies, and environmental and economic interest groups. This final report was prepared by the SAMP Program Manager, Stephen Cofer-Shabica.

Recommended Actions To Protect County Water Resources

The following recommended actions were formulated by the contractors and grantees with guidance from the SAMP Oversight Committee and Board of Technical Advisors. These recommendations represent an extraordinary amount of work by many individuals and form the basis for action to protect the unique water resources of the lowcountry of Beaufort County.

All recommendations are considered important to achieving the primary goal of the SAMP, the protection and restoration of the waterways of Beaufort County. Funding plans are being prepared by the affected organizations, separate from this report, but should not preclude following through on these recommendations whenever possible. Each recommendation details the action needed to accomplish a specific objective and gives the background or reasoning behind a particular action item. The agencies or organizations that will play central roles in accomplishing the tasks are also identified. Several of the recommendations have already been completed. For example, a stormwater utility has been implemented, educational brochures and CDs are being distributed county-wide, and stormwater and wastewater controls on Broad Creek are in progress.

Copies of each project report, as well as this final report, are available for reference at OCRM, and for general use, have been placed in the Beaufort County and Hilton Head Island Public Libraries. In addition, these same reports may be accessed on the internet at the following web site: <http://www.scdhec.net/ocrm/HTML/bftsamp.html>.

Recommended Actions To Protect County Water Resources

Stormwater Management – Improve Stormwater Standards

Establish a Stormwater Utility

PROBLEM

Prior to the completion of the SAMP, stormwater permitting programs in Beaufort County were focused exclusively at the site level. Consequently, each proposed development project that required stormwater permits was evaluated without regard to the effects on the sub-watershed or even on the entire watershed.

ACTION

Establish a county-wide stormwater utility that allows government to address stormwater issues and to appropriate fees to fund stormwater management programs.

BACKGROUND

The flooding, water pollution, and other stormwater problems in Beaufort County are a result of the county not adequately funding stormwater management in the past. Stormwater management systems require a comprehensive management approach to address flooding, stormwater quality issues and solutions. One mechanism to achieve this goal is the stormwater utility. This entity allows governments to address stormwater issues and to appropriate fees to fund stormwater management programs. The guiding policy for the county is to establish and provide a long-term comprehensive approach to stormwater management with dedicated funding.

ACCOMPLISHMENTS

This project recommends ways to deal with the growing flooding and water quality problems in the county and concentrates on three major areas: the stormwater utility program, finance and database management, and public education and involvement. The following issues were successfully addressed through the stormwater utility: (1) water pollution and water quality impairment sources, (2) stable, equitable, long-term, and adequate funding, (3) long-standing drainage problems and drainage system maintenance, (4) public involvement and education, (5) stormwater reuse and recycling, (6) best management practices (BMPs) inspection programs, and (7) technical support resources and management for stormwater operations. Of greatest importance to the citizens and water resources of Beaufort county, the following were implemented or established:

Stormwater Utility Operation Plan and Program.
Stormwater Utility Ordinance and Fees Collection Ordinance.
Stormwater Utility Management Board.

SPECIFIC RECOMMENDATIONS

Ensure that the stormwater utility program and the fees that are collected are integrated into and used for a comprehensive water quality protection program for the county.

IMPLEMENTATION

Beaufort County

Recommended Actions To Protect County Water Resources

Stormwater Management – Improve Stormwater Standards Develop a Broad Creek Management Plan

PROBLEM

Hilton Head Island's 1999 Comprehensive Plan recognized Broad Creek's importance to the island as a "blueway" (a corridor of water, such as a creek or river, and its shoreline), but also noted the numerous threats to its long-term existence. It suggested that the town must "commit to protecting Broad Creek because it is the most significant and most vulnerable natural resource on Hilton Head Island." That plan recommended that a separate management plan be created for the creek to identify ways to protect it from further degradation.

ACTION

Develop and implement a management plan to address water quality aspects of Broad Creek as well as its recreational uses.

BACKGROUND

The Town of Hilton Head Island recognized that water quality in the surrounding water bodies is dependent on the quality of the stormwater runoff from the land. In April 1999, the updated comprehensive plan recommended that Broad Creek become a blueway—a community focal point around water use and view sheds. The Town Council requested that an action plan be prepared that addressed the water quality of Broad Creek, preserved the environmental quality, and enhanced the recreational opportunities and public access to the creek.

The overall goal of the Broad Creek Management Plan is to improve the environment of the creek and its ecosystem for all living creatures. To ensure the long-term ecological integrity of this system, negative impacts from past development practices are being corrected, and new practices instituted that will not have detrimental effects on the creek's ecosystem.

ACCOMPLISHMENTS

The assessment of Broad Creek formed the basis for Hilton Head Island's management plan. Elements of this plan:

1. Identified and analyzed water quality impacts on Broad Creek from stormwater, septic systems, and recreational uses;
2. Identified and implemented means to mitigate, reduce or eliminate these impacts; and
3. Inventoried the recreational use and other uses of Broad Creek.



Recommended Actions

To Protect County Water Resources

The Town of Hilton Head Island has adopted the management plan for Broad Creek as an appendix to the town's comprehensive plan, and has initiated implementation of the plan's 57 recommendations. Everything in this management plan is interrelated. The land uses affect the quality and quantity of stormwater runoff, which in turn impacts the water quality of Broad Creek, which impacts the wildlife habitat both in the water and along the shoreline. The impacts on the wildlife in turn impact the enjoyment of the creek for recreation and fishing on the creek.

SPECIFIC RECOMMENDATIONS

1. Manage land uses to protect the water quality of Broad Creek.
2. Reduce current pollutant loads entering Broad Creek through the stormwater system and introduce BMPs to improve the water quality in the creek.
3. Reduce and eventually eliminate, to the extent possible, pollution of Broad Creek from onsite sewage disposal systems.
4. Meet and exceed requirements for the National Pollutant Discharge Elimination System (NPDES) permit; comply with all of the required elements of the NPDES program.
5. Protect important habitat including the water, the marsh, the oyster beds, and the surrounding uplands.
6. Restore degraded systems. Merely protecting the remaining habitat areas on Broad Creek is not sufficient.
7. Manage land uses to preserve the natural beauty of Broad Creek and its shoreline.
8. Investigate ways to limit the number of docks on Broad Creek as well as ways to mitigate their appearance.
9. Improve the accessibility of the creek to the public by creating additional access points along the creek for recreational purposes, both boating and passive recreation on the shore.
10. Investigate ways to improve safety for boaters and others on the creek.
11. An informed public is more likely to become involved in protecting and improving this outstanding resource. Produce and distribute the seven educational brochures, design and install interpretive signs and kiosk to increase public awareness, and develop computer-based products to help inform the public on issues relevant to the Broad Creek ecosystem.

IMPLEMENTATION

Town of Hilton Head Island.

Recommended Actions To Protect County Water Resources

Stormwater Management – Improve Stormwater Standards

Develop Watershed-level Stormwater Management Plans: Okatie Basin Pilot Study

PROBLEM

Stormwater runoff transports pollutants into the marshes and estuaries from many sources on land. Currently, local and state stormwater permitting programs focus at the site level. Each proposed development project is evaluated in relative isolation from all others.

ACTION

Improve stormwater standards for new developments, develop measures to protect the headwaters of tidal creeks, and reduce flooding and water quality impacts in order to minimize economic and social losses.

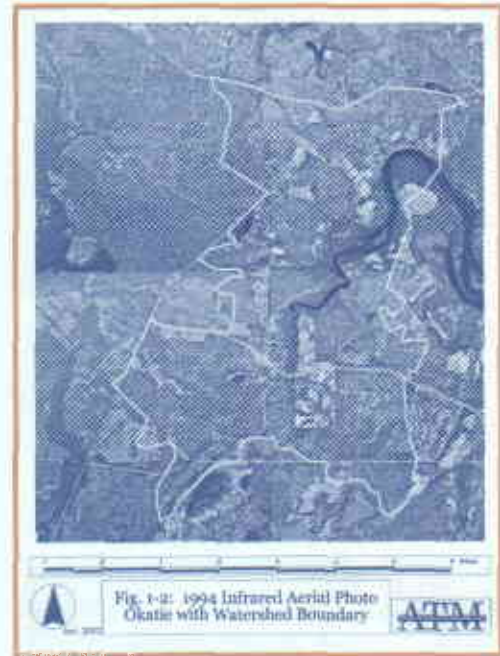
BACKGROUND

Watershed-level management of stormwater can create opportunities to make better use of natural drainage ways and consolidate stormwater management systems. The water quality benefits can be significant, and engineering and management costs can be reduced over time. The focus for this work was on stormwater management in the Okatie River sub-watershed as a prototype for the remaining watersheds of Beaufort County. Optimum design of stormwater management should mimic (and use) the features and functions of the natural ecosystem, and systems should be designed for minimum maintenance. The Okatie sub-watershed was considered the best place to start as it is a relatively small and undeveloped watershed.

