CITY OF WILMINGTON, NORTH CAROLINA

STORMWATER MANAGEMENT PLAN

Prepared by:
Stormwater Services
PO Box 1810
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Wilmington, NC 28412

NPDES Permit No.: NCS000406

Reporting Year: March 1, 2008 – February 28, 2009

REPORTING CERTIFICATION

I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

_____ _____

David B. Mayes, P.E. Date
Manager, Stormwater Services

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INTRODUCTION

STORMWATER MANAGEMENT PLAN OVERVIEW

The North Carolina Division of Water Quality issued NPDES Phase II Permit NCS000406 to the City of Wilmington effective March 1, 2007. The Stormwater Management Plan is the City of Wilmington's program to comply with NPDES Phase II permit NCS000406 for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The plan defines strategies and guidelines necessary for protecting water quality and reducing pollutant discharges to the maximum extent practicable. The plan also includes reporting results for the current yearly reporting period from March 1, 2008 to February 28, 2009.

The plan is a guidance document to be used by the City staff and the general public. The plan is evolving and will address needs and priorities that will be reflected in compliance programs and revised ordinances over the 5 year implementation schedule.

As required by EPA regulations for the NPDES Phase II stormwater programs, the following six minimum measures are addressed in the plan:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention and Good Housekeeping for Municipal Operations

STATUS OF IMPLEMENTATION

The City of Wilmington is pleased to report excellent progress for year 2 compliance with requirements of NPDES Phase II permit NCS000406. Primary areas of work include:

- Preparation for ordinance revisions related to Post Construction and Illicit Discharge BMPs
- Continuation of Public Outreach and Public Participation efforts

Wilmington has been preparing for these requirements since 1998 when City Council approved the formation of a stormwater utility. We have had a public outreach and participation program since then. We have also contracted with UNCW Center for Marine Science for ambient monitoring of water quality on creeks within the City. Therefore, we were already well underway prior to NCDWQ issuing Wilmington's permit.

CHANGES/JUSTIFICATION

1) Proposed Change to Section F: Post-Construction Site Runoff Controls

Current Requirement –

BMP (a) Establish a Post Construction Stormwater Management Program.

Measurable Goal – Develop and adopt by ordinance (or similar regulatory mechanism) a program to address stormwater runoff from new development and redevelopment. Implement and enforce the program within 24 months of the permit issue date.

Change Approved by NCDWQ: Because of NCDWQ communications with the City of Wilmington in March of 2008 regarding pending changes to the State coastal stormwater rules, an extension was granted to allow modification of the post construction ordinance by November of 2009 instead of the previous deadline of March 2009.

CITY OF WILMINGTON STORMWATER SERVICES OVERVIEW

COMPREHENSIVE STORMWATER MANAGEMENT

Comprehensive stormwater management takes into account both the quantity and quality of stormwater runoff and is reflected in five core components of the Wilmington's Stormwater Services program:

MANAGEMENT AND PLANNING

Master planning utilizes the existing stormwater system inventory to develop a long range plan to improve drainage and water quality within an entire watershed. When planning on such a large scale, Stormwater Services seeks involvement and input from citizens and stakeholders. Management activities also include customer service – responding to customer concerns or inquiries and administrative services required for operation of the City stormwater utility.

REGULATORY AND ENFORCEMENT

Future regulatory and enforcement activities include modifying the existing stormwater ordinance requiring comprehensive stormwater management and creating technical standards for design and maintenance of private stormwater facilities. Stormwater Services also provides two semi-annual inspections for privately permitted stormwater retention facilities. These inspections are performed in order to ensure compliance with city maintenance standards. Compliance with NPDES Phase II stormwater regulations also fall into this category.

CAPITAL IMPROVEMENTS

The stormwater utility provides dedicated funding and staff resources for planning, designing, and constructing capital projects. These projects are necessary when the existing storm drainage system is inadequate and can result in flooded streets, houses, and businesses. Capital improvement projects require collaboration among City departments, outside agencies, and citizens in affected areas. Whenever possible, capital projects incorporate innovative design or best management practices (BMPs) to improve water quality and reduce the quantity of stormwater runoff.

