MAY RIVER WATERSHED ACTION PLAN

APPENDIX B:

319 PROJECT OVERVIEW

Fecal Load Reduction in the May River Watershed

Project location: HUC 030601100301, May River Watershed Beaufort County affecting the Town of Bluffton and Beaufort County jurisdictions and including SCDHEC shellfish monitoring stations of 19-19, 19-24 and 19-16. (Figure 1. Locator Map)

Funding:

Federal:	$483,500.00
Non-Federal:	$322,494.50
Total:	$805,994.50

Lead organization and project manager:

The Town of Bluffton has extensive project management experience and will implement this initiative through a process of collaboration among partners, constituents, and town staff to attain the highest level of quality and effectiveness. Key staff are highly qualified and include town employees from the Department of Engineering. Other supplemental staff will advise on the project as needed including representatives from the Finance Department and the Department of Growth Management.

Individuals in key positions are as follows:

- Project Manager: Kimberly W. Jones, Natural Resources Manager
  kjones@townofbluffton.com
- Supervisor: Ron Bullman, Director, Division of Stormwater Management
  rbullman@townofbluffton.com

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Cooperating organizations and partnerships:

Title	First	Last	Position	Agency
Dr.	Geoff	Scott	Director	NOAA - National Centers for Coastal Ocean Science
Dr.	Alan	Warren	Program Director	USCB - Environmental Health Science
Dr.	Dwayne	Porter	Director, Chair	USC – Environmental Health Sciences
Dr.	Bill	Leonard	Project Manager	Clemson Master Gardener's Turf Love Program
Ms.	Rebekah	Szivak	Program Coordinator	SC DNR – ACE Basin NERR Coastal Training
Ms.	April	Turner	Coastal Community Specialist	SC Sea Grant Extension Program

The Town has obtained the commitment of support from a number of individuals/organizations. Dr. Geoff Scott, NOAA, has committed access to his Human Dimension Specialist to assist with the creation of a social marketing/outreach campaign, as well as his expertise in installing innovative Best Management Practices (BMPs) to improve water quality. Dr. Alan Warren, USCB, has committed use of the water quality laboratory, its equipment and the Water Quality Analyst's time to assist the Town in locating areas of high fecal coliform levels that require BMPs to reduce the loading. Dr. Dwayne Porter, USC, has committed his expertise on how changing land use affects fecal loading. Dr. Bill Leonard and the Lowcountry Council of Master Gardeners have committed to partner with the Town to install rain gardens. Ms. Rebekah Szivak, SC DNR – ACE Basin NERR Coastal Training Program, has committed to partner with the Town to hold two Low Impact Development (LID) outreach workshops each year of the grant. Ms. April Turner, SC Sea Grant Extension, has committed to bring the Coast-a-Syst Program to the greater Bluffton community.

Supporting organizations and partnerships:

Title	First	Last	Position	Agency
Mr.	Craig	Hesterlee	Region 4 Coordinator	EPA
Mr.	Russell	Berry	Regional Director	DHEC - EQC Region 8 - Beaufort
Mr.	Mike	Monday	Regional Shellfish Program Manager	DHEC - EQC Region 8 - Beaufort
Mr.	Curtis	Joyner	Coastal Projects Manager	DHEC - OCRM
Ms.	Laura Lee	Rose	Extension Agent/Master Gardener	Clemson University – Beaufort County Ext.
Ms.	Patty	Kennedy	Director	Palmetto Bluff Conservancy
Ms.	Nancy	Schilling	Founder/Director	Friends of the Rivers
Mr.	Glenn	Stanford	Project Manager	Trust for Public Land
Mr.	Bob	Klink	Beaufort County Engineer	Beaufort County
Mr.	Dan	Ahern	Stormwater Manager	Beaufort County
Ms.	Amanda	Flake	Natural Resources Planner	Beaufort County
Mr.	Brian	Herrmann	Community Planner, LEED certified	Beaufort County

The above individuals/organizations are an example of some of the organizations that have partnered with the Town of Bluffton in this project by serving on regular committees. These committees support the project with access to expert knowledge, advocacy for the project and outreach regarding the project.

PROJECT ABSTRACT:

Background/Overview of Project:

The May River has been identified as a priority watershed by the EPA and SCDHEC. It is a regionally significant waterbody for a number of reasons including its aesthetics and views which increase the popularity of the area for continued residential and commercial growth; its numerous natural resource populations that are directly harvested and utilized by local and regional residents; and the economic conditions, directly and indirectly, generated to the community because of the river are substantial. Finally, the water quality within the May River historically has been reported as very good, resulting in the Outstanding Resource Waters (ORW) designation from the DHEC Environmental Quality Control's (EQC) Bureau of Water. All of these facets of the river help provide a sense of community character and pride that is locally and regionally recognized.

The Town of Bluffton has grown rapidly in recent years and this trend is expected to continue into the future. Changes in the intensity and types of land use associated with population growth and new development within the watershed during the past decade have resulted in changes in water quality. There is evidence of this represented by the increasing fecal numbers reported by SCDHEC-EQC at shellfish stations 19-19, 19-24 and 19-16 located from the headwaters to the middle stem of the river, respectively.

Objectives/Goals of the Project:

The Town is committed to utilizing its resources and partnerships to protect the river in the face of changing land use patterns, which has brought the amount of fecal loading into the headwaters of the May River to approximately 1,200,000 lbs/year. By implementing structural and non-structural Best Management Practices (BMPs), the Town is estimating fecal coliform loading will be reduced by 300,000 lbs/year **(a 25% reduction)** by one year after the close of the project. Thus, the goal of this project is to reduce fecal loading into the May River by 25%, with a focus on the headwaters area, thereby repairing a fecal impairment which resulted in the closure of the shellfish beds for harvesting.

Methods Employed:

The measurable objectives and methods used to reach this goal are:

1. Create a social marketing campaign that targets specific audiences to adopt positive behavioral change to improve water quality in the May River. This will be accomplished by examining the needs of the target audiences to tailor the message for each group, but will focus on septic tank maintenance and proper pet/domestic waste disposal.
2. Establish smart growth regulations within the watershed via an overhaul of the existing Unified Development Ordinance based in watershed principles including stormwater, land use and land disturbance elements. The Town of Bluffton, in collaboration with Beaufort County, will update their Stormwater Ordinances with more rigorous requirements for volume control based on current research, while also updating an Animal Ordinance for the Town of Bluffton.
3. Install structural Best Management Practices (BMPs). Loading to the May River will be reduced by installing BMPs in homeowners' yards to reduce stormwater runoff into stormwater ponds thereby reducing the transport of fecal coliforms from yards into the ponds while also reducing the volume of stormwater carrying fecal coliforms. Installing BMPs at critical pond outfalls will reduce fecal coliform transportation via stormwater discharges into adjacent wetlands.

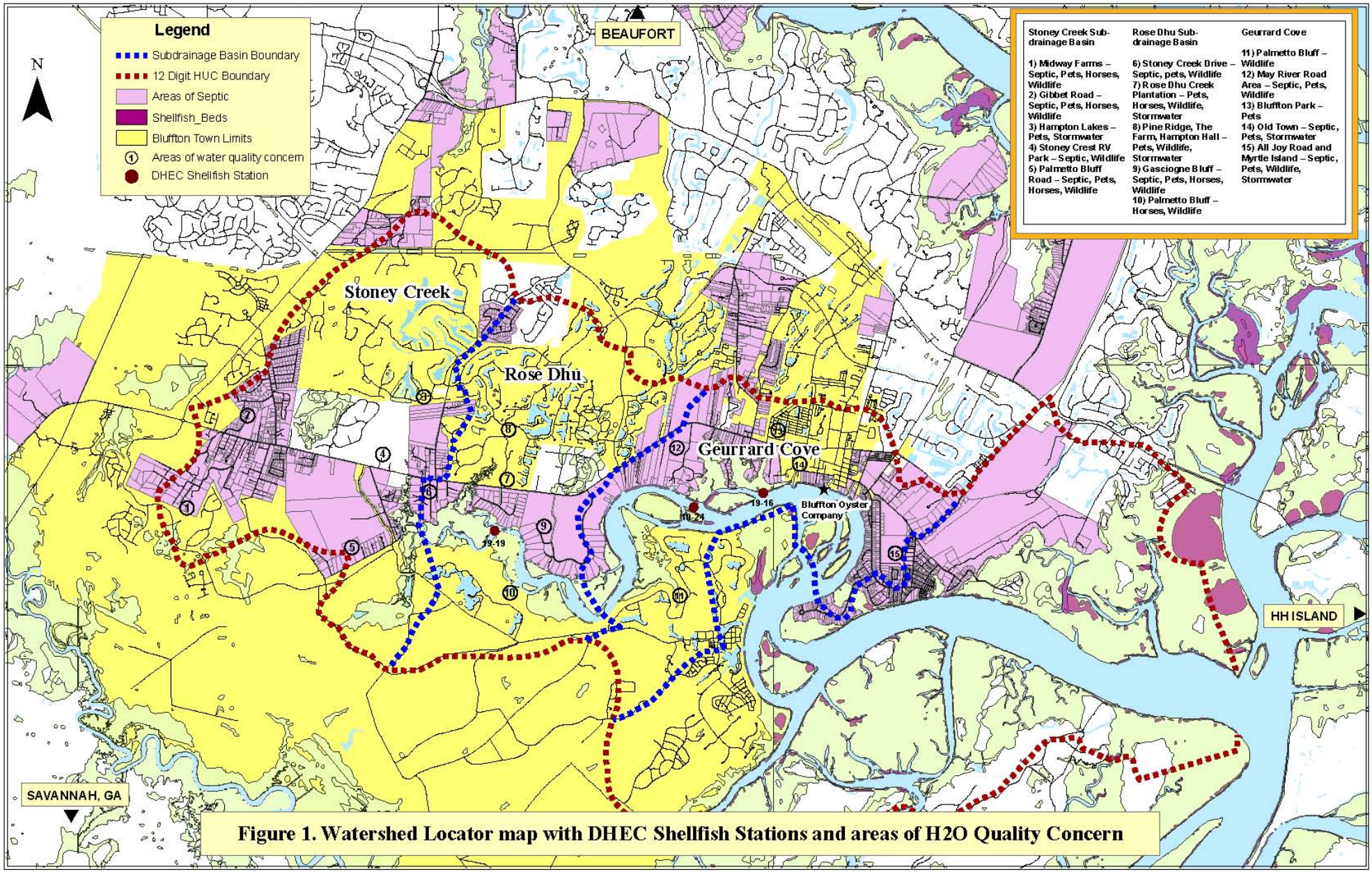


Figure 1. Watershed Locator map with DHEC Shellfish Stations and areas of H2O Quality Concern

PROJECT DESCRIPTION:

Significance of the May River

The May River is a regionally significant waterbody for a number of reasons:

1) The river contains numerous natural resource populations, including finfish, blue crabs, shrimp and oysters, which are directly harvested for consumption and/or for sports fishing and recreation by local and regional residents.
2) The aesthetics and views of the May River waterbody increase the popularity of the area for continued residential, commercial and tourist visitation growth, thus tying the Town's economic conditions directly and indirectly to the river.
3) Commercial shellfish harvesting, particularly for oysters and hard clams (Figure 2), remains a significant component of the economy, tradition and community character of the Town of Bluffton. The Bluffton Oyster Company is the longest, continually operational oyster harvesting/shucking facility in the state of South Carolina. According to DHEC, the May River supplies nearly 20% of the State's annual harvest of oysters and is well known for the famous Bluffton oyster.
4) The water quality within the May River has been historically reported as very good, resulting in the Outstanding Resource Waters (ORW) designation from the DHEC Environmental Quality Control's (EQC) Bureau of Water. With this designation has come a sense of security for area residents and visitors that recreational contact with the water for swimming, water skiing and kayaking is safe.
5) The River and its associated marshes provide high quality habitat for a number of federally protected species including Bottlenose Dolphins, Bald Eagles, Kemp's Ridley Sea Turtles, Loggerhead Sea Turtles and Wood Storks.
6) The River provides a sense of community character and pride that is locally and regionally recognized.