ACCOMPLISHMENTS

The assessment of the Okatie sub-watershed provided a basis for the understanding of stormwater flow and effects within the watersheds of the county. Elements of this assessment included:

1. An understanding of present water quality conditions in the watershed;
2. The effectiveness of stormwater management design and operational practice in the watershed;
3. How to improve stormwater standards for new developments and evaluate growth boundaries;
4. How to define important headwater areas and develop additional measures to protect the upper reaches of tidal creeks; and
5. How to reduce existing flooding and water quality impacts to prevent future flooding and water quality impacts, and how to minimize economic and social losses.



Recommended Actions

To Protect County Water Resources

SPECIFIC RECOMMENDATIONS

1. Headwater riparian buffers should be non-managed and naturally vegetated.
2. Buffer and green space designs should have wildlife corridors that lead away from the vegetated buffer areas adjacent to tidal creeks.
3. Buffers should be included in all new developments with widths of between 50 and 100 feet recommended. The maintenance of buffers as "unmanaged" forested systems is recommended.
4. With wet detention ponds, a 30% pond littoral zone area should be incorporated. It is also recommended that the 10-foot safety bench be used with no mowing activity permitted.
5. Stormwater pond and wetland BMP systems should have hydrologic designs similar to wet detention ponds.
6. Where soils allow (types HSG A or B), dry retention ponds should be required, particularly in headwater areas.
7. Infiltration and sand filtration BMP systems are not recommended.
8. A goal of 7.5% imperviousness should be adopted through impervious surface reduction and BMPs.
9. Street sweeping is only recommended in high-density areas with large amounts of impervious surfaces.
10. It is recommended that Jasper County adopt Beaufort County's criteria for stormwater treatment as contained in the Beaufort County Manual for Stormwater BMPs.
11. Septic systems should not be allowed within 200 feet of the critical line.
12. Baffle box systems and baffle (detention and retention) technologies should be used only when no other alternatives are possible.
13. Vegetated submerged bed wetlands systems may be part of a treatment train downstream of a wet detention system.
14. A water quality monitoring program at key tributary sections should be implemented and include monitoring of the influent/effluents of in-situ retention and detention systems. Regional facilities should be considered for buffer/conservation areas before the watershed is built-out.
15. Educational kiosks, storm drain markers, and advertising campaigns should be geared to both new and existing homeowners and industry.

IMPLEMENTATION

Beaufort County

Recommended Actions To Protect County Water Resources

Stormwater Management – Improve Stormwater Standards

Develop Treatment Standards for Bridge Runoff

PROBLEM

Stormwater runoff from highways and bridges flows directly into the rivers and marshes of Beaufort County without treatment. This water carries oils, grease, asbestos, rubber, and other road debris into the waterways and has the potential for impacting shellfish beds as well as fish and wildlife.

ACTION

Reduce and prevent further water quality degradation in the watersheds of Beaufort County.

BACKGROUND

South Carolina currently has a protective standard for bridge runoff when the bridge crossing lies within 1,000 feet of a shellfish bed. Bridge approaches and bridges that cross outstanding recreational waters or shellfish habitat waters, but are not within 1,000 feet of shellfish beds, are not subject to this high standard. The objective of this work was to determine specific improvements to road and bridge design and maintenance standards that would improve the protection of water quality. Stormwater runoff from the U. S. Highway 278 Okatie River Bridge flows directly into the river and marshes without treatment. In addition, the bridge crosses outstanding recreational and shellfish habitat waters. To rectify this, a retrofit rainwater runoff collection system for the Okatie River Bridge was designed as a pilot study for other county bridges. The design centered on the collection and treatment of runoff to protect the water quality in the Okatie River sub-watershed.

ACCOMPLISHMENTS

The Okatie Bridge report includes engineering design specifications and drawings for the construction of a stormwater conveyance and treatment system to accommodate and treat stormwater runoff from a 10-year 24-hour storm event. The system consists of fiberglass pipe connections from the vertical scupper drains that discharge through the bridge. These are connected to collector fiberglass pipes, hung on the outside and below the roadway. The stormwater from the roadbed flows through the scuppers, is collected and transported through the collector pipe to a Vortech Model 9000 stormwater treatment unit prior to discharge through a riprap erosion control structure to the surrounding marsh. The treatment unit collects sediment, floating substances (example oils and grease), and debris.

SPECIFIC RECOMMENDATIONS

1. Construct a stormwater conveyance and treatment system with a maintenance program for the Okatie River Bridge to collect and treat stormwater runoff from a 10-year, 24-hour storm event.
2. Evaluate other bridge approaches and bridges in the county for similar retrofits, if warranted.
3. In all new bridge construction, provide for, where warranted or appropriate, stormwater collection and treatment systems for the bridge approaches and the bridge.

IMPLEMENTATION

Beaufort County, South Carolina Department of Transportation.

Recommended Actions

To Protect County Water Resources

Stormwater Management – Improve Stormwater Standards

Develop a River Quality Overlay District Ordinance

PROBLEM

Impervious surfaces, narrow or absent buffers along county waterways, and some human activities have a potential to negatively affect estuarine water quality, especially in headwater areas.

ACTION

Provide Beaufort County with the best, state-of-the-knowledge, technical and scientific basis for the implementation of the River Quality Overlay District Ordinance: to define important headwaters and to develop protective measures that reduce and prevent biological and water quality degradation downstream. It is assumed that the methodologies, based on the Okatie sub-watershed model, will be utilized for the definition of the ordinance in the remaining waterways of the county.

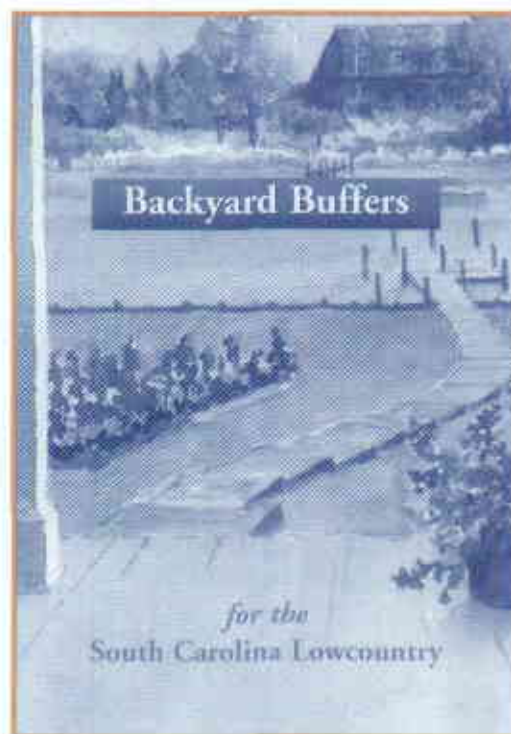
BACKGROUND

Studies by the Charleston Harbor Project and others showed that small tidal creeks are more susceptible to the effects of pollution, both chemical and physical, than larger water bodies. Beaufort County has passed a River Protection Overlay District Ordinance identifying an area, adjacent to the marsh, as needing additional protection and controls. However, the county needed assistance in developing standards, such as set-backs and appropriate impervious cover limits for this new district. A series of facilitated workshops was held to provide an overview of the state-of-the-knowledge on how setbacks, impervious surfaces, and surface water and groundwater affect water quality.