OPERATIONS AND MAINTENANCE

The City of Wilmington's Maintenance Division is responsible for maintaining the public drainage system. Maintenance activities consist of open drainage, closed drainage, street sweeping, and best management practices (BMPs). The open drainage system consists of roadside swales, ditches, channels, creeks, and ponds. The closed drainage system consists of pipes, culverts, catch basins, and manholes. Both of these systems are maintained using manual and mechanical techniques to insure that they remain open for proper drainage. Street sweeping provides preventative maintenance to minimize the amount of trash, debris, sediment, and other pollutants entering open or closed drainage

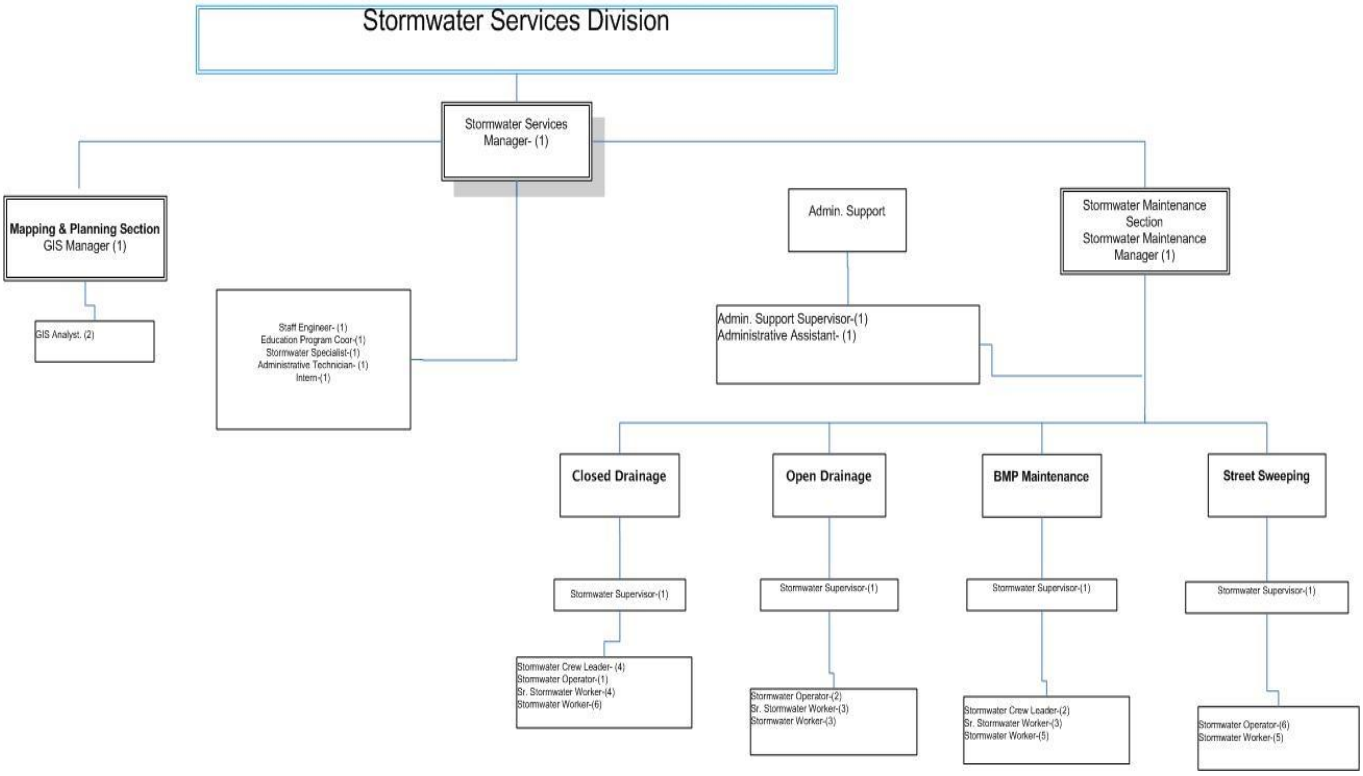
routes. BMP maintenance consists of activities necessary to keep over 40 ponds, wetlands, and bio-retention areas in fully-functioning condition.

WATER QUALITY

Water quality monitoring is executed by the University of North Carolina at Wilmington under annual contract with the City. Monitoring is performed on specific creeks and waterways within the City limits. Monitoring tests for specific pollutants and resulting data is used to plan capital improvement projects, guide outreach and education efforts, assess water quality at the sites monitored, identify persistent pollutant discharge areas or points, help to build a framework for future detection and tracing of pollutant sources and obtain grant funding. In addition, Stormwater Services implements an extensive outreach, education, and public involvement program that serves the citizens of Wilmington and includes a wide array of water quality education programming and materials. These programs include school presentations, homeowner association outreach, stormwater publications and giveaways, mass media advertising, special event exhibits, workshops, volunteer cleanups and storm drain marking, and collaborative efforts such as grant projects. These efforts strive to educate and engage citizens in protecting and improving local water quality through awareness, education, behavior modification and action.