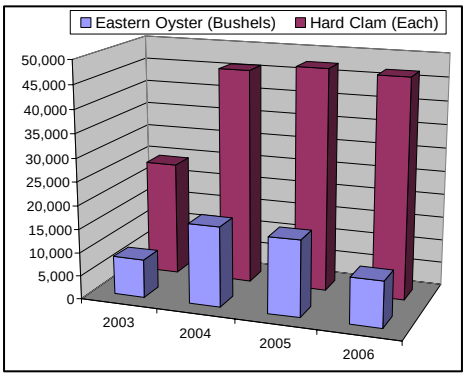


Figure 2. Shellfish Harvest 2003-2006

A fecal coliform impairment has closed shellfish harvesting beds. This closure has a direct detrimental impact on the community seen in reduced shellfish harvest income for the commercial operation. With the loss of shellfish harvesting, there will be a public perception that the area is polluted, thus potentially lowering property values and affecting future economic growth in the area.

May River is a Threatened Waterbody

Historically, few sources of impairments to water quality existed within the May River Watershed. The Town of Bluffton has grown rapidly in recent years and this trend is expected to continue into the future. Changes in the intensity and types of land use associated with population growth and new development within the watershed during the past decade have resulted in changes in water quality. While the May River still retains its ORW status, for the first time in recent history the May River has experienced a shellfish harvesting classification down-grade due to an increased level of fecal coliform in its headwaters at DHEC shellfish monitoring station 19-19. (Fig. 1).

DHEC determines if shellfish impairments exist (or are being approached) by compiling data from three years of monthly stratified, random samples

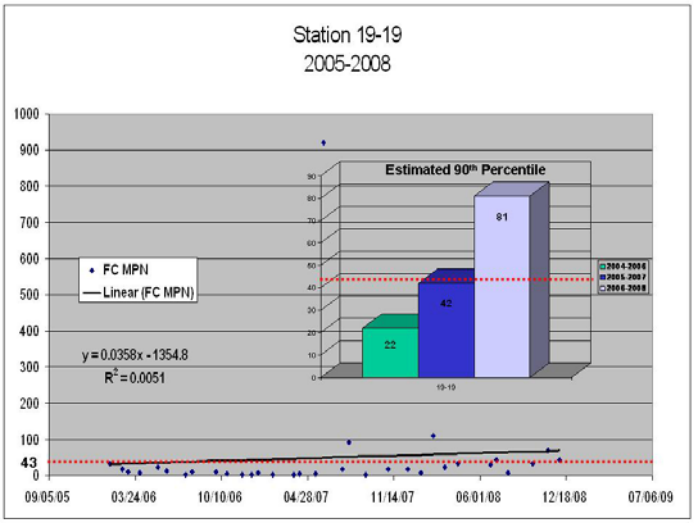


Figure 3. Fecal Numbers ('05-'08) at DHEC Station 19-19.

at each of its shellfish monitoring locations. Fecal numbers are derived by the Most Probable Number (MPN) methodology. The standards state the MPN geometric mean shall not exceed 14 Colony Forming Units (CFU)/100 ml, and the estimated 90th percentile shall not exceed an MPN of 43 CFU/100ml. The geometric mean is the average of the log values of a data set converted back to a base 10 number. The estimated 90th percentile is a statistical technique that accounts for variability within a dataset (i.e. random high bacteria counts).

The evidence that the May River is a threatened waterbody for a shellfish fecal impairment is in the increasing fecal numbers reported by DHEC at shellfish station 19-19 (Fig. 3). Figure 3 depicts the standard for a shellfish fecal impairment as a red threshold line. The trend line shows that the station approached the exceedance level in 2007 and was expected to exceed in 2008.

The raw data provided by DHEC for each of the three stations of concern (19-19 in the headwaters and 19-24 and 19-16 in the middle stem of the river) are in Appendix A, Tables 1-3. Of the 27 samples collected and reported for 2008 at the three stations, nearly 1/3 of the samples either exceed or are approaching an exceedance of the 90th percentile standard of 43 CFU/100 ml as depicted by the red and orange highlighting.

As these three stations are located within the headwaters and middle stem of the May River, they are affected by three sub-drainage basins, Stoney Creek, Rose Dhu Creek and Guerrard Cove (Fig. 1). As the fecal levels entering the river from these three sub-drainage basins have yet to be reduced, there was a closure for shellfish harvesting that encompasses all of the headwaters, approximately 1,200 acres[2], of the May River in September 2009.

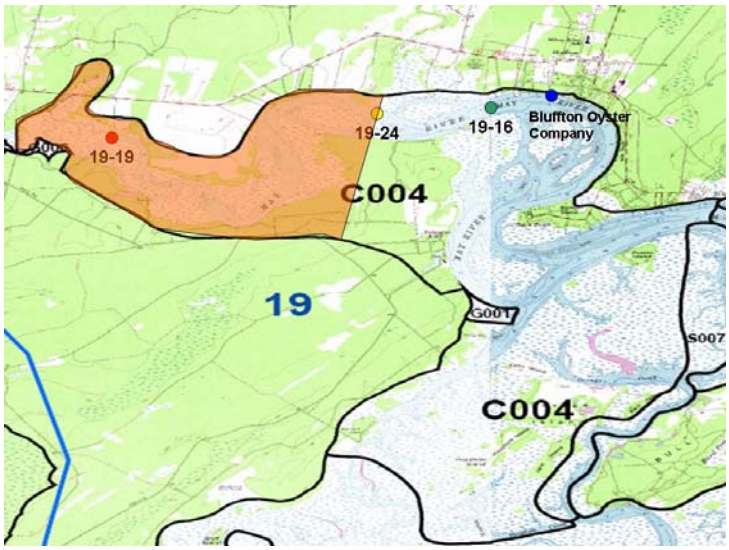


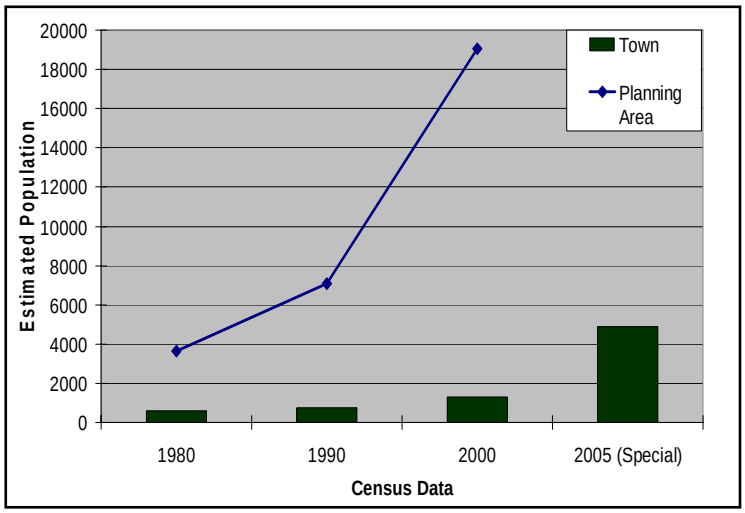
Figure 4. Shellfish bed closure (red) if DHEC Station 19-19 exceeds fecal limits.

This large area is mandated by DHEC protocol which requires the shellfish beds be closed for harvesting from the station where an exceedance occurs to the next station where there is no exceedance, thus the area from 19-19 to 19-24 (Fig. 4) is closed. Fig. 4 illustrates the 1,200 acres[2] and the proximity of the Bluffton Oyster Company, which is impacted by the closure of commercial beds. If the fecal loading problem is not reduced, the next closure will be from 19-24 to 19-16, which is right next to the Company. Not only would this impact the commercial operation, but recreational harvesting would also be negatively affected and in turn is reflected in a reduced quality of life, potentially resulting in reduced property values.

Growth & Land Use Changes in the Watershed

The Town of Bluffton and the surrounding area located within the May River watershed have seen dramatic growth over the past 25 years (Fig. 5). In 1980, the US Census reported that the population of the Town of Bluffton was 598, and the surrounding planning area, which includes all of the Southern Beaufort area except Hilton Head Island, was reported to be 3,652. Since the 2000 Census, Bluffton continued to grow, and the special census requested in 2005 indicated 4,885 residents in the Town. The annexation of Buck Island/ Simmonsville Roads increased that number to 6,377 residents within the Bluffton corporate limits.

Figure 5. Population change in Bluffton and the surrounding area.



Population density estimates are available for the Town of Bluffton and other areas within the Southern Beaufort County planning area. The density of the Town of Bluffton in 1990, when it still encompassed approximately one square mile, was approximately 1.15 persons per acre. Following the recent annexations, and an increase to roughly 53 square miles, the Town's density decreased to 0.19 persons per acre. Based on projected population associated with a Town of Bluffton build-out scenario for its current corporate limits (assuming a population of 47,310 by 2025), the estimated population density within the Town may be 1.38 persons per acre.

Demographic information for the population of the Town of Bluffton was documented in the 2000 census and for the special census taken in 2005. The figures do not include the population changes associated with the later annexation of the Simmonsville/Buck Island tracts. The average age of the population of Bluffton switched between 2000 and 2005 from nearly 36 years old to less than 31 years. The predominant age range in 2005 became 25 to 34 years old (21% of Bluffton's estimated population). Increases were also seen in the Town's population of children under 5 years old (a 430% change between 2000 and 2005) and ages 5 to 9 (a 363% change). These factors show that the Town has a considerable amount of young families with school age children.

The gender distribution within the Town of Bluffton is approximately 48% male and 52% female, according to the Town's Comprehensive Plan. Racial composition and ethnicity data from the 2005 census was predominantly white (69%). The African-American population showed a decrease from the 2000 census (32%) to the 2006 estimates (23%). A significant increase was observed between 2000 and 2005 in the population of Hispanic or Latino residents. This population increased 627% between 2000 and 2005 to approximately 11.3% of the population, not including the Simmonsville/Buck Island areas. The largest increase was seen in the percent of the population identified as Two or More Races (1.2% of the total 2006 estimated population). The Asian population also rose by the 2006 estimate to approximately 1.1% of the total Town population. At present, approximately 90% of the population of the Town of Bluffton speaks English at some level.

Population demographics are important factors to consider in the development of a Social Marketing Plan, particularly in areas of large Asian, Hispanic and Latino populations. Cultural differences among population groups influence the expected and accepted uses of waterbodies and their associated natural resources. Understanding the needs and expectations of coastal resources for these groups will be important to consider. In addition, language barriers between population groups must be recognized in the development and discussion of various coastal management initiatives.