ACCOMPLISHMENTS

The following questions were answered by the workshop:

1. What form should the River Protection Overlay District Ordinance take to provide adequate protection for county receiving waters?
The ordinance would address two distinct geographic areas in the watershed: the area of the watershed that drains to the headwaters, and a variable width of land that drains directly to the critical area, but is in no case wider than 500 feet.
2. Within the district, what are the appropriate setbacks and the technical basis for these setbacks, as each relates to surface water, and to groundwater?
100 foot forested buffer in the headwater watersheds, and 100 foot buffer, 50 managed and 50 natural/forested, in the remaining watershed.



Recommended Actions To Protect County Water Resources

3. What is the appropriate level of impervious surface within the district?
Stormwater runoff from developments should be treated to a water quality level that would be equal to that from a development with 10% imperviousness through the use of BMPs as appropriate.
4. What activities should be limited within the district?
Activities are described as either permitted, limited, or prohibited.

SPECIFIC RECOMMENDATIONS

Enact the River Protection Overlay District Ordinance for Beaufort County.

IMPLEMENTATION

Beaufort County Council

Recommended Actions To Protect County Water Resources

Wastewater Management – Improve Management of Septic Systems

Map Existing and Potential Land Application Disposal Sites

PROBLEM

Direct disposal of treated wastewater into county waterways is no longer an option for Beaufort County. Yet, with the growing population there is a growing need for wastewater disposal.

ACTION

Improve centralized wastewater system operations that encourage land application of treated wastewater in the county.

BACKGROUND

Currently, it is unlikely that any new direct discharge points for treated wastewater will be proposed in Beaufort County. Rather, the trend is toward consolidating and eliminating existing discharge points and disposing of new wastewater flows by land application. There is concern, however, that the number of sites suitable for land application will decline as land development occurs within the county. A considerable amount of land is needed. For example, in an 83-acre subdivision of 1/4-acre lots, 50 acres of open space are needed for land application. High and dry sites are best for land application, but raw land of this type is already scarce in Beaufort County and will become more rare as land development progresses. Land application is a positive option that should be encouraged and preserved. Land application sites that could be used for future land disposal and back-up disposal sites were identified and mapped. Purchase, easement, and other strategies should be evaluated to protect such lands from alternative uses.

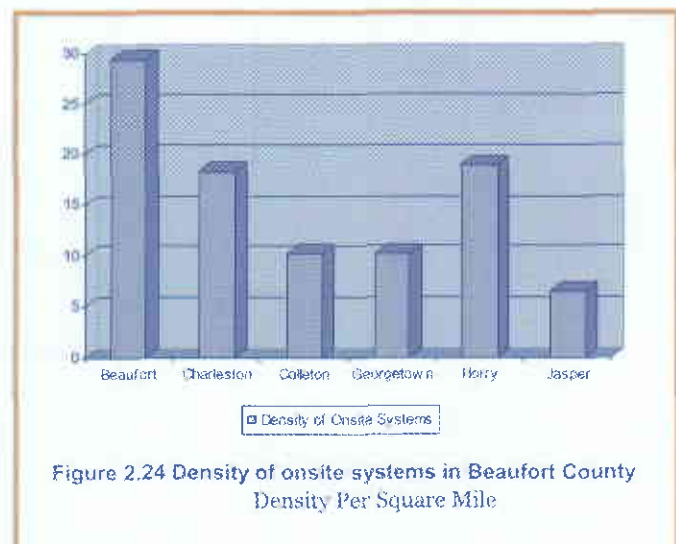


Figure 2.24 Density of onsite systems in Beaufort County
Density Per Square Mile

ACCOMPLISHMENTS

Mapping of land application sites has been completed by the Beaufort/Jasper Water and Sewer Authority (BJWSA).

SPECIFIC RECOMMENDATIONS

Prioritize all land application sites, select and acquire sites, and implement a wastewater land discharge program.

IMPLEMENTATION

Beaufort/Jasper Water and Sewer Authority (BJWSA) and Beaufort County

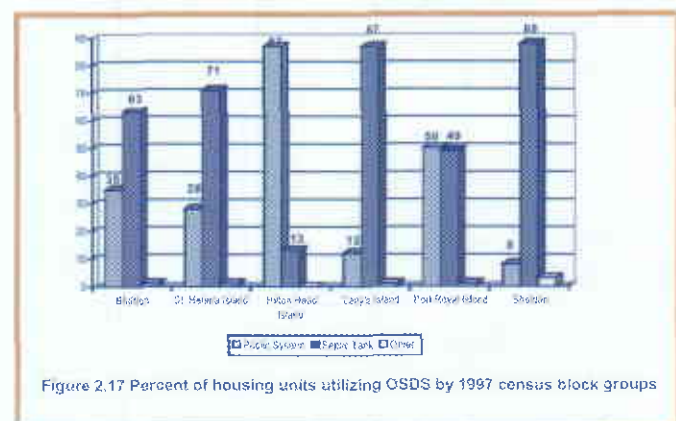


Figure 2.17 Percent of housing units utilizing OSDS by 1997 census block groups

Recommended Actions To Protect County Water Resources

Wastewater Management – Improve Management of Septic Systems Develop a Comprehensive On-Site Disposal System (OSDS) Program

PROBLEM

It is believed that due to county soil types and characteristics, the current state standards for permitting new septic systems and managing existing systems may not be sufficiently protective of human health and marine and estuarine resources.

ACTION

Enact a comprehensive OSDS management program for Beaufort County.

BACKGROUND

In the lowcountry with its shallow water table, the most controversial aspect of South Carolina's current standards for new septic systems is the six-inch separation distance between the bottom of a system's drain field and the groundwater's seasonal high-water mark. The permitted density of septic systems is a second area of contention. It has been argued that in low-lying coastal areas with marginally suitable soils and a shallow water-table, communities run a great risk

when a number of septic systems are allowed to concentrate in one area should many of these become defective. The consequences of one septic system leaking may not be great, but the cumulative effects of many failing in a small area can be great. South Carolina currently has no density limitation for septic systems. With more stringent design standards, a more comprehensive range of alternatives to conventional septic systems would be available so that landowners, even in marginal areas, would have the ability to develop their property.

Even the best-designed on-site disposal systems, in the best of soils, should be inspected and maintained on a regular and routine basis. Some coastal communities that have a preponderance of septic systems have instituted inspection and maintenance programs that apply to all homeowners using septic systems. This program is typically accomplished through a wastewater management district. The public agency can do the work itself or can require homeowners to certify that their systems have been inspected and pumped-out at regular intervals. Construction standards do not exist that would limit the volume of wastewater, and level of nutrients and foreign materials (washing machine lint and grease) entering the septic system. This could be accomplished by controlling the type of plumbing and household appliances that can be used in new homes on septic systems.

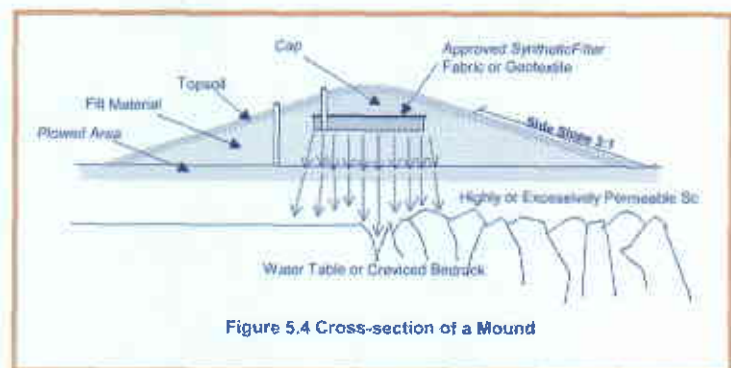


Figure 5.4 Cross-section of a Mound

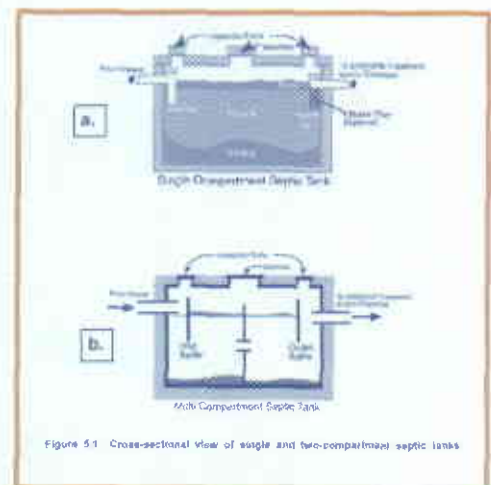


Figure 5.1 Cross-sectional view of single and two-compartment septic tanks

Recommended Actions To Protect County Water Resources

ACCOMPLISHMENTS

This report documents appropriate onsite/decentralized wastewater management strategies for Beaufort County. Inspection and maintenance procedures are set forth in draft ordinance language establishing protocols for a model onsite/decentralized wastewater management inspection and maintenance program within the county's overall onsite management system. Standards for conventional, innovative, and small flow community on-site wastewater disposal systems (OSDS) relevant to the county are reviewed. A comprehensive quantitative and qualitative analysis of primary, secondary and tertiary onsite/decentralized systems including operation, maintenance and cost considerations for conventional, innovative, and small flow community OSDS is provided. New standards for relevant household appliances are set forth within recommendations for draft ordinance language. Finally, an overview for a county-wide OSDS management system is identified in a draft ordinance.