MANAGEMENT AND PLANNING

Organization Chart of the Stormwater Services Division



*Current FY Budget and Next Year's Anticipated Budget**

	FY 08-09 Adopted	FY 09-10 Estimated
REVENUES		
Storm Water Utility Fees	4,954,389	5,003,933
City Streets Storm Water Fees	1,317,285	1,350,217
Storm Water Discharge permits	12,000	10,000
NCDOT Drainage Maintenance	37,000	37,000
Transfer from Payment in Lieu	30,000	30,000
Interest Earnings	114,000	63,460
Miscellaneous	-	-
Appropriated Fund Balance	14,966	55,931
TOTAL REVENUES	6,479,640	6,550,541
EXPENDITURES		
Public Services	4,287,367	4,317,322
Nondepartmental	788,263	628,325
Debt Service	1,184,010	1,184,894
Contingency	20,000	20,000
Transfer to Capital Project Fund	200,000	400,000
TOTAL EXPENDITURES	6,479,640	6,550,541

Note: Estimated Budget for FY 2009-10 has not yet been presented to City Council for approval and is provided in this report in draft form.

*Source: HTE System Application

REGULATORY AND ENFORCEMENT

Public Services Code Enforcement

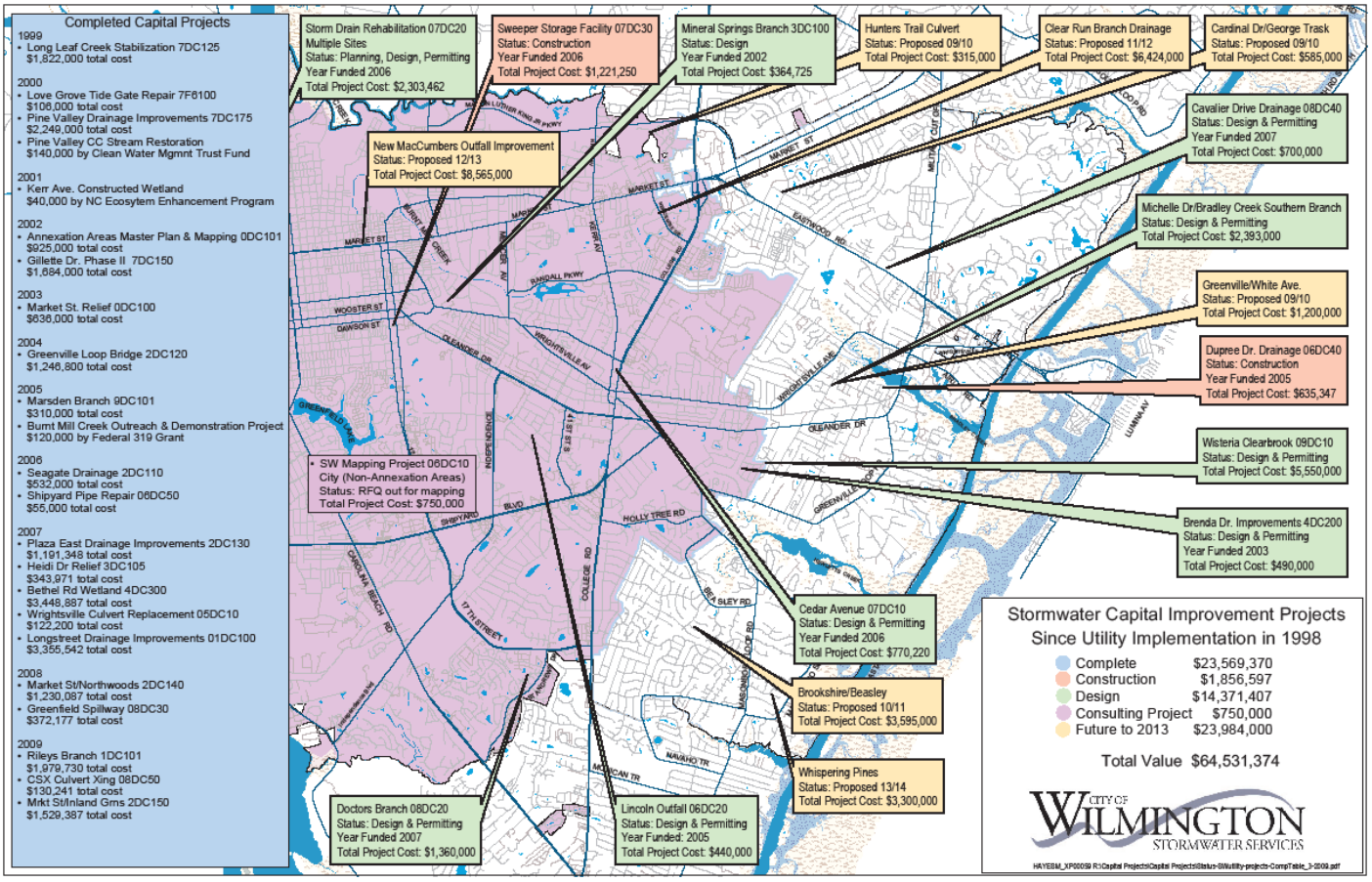
The Public Services Department has enforcement authority and issues Notices of Violation for noncompliance. The City's new stormwater ordinance required by this permit is being drafted at this time and will be in affect November 2009. All complaints received by the department from the public or from city staff are documented, investigated, and corrective action can be required. Violations of the current ordinances such as those regulating willful disposal of yard waste in the stormwater system and accumulation of litter can result in enforcement action. Any complaints received falling outside the City's regulatory authority is referred to DENR DWQ Wilmington Regional Office. Consequently all complaints provide the opportunity to educate the public on the issues which threaten stormwater, the best management practices for prevention, the awareness of our city's stormwater program, and the new ordinances that will soon come into effect.