This population growth within the watershed is expected to continue to increase over the next few decades. While population projections have not been prepared specifically for the watershed area, the Town's Comprehensive Plan indicates that 22,191 dwelling units are permitted for construction in planned developments. Based on the average household size per dwelling unit, the estimated population of the Town of Bluffton is expected to be between 60,800 and 63,000 at build-out. The unincorporated area within the watershed is comprised of relatively stable existing residential communities. The anticipated growth within this area, although currently not estimated, is believed to be marginal.

With the increased population, there have been substantial changes to the land use within the watershed. The Town of Bluffton was originally developed as a summer getaway for local wealthy landowners. Because of this purpose, the original settlement was focused along the May River to maximize access and benefits from the water. Land development patterns did not take a structured form, resulting in a series of differing land use patterns occurring throughout the watershed. The recent expansion of the Town also resulted in development agreements and planned unit developments which enable more flexible land use design and management than used in traditional zoning.

As the region grows, land use controls may be forced to evolve in order to achieve the goals and objectives established in the Town's Comprehensive Plan and for the best interest of the May River. Recognition of the difference between traditional land use controls associated with zoning and those established as part of a completed development agreement is important to consider when discussing land use in the May River watershed.

Image 1. Typical land use along the May River.

Land use within the watershed is governed by the Town and County in their respective jurisdictions. In the watershed within Bluffton, the majority of land uses are residential, with some small-scale commercial uses, and a few instances of light industry. Light industry in the watershed includes the junkyard on May River Road, the Bluffton Oyster Factory on Wharf Street, and the Resort Services Incorporated (RSI), which operates an industrial laundry. No heavy industrial activity occurs within the watershed.

Approximately 90% of the land within the Town is zoned for Planned Unit Development (PUD). Developed areas and housing developments that exist within the watershed include Palmetto Pointe, May River Plantation, Rose Dhu Creek Plantation, Gascoigne Bluff, Barton's Run, Hampton Hall, The Farm, Pine Ridge, Pine Crest, Wellstone, and Bluffton Park. Other developed areas are referred to as the Brighton Beach area and the All Joy area. Housing developments known as Heritage at New Riverside, Alston Park, The Haven, Midpoint, Southern Oaks and Headwaters are located on Palmetto Bluff.

Even within similarly zoned areas, the uses of land within the watershed differ somewhat. Equestrian activities are found at Rose Dhu Creek Plantation, Gascoigne Bluff, and some areas of Palmetto Bluff. A mixed-use commercial and residential development is under construction along Calhoun Street. Greater commercial activity occurs along Burnt Church Road and on Ulmer Road near All Joy Road.

The Town's Comprehensive Plan establishes a desired plan for the community with regard to future land use and development. Within the unincorporated areas of the watershed, large portions are currently undeveloped or used as open space. The Town's Comprehensive Plan identifies these areas as possibly being incorporated into the Town in the future, and rezoned for low-density residential use.

Changes in the intensity and types of land use associated with population growth and new development within the watershed during the past decade have resulted in changes in water quality.

Sources of Fecal Coliform

The conversion of land use from timberland to planned unit development-residential is most concentrated within the Stoney and Rose Dhu Creeks headwaters sub-drainage basins, with the exception of Bluffton Park in the Guerrard Cove sub-basin. With increasing residential development in the headwaters, potential new sources of fecal were added to existing sources, thus possibly increasing the amount of fecal loading or changing the mechanism of fecal coliform delivery to the May River. Potential fecal coliform sources include:

1) **Stormwater Ponds**. Ponds are a potential source of fecal coliforms as they receive the pet waste-contaminated runoff from residential areas and serve as wildlife habitat for alligators and wading birds. As a result of more than 18 months of weekly fecal coliform "hot spot" testing conducted by the University of South Carolina-Beaufort (USCB), the results indicate that ponds are an effective treatment for fecal coliforms, not a source as initially thought. However, much discussion has ensued about the effects of stormwater volume and the nature of the discharges, i.e. the episodic release of stormwater from the ponds into the adjacent wetlands where fecal coliform numbers are higher.
2) **Horses**. In addition to existing communities with horses, several residential communities that promote having horses either stabled or on private lots have been created. To date, the Town and County have identified the location and number of horses in the May River Watershed. This information coupled with the USCB results from the weekly fecal coliform testing indicates that commercial and hobbyist farms are not largely contributing to the identified fecal coliform hot spots.
3) **Pets**. With residential development, there has been an increase in the number of cats and dogs in the area, and pet waste is not being properly disposed. While the number of pets has increased in the area, most are within neighborhoods whose stormwater is treated with ponds. Again, the USCB weekly fecal coliform results indicate that ponds are effectively reducing fecal coliform numbers. Thus, while pet waste may have increased in the watershed, the net result on the May River appears to be insignificant.
4) **Wildlife**. With increasing development, native wildlife has been pushed into the wetlands and buffer areas for habitat and refuge. There is an assumed increase in animal concentrations and their fecal matter for deer, hogs, raccoons, and other urban wildlife species including alligators in these areas which drain to or are adjacent to the May River. This theory is supported by the USCB weekly fecal coliform testing. While fecal numbers are low at pond outfalls, they dramatically increase in downstream wetland samples.

5) **Humans**. Failing or poorly maintained septic tanks, possible sanitary sewer failures, recreational vehicle (RV) waste disposal in the Stoney Creek sub-basin, and old septic tanks in the Rose Dhu and Guerrard Cove sub-basins are another source of fecal contamination.
6) **Soil/Land Disturbance**. With construction land disturbance, inert fecal in the soil can become reactivated and enter the May River via sediment. Additionally, as it rains, stormwater runoff erodes ditch banks and can expose buried fecal coliforms.

Based on fecal coliform loading calculations for horses, pets, wildlife and humans above, the change in land use has brought the amount of fecal loading into the headwaters of the May River to approximately 1,200,000 lbs/year. While these four sources were considered to be the major fecal coliform sources in the watershed, the results of the USCB testing indicate that neither horses nor stormwater ponds are sources of fecal coliform. In fact ponds appear to be an effective treatment for fecal coliforms, thus negating the impact of pets and ponds as significant fecal sources. Therefore, focus will be placed on the relationships between development standards (e.g. stormwater pond design, wildlife corridors, buffers, and land disturbance requirements), stormwater pond discharges and wildlife in wetlands. Human impacts via failing septic systems will also be a major focus. Pet waste will still be addressed via the social marketing campaign for its potential effects in areas not treated by stormwater ponds.

The Town is proposing to address these sources of fecal and other potential contaminants in a phased approach via the comprehensive May River Watershed Action Plan. Phase I, supported in part by the Section 319 grant, will implement structural and non-structural BMPs which the Town estimates will reduce fecal coliform loading by 300,000 lbs/year **(a 25% reduction)** by one year after the close of the project. These loading and reduction rate calculations are located in Appendix B. Future phases of the project may include land/conservation easement purchases and connection to public sewer.

The work plans below contain a summary of all sources of pollution found within the watershed, the necessary load reductions to correct a fecal exceedance, the BMPs needed to achieve the load reductions, identification of sources of technical and financial assistance and the target audiences for social marketing including the necessary messages.

The work plans are applicable to the entire watershed. However due to the rising fecal numbers at DHEC shellfish station 19-19, it is a priority to implement measures first in the headwaters, e.g. Stoney and Rose Dhu Creeks sub-drainage basins, and then in Guerrard Cove sub-drainage basin to address stations 19-24 and 19-16. As resources are available at the end of the project, they may be implemented in the other sub-drainage basins. Social marketing and other non-structural BMPs will be presented throughout the entire watershed.

Work Plans to Address Sources of Fecal Coliform

Source 1: Stormwater Ponds

The Issue: There has been a change in land use from timberland and natural ecosystems to PUDs. With the increasing development, there has been a required increase in the number of stormwater ponds to treat runoff. These ponds are designed to receive fecal pollutants from development, but they have also become wildlife habitat for alligators, wading birds and urban wildlife. As such, they are now potential sources of fecal contamination. However, the data from USCB corroborates that ponds are sufficiently treating fecal coliforms. Yet, discharges from pond outfalls can be a confounding factor in the deliverance of fecal coliforms to the May River both in discharge volume and discharge timing, e.g. the episodic nature of the discharges not mimicking pre-development run off conditions.

Management Needed:

- Retrofit pond outfalls to mimic more natural conditions in the Pilot Project.
- Create a regional pond to treat fecal coliform hot spots identified by USCB testing via the Pilot Project.
- Pond littoral shelf maintenance/enhancement standards, ditch vegetation, and aeration BMPs should be inspected and improved as needed according to the Town's and Beaufort County's Stormwater Ordinances.
- Adopt standards in the Town's and County's stormwater ordinances which require post-development stormwater conditions to mimic pre-development conditions.
- Educate developers, POA/HOAs and staff on the benefits of the increased standards via a social marketing campaign.

Social Marketing Needed:

- Target Audience:

a. Developers: typically Caucasian males from >25yrs and higher.
b. Property Owner Associations (POAs): males and females of each community, mixed financial, age and racial representation.
c. Staff of the Town and County: males and females of varying ages.

- Message:
  a. Vegetated littoral shelves are not ugly; they are good for water quality and should be maintained or enhanced.
  b. Adding aeration to a pond is not only aesthetically pleasing, it benefits water quality.
  c. By retrofitting ponds to mimic natural conditions for outfalls, water quality in the May River will improve.

Objectives:

- Modify standards in the Town's and County's Stormwater Ordinances so that post-development stormwater runoff conditions mimic pre-development stormwater runoff conditions.
- Modify the Unified Development Ordinance based on watershed principles including stormwater (Illicit Discharge Detection, volume, turbidity, aeration, etc.), land use and land clearing standards.

Potential Strategies:

- Targeted workshops for developers and Town/County staff with continuing education credits.
- Work with property management companies to deliver message and then identify what PUDs they manage to make connections with them.
- Attend Property Owner and Homeowner Association meetings (POAs & HOAs) to talk with homeowners about stormwater pond issues.

Evaluation:

- Pre- and post-surveys of workshops.
- Determine if BMP maintenance requirements in the ordinances are being met and maintained.
- Pre- and post-surveys after POA and HOA presentations.
- Install a pilot project in both green field and brown field situations to mitigate for the impact that pond discharges have on transporting fecal coliform to the May River.

Source 2: Horse Manure

The Issue: There are three commercial and three regional hobbyist horse farms in the Stoney Creek and Rose Dhu Creek sub-drainage basins which may contribute to the fecal numbers at DHEC station 19-19 (Fig 1. #1, 2, 5, 7, 9, 10). While the Town estimated that 700,000lbs/year of horse manure is produced annually, current weekly fecal coliform testing indicates that horses are not a top contributor to high fecal numbers at "hot spots" which contribute to station 19-19, so this is not a priority for implementation. Thus, these funds are requested to be re-programmed to a Trap-Neuter-Release (TNR) Pilot Program to reduce feral cat populations.

Source 3: Pet Waste

The Issue: As discussed previously there has been extensive population growth in the greater Bluffton area. Utilizing equations provided by the American Veterinary Medical Association (AVMA), there are approximately 3,200 dogs in the priority sub-drainage basins (Stoney Creek and Rose Dhu) which impact fecal levels at station 19-19 (Fig. 1 #1, 2, 3, 5, 6, 7, 8, 9, 10). The Town estimates 290,000 lbs of pet waste is produced annually, thus needing to be reduced by ~35% (100,000 lbs/year). Stormwater ponds within the developments appear to be adequately treating fecal coliforms as a result of pet waste. Thus, this is not a major priority for the plan.