SPECIFIC RECOMMENDATIONS

1. Enact inspection and maintenance standards by the establishment of a wastewater management district that addresses all septic systems in the county.
2. Enact a comprehensive on-site wastewater disposal management program.
3. Enact innovative standards for on-site wastewater disposal.
4. Enact new standards for household appliances.
5. Adopt a manual of alternative OSDSs.
6. Review DHEC Regulations 61-56 to identify duplications in recommendations prior to the enactment of a county OSDS ordinance.

IMPLEMENTATION

Beaufort County

Recommended Actions To Protect County Water Resources

Water Quality Monitoring – Improve Monitoring of Water Quality **Identify Water Quality Monitoring Activities in County**

PROBLEM

Currently, several federal, state and local agencies monitor the water quality and biotic conditions of Beaufort County's rivers and creeks. Yet, there is neither a central clearinghouse for, nor coordination of this monitoring effort and the dissemination of the information.

ACTION

Evaluate current water quality monitoring activities within the county and determine if improvement and/or coordination of these activities are appropriate and feasible.

BACKGROUND

Many federal, state and local agencies monitor the water quality and biotic conditions of Beaufort County's rivers, creeks, and sounds. Current and future monitoring activities, if coordinated properly, would provide more efficient and effective use of the collected data. This would serve to better understand water quality conditions of county waterways and to identify areas of concern before closure to harvesting is required.

ACCOMPLISHMENTS

Federal, state and local sources of water quality monitoring and watershed protection data were identified and the data records categorized.

SPECIFIC RECOMMENDATIONS

1. Establish a structure to coordinate all water quality monitoring activities in the county.
2. Explore and evaluate the possibility of using the Land Uses—Coastal Ecosystem Study (LU-CES) web-enhanced, GIS-based database management and information system research effort as a vehicle to place the data collection, management, quality assurance/quality control, and documentation responsibilities for county-wide water quality monitoring in the hands of geographers and experts at the university level.

IMPLEMENTATION

Beaufort County Council, Town of Hilton Head Island, DHEC, and South Carolina Department of Natural Resources (DNR).

Recommended Actions

To Protect County Water Resources

Boating Management – Provide Low-Impact Boating in Beaufort County

Develop County Boating Management Plan

PROBLEM

Southern Beaufort County, excluding Hilton Head Island, is predicted to grow from 7,000 people in 1990 to 47,000 in 2020. This increased population will bring a predictable increase in boats and boating impacts on the water quality and aquatic resources of county waterways.

ACTION

Provide for orderly, low-impact boating in Beaufort County and encourage low-impact growth in the boating industry.

BACKGROUND

The CWTF identified the need to prepare a boating management plan to explore current patterns of waterway use and to develop a framework for provision of public access to local waters while ensuring protection of natural resources and water quality. To accomplish these goals, an inventory of major boating access facilities and a review of the regulations that guide the development of these facilities were needed. Additionally, the identification of environmentally sensitive areas and of waterway use conflicts would allow for the creation of a more proactive plan. The plan would also address environmentally sound policies, improved boater education, and increased enforcement of boater regulations to promote safe use of local waters.

Table 3-1 Beaufort County Public Boat Landings

County Region	Ramp Name	Current upgrade status
Coastal Group	Butchers Island	Pending
	Russ Point	Underway
	Sands Beach	Pending
Combahee River/Wimbee Creek	Wimbee Creek	Pending
	Combahee (Steel Bridge)	Complete
	Sugar Hill	Pending
Coosaw River	Sam's Point	Underway
Beaufort River	Capers	Pending
	Parris Island	Complete
	Fort Frederick	Pending
	White Hall	Pending
	Pigeon Point	Complete
	Brickyard	Pending
Broad River	Station Creek	Complete
	Broad River	Pending
	Grays Hill	Underway
Chechessee / Colleton River	Paige Point, Hurspah	Underway
	Lemon Island	Pending
Hilton Head Island	H.E. Trash	Pending
	Broad Creek	Underway
Oaufuskie	Oaufuskie Island	Underway
May River/ Mackays Creek	Buckingham	Pending
	Aljoy	Complete
	C. C. Haigh	Complete

Source: Beaufort County Boating Needs Assessment (BNA) (Taylor, 1993) and personal communication (Beaufort County Engineer, 2001)

Reference should also be made to the Stormwater Management section Develop a Broad Creek Management Plan. This plan details the Town of Hilton Head Island's boating management recommendations for Broad Creek.

ACCOMPLISHMENTS

A plan was developed that provides a current inventory of major boating access facilities (marinas, boat ramps, and docks), a review of regulations that guide development of these facilities, identification of environmentally sensitive areas, identification of waterway use conflicts, and finally, recommendations to address environmentally sound policies, improved boater education, and increased enforcement of boater regulations to promote safe use of county waters.

Table 5-1 Population Projections and Predicted Registered Vessels in Beaufort County, SC

	Registered Boats	Power:	Unpowered	Population
2000	14,622	14,085	537	111,083
2005	16,619	16,009	610	126,269
2010	19,205	18,500	705	145,918
2015	22,589	21,759	829	171,628
2020	27,391	26,385	1,005	208,111

Source: National Marine Manufacturers Association, Statistical Data, 2000; South Carolina Department of Natural Resource, Boat Registrations, 2000

Recommended Actions To Protect County Water Resources

SPECIFIC RECOMMENDATIONS

1. To meet future demand, explore county-wide redevelopment or expansion of existing marinas and boat landings.
2. Encourage development of dry storage marinas rather than wet slip marinas.
3. Prepare an update of the 1993 Beaufort County Boating Needs Assessment to include projection of needs through 2020.
4. During the development planning process, the Town of Bluffton should encourage the creation of community docks, dry storage facilities, and boat ramps.
5. As part of the Waterfront Redevelopment Program, the City of Beaufort should include a waterway use study that addresses the needs for berthing, boat trailer access, mooring capacity, and public access.
6. Beaufort County should consider nominating for No Discharge Zone designation outstanding resource waters, such as the May, New, Colleton, Coosaw, Whale Branch, and Okatie rivers.
7. Beaufort County should adopt an ordinance requiring sewage pump-out facilities at all marinas. It should establish a Beaufort County Waterway Committee of stakeholders, with the mission to facilitate and implement management of the waters through consensus building of users and increase boater education programs.
8. Boating enforcement efforts should be increased in Beaufort County, City of Beaufort, towns of Port Royal, Bluffton, and Hilton Head Island through a cooperative agreement between the DNR and the Beaufort County Sheriff's Department.

IMPLEMENTATION

Beaufort County, South Carolina State Ports Authority, City of Beaufort, Towns of Port Royal, Bluffton, and Hilton Head Island, DNR, and Beaufort County Sheriff's Department.

Recommended Actions

To Protect County Water Resources

Public Education - Provide for an Informed and Involved Citizenry

Conduct Educational Campaigns

PROBLEM

The information and knowledge gained from the SAMP must be disseminated to the general public in an easily understandable form.

ACTION

Improve and protect the water quality in Beaufort County through an educated and involved public.

BACKGROUND

Unless people are informed and participate in various activities related to water quality protection, needed changes in county policy will not occur. A number of existing outreach and education efforts focus on non-point source pollution. These were evaluated for their applicability in Beaufort County. Six specific projects were proposed to address the identified needs for public education.