Cape Fear Public Utility Authority

The Cape Fear Public Utility Authority currently employs 6 Environmental Compliance Officers that's duty it is to implement and enforce elements of the City's NPDES Wastewater Discharge Permit, the City's Collection System Permit. As part of those requirements the group regulates sanitary sewer overflows (SSOs) and eliminates any wastewater or other polluted waters from leaving their system. They respond to reports and investigate leads generated by the public or monitoring results as part of their permit requirement and respond using public education, enforcement and maintenance. The CFPUA copies the City on all SSOs and follows up with monitoring results and clean up measures. The CFPUA has maintained right of entry on the properties that it services.

CAPITAL IMPROVEMENT PROJECTS

Capital Projects Summary Map



In- House Projects

Location	Description		Total
2100 Blk. S. 17th St.	Install new pipe	202' pipe	$ 17,806.69
58th & Verbenia Dr.	Install new pipe & structure	895' pipe, (4) basins, (2) manholes	$ 103,488.70
Coleman Complex	Install new pipe & structure	108' pipe, (1) basin, (1) outlet box	$ 13,631.54
4700 Blk. College Acres Dr.	Install new structure	(1) basin	$ 2,002.17
600 Blk. Dogwood	Install new pipe	24' pipe	$ 1,378.42
Greenfield Lake	Build new structure	80' pipe, (1) basin	$ 3,906.60
900 Blk. Greenhowe Dr.	Install new pipe & structure	60' pipe, (1) basin	$ 3,586.25
300 Blk. Lance Dr.	Install new pipe	32' pipe	$ 1,645.91
900 Blk. Market St.	Build new structure	(1) basin	$ 5,439.66
1000 Blk. Princess St.	Install new basin	(1) basin	$ 6,115.03
800 Blk. Shinn Point Rd.	Install new pipe	8' pipe	$ 5,536.25
100 Blk. Skystsail Dr.	Install new pipe & structure	41' pipe, (1) basin	$ 7,005.27
Suncourt Villas	Install new subdrain & structures	128' pipe, (1) basin	$ 23,562.66
6300 Towles Rd.	Install new pipe	32' pipe	$ 3,865.82
4800 Blk. Wrightsville Ave.	Build new structure	(1) basin	$ 3,196.34
100 Blk. Westwood Rd.	Install new pipe	32' pipe	$ 1,264.76
300 Blk. Yorkshire		(1) basin	$ 1,680.82
			$209,112.89