Management Needed:

- Installation of 10 pet waste stations within the watershed targeting specific areas (Buckwalter Parkway, Bluffton Park, and Old Town) to reduce the amount of dog waste left on the ground where runoff can transport it to stormwater lagoons. Support from Palmetto Pride grant will cover these expenses.
- Installation of 6 trash cans for pet waste and litter reduction in Old Town. Support from Palmetto Pride grant will cover these expenses.
- Disconnect downspouts in approximately 145 homes to prevent runoff from pet-owner's lots from reaching receiving stormwater lagoons. Disconnecting downspouts can be achieved by directing the flow into a rain barrel or series of rain barrels or to pervious areas. Preventing sheet flow across the lawn will stop the runoff from transporting fecal coliform to stormwater lagoons and ultimately to the May River.
- Install 40 Doggy Dooley pet septic systems to provide a safe, yet convenient, means for pet owners to pick up and properly dispose of their pets' waste.

- By contracting with Dr. Bill Leonard, Clemson Extension Master Gardener, a series of 45 rain gardens designed for varying conditions, but all for the same purpose, fecal load reduction, will be installed in the watershed with a focus on the Old Town Historic District as a demonstration project. By capturing runoff in a rain garden, there is pollutant load reduction by the plants.
- Update the Town's Municipal Animal Ordinance to allow trap-neuter-release as a mechanism for feral cat population reduction and add a requirement for the proper disposal of pet waste punishable as a misdemeanor offense.
- Educate pet owners on the environmental harms their pets' waste can cause and how to properly dispose of the waste via a social marketing campaign.

Social Marketing Needed:

- Target Audience: All sectors of the greater Bluffton population representing all income, age, education and ethnicity segments, with an implementation priority of a social marketing campaign targeted to the headwaters sub-drainage basins
- Message:
  a. Pet waste can be harmful to human health, especially children.
  b. Pet waste is harmful to water quality and thus our quality of life.
  c. Properly dispose of pet waste with pet septic systems or by using pet waste stations.
  d. Decrease the chances of waste leaving your yard and polluting local waterways by installing rain barrels and rain gardens to reduce stormwater runoff from your property.

Objectives:

- 10 pet waste stations will be installed in the designated areas.
- 6 trash cans will be installed in the designated areas.
- 145 homes will install a rain barrel(s) and/or disconnect downspouts.
- 40 pet owners will install a pet septic system.
- 45 rain gardens will be installed and maintained.
- Create and implement an updated Animal Ordinance in the Municipal Code.

Potential Strategies:

- Work with property management companies to deliver message and then identify what PUDs they manage to make connections with them.
- Attend Property Owner and Homeowner Association meetings (POAs & HOAs) to talk with homeowners and pet owners to learn more about the issue.
- Use DHEC "Scoop the Poop" campaign materials.
- Homeowners that receive cost-sharing benefits commit to proper pet waste disposal.
- Work with PUD special interest groups to spread the message (birding, garden, and nature clubs).
- Work to identify leaders within the local Hispanic community and establish partnerships with those leaders. Some potential partners include Luis Bell, past leader of the Latin-American Council, Eric Esquivel, publisher of La Isla Magazine, and local church leaders for churches with Hispanic congregations. If necessary, other potential partners may be identified by seeking assistance from the Arnold School of Public Health Consortium for Latino Immigration Studies through Dr. Porter.

Evaluation:

- Track number of pet waste stations installed against objectives, estimate waste removed and inspect use.
- Track number of rain barrels and disconnected downspouts installed against objectives.
- Track number of pet septic systems installed against numbers and inspect use.
- Track number of rain gardens installed against objectives.
- Determine if an updated Animal Ordinance has been developed.
- Pre- and post-surveys after POA and HOA presentations.
- Fecal loading from this source will decrease by 45% (90,000 lbs.) within one year after the close of the project.

Source 4: Wildlife

The Issue: As land use change has occurred with an increasing population, native wildlife have less habitat available and are often pushed into wetlands and buffer areas to survive. Many buffers are located along the waterways to protect water quality from development, yet now there is a large source of fecal contamination. Additionally, the introduction of non-native species is negatively impacting our ecosystems, specifically for water

quality this is true with feral hogs. The Town estimates that 200,000 lbs/year of wildlife fecal matter is produced annually and needs to be reduced by 10% (20,000 lbs/year). This is a problem throughout the watershed (Fig. 1 #1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15). Weekly testing from USCB indicates that wildlife may be a major contributor of fecal coliforms. However, due to the negative public perception of wildlife management, all other structural and non-structural BMP measures (e.g. Pilot Project & Unified Code Overhaul) will be exhausted prior to culling herds of deer or other urban wildlife.

Management Needed:

- Retrofit 100 docks and railings with bird roosting deterrents to prevent mass roosting areas where birds defecate on or near the water.
- Collaborate with the SC Department of Natural Resources (DNR) to develop appropriate wildlife management plans as necessary, specifically for deer.
- Based upon the weekly hot spot testing by USCB, install Greenfield and Brownfield BMPs via the Pilot Project to reduce fecal coliforms at station 19-19 or in waters leading to station 19-19.
- Educate all residents in the greater Bluffton area to not feed wildlife, but to provide additional habitat by putting their land under conservation easement or creating habitat in their yard via a social marketing campaign.

Social Marketing Needed:

- Target Audience: All sectors of the greater Bluffton population representing all income, age, education and ethnicity segments, with an implementation priority of a social marketing campaign targeted to the headwaters sub-drainage basins
- Message:
  a. Feeding wildlife can be harmful to you, your pet and the wildlife.
  b. Create wildlife habitat in your back yard by planting beneficial native plants.
  c. Introduced, non-native species, like hogs, are detrimental to the environment.

Objectives:

- 50% of the 100 docks identified will install bird roosting deterrent devices.
- Unified Ordinance will be modified based on watershed principles.
- Pilot Project will be installed.
- Wildlife management plan will be developed for deer.

Potential Strategies:

- Work with property management companies to deliver message and then identify what PUDs they manage to make connections with them.
- Attend Property Owner and Homeowner Association meetings (POAs & HOAs) to talk with homeowners about wildlife issues.
- Work to identify leaders within the local Hispanic community and establish partnerships with those leaders. Some potential partners include Luis Bell, past leader of the Latin-American Council, Eric Esquivel, publisher of La Isla Magazine, and local church leaders for churches with Hispanic congregations. If necessary, other potential partners may be identified by seeking assistance from the Arnold School of Public Health Consortium for Latino Immigration Studies through Dr. Porter.

Evaluation:

- Track number of docks retrofitted with bird roosting deterrent devices.
- Track % of fecal coliform reduction post-installation of the Pilot Project.
- Unified Ordinance will be updated based in watershed principles.
- Track number of deer culled, if necessary, during and within one year after the project period.
- Fecal loading from this source will decrease by 10% (20,000 lbs.) within one year after the close of the project.

Source 5: Humans

The Issue: In newer developments, residents have turf that they over water and over fertilize, which contributes additional fecal pollutant runoff if they are also pet owners. In other areas, due to development, sewer connections are available, but the connection has not occurred and this may be addressed in future phases of the project.

With aging septic tanks in the region, there are some systems that require maintenance or replacement. There is a 10% failure rate assumed for septic tanks at any given time. There are approximately 500 septic tanks along

the May River and coves, thus it is assumed that 50 tanks are failing. However, following infrared flyovers in the winter of 2008, the Town determined that failing septic systems were not a major issue within the headwaters of the May River watershed, and thus has reduced the number to 22 failing systems throughout the watershed. There is one Recreational Vehicle (RV) Park/campground that is served by septic and is located in the Stoney Creek sub-drainage basin. The Town estimates that 5,400 lbs/year of human fecal material is reaching the May River and needs to be reduced by at least 90% (4,900lbs/yr). This is an issue throughout the watershed (Fig. 1 #1, 2, 4, 5, 6, 9, 12, 14, 15).

Management Needed:

- Septic tank pump-out and inspection of an estimated 22 tanks and a replacement of 1-2 tanks (10% of the 22 identified) within the Town's and County's jurisdiction.
- Develop and/or review the waste management plan for Stoney Crest Campground/RV Park.
- Create a Septic System Maintenance Ordinance for the Town and Beaufort County.
- Disconnect downspouts in 145 homes to prevent runoff from turf reaching receiving stormwater lagoons. Disconnecting downspouts can be achieved by directing the flow into a rain barrel or series of rain barrels or to a pervious area, thus preventing sheet flow across the lawn and stopping the transport of fecals to stormwater lagoons.
- Increase and/or enhance the vegetated buffer in 47 lots in May River Plantation and Gascoigne Bluff that have river/creek frontage. By partnering with Sea Grant and utilizing their Coast-a-Syst program, river buffers can be enhanced with additional vegetation or increased in depth to elevate fecal coliform removal efficiencies.
- By contracting with Dr. Bill Leonard, Clemson Extension Master Gardener, 45 rain gardens designed for varying conditions, but all for the same purpose, fecal load reduction, will be installed on individual parcels. By capturing runoff in a rain garden, there is increased fecal load reduction.
- Partner with the EPA WaterSense program. While this program is primarily focused on water conservation, the Town believes the principals of conservation will also result in reduced runoff from residential lawns and other areas where pet waste may be found. Thus, by conserving water and reducing runoff in these areas, there will be reduced transport of fecal material from lawns.
- Educate homeowners about the benefits of maintaining their septic tanks, the benefits of connecting to public sewer where available and the importance of reducing runoff from their land.

Social Marketing Needed:

- Target Audience:
  a. Septic Tank Maintenance/Repairs: varies from neighborhood to neighborhood; along the river - typically affluent, 50+yrs, Caucasians; along the coves and areas of Old Town - middle to lower income bracket, 35+yrs, African American, Hispanic and Caucasian
  b. Connection to Sewer in Old Town: primarily individuals of low income bracket, >45yrs, African American
  c. RV/Campground Waste Management: middle to lower income bracket, across age classes, mostly Caucasian.
  d. Rain Barrel, River Buffers & Rain Garden Installation: middle to higher income bracket, mostly residents of Old Town; across age classes, African American, Caucasian and Hispanic
  e. WaterSense Program: All residents of greater Bluffton area (across all demographics)
- Message:
  a. How to recognize a failing system.
  b. Maintaining your septic tank is more cost-effective in the long term than not maintaining it.
  c. Connecting to sewer where practical is beneficial to water quality and sometimes your health if your system is failing.
  d. Disconnecting downspouts by installing rain barrels and rain gardens is good for water quality.
  e. Installing rain barrels and rain gardens are cost-saving measures by reducing irrigation needs.
  f. Rain barrels, river buffers and rain gardens help conserve our water resources.
  g. Conserving water and preserving water quality is important for healthy future generations.

Objectives:

- Recruit 75% of the estimated 22 homeowners within the watershed to pump out their system.
- Of the 47 lots identified for buffer enhancement, 65% will participate in the Coast-a-Syst program.
- Recruit 90% of identified failing systems to replace them.