ACCOMPLISHMENTS

Educational brochures for countywide distribution were completed for all project areas. These include the following:

1. Buffer function and maintenance: a brochure on backyard buffers by DHEC OCRM, the Battery Creek Demonstration Project in collaboration with Beaufort County Planning Department, and a brochure by the Town of Hilton Head Island.
2. On-site disposal systems standards and maintenance: a brochure in collaboration with the Town of Hilton Head Island and DHEC.
3. Recreational opportunities, and shellfish and wildlife protection: three brochures in collaboration with the Town of Hilton Head Island.
4. Boater education and safety programs for boaters: three brochures in collaboration with SC Department of Natural Resources and the Town of Hilton Head Island.
5. Homeowner landscape care: two brochures, and an interactive CD in collaboration with Beaufort County Extension/Clemson University Cooperative Extension Service.
6. Household hazardous waste disposal: a brochure in collaboration with Beaufort County Extension/Clemson University Cooperative Extension.

Recommended Actions To Protect County Water Resources

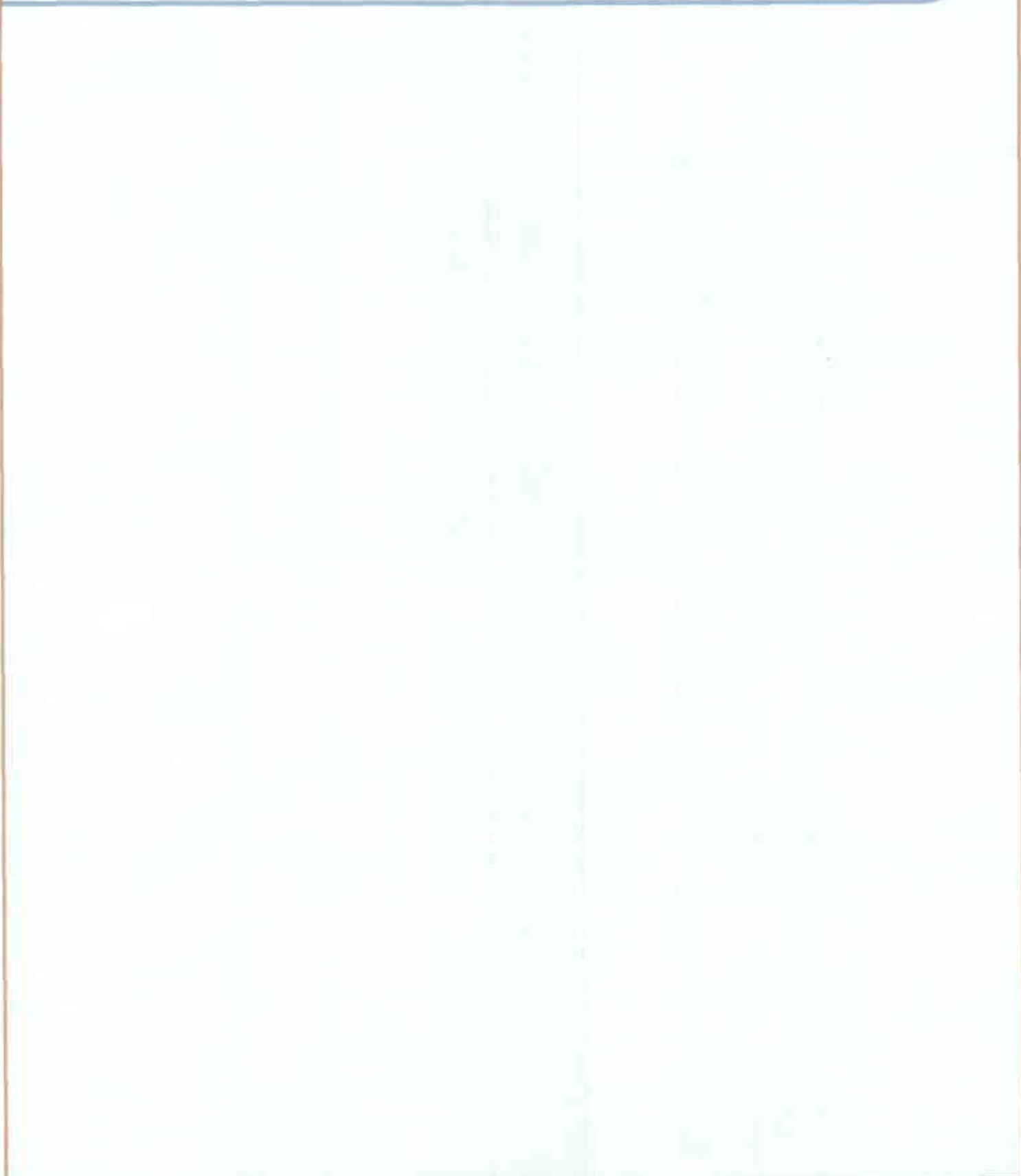
A Citizen Shoreline Watch program in collaboration with the Low Country Institute and the Friends of the Rivers was initiated. Finally, in collaboration with DNR, two oyster shell recycling sites for oyster restoration projects were established in the Town of Hilton Head Island and the necessary equipment for shell handling acquired.

SPECIFIC RECOMMENDATIONS

The brochures and CD need to be widely distributed to citizens within Beaufort County. This will be done by, among others, the Beaufort County Extension/Clemson University Cooperative Extension Service, Beaufort County, and OCRM. In addition, copies should be placed in all city, county, and academic libraries in the county.

IMPLEMENTATION

Beaufort County, Town of Hilton Head Island, Lowcountry Institute, DNR, and the Beaufort County Extension/Clemson University Cooperative Extension Service



APPENDICES

Project Staff

Project Director

The SAMP was conducted by a project staff under the direction of Debra Hernandez, Assistant Director of Planning for OCRM (1999), and Steve Moore, Director of Planning for OCRM (1999-2002). The Project Director had the primary responsibility for the conduct of the SAMP, supervised the project staff, and was chairperson of the SAMP Oversight Committee.

Administrative Board

The Administrative Board reviewed the progress of the SAMP on a frequent basis and evaluated the achievement of goals and refinement of project direction and activities. The initial function of the Administrative Board was to develop criteria and procedures for the review of project milestones and products. Membership was comprised of:

Stephen Cofer-Shabica, Ph.D., SAMP Project Manager,
Chris Brooks, Deputy Commissioner, DHEC/OCRM,
Steve Moore, Director of Planning, DHEC/OCRM,
Debra Hernandez, Assistant Director of Planning/Project Director, DHEC/OCRM,
Ed Kruse, NOAA Program Officer (1999 – 2000, 2002), and
Jay Charland, NOAA Program Officer (2001)

Membership of Committees and Boards

Beaufort County SAMP Oversight Committee

The Beaufort SAMP Oversight Committee served as the focal point for SAMP activities. This committee provided oversight on the general conduct of the SAMP, established the priorities, goals, and objectives of the SAMP, represented their organizations, and advocated the work of the SAMP within their organizations. The function of the committee was to provide advice on project activities, documents, and budgets. Work plan development and work element reviews were accomplished with the assistance of the Oversight Committee. Membership included:

Barry Connor, Pinckney Colony Community Association and Connor & Associates, Bluffton

David Harter, Hilton Head Fishing Club and Greater Island Committee, Hilton Head Island

Debra Hernandez, DHEC/OCRM, Charleston

Bill Marscher, Bluffton Area Community Association and Greater Island Committee, Hilton Head Island

Sam Passmore (1999-2001), **Patty Richards** (2001-2002), South Carolina Coastal Conservation League, Beaufort

Dorothy Perkins, former Councilwoman Town of Hilton Head Island, Hilton Head Island

Chester Sansbury (1999-2000), **Sally Knowles** (2000-2002), DHEC, Bureau of Water, Columbia

Geoff Scott, Ph.D., NOAA, Charleston

Bob VanDolah, Ph.D., SC DNR, Charleston

Policy Advisory Committee

The Policy Advisory Committee provided advice to the Oversight Committee on SAMP direction and goals, served as a sounding board for SAMP recommendations, and informed their organizations of SAMP directions and events. Membership was comprised of:

Jack Alderman (1999-2000), **Charles Mitchell** (2000-2002), The Branigar Organization, Bluffton

Elizabeth Anderson, Planning Office, City of Beaufort

Criswell Bickley, Jr., Executive Director, Lowcountry Council of Governments, Yemassee

Linda Bridges, Planning Administrator, Town of Port Royal

Dr. Howard L. Brilliant, DHEC Board for First Congressional District, Charleston

Jim Chaffin (1999-2001), Developer, Spring Island Company, Spring Island

Woody Collins, Oysterman, Hilton Head Island

Henry Lawton, Sr., DHEC/OCRM Appellate Panel for Jasper County, Ridgeland

Jean Lebro, (1999-2000) Executive Vice-President, Greater Beaufort Chamber of Commerce, Beaufort

Ross Lyssinger, Boating/Marina Industry, Skull Creek Marina, Hilton Head Island

Thomas E. McClary, Chairman, Jasper County Council, Ridgeland

Emmett McCracken, Mayor and Councilman, Town of Bluffton

Pam McFarland, Director of Community Development, Town of Bluffton

Dean Moss, Beaufort/Jasper Sewer and Water Authority, Beaufort

Cyndi Mosteller, DHEC Board (1999-2000), Citizen, Isle of Palms (2000-2002)

Samuel E. Murray, Mayor, Town of Port Royal

Bill Rauch, Mayor, City of Beaufort

Mac Sanders, Farmer, St. Helena Island

Nancy Schilling, SC Marine Association, Hilton Head Island

Col. Beverly Snow, Jr., DHEC/OCRM Appellate Panel for Beaufort County, Fripp Island

Membership of Committees and Boards

Board of Technical Advisors

The Board of Technical Advisors provided technical advice in their areas of expertise, and reviewed and commented on draft reports and recommendations. Membership included:

Russell Berry, DHEC, Lowcountry EQC District, Beaufort

Cindy Bower-Camacho (2000-2002), Beaufort County Planning Department, Beaufort

Colt Bowles, DHEC, Environmental Quality Control, Bureau of Water, Columbia

Rocky Browder, DHEC/OCRM, Beaufort

Don Campbell, SCDHEC, Lowcountry Health District, Beaufort

Charles Cousins (1999), **Jill Foster** (2000-2002), Planning Department, Town of Hilton Head Island

Lauren Petrovich (1999-2001), **Tom Fish, Ph.D.** (2001-2002), NOAA Coastal Services Center, Charleston

Ray Vaughn, SCDOT, Columbia

Tom Wilson (1999-2000), Beaufort County Planning Department, Beaufort

Membership of Clean Water Task

Thad Bailey, Oysterman, Okatie

Roddy Beasley, Maggioni Seafood, St. Helena Island

Russell Berry, DHEC, Lowcountry EQC District, Beaufort

Woody Collins, Oysterman, Hilton Head Island

General Howard Davis, Developer, Hilton Head Island

Beth Grace, formerly Beaufort County Council, Beaufort

David Harter, Hilton Head Fishing Club and Greater Island Committee, Hilton Head Island

Clark Lowther, Lemon Island Seafood, Okatie

Bill Marscher, Bluffton Area Community Association and Greater Island Committee, Hilton Head Island

Emmett McCracken, Mayor and Councilman, Town of Bluffton

Laura McIntosh, Citizen, Bluffton

Tom Peebles, Mayor, Town of Hilton Head Island

David Payne, DHEC, Environmental Quality Control, Beaufort

Sam Passmore, South Carolina Coastal Conservation League, Charleston

River Quality Overlay District Workshop Participants

Russell Berry	DHEC/Lowcountry EQC District
Elizabeth Blood	Jones Ecological Research Center
Cindy Bower-Camacho	Beaufort County Planning Department
Colt Bowles	DHEC/Bureau of Water
Stephen Cofer-Shabica	DHEC/OCRM
Jimmy Collins	Thomas and Hutton
Barry Connor	Connor and Associates, Beaufort County Council
Michael Criss	DNR
Rick DeVoe	SC Sea Grant Consortium
Chris Eversmann	Beaufort County Public Works
Larry Frey	Beaufort County Planning Department
Mike Fulton	NOAA/NOS
John Hayes	Clemson University
Debra Hernandez	DHEC/OCRM
Fred Holland	DNR/Marine Resources Research Institute
John Holloway	Beaufort County Planning Department
Samantha Joye	University of Georgia
Lane Kendig	Kendig and Associates
Anne Kitchell	University of Delaware
Steve Klaine	Clemson University
Gary Kleppel	University of South Carolina
Bob Klink	Beaufort County Engineering Department
Sally Krebs	Town of Hilton Head Island
Bill Marscher	Clean Water Task Force
Steve McCutcheon	EPA - Region IV
Hank McKellar	University of South Carolina
Charles Mitchell	The Branigar Organization, Inc.
Steve Moore	DHEC/OCRM
Judy Nash	City of Beaufort
Duncan Newkirk	Newkirk Environmental, Inc.
Douglas Noel	Ogden Environmental
Carla Palmer	St. Johns Water Management District, FL
Sam Passmore	SC Coastal Conservation League
David Payne	DHEC/EQC Lowcountry District
Gail Phipps	DHEC/OCRM
Patty Richards	SC Coastal Conservation League
Mike Robertson	DHEC/OCRM
Gary Rowe	Belfair
Cal Sawyer	SC Sea Grant Consortium
Nancy Schilling	SC Marine Association
Tom Schueler	Center for Watershed Protection
Geoff Scott	NOAA/NOS
Tom Siewicki	NOAA/NOS
Charles Truax	USDA/NRCS
Bob VanDolah	DNR/Marine Resources Division
Tom Wilson	Beaufort County Planning Department

Project Summaries

Beaufort County Boating Management Plan

Applied Technology & Management, Inc. 2002.

The Boating Management Plan explores current patterns of waterway use and develops a framework for public access to local waters while ensuring protection of natural resources and water quality. It includes (1) a current inventory of major boating access facilities (marinas, boat ramps, and docks), (2) a review of regulations that guide development of these facilities, identification of environmentally sensitive areas, identification of waterway use conflicts, and (3) recommendations to address environmentally sound policies, improved boater education, and increased enforcement of boater regulations to promote safe use of local waters. Critical recommendations that are needed include: (1) a county-wide redevelopment or expansion of existing marinas and boat landings to meet future demand, (2) new regulations to encourage development of dry storage marinas, (3) the update of the 1993 Beaufort County Boating Needs Assessment to include projection of needs through 2020, (4) consideration that outstanding resource waters, such as the May, New, Colleton, Coosaw, Whale Branch, and Okatie rivers be nominated for No Discharge Zones (NDZ), (5) more sewerage pump-out facilities (i.e. pump-out boats), increased boater education programs, and consideration for the formation of a Beaufort County Waterway Committee and stakeholder group with the mission to facilitate and implement management of the waters through consensus building of users, and (6) an increase in boating enforcement efforts through a cooperative agreement between DNR and the Beaufort County Sheriff's Department.

Okatie River Watershed Management Plan

Applied Technology & Management, Inc. 2002.

The focus for this work is on stormwater management in the Okatie Basin as a prototype for the remaining watersheds of Beaufort County. The goals were to gain an understanding of present water quality conditions in the watershed, to evaluate the effectiveness of stormwater management design and operational practice in the watershed, to improve stormwater standards for new developments and evaluate growth boundaries, to define important headwater areas and develop additional measures to protect the upper reaches of tidal creeks, to reduce existing flooding and water quality impacts, to prevent future flooding and water quality impacts, and to minimize economic and social losses. The following were recommended for implementation in the Okatie River watershed: (1) stormwater management should mimic (and use) the features and functions of the natural ecosystem and systems should be designed for minimum maintenance, (2) headwater riparian buffers should be non-managed and naturally vegetated, (3) buffers should be included in all new development, (4) With wet detention ponds, a 30% pond littoral zone area should be incorporated, (5) Stormwater pond/wetland systems should have hydrologic design parameters similar to wet detention ponds, (6) Where soils allow, dry retention ponds should be required, particularly in headwater areas, (7) infiltration/sand filtration systems are not recommended, (8) 7.5% imperviousness should be adopted through impervious surface reduction and BMPs, (9) street sweeping is only recommended in high-density areas with large amounts of imperviousness, (10) Jasper County should adopt Beaufort County's criteria for stormwater treatment as contained in the Beaufort County Manual for Stormwater Best Management Practices, (11) septic systems should not be allowed within 200 feet of the critical line, (12) baffle box systems/baffle technologies should be used when there are few alternatives, (13) educational kiosks, storm drain markers, and advertising campaign should be geared to both new and existing homeowners and industry.