OPERATIONS AND MAINTENANCE

Yearly Maintenance Activities Chart

Activity	***Amount***	***UOM***	***Labor Hrs.***	***Total Cost***
INSPECTION				
Inspect culverts	728	Each	1951.49	$ 2,929.32
Inspect curb lines	n/a	Miles	1480.00	$ 43,281.24
Inspect outfalls	44	Each	393.25	$ 9,347.32
Inspect pipe lines	24345	Ft.	708.50	$ 15,440.08
Inspect ponds	148	Each	188.25	$ 4,075.68
Inspect structures	16887	Each	2161.25	$ 57,705.86
Inspect tidegate	n/a		93.50	$ 3,039.76
			6976.24	**$135,819.26**
MAINTENANCE				
Clean culverts	727	Each	484.00	$ 12,547.08
Clean ditch (manual)	199770	Ft.	4555.75	$ 98,831.13
Clean ditch (mechanical)	15379	Ft.	2450.75	$ 87,909.89
Clean structures	10847	Each	3410.75	$103,785.03
Clean lines	150194	Ft.	3167.50	$112,714.55
Haul waste material	388	Load	489.00	$ 18,550.31
Mow ditch/slope	360352	Ft.	1689.25	$ 53,357.93
Mechanical rodder	1058	Ft.	81.50	$ 1,744.74
Tidegate maintenance	n/a		33.00	$ 725.03
			16361.50	**$490,165.69**
BMP				
Apply Chemicals	n/a		216.50	$ 10,738.26
Greenfield Lake maintenance	n/a		270.00	$ 8,391.23
Mow pond	182	Each	855.50	$ 18,833.08
Pond maintenance	53	Each	741.75	$ 15,409.56
Randall Pond maintenance	1	Each	32.00	$ 800.28
			2115.75	**$ 54,172.41**
SWEEPING				
Sweep streets	7896.17	Miles	5283.00	$236,630.26
Hand sweeping	3.67	Miles	369.25	$ 10,375.87
Haul sweepings	388.25	Load	545.00	$ 15,771.01
			6197.25	**$262,777.14**
REPAIR				
Cave-ins	159	Each	4707.50	$141,768.24
Stabilize banks	1219	Ft.	332.00	$ 11,909.26
Washouts	39	Each	353.00	$ 11,305.78
			5392.50	**$164,983.28**

WATER QUALITY

Monitoring Program Overview

In October 1997, the City of Wilmington contracted with the UNCW Center for Marine Science for a project with the goal of assessing water quality in Wilmington City watersheds under base flow conditions. Also, certain sites were analyzed for sediment heavy metals concentrations (EPA Priority Pollutants). New Hanover County also participated in this effort for tidal creeks outside of City jurisdiction. UNCW produced a combined report of results entitled Environmental Quality of Wilmington and New Hanover County Watersheds. Immediately below is an overview of their work methods. Following this overview is the executive summary of their most recent report.

The water quality data in these reports are presented from a watershed perspective. Some of the watersheds cross political boundaries (i.e. parts of the same watershed may lie in the County but not the City). Howe and Whiskey Creeks are examples. Water quality parameters analyzed in the tidal creeks include water temperature, pH, dissolved oxygen, salinity/conductivity, turbidity, nitrate, ammonium, orthophosphate, chlorophyll *a*, and in selected creeks fecal coliform bacteria. Similar analyses were carried out in the City watersheds with the addition of total Kjeldahl nitrogen (TKN), total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) and biochemical oxygen demand (BOD) at selected sites.

Water Quality Methods

Field parameters were measured at each site using a YSI 6920 Multiparameter Water Quality Probe (sonde) linked to a YSI 650 MDS display unit. Individual probes within the instruments measured water temperature, pH, dissolved oxygen, turbidity, salinity, and conductivity. YSI Model 85 and 55 dissolved oxygen meters were also used on occasion. The instruments were calibrated prior to each sampling trip to ensure accurate measurements. The UNCW Aquatic Ecology laboratory is State-Certified for field measurements (temperature, conductivity, dissolved oxygen and pH) and for laboratory chlorophyll *a* measurements.

The analytical method used to measure chlorophyll *a* is described in Welschmeyer (1994) and US EPA (1997). Chlorophyll *a* concentrations were determined from the 1.0 micrometer glass fiber filters used for filtering samples for nitrate+nitrite and orthophosphate analyses. All filters were wrapped individually in aluminum foil, placed in an airtight container and stored in a freezer. During the analytical process, the glass filters were separately immersed in 10 ml of a 90% acetone solution. The acetone was allowed to extract the chlorophyll from the material for 18-24 hours. The solution containing the extracted chlorophyll was then analyzed for chlorophyll *a* concentration using a Turner AU-10 fluorometer. This method uses an optimal combination of excitation and emission bandwidths that reduces errors in the acidification technique.