- 90% of participating homeowners will understand the importance of maintaining and how to maintain their system.
- Create/update a waste management plan for Stoney Crest Campground.
- Create and implement a Septic Tank Maintenance Ordinance for the Town and County.
- 145 homes will install a rain barrel(s).
- 45 rain gardens are installed and maintained.
- Establish partnership with EPA's WaterSense program and employ their outreach materials making the connection between water conservation and improved water quality.

Potential Strategies:

- Public workshop on recognition of a failing septic and how to maintain one properly.
- Hold targeted workshops to present the Coast-a-Syst program.
- Public workshop on turf management and water conservation.
- Work with property management companies to deliver message and then identify what PUDs they manage to make connections with them.
- Attend Property Owner and Homeowner Association meetings (POAs & HOAs) to talk with homeowners about turf issues.
- Work to identify leaders within the local Hispanic community and establish partnerships with those leaders. Some potential partners include Luis Bell, past leader of the Latin-American Council, Eric Esquivel, publisher of La Isla Magazine, and local church leaders for churches with Hispanic congregations. If necessary, other potential partners may be identified by seeking assistance from the Arnold School of Public Health Consortium for Latino Immigration Studies through Dr. Porter.

Evaluation:

- Pre- and post-surveys of workshops.
- Track the number of enhancement buffers.
- Pre- and post-surveys after Coast-a-Syst workshop.
- Rate of participant recruitment evaluated against objectives.
- Determine if a waste management plan has been developed/updated for Stoney Crest RV/Campground.
- Pre- and post-surveys after POA and HOA presentations.
- Track number of rain barrels and disconnected downspouts.
- Track number of rain gardens installed.
- Fecal loading from this source will decrease by 90% (3,150 lbs.) within one year after the close of the project.

Source 6: Soil/Land Disturbance

The Issue: As development occurs, land disturbance is inevitable. This disturbance can re-activate fecal coliforms in the soil that can then be transported to stormwater lagoons via sediment runoff. This can happen not only during development, but in ditches that erode as they receive rainfall. Thus, it is necessary to limit the amount of land disturbance in preparation for development and to enhance ditches/banks to prevent soil erosion. This is a source of fecal throughout the entire watershed and is dealt with via the Town's Capital Improvement Projects program.

Management Needed:

- Pond littoral shelf maintenance/enhancement standards, ditch vegetation, and aeration BMPs should be inspected and improved as needed according to the Town's and Beaufort County's Stormwater Ordinances
- Identify ditches in need of enhancement (10/project period).
- Conduct construction site inspections to ensure proper sediment and erosion control measures are in place.
- Development Standards Ordinance revision in Town of Bluffton/Beaufort County to limit allowable land disturbance areas and/or timeframes.

Social Marketing Needed:

- Target Audience:
  a. Developers: typically Caucasian males from >25yrs and higher.
  b. Staff of the Town and County: males and females of varying ages
- Message:
  a. Clearing more land than necessary harms the environment in water quality and loss of habitat for wildlife prematurely

Objectives:

- Modify the Unified Ordinance based on watershed principles including stormwater (Illicit Discharge Detection, volume, turbidity, aeration, etc.), land use and land clearing standards to include spatial and temporal limits between the time of clearing and construction.
- Identify and enhance 10 ditches during the project period.
- Conduct 1 site inspection/month for construction projects.

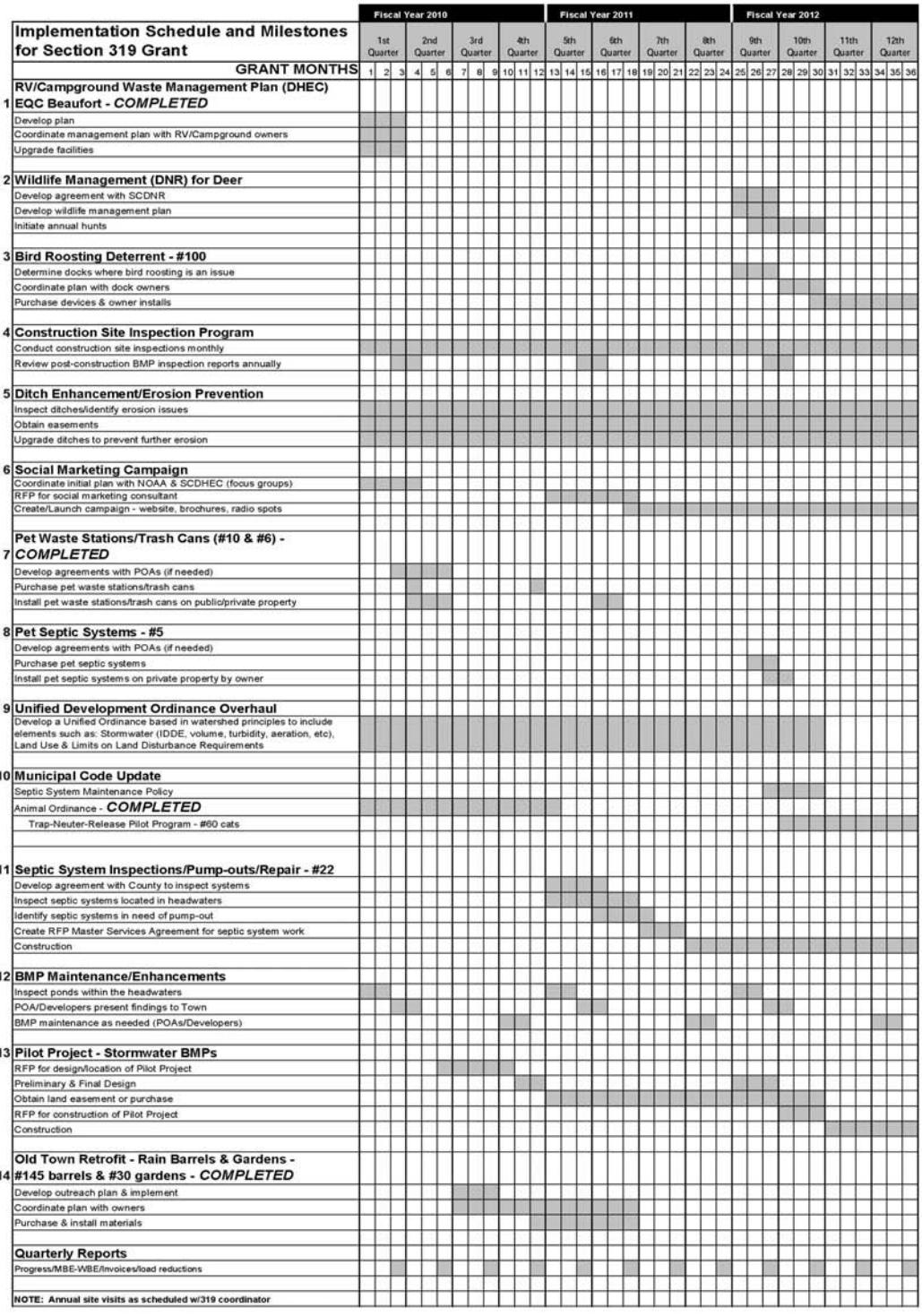
Potential Strategies:

- Targeted workshops for developers and Town/County staff with continuing education credits.

Evaluation:

- Pre- and post-surveys of workshops
- Determine if ditch vegetation requirements in the ordinances has been developed.
- Determine if land disturbance limit requirements in the ordinances has been developed.
- Track number of enhanced ditches.
- Track number of site inspections by the Town and County.

Implementation Schedule including Milestones



Project Period
The project is anticipated to be complete within 36 months. The Town will remain in close contact with the 319 Coordinator to discuss any potential extension if circumstances warrant so.

Detailed Itemized Budget

Salary –

- **The Town's match will be the required 40% or $322,494.50 instead of the original 58% match**

Table 1: Expenses

	SECTION 319 GRANT EXPENSES					
		YEAR 1	YEAR 2	YEAR 3	TOTAL	
1	~~**Manure Management Plan (Clemson Ext)**~~	-	-	-	~~**$2,000.00**~~	
	~~Create manure management plan~~	-	-	-	~~$0.00~~	
	~~Coordinate management plan with horse owners~~	-	-	~~$2,000.00~~	~~$2,000.00~~	
	~~Install/upgrade facilities~~	-	-	-	~~$0.00~~	
	~~Clarify definition of "domestic" animal in ZDSO~~	-	-	-	~~$0.00~~	
2	**RV/Campground Waste Management Plan - COMPLETED**				**$0.00**	
	Develop plan				$0.00	
	Coordinate management plan with RV/Campground owners				$0.00	
	Upgrade facilities as needed				$0.00	
3	**Wildlife Management (DNR) for Deer**				**$6,000.00**	
	Develop agreement with SCDNR				$0.00	
	Develop wildlife management plan			$2,500.00	$2,500.00	**contractual**
	Initiate annual hunts			$3,500.00	$3,500.00	**supplies**
4	**Bird Roosting Deterrent - #100**				**$18,500.00**	
	Determine docks where bird roosting is an issue				$0.00	
	Coordinate plan with dock owners				$0.00	
	Purchase devices & owner installs			$18,500.00	$18,500.00	**supplies**

	SECTION 319 GRANT EXPENSES					
		YEAR 1	YEAR 2	YEAR 3	TOTAL	
5	**Construction Site Inspection Program - SALARY**				**$0.00**	
	Conduct construction site inspections monthly				$0.00	
	Review post-construction BMP inspection reports annually				$0.00	
6	**Ditch Enhancement/Erosion Prevention - CIP**				**$0.00**	
	Inspect ditches/identify erosion issues				$0.00	
	Obtain easements				$0.00	
	Upgrade ditches to prevent further erosion				$0.00	
7	~~**EPA Water Sense Partnership - NO COST**~~	-	-	-	~~**$0.00**~~	
	~~Establish partnership with EPA program~~	-	-	-	~~$0.00~~	
	~~Incorporate promotional material into Town website & social marketing campaign~~	-	-	-	~~$0.00~~	
8	**Social Marketing Campaign**				**$40,000.00**	
	Coordinate initial plan with NOAA & SCDHEC (focus groups)	$1,500.00	$3,500.00		$5,000.00	**supplies**
	RFP for social marketing consultant		$30,000.00		$30,000.00	**contractual**
	Create/Launch campaign - website, brochures, radio spots		$5,000.00		$5,000.00	**supplies**
9	**#10 Pet Waste Stations/#6 Trash Cans**				**$0.00**	
	Develop agreement with POAs				$0.00	
	Purchase pet waste stations/trash cans				$0.00	
	Install pet waste stations/trash cans on public/private properties				$0.00	
10	**Pet Septic Systems - #5**				**$470.00**	
	Develop agreements with POAs				$0.00	
	Purchase pet septic systems			$470.00	$470.00	**supplies**
	Install pet septic systems by Town staff				$0.00	