Project Summaries

Beaufort County South Carolina Stormwater Management: Stormwater Utility *Beaufort County Engineering Department. 2001.*

The flooding, water pollution, and other stormwater problems in Beaufort County are a result of the county not pursuing stormwater management in the past. Following the preparation of a feasibility study for the development of a Beaufort County stormwater utility, the County Engineering Department conducted this Phase Two evaluation and study for the implementation of the stormwater utility. The guiding policy for Beaufort County is to provide a long-term comprehensive approach to stormwater management with dedicated funding. This report recommends ways to deal with the growing flooding and water quality problems in the county, and concentrates on three major areas: stormwater utility program, finance and database, and public education and involvement. The following issues and goals for Beaufort County are addressed and resolved or improved through the stormwater utility: water pollution and water quality impairment sources, long-term, and adequate funding, drainage problems and drainage system maintenance, public involvement and education, stormwater reuse and recycling, BMPs inspection program, and technical support resources and management for stormwater operations.

Beaufort County River Buffer Project

Beaufort County Planning Department. 2002.

A model vegetated river buffer was designed and constructed adjacent to the Beaufort County Government Complex at the headwaters of Battery Creek to complement the development of the River Protection Overlay District Ordinance. At the same time it serves to educate the citizens of Beaufort County in the protection of their water resources and to promote the SAMP initiative to protect local water quality. The project consisted of site preparation, installation of irrigation system, plantings of native vegetation, and mulching. Interpretative signage that explain how plants affect transpiration, filter runoff, and positively influence water quality in the headwaters of tidal creeks were also installed. In addition, with the assistance of Friends of the Rivers and the Beaufort County Public Works Trash and Litter Control Office, a partial clean-up of the adjacent marsh and existing native buffer was accomplished to focus attention on the buffer construction project as it was completed. The Battery Creek project landscape plans and overview is described at the Beaufort County website, www.co.beaufort.sc.us.

Buckwalter Tract Land Survey of Ditches, Culvert, and Road Intersections.

Beaufort County Soil & Water Conservation District. 2007.

Topographic data were required for the Okatie stormwater model. This project provided survey quality topographic data for ditches, canals, culverts, and other surface water channeling structures in the Buckwalter portion of the Okatie Watershed. Data collected were used to verify locations, dimensions, and conditions of main drainage features identified in the April 1970 county stormwater study and the September 1994 Beaufort County Stormwater Management Master Drainage Plan, and to collect new (since 1994) feature data. The project provides the dimensions and descriptions of culverts, bridges, and ditches, with photographic documentation of structures and ditches. The data were used in the development and verification of the Okatie stormwater model.

Project Summaries

Land Application Wastewater Disposal Sites

Beaufort/Jasper Water & Sewer Authority. 2002.

At present, it is unlikely that any new direct discharge points for treated wastewater will be proposed in Beaufort County. The trend is toward consolidating and eliminating existing discharge points and disposing of new wastewater flows by land application. There is concern, however, that the number of sites suitable for land application will decline as land development occurs within the county. A considerable amount of land is needed: for an 83 acre subdivision of 1/4 acre lots, 50 acres of open space is needed for land application. A map showing the locations of and description of land application sites of wastewater in Beaufort County was prepared. The scarcity of sites was anticipated and sites in the county that could be used as future land disposal and back-up disposal sites were identified and mapped. Purchase, easement, and other strategies of potential means of acquisition of such sites and points were also considered.

Final Report and Deliverables for the Clemson Extension Beaufort County SAMP Education Project

Clemson University Cooperative Extension Service. 2002.

This grant provided for the creation of educational brochures for the citizens of Beaufort County in the protection of their water resources and to promote the SAMP initiative to protect local water quality. In addition to the creation of these educational brochures, the Service assisted in the distribution of brochures and informational materials prepared as part of the SAMP program. Three brochures, The Carolina Yardstick Workbook, Managing Hazardous Household Products, and South Carolina Friendly Landscaping, and one interactive compact disc Carolina Yards & Neighborhoods were produced. These brochures, in addition to the Backyard Buffers for the South Carolina Lowcountry pamphlet, Coastal Guide to Boating booklet, and Septic Systems trifold are being distributed to the public throughout Beaufort County.

The Carolina Yardstick Workbook

Clemson University Cooperative Extension Service. 2002.

A detailed workbook that provides simple steps that citizens can take to save time and money, make their yard the best that it can be, and at the same time protect South Carolina's environment and water resources. Topics that are discussed include how to create your own design plan, using the right plants in the right places, common mistakes in landscape plantings, watering efficiently, mulching, recycling grass clippings and leaves, fertilizing, managing yard pests, making a rain barrel, and wildlife. Agency contact information and web sites are also provided.

Managing Hazardous Household Products

Clemson University Cooperative Extension Service. 2002.

Since some commercial products commonly used in homes have the potential to harm both an individual's health and the environment, this booklet will help identify potential product hazards and minimize an individual's risks. It details safe management of products from purchase to disposal. It includes details on the risks associated with product selection, purchase and use, the safe storage of hazardous products, and product disposal. An extensive listing of contacts and literature for information on hazardous household products and pesticides, disposal and recycling is also provided.

Project Summaries

South Carolina Friendly Landscaping

Clemson University Cooperative Extension Service. 2002.

This trifold brochure provides information on creating and maintaining attractive landscapes that enhance the community and help to protect South Carolina's natural environment. Agency contact information and web sites provide the resources for obtaining lawn and garden information.

Carolina Yards & Neighborhoods, Interactive Compact Disc Tutorial

Clemson University Cooperative Extension Service. 2002.

An interactive CD that demonstrates for the homeowner how to plan, design, and then care for his/her yard. Features of the CD include Carolina yard principles, caring for your Carolina yard, an extensive resource library, a searchable plant database, and many other resources that will help citizens to care for their yards and protect the environment and water quality of their neighborhood.

Broad Creek Management Plan

Hilton Head Island Planning Department. 2002.

The growth of the tourism industry and population of Hilton Head Island have put considerable strain on the natural environment. The elements of this plan address water quality aspects as well as recreational uses of the Broad Creek: the water quality impacts from stormwater, septic systems and recreational uses and the means to mitigate, reduce or eliminate these impacts, and an inventory the recreational use and other uses of Broad Creek. It addresses the impacts of development on the scenic beauty, and wildlife and wildlife habitat of the creek and is the first step in an overall management strategy for the creek. It provides baseline data, an analysis of the findings, and recommendations on ways to reduce or mitigate impacts on the creek. The plan focuses on (1) land use and zoning and their effects on the creek and projections of future land, (2) stormwater management, and wastewater system management, (3) environmental issues including descriptions of the environmental zones of the creek and those activities that are threatening and/or damaging, (4) recreational use of the creek, (5) public education recommendations provide the means to meet the needs of the public through various educational outreach programs, (6) implementation strategies are grouped by task. These include amendments to the town's Land Management Ordinance, other regulatory efforts, monitoring and enforcement activities, financial and other assistance, town owned property, and other efforts involving citizen participation.

Septic Systems

Hilton Head Island Planning Department. 2002.

This educational brochure provides a primer on what septic systems are, how they work, and how to maintain them properly to protect the environment. It also provides a discussion of the factors that cause septic system failures and the impact that these failures have on the environment. It includes an extensive discussion of what owners should do to prevent system failure and details those household items that are harmful to the systems. Agency contact information and web sites detailing septic systems is included.

Project Summaries

Low Country Institute Water Quality Monitoring Education Program

Low Country Institute. 2002.