	SECTION 319 GRANT EXPENSES					
		YEAR 1	YEAR 2	YEAR 3	TOTAL	
11	**Unified Ordinance Overhaul**				**$63,750.00**	**contractual**
	Develop a Unified Ordinance based in watershed principles to include elements such as: Stormwater (IDDE/volume/turbidity/ aeration/etc); Land Use & Limits on Land Disturbance Requirements	$61,670.00	$2,080.00		$63,750.00	
12	**Municipal Code Update - SALARY**				**$0.00**	
	Septic System Maintenance Ordinance				$0.00	
	Animal Ordinance - **COMPLETED**				$0.00	
13	**Septic System Inspections/Pump-outs & Repairs/Replacements - #22 & #1-2**				**$16,740.00**	
	Develop agreement with County to inspect systems				$0.00	
	Inspect septic systems located in headwaters				$0.00	
	Identify septic systems in need of pump-out				$0.00	
	Create RFP to pump-out septic systems				$0.00	
	Construction ($300/pump out)		$16,740		$16,740.00	**construction**
14	~~**Septic System Replacements/Repairs - #1-2**~~	-	-	-	~~**$10,140.00**~~	
	~~Develop agreement with County to inspect systems~~	-	-	-	~~$0.00~~	
	~~Inspect septic systems located in headwaters~~	-	-	-	~~$0.00~~	
	~~Identify septic systems in need of replacement~~	-	-	-	~~$0.00~~	
	~~Create RFP to replace septic systems~~	-	-	-	~~$0.00~~	
	~~Construction~~	-	~~$10,140.00~~	-	~~$10,140.00~~	
15	**Pond Enhancements - SALARY**				**$0.00**	
	Inspect ponds within the headwaters				$0.00	
	POA/Developers present findings to Town				$0.00	
	Replant littoral shelves as needed				$0.00	
16	~~**Enhanced Buffers Plan (Sea Grant) - #47**~~	-	-	-	~~**$500.00**~~	
	~~Educational outreach with property owners on water front~~	-	-	-	~~$0.00~~	
	~~Assist with planting enhancement (Coast-a-Syst book)~~	-	-	~~$500.00~~	~~$500.00~~	**supplies**

	SECTION 319 GRANT EXPENSES					
		YEAR 1	YEAR 2	YEAR 3	TOTAL	
17	**Pilot Project**				**$281,081.00**	
	Pilot Project Design				$0.00	
	~~Materials~~	-	~~$121,081.00~~	-	~~$121,081.00~~	
	Construct and maintain system(s)		~~$160,000.00~~	$281,081.00	$281,081.00	**construction**
18	**Old Town Retrofit - Rain Barrels & Rain Gardens - #145 barrels & #45 gardens**				**$53,003.00**	
	Develop outreach plan & implement		$2,953.00		$2,953.00	**supplies**
	Coordinate plan with owners	$2,110.00	$6,890.00		$9,000.00	**contractual**
	Purchase & install materials	$7,200.00	$33,850.00		$41,050.00	**supplies**

Table 2: Mileage Rates

Type of Approved Reimbursement Rate	A. Estimated Miles	B. Approved Rate/ Mile	A. x B. Total Mileage Cost
State Reimbursement	0	0	0

Mileage is not included in the overall budget listed in Table 4 as it is included in the Town's general operating expense and consultant fees.

Table 3: Budget Estimates - Original

Cost category	Federal 319 Grant	Non-Federal Match	Total Cost
Salary (From Table 1)		$574,800.00	$574,800.00
Fringe		$100,000.00	$100,000.00
Construction	$160,000.00		$160,000.00
Contractual (From Table 2)	$130,871.00		$130,871.00
Travel (Including Mileage Rates from Table 3)			$0.00
Equipment	$95,000.00		$95,000.00
Supplies	$97,629.00		$97,629.00
Other			$0.00
Indirect (Federally Approved)			$0.00
Totals	$483,500.00	$674,800.00	$1,158,300.00

Table 3: Budget Estimates - Revised

Cost category	Federal 319 Grant	Non-Federal Match	Total Cost
Salary (From Table 1)		$248,072.69	$225,633.33
Fringe		$74,421.81	$96,700.00
Construction	$176,740.00		$176,740.00
Contractual (From Table 2)	$105,250.00		$103,170.00
Travel (Including Mileage Rates from Table 3)			$0.00
Equipment	$121,081.00		$121,081.00
Supplies	$80,429.00		$82,509.00
Other			$0.00
Indirect (Federally Approved)			$0.00
Totals	$483,500.00	$322,494.50	$805,994.50

Detailed Budget Narrative:

Calculations of how all budget category amounts were derived are contained in "Table 2. Contractual Expenses for each budget item." The Non-Federal Match requirement will be met with staff salary and fringe. The Town anticipates contributing significantly more non-federal matching funds from cost-sharing on BMPs, in-kind volunteer labor and mileage expenses; however these costs are not included in budget estimates in the charts above because of DHEC grant agreement requirements.

1. **RV/Campground Waste Management Plan – No Section 319 funds needed.**
   a. **Develop waste management plan (months 1-3):** With the in-kind assistance of DHEC-EQC an updated waste management plan for the RV/Campground facility will be developed.
   b. **Coordinate management plan with RV/Campground owners (months 1-3):** The updated plan will be delivered and explained to the managers of the facility by SCDHEC.
   c. **Upgrade facilities (months 1-3):** The owner(s) and managers of the facility will upgrade the waste management system as specified by DHEC.

2. **Wildlife Management Plan - $6,000.00**
   a. **Develop agreement with SCDNR (months 25-27):** Any necessary agreements which are required by SCDNR to enact wildlife management plans will be established. The SCDNR agent's time is considered in-kind.
   b. **Develop wildlife management plans (months 25-27):** A contract for $2,500 will be developed to create appropriate wildlife management plans as determined by surveys.
   c. **Initiate annual hunts (months 26-30):** After wildlife management plans have been developed, $3,500 in supplies (promotional materials, necessary hunt items) will be expended to initiate annual hunts.

3. **Bird Roosting Deterrent - $18,500**
   a. **Determine docks where bird roosting is an issue (months 25-27):** Staff will conduct surveys of dock owners to determine where the most effective areas for placement of bird roosting deterrents.
   b. **Coordinate plan with dock owners (months 28-30):** Staff will work with appropriate dock owners to establish an installation schedule.
   c. **Purchase devises & owner installs (months 30-36):** To remove this fecal loading, unsightliness, and odor from private and public docks, bird deterrent systems (the "spider") will be installed on 100 docks, along with railing wire ($185/total system x 100 = $18,500).

4. **Construction Site Inspection Program – No Section 319 funds needed.**
   a. **Conduct construction site inspections monthly (months 1-36):** The Town of Bluffton currently conducts monthly construction site inspections on all active construction projects to ensure proper sediment and erosion control BMPs are in place. If they are not, warnings and eventually citations are issued to correct the problems.
   b. **Review post-construction BMP inspection reports annually (months 3-4; 15-16; 27-28):** As required by the Town's stormwater ordinance, developments within the Town's jurisdiction must submit an annual report stating that all BMPs are functioning as designed.

5. **Ditch Enhancement/Erosion Prevention – No Section 310 funds needed.**
   a. **Inspect ditches/identify erosion issues (months 1-36):** Staff routinely inspects ditches in need of maintenance for either vegetation trimming or erosion prevention.
   b. **Obtain easements (months 1-36):** Occasionally easements must be obtained to properly maintain ditches.
   c. **Upgrade ditches to prevent further erosion (months 1-36):** Approximately every three months, 5 – 6 ditches are cleared of obstructions in known flooding problem areas. This is an on-going effort to keep vegetation in place, but under control, thus the ditches must be cleaned every 6 – 12 months. These efforts are funded through the Town's Capital Improvement Projects.

6. **Social Marketing Campaign - $40,000**
   a. **Coordinate initial plan with NOAA & SCDHEC (months 1-4):** Dr. Geoff Scott, NOAA, has committed his services and those of his Human Dimensions Specialist, Dr. Theresa Goedeke, to aid in this objective. However, as both individuals are federally funded their $50,000 of in-kind services cannot be counted as a match for 319-funds. Dr. Goedeke will assist with conducting focus groups for 3 target audiences – pet owners, horse owners, septic owners. The supply costs for these focus groups and for Dr. Goedeke's travel is $5,000.
   b. **RFP for social marketing (months 13-18):** An initial RFP was released in months 6-7, however due to a lack of qualified, responsive bidders, staff will re-scope the project and release a revised RFP according to the Town's and Grant's procurement requirements. The contractual amount to obtain a qualified consultant is $30,000.
   c. **Create/Launch campaign with collateral materials (months 18-36):** During this period the contracted consultant will employ community-based social marketing techniques to develop a campaign targeted at adopting positive behavioral changes, will develop appropriate collateral materials, will pilot and revise the campaign as necessary and will conduct a broad-scale roll out of the project to improve water quality in the May River. Collateral material supplies are estimated at $5,000.

7. **Pet Waste Stations/Trash Cans – No Section 319 funds needed.**
   a. **Develop agreements with POAs (if needed) (months 3-6):** If the need exists to place pet waste stations in common areas of neighborhoods, staff will develop agreements with these neighborhoods that the units will be properly maintained.
   b. **Purchase pet waste stations/trash cans (months 4 and 12):** With support from the SC Palmetto Pride grant, staff will purchase, install and maintain 10 pet waste stations within the National Register Historic District of Old Town and on public property. Additionally, this grant will provide support to purchase 6 trash can receptacles for placement in the National Register Historic District of Old Town.
   c. **Install pet waste stations/trash cans on public/private property (months 4-6 and 16-17):** Pet waste stations and trash cans will be installed by staff on public property as determined by need. Any units installed on private property will be installed and maintained by the community POA.

8. **Pet Septic Systems - $470**
   a. **Develop agreements with POAs (if needed) (months 25-26):** If the need exists to place pet septic stations in common areas of neighborhoods, staff will develop agreements with these neighborhoods that the units will be properly maintained.
   b. **Purchase & install pet septic systems (months 26-27):** To make it convenient for owners to properly dispose of their pets' waste to reduce fecal runoff, the purchase of 5 pet septic systems (including the Doggie Dooley brand, scooper with rake, and deodorizer kit $94 each.) will be 319-

funded ($470 supplies) and then installed by Town staff as a supporting part of the Social Marketing Pet Waste Reduction Campaign.

c. **Install pet septic systems on private property (months 28-29):** Owners will install the devices in-kind.

9. Unified Ordinance Overhaul - $63,750.00

a. **Develop a Unified Ordinance based in watershed principles to include elements such as Stormwater (IDDE, volume, turbidity, aeration, etc.), Land Use & Limits on Land Disturbance requirements (months 1-19):** Based upon evaluation of the current zoning and development standards in the Unified Ordinance, and the results of the USCB lab weekly fecal coliform testing, it has become apparent that current standards are not beneficial for the overall health of the watershed. Thus, a major overhaul of the code based in watershed principles will occur, emphasizing sustainability elements such as clustered development in appropriate areas of the watershed, providing wildlife corridors and more open space which will allow wildlife to move away from the wetlands and buffers feeding into the May River. A team of consultants will work with the entire Growth Management Department in this endeavor on a contractual basis.

10. Municipal Code Update - No Section 319 funds needed for code; $2,500 for TNR Pilot Project

a. **Septic System Maintenance Ordinance (months 1-19):** Utilizing the template available from DHEC, the Town and County will draft a Septic System Maintenance Ordinance which may include mandatory maintenance inspections at property-transfer transactions among other points. Supplies to provide PR, information for public meetings, drafts and final product as well as a lawyer's review of the drafts and final document will be covered by the Town.

b. **Animal Ordinance (months 1-19):** By partnering with Palmetto Animal League the current Animal Ordinance in the Municipal Code will be updated by the Bluffton Police Department. New elements include a section requiring proper pet waste disposal (punishable as a misdemeanor) and humane feral cat reduction program through Trap-Neuter-Release.

c. **Trap/Neuter/Release Pilot Project (months 27-30):** By continuing to partner with Palmetto Animal League and local veterinarians, approximately 60 feral cats ($40/cat; $2,500 salary) from a colony in Old Town will be trapped, neutered, and released. This Pilot Project is the first in a long-term humanitarian effort to reduce feral cat population and their contributing fecal coliforms.

11. Septic System Inspection/Pump-outs & Repairs/Replacements - $6,600

a. **Develop agreement with County to inspect systems (months 13-16):** The Town and County must agree to a cohesive approach to this watershed problem as a number of the septic systems within the watershed lie within the County's jurisdiction. Outreach to septic owners will be a result of this agreement (supplies for post cards and fliers from social marketing budget).

b. **Inspect septic systems located in headwaters (months 13-18):** It is assumed at any given time there are 10% of septic tanks in failure. There are roughly 500 septic tanks along the shores of the May River. Suspecting this to be a major fecal contributor the Town conducted a Thermal Imagery (IR) fly-over in the winter of 2008. There were no failing septic systems found as a result of this methodology. Realizing that IR does not catch all septic systems that are failing the Town is assuming that there are 22 tanks in failure (500 x 10% = 50 reduced to 22 as a result of the fly-over). Approximately 10 Town and County employees are certified septic tank inspectors after attending training offered by Lisa Hajjar and Blaine Lyons of SCDHEC.

c. **Identify septic systems in need of pump out (months 16-19):** Based upon inspections, those tanks in obvious failure will be identified and scheduled for pump out and in depth inspection.

d. **Create RFP to pump-out/repair/replace septic systems (months 19-21):** Staff will prepare a RFP for a Master Services Agreement according to Grant and Town procurement standards for the required work.

e. **Construction (months 22-24):** Every tank in need of in depth inspection will need to be pumped-out, which is approximately $300/tank (construction). Based upon inspections and assuming a 10% failure rate from the 22 inspections/pump-outs, 1 or 2 tanks will be identified and scheduled for replacement construction. Typical septic system replacement is $15,000. Thus, additional Town funds from other sources will be utilized for replacement of 1-2 systems (construction).

12. **Pond Enhancements – No Section 319 funds needed.**
    a. **Inspect ponds within the headwaters (months 1-2; 13-14; 25-26):** As part of the Town's required annual BMP inspection report, developers and POAs must inspect their stormwater ponds and other BMPs and submit a report to the Town that the BMPs are performing as designed..
    b. **POA/Developer presents findings to the Town (months 3-4; 15-16; 27-28):** The results of these inspections must be reported to the Town.
    c. **BMP maintenance as needed (months 10-12; 22-23; 34-35):** Based upon the results of the annual inspection and the Town's review, the developer or POAs may be required by the Town to replant their littoral shelves if adequate vegetation is missing.

13. **Pilot Project - $281,081**
    a. **RFP for design/location of Pilot Project (months 6-10):** Staff will develop and release a RFP following Grant and Town procurement protocol.
    b. **Preliminary & final design (months 11-15):** The successful responder will develop designs for structural BMPs that will be effective in reducing fecal coliform counts at Station 19-19 or to the waters flowing to Station 19-19. The design fees will be covered by the Town.
    c. **RFP for construction of Pilot Project (months 16-18):** Upon receiving final design and construction drawings, staff will release an RFP for the construction of the proposed BMPs.
    d. **Construction (months 19-21):** Upon awarding the contract to the successful responder, construction will begin ($121,081 equipment; $160,000 construction).

14. **Old Town Retrofit – Rain Barrels & Rain Gardens - $53,003**
    a. **Develop outreach plan & implement (months 7-9):** Staff will create a press release, flyers for distribution and an application for the Old Town Rain Barrel/Rain Garden project. The Old Town Historic District was targeted as the site for this demonstration project due to its highly visible nature, relatively dense development including mixed-use commercial and residential space, and lack of current stormwater treatment options. Areas outside of Old Town, but within the May River Watershed, are able to participate in the program as well. The goal is to install 145 rain barrels and 45 gardens in the watershed. Supplies for hose, fixtures, concrete blocks, and signs are estimated at $2,953.
    b. **Coordinate plans with owners (months 7-18):** The Town will partner with Dr. Bill Leonard, master gardener, to conduct pre-design site visits with applicants including a soil analysis by Clemson Extension, to design the garden for each applicant and to oversee the installation of the gardens. It is estimated that he will spend 10 hrs/garden at the rate of $19.51/hr for 45 gardens on a contractual basis ($9,000). The Lowcountry Master Gardeners will volunteer their services to assist with garden installations as an in-kind service.
    c. **Purchase and install materials (months 12-18):** The supplies necessary for the rain gardens are estimated to be $300/garden (plants, soil amendment, etc.) for 45 gardens ($13,500) based upon a rain garden of similar size installed at Town Hall in 2009.
    The Town has partnered with Palmetto Rain Barrels for all the necessary rain barrel supplies and installation at a cost of $175 plus tax/barrel for 145 barrels ($27,550).

Appendix A

Table 2. DHEC Station 19-19 partial Fecal Results for 2006 - 2008

Station	Date	Time	Tide	Water	Air	FC MPN	F.C.Log	Salinity
19-19	11/05/08	818	2000	18.3	16.7	70	1.8451	22
19-19	10/01/08	821	2200	24.4	21.7	34	1.5314	32
19-19	08/05/08	835	2100	31.1	28.9	8	0.9031	32
19-19	07/09/08	740	2000	30	23.9	43	1.634	30
19-19	06/26/08	810	4300	30.6	26.7	31	1.4914	32
19-19	04/10/08	750	2000	20	14	34	1.5314	26
19-19	03/12/08	1045	2200	16.1	10	23	1.3617	20
19-19	02/13/08	805	2000	16.4	16.8	33	1.5185	28
19-19	01/16/08	735	2000	11.6	6.6	7	0.8451	26
19-19	12/17/07	920	2100	14.0	3.0	17	1.2304	30
19-19	10/31/07	1105	2200	20.5	23.5	17	1.2304	30
19-19	09/09/07	658	2300	29.5	23.5	2	0.3010	30
19-19	08/01/07	855	2300	30.0	29.0	93	1.9685	22
19-19	07/17/07	904	2200	31.0	28.5	17	1.2304	26
19-19	06/04/07	806	2200	25.0	25.0	920	2.9638	28
19-19	05/16/07	859	2300	24.0	24.0	5	0.6990	34
19-19	04/10/07	1031	2100	18.5	18.5	4	0.6021	30
19-19	03/26/07	923	4300	21.5	19.0	1.9	0.2788	28
19-19	02/06/07	822	2200	9.0	3.0	2	0.3010	28
19-19	01/03/07	738	4300	14.5	16.0	8	0.9031	28
19-19	12/19/06	726	4000	15.0	14.0	2	0.3010	32
19-19	11/27/06	823	2100	15.0	17.5	1.9	0.2788	32
19-19	10/23/06	931	2300	22.0	12.0	4	0.6021	32
19-19	09/27/06	831	2100	27.5	25.0	11	1.0414	30
19-19	08/03/06	824	2000	32.0	29.0	11	1.0414	30
19-19	07/19/06	631	4200	31.5	29.0	2	0.3010	30
19-19	06/05/06	903	4300	29.0	21.5	13	1.1139	30
19-19	05/15/06	924	2300	21.0	23.0	23	1.3617	30
19-19	04/04/06	845	2000	20.0	18.0	8	0.9031	26
19-19	03/08/06	845	4300	15.0	12.5	11	1.0414	22
19-19	02/22/06	851	4300	14.0	16.0	17	1.2304	18
19-19	01/24/06	933	4300	15.0	17.0	33	1.5185	18

Station:	**19-19**
Samples:	35
Geomean:	**12.5031684**
Log Avg:	1.09703209
LogSD:	0.59295816
Est 90th:	**71**

Tide

(2000) Ebb (4000) Flood
(2100) 1/4 Flood (4100) 1/4 Ebb
(2200) 1/2 Flood (4200) 1/2 Ebb
(2300) 3/4 Flood (4300) 3/4 Ebb

Table 3. DHEC Station 19-24 partial Fecal Results for 2006 - 2008

Station	Date	Time	Tide	Water	Air	FC MPN	F.C.Log	Salinity
19-24	11/05/08	807	2000	18.3	16.7	9	0.9543	26
19-24	10/01/08	809	2200	24.4	21.7	4	0.6021	32
19-24	08/05/08	830	2100	31.1	28.9	2	0.301	32
19-24	07/09/08	728	4300	30	23.9	9	0.9543	32
19-24	06/26/08	750	4300	30.6	26.7	6	0.7782	32
19-24	04/10/08	730	2000	20	14	26	1.4149	26
19-24	03/12/08	1030	2200	16.1	10	11	1.0414	24
19-24	02/13/08	815	2000	16.5	17.5	33	1.5185	30
19-24	01/16/08	745	2000	11.6	6.6	4	0.6021	30
19-24	12/17/07	910	2100	14.0	3.0	33	0.0901	32
19-24	10/31/07	1210	2300	20.5	21.6	2	0.3010	32
19-24	09/09/07	646	2300	29.5	23.5	4	0.6021	28
19-24	08/01/07	840	2300	30.0	29.0	11	1.0414	28
19-24	07/17/07	846	2200	31.0	28.5	2	0.3010	30
19-24	06/04/07	758	2200	25.0	25.0	17	1.2304	30
19-24	05/16/07	846	2300	24.0	24.0	4	0.6021	34
19-24	04/10/07	1003	2100	18.5	18.5	2	0.3010	30
19-24	03/26/07	901	4300	21.5	19.0	13	1.1139	28
19-24	02/06/07	817	2200	9.0	3.0	2	0.3010	28
19-24	01/03/07	732	4300	14.5	16.0	13	1.1139	30
19-24	12/19/06	721	4000	15.0	14.0	5	0.6990	32
19-24	11/27/06	817	2100	15.0	17.5	2	0.3010	32
19-24	10/23/06	926	2300	22.0	12.0	1.9	0.2788	32
19-24	09/27/06	825	2100	27.5	25.0	13	1.1139	30
19-24	08/03/06	816	2000	32.0	28.5	5	0.6990	30
19-24	07/19/06	625	4200	31.5	29.0	5	0.6990	30
19-24	06/05/06	855	4300	29.0	21.5	13	1.1139	30
19-24	05/15/06	917	2300	21.0	23.0	49	1.6902	30
19-24	04/04/06	837	2000	20.0	18.0	33	1.5185	26
19-24	03/08/06	834	4300	15.0	12.5	8	0.9031	22
19-24	02/22/06	840	4300	14.0	16.0	13	1.1139	20
19-24	01/24/06	923	4300	15.0	17.0	79	1.8976	26

Station:	**19-24**
Samples:	35
Geomean:	7.84168423
Log Avg:	0.84977446
LogSD:	0.46276824
Est 90th:	**27**

Tide

(2000) Ebb	(4000) Flood
(2100) 1/4 Flood	(4100) 1/4 Ebb
(2200) 1/2 Flood	(4200) 1/2 Ebb
(2300) 3/4 Flood	(4300) 3/4 Ebb