The Low Country Institute increased public awareness of water quality issues and the Beaufort SAMP by having local school children conduct a high-profile water quality monitoring program. At the middle and high school levels, the Institute included biological studies in the monitoring program to demonstrate the impacts of water quality on estuarine organisms. A total of 52 classroom presentations were made to over 900 students. The presentation consisted of a Coastal Enviroscape™ model demonstrating non-point source pollution within a watershed, instruction in operating water quality monitoring equipment, and testing of a surface water sample from their watershed. Classrooms participating in the above instruction completed their water study by kayaking a local body of water. During this trip, students monitored water directly from their kayaks, and received a first hand sense of the way their watershed looks. At Battery Creek High School, students created public service announcements explaining the importance of riparian buffers within a watershed. Over 40 student projects were created, with the top three receiving awards. During the spring and fall, news articles were placed in local newspapers highlighting the project and water quality issues being addressed by the project. The water-monitoring program has been developed into a sustainable network of volunteers with support of the Friends of the Rivers. At present, 12 active monitoring locations exist with over 40 volunteers collecting data and entering their results on-line. The results of the testing are available on-line at [www.lowcountryinstitute.org/water quality.htm](http://www.lowcountryinstitute.org/water%20quality.htm).

Onsite Sewage Disposal System Management

National Environmental Services Center, West Virginia University 2002.

This report addresses the core issues necessary to the development of a county onsite, decentralized wastewater management system. Inspection and maintenance ordinances and/or regulations are identified for Beaufort County and programmatic recommendations are set forth in draft ordinance language establishing protocols for a model onsite/decentralized wastewater management inspection and maintenance program within the county's overall onsite management system. Standards for conventional, innovative, and small flow community onsite disposal systems germane to South Carolina are reviewed. A comprehensive quantitative and qualitative analysis of primary, secondary and tertiary onsite/decentralized systems along with significant operation and maintenance considerations and associated costs for conventional, innovative, and small flow community onsite disposal systems applicable statewide is provided. New standards for relevant household appliances are also provided. General recommendations for the establishment of a Beaufort County onsite disposal management system are found throughout the report and articulated in the draft, Beaufort County Wastewater Ordinance.

The Complete Guide to Coastal Boating in South Carolina

South Carolina Department of Natural Resources. 2001.

Direct enforcement of even typical and widely accepted boating regulations is very difficult. For this reason, boater education that prompts voluntary action is important. This comprehensive guide was prepared to meet that need, and provides boaters with information for management practices to help ensure the preservation of the aquatic environment. It offers recommendations for the safe use and disposal of potentially harmful products, as well as suggestions for safer alternative products. Helpful information on observing the area's wildlife, environmental programs, and a boater's directory with contact phone numbers for most boating situations is included. The guide is being distributed at marinas and law enforcement stations and will encourage boaters to think of themselves as stewards of the waterways of South Carolina.

Beaufort County South Carolina Stormwater Management: Culvert-Road Intersections

South Carolina Department of Natural Resources, 2002.

Stormwater problems create hazards to the citizens, damage private and public properties, diminish the reputation of the community, and may cause businesses and industry to look elsewhere when locating or even to relocate their existing facilities. Stormwater management requires a comprehensive evaluation of the landscape in order to address flooding, stormwater quality issues as well as solutions. Beaufort County through the stormwater utility is addressing these issues by preparing stormwater models of all sub-watersheds of the county. Critical to this effort is the identification of water conducting structures and their intersections with roads and their proximity to wetlands and natural water bodies of the county. This project identified locations in Beaufort County where roads and water bearing culverts fall within pre-designated distances (250 ft, 500 ft, 1000 ft) from wetland habitats through the use of a Geographic Information System. Products include ArcView shapefiles of intersections of Beaufort County wetlands and roads set within buffers of 250, 500, and 1000 foot distances.

Beaufort County Special Area Management Plan, Support for South Carolina Department of Natural Resources' Shell Recycling Program

South Carolina Department of Natural Resources, 2002.

In order to return critical shell and provide an environment to restore oyster populations in state waters, SCDNR has developed a statewide oyster shell recycling program, designed to recover shell from oyster roasts, restaurants, and households. Currently there are three shell recycling drop-off sites in Beaufort County that provide depositories for shell that is then replanted on public oyster beds. In this project, shell handling equipment to support recycling efforts in Beaufort County was acquired, and television and radio public service announcements to highlight shell recycling for broadcast to the greater Beaufort County area developed. In addition, the Town of Hilton Head allowed the use of the Otter Hole site for shell collection, where two "urban friendly" shell recycling dump trailers have been placed. Finally, funds were used for the construction of an information kiosk at the Marshland Road boat landing on Broad Creek that emphasizes shell recycling and conservation.

Bridge Deck Drainage System for the US 278 Bridges at Okatie River.

South Carolina Department of Transportation, 2001.

South Carolina currently has a protective standard for bridge runoff when the bridge crossing lies within 1,000 feet of a shellfish bed. Stormwater runoff from the U. S. Highway 278 Okatie Bridges that cross outstanding recreational and shellfish habitat waters flows directly into the river and marshes without treatment. To rectify this, a retrofit rainwater runoff collection system for the Okatie Bridges was designed as a pilot study for other county bridges. The design centered on the collection and treatment of runoff to protect the water quality in the Okatie River sub-watershed of Beaufort County. The stormwater collection system was designed to accommodate and treat stormwater runoff from a 10-year 24-hour storm event. The report includes the engineering design specifications and drawings for the construction of the stormwater conveyance and treatment system. The system design consists of 8" fiberglass pipe connections from the 6" vertical scupper drains that discharge through the bridge. These are connected to 12" to 18" collector fiberglass pipes, hung on the outside and below the roadway. The stormwater from the roadbed flows through the scuppers is collected and transported through the collector pipe to a Vortech Model 9000 stormwater treatment unit prior to discharge through a riprap erosion control structure to the surrounding marsh. The treatment unit collects sediment, floating substances (ex. oil), and debris.

Project Summaries

Beaufort County Special Area Management Plan, Water Quality Monitoring Initiative

Thomas & Hutton Engineering Co. 2000.

This project evaluated the current monitoring activities within Beaufort County to determine the appropriateness and feasibility of improvement or coordination of these activities among the many federal, state and local agencies that monitor the water quality and biotic conditions of Beaufort County's rivers and creeks. Survey questionnaires were sent to 37 organizations. Out of the 14 responses received, ten were involved with water quality monitoring within five different agencies/organizations. Out of the five agencies, four sent spatial locations of monitoring locations. Survey responses on physicochemical parameters of the water column and sediments were completed to varying degrees. When possible, information from other reference sources were extracted and extrapolated to fill in data gaps. Overall, the response for the data and information requested through this initiative was less than anticipated. All spatial data of monitoring sites were assembled and coded with a unique identifier; attributes that were submitted with original data were maintained in combined coverage. The entire geographic extent of submitted data was also maintained. Relate tables were extracted from the database to create table links and /or joins in GIS software. Available GIS coverages were assembled in South Carolina State Plane Coordinate System, NAD 83. Metadata links are included.

A Baseline Assessment of Environmental and Ecological Conditions in the May River, Beaufort County, South Carolina

Town of Bluffton, South Carolina, 2002.

The May River, that flows through Bluffton, is an ideal system to develop a pre-urbanization characterization for monitoring human related changes and impacts. This study of the May River is a collaborative effort to provide a comprehensive baseline assessment of the May River including headwater tidal creeks, large tidal creeks, and the mainstem open-water areas of the river. Sampling at headwater tidal creek stations was conducted by the University of South Carolina during the spring and summer of 2002. The following parameters were measured at each headwater tidal creek site during one sampling event in the summer: benthic community composition, fish and crustacean community composition, sediment composition, contamination, and toxicity, pore water ammonium, water quality, water column bacterial typing and levels, nutrients, total organic carbon, turbidity, biological oxygen demand, and phytoplankton biomass, composition, and harmful species. A sub-set of physical and biological parameters was also measured at each headwater tidal creek site during one sampling event in the spring: water column bacterial typing and levels, nutrients, total organic carbon, turbidity, biological oxygen demand, and phytoplankton biomass, composition, and harmful species. These data are being processed by DNR and the National Ocean Service as part of the May River Assessment.

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South Carolina Department of Health
and Environmental Control

Printed June 2003

Total Printing Cost - \$1,900.00

Number of Documents Printed - 500

Cost Per Unit - \$3.80