Table 4. DHEC Station 19-16 partial Fecal Results for 2006 - 2008

Station	Date	Time	Tide	Water	Air	FC MPN	F.C.Log	Salinity
19-16	**11/05/08**	**804**	**2000**	**18.3**	**16.7**	**14**	**1.1461**	**28**
19-16	**10/01/08**	**806**	**2200**	**24.4**	**21.7**	**5**	**0.6989**	**32**
19-16	**08/05/08**	**825**	**2100**	**31.1**	**28.9**	**2**	**0.301**	**34**
19-16	**07/09/08**	**723**	**4300**	**30**	**23.9**	**11**	**1.0413**	**32**
19-16	**06/26/08**	**748**	**4300**	**30.6**	**26.7**	**5**	**0.6989**	**32**
19-16	**04/10/08**	**725**	**2000**	**20**	**14**	**8**	**0.9031**	**26**
19-16	**03/12/08**	**1025**	**2200**	**16.1**	**10**	**4**	**0.6021**	**26**
19-16	**02/13/08**	**820**	**2000**	**16.5**	**18**	**6**	**0.7781**	**30**
19-16	**01/16/08**	**748**	**2000**	**11.6**	**6.6**	**5**	**0.6989**	**30**
19-16	12/17/07	902	2100	14.0	3.0	23	-1.0455	32
19-16	10/31/07	1202	2200	20.5	21.5	8	0.9031	32
19-16	09/09/07	641	2300	29.5	23.5	1.9	0.2788	30
19-16	08/01/07	837	2300	30.0	29.0	5	0.6990	28
19-16	07/17/07	841	2200	31.0	28.5	4	0.6021	30
19-16	06/04/07	755	2200	25.0	25.0	11	1.0414	32
19-16	05/16/07	840	2300	24.0	24.0	1.9	0.2788	34
19-16	04/10/07	956	2100	18.5	18.5	2	0.3010	30
19-16	03/26/07	857	4300	21.5	19.0	2	0.3010	28
19-16	02/06/07	814	2200	9.0	3.0	1.9	0.2788	30
19-16	01/03/07	729	4300	14.5	16.0	1.9	0.2788	30
19-16	12/19/06	718	4000	15.0	14.0	5	0.6990	32
19-16	11/27/06	815	2100	15.0	17.5	2	0.3010	32
19-16	10/23/06	923	2300	22.0	12.0	8	0.9031	32
19-16	09/27/06	821	2100	27.5	25.0	2	0.3010	32
19-16	08/03/06	809	2000	32.0	28.5	2	0.3010	30
19-16	07/19/06	623	4200	31.5	29.0	2	0.3010	30
19-16	06/05/06	851	4300	29.0	21.5	14	1.1461	30
19-16	05/15/06	908	2300	21.0	23.0	17	1.2304	30
19-16	04/04/06	835	2000	20.0	17.5	17	1.2304	26
19-16	03/08/06	827	4300	15.0	12.5	5	0.6990	24
19-16	02/22/06	834	4300	14.0	15.5	17	1.2304	22
19-16	01/24/06	920	4300	15.0	17.0	110	2.0414	26

Station:	**19-16**
Samples:	35
Geomean:	5.45486739
Log Avg:	0.66154856
LogSD:	0.51578002
Est 90th:	**20**

Tide

(2000) Ebb	(4000) Flood
(2100) 1/4 Flood	(4100) 1/4 Ebb
(2200) 1/2 Flood	(4200) 1/2 Ebb
(2300) 3/4 Flood	(4300) 3/4 Ebb

Appendix B

Estimated Waste (Fecal Coliform) Loading into May River from Various Sources and Predicted Removal Efficiencies

Staff estimates a total loading of fecal coliform into the headwaters of the May River of 1,195,400 lbs or approximately 1,200,000 lbs per year. Removal rate efficiencies of BMPs will reduce loading by 299,900 lbs/year. The Town is estimating fecal loading into the headwaters will be reduced by approximately 300,000 lbs/year by one year after the end of the project.

A reduction rate of 20-25% for most sources has been assumed necessary as the fecal coliform numbers at DHEC Shellfish Station 19-19 have not exhibited a large spiked increase, but a more gradual one over the last several years. Thus, a slight reduction in loading should bring the station into compliance.

Additionally, Staff estimates that 25% of most sources of waste will make its way into the river based upon the fact that SC Stormwater Management and Sediment Reduction Regulations Appendix A (1976) states that "removal efficiency of 80% for suspended solids" is required with Best Management Practices (BMPs) in place. Thus, 20% of sediment from construction sites will enter a receiving waterbody. If this is the case with BMPs in place for sediment transport, then staff assumes that there will be a slight increase in cases where there are no BMPs to prevent fecal transport resulting in 25% of fecal load entering the waterbody.

1. <u>Horses</u>- (700,000 lbs/yr entering May River; 175,000 lbs/yr removed)

The DEP estimates that there are 150 horses located within the headwaters of the May River. To estimate the loading of waste from horses, the following assumptions were made:

a) Staff estimates 150 horses in the May River watershed. Estimate of 30 horses in Rose Dhu, 20 horses estimated using trails in Palmetto Bluff, 25 horses estimated in Midway Farms, 10 horses estimated on Gibbet Road, and 15 horses estimated at one farm on Palmetto Bluff Road. Thus, we're estimating 100 horses at locations that we know about and another 50% at locations that we have not visited within May River watershed. Therefore, we feel comfortable with 150 horses being a good overall estimate. However, accurate final numbers may be as low as 100 horses.
b) One 1,000 lb horse produces 50 lbs of manure per day (Iowa State University, 1993) x 365 days = 18,250 lbs/horse/year.
c) 18,250 lbs/horse x 150 horses x 25% entering the river = 684,375 lbs or roughly 700,000 lbs of horse waste entering the May River.

Proposed BMPs such as revised manure management plans, buffer gardens and social marketing for horse areas will remove 25% of the waste entering the headwaters of the May River. 700,000 lbs/yr X 25% = **175,000 lbs**/yr removed.

2. <u>Pet Waste</u>- (290,000 lbs/yr entering May River; 100,000 lbs/yr removed)

a) The average dog produces approximately 1 lb of waste/day (Tyler, 2008).
b) Using GIS, staff hand counted 5,000 houses within May River headwaters.
c) The American Veterinarian Association (2007) reports a formula for estimating the number of dogs in a community as "Number of dogs = 0.632 x total number of households in your community."
d) 5,000 houses x 0.632 dogs/house = 3,160 dogs in May River headwaters or approximately 3,200 dogs.
e) Staff estimates that 25% of dog waste will make its way into the May River due to owners who do not pick up after their pets, but allowing for the attenuation of some of the material on land.
f) 3,200 dogs x 1 lb of waste/dog/day x 365 days x 25% entering May River = 292,000 lbs or **290,000 lbs**/year of pet waste entering the May River.

Buffer rain gardens, pet septic systems, rain barrels, disconnected drainage and social marketing will remove 20% of the waste entering the May River from pets. This is primarily from the reduction of volume which reduces sheet flow transport of waste. These BMPs will be important in the Stoney Creek Subdrainage Basin as it accounts for nearly 50% of the headwaters area. 290,000 lbs/yr X 20% = **58,000 lbs**/yr reduction for pets.

An ultraviolet (UV) light at a critical outfall will reduce a large amount of the fecal coliform entering the river. These units have reported removal efficiencies approaching 100% (PBS&J, 2006). The Rose Dhu subdrainage basin accounts for 20% of the size of the headwaters. Thus, assuming that nearly 100% of the pet fecal material in this area is removed, this is a 20% reduction of pet fecal loading in the headwaters. Therefore, waste loading from pets will be reduced further from 232,000 lbs/yr to 185,600 lbs/yr or roughly **46,400 lbs**/yr. Thus, the total pet waste reduction is estimated to be approximately **100,000 lbs.**

3. <u>Wildlife</u>- (200,000 lbs/yr entering May River; 20,000 lbs/yr removed)

a) Wildlife living in the May River watershed that produce fecal coliform in their waste include feral hogs, deer, raccoon, squirrels, birds, alligators, dolphin, and others. No known study has been completed on the production of waste by raccoon, squirrels, birds, alligators, or dolphins, which leads the DEP to provide rough estimates for wildlife. We're estimating that feral hogs and deer account for 50% of the waste produced by wildlife and that "others" account for 50%.
b) Miner (1995) states that the average hog produces 13 lbs of waste/day. Staff estimates that there are 50 feral hogs within the May River headwaters. 13 lbs/feral hog/day x 365 days/year x 50 feral hogs x 25% of their waste entering the May River = 59,312 lbs/year or **60,000 lbs** /year.
c) Deer numbers are a little tougher to estimate as they have changed their foraging habits over the last thirty years due to man-made changes. Staff estimates that there are roughly 200 deer within the May River headwaters. The MapTech TMDL for the Bluestone River (EPA Approval 2004) states that deer produce approximately 2 lbs of waste per day (1.7 lbs). 2 lbs/day x 365 days x 200 deer x 25% entering the May River = 36,500 lbs or **35,000 lbs** of deer waste entering the May River each year.
d) The "other" animal fecal coliform loading estimate is the most difficult to identify. Palmetto Bluff was the first to identify that alligators contribute fecal coliform into receiving waterbodies. Previously, scientists limited potential sources to warm-blooded animals. Since nobody has studied the amount of waste produced per day for the above animals, the DEP simply combined loading of feral hogs and deer to address "others". Therefore, "others" contribute **95,000 lbs** of waste into the May River per year.
e) The total amount of wildlife waste entering the May River per year is 190,000 lbs or **200,000 lbs**.

An ultraviolet (UV) light at a critical outfall will reduce a large amount of the fecal coliform entering the river. These units have reported removal efficiencies approaching 100% (PBS&J, 2006). The Rose Dhu subdrainage basin accounts for 20% of the size of the headwaters, thus assuming that nearly 100% of the wildlife fecal material in this area is removed, this is a 20% reduction. Wildlife waste loading from UV lights will be reduced from 200,000 lbs/yr to 180,000 lbs/yr or a reduction of **20,000 lbs**/yr.

4. <u>Human</u>- (5,400 lbs/yr entering May River; 4,900 lbs/yr removed)

a) An aerial thermal imagery flyover over a portion of the May River watershed last year did not show failing septic systems among the 200 systems located adjacent to the river. However, Briggs, et. al. (2008) reported that Florida experienced a septic tank failure rate of 8-11%. For the May River watershed a failure rate of 10% of septic systems is assumed. Therefore, staff estimates that there are 20 failing septic systems along the May River which is likely a high estimate. 20 failing septic systems x 3 people/house x 120 lbs of waste produced/human/year (Porter, 2008) x 75% of it entering the May River (due to the close proximity of these septic systems to the receiving waterbody) = 5,400 lbs of human waste entering the May River per year.

Upgrading failing septic systems can remove 90-100% of human waste loading into the river, combined with social marketing on septic tank maintenance will prevent or reduce the likelihood of future failures. Assuming a 90% removal, this will total 4,860 lbs/yr or approximately **4,900 lbs/yr**.

5. <u>Conclusions</u>-

a) Staff estimates a total loading of fecal coliform into the May River of 1,195,400 lbs or approximately 1,200,000 lbs of waste entering the May River per year.
b) Horses account for 59% of the waste entering the river.
c) Pets account for 24% of the waste.

d) Wildlife is responsible for 17% of the waste
e) Humans are responsible for <1%.
f) This shows that staff needs to concentrate initial efforts on reducing horse manure loading into the May River.

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