Nutrients (nitrate, ammonium, total Kjeldahl nitrogen, total nitrogen, orthophosphate, and total phosphorus) and total suspended solids (TSS) were analyzed by a state-certified contract laboratory using EPA and APHA techniques. We also computed inorganic nitrogen to

phosphorus molar ratios for relevant sites (N/P). Fecal coliform concentrations were determined using a membrane filtration (mFC) method (APHA 1995).

For a large wet detention pond (Ann McCrary Pond on Burnt Mill Creek) and for a constructed wetland on Kerr Avenue (at the headwaters area of Burnt Mill Creek) UNCW collected data from input (control) and outfall stations. This data was used to test for statistically significant differences in pollutant concentrations between pond input and output stations. The data were first tested for normality using the Shapiro-Wilk test. Normally distributed data parameters were tested using the paired-difference t-test, and non-normally distributed data parameters were tested using the Wilcoxon Signed Rank test. Statistical analyses were conducted using SAS (Schlotzhauer and Littell 1987).

Wilmington Watersheds Yearly Monitoring Report

(The following is the Executive Summary from Environmental Quality of Wilmington and New Hanover County Watersheds 2005-2006)

ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2008

by

Michael A. Mallin, Matthew R. McIver, Mary I.H. Spivey, Bongkeun Song

CMS Report 09-03
Center for Marine Science
University of North Carolina Wilmington
Wilmington, N.C. 28409
www.uncw.edu/cmsr/aquaticecology/tidalcreeks

February 2009

Funded by:
The City of Wilmington and the US EPA 319 Program (through NC Division of Water quality and North Carolina State University), and the Newland Corporation

Executive Summary

This report represents combined results of Year 10 of the Wilmington Watersheds Project. Water quality data are presented from a watershed perspective, regardless of political boundaries. The program involved 9 watersheds and 28 sampling stations. In this summary we first present brief water quality overviews for each watershed from data collected between January and December 2008.

Barnards Creek – Barnards Creek drains into the Cape Fear River Estuary. It drains a 2,944 acre watershed that consists of about 17% impervious surface coverage, and a population of 12,547. There was one station sampled in this watershed during 2008, lower Barnard's Creek at River Road. Based on limited data (three samplings) this site was sampled only in cool weather, November-December and there were no algal bloom or turbidity problems, and dissolved oxygen was above standard on all three occasions. However, fecal coliform bacteria exceeded the NC standard of 200 CFU / 100 mL on all three trips, and the geometric mean of the counts was 476 (Table 3.1).

Bradley Creek – Bradley Creek drains the largest tidal creek watershed in the area (6,016 acres), including much of the UNCW campus, into the Atlantic Intracoastal Waterway (ICW). The

watershed contains about 23% impervious surface coverage. Four sites were sampled, all from shore. In 2008 there were no problems with turbidity exceeding the state standard, but total suspended solids (TSS) were high at BC-NB and BC-SB in September (25-33 mg/L). Station BC-SB had three significant algal blooms (34-40 µg-chlorophyll a/L) in May, July and September, and averaged nearly 24 µg/L as chlorophyll a. Average dissolved oxygen was good to fair at three sites, but poor at BC-76, the marina. The three upper sites sampled were rated poor for fecal coliform bacteria, with BC-SB having especially high counts; the downstream location BC-76 was rated fair. We note that construction activity has been ongoing upstream of BC-NB.

Burnt Mill Creek – Burnt Mill Creek drains a 4,288 acre watershed which is extensively urbanized (36% impervious surface coverage) into Smith Creek. Six locations were sampled from 2005-2008. This creek has very poor water quality, with large algal blooms characterizing the lower creek, substandard dissolved oxygen at several sites, and major issues with high fecal coliform counts, with all six sites exceeding the human contact standard > 25% of occasions sampled. These levels of pollution have characterized the system for the past several years. Restoration efforts are continuing in a joint effort by the City, NCSU, and UNCW funded through the US EPA. Sediment metals concentrations were mostly below harmful levels except for lead at the Princess Place and Wallace Park sites. However, sediment polychlorinated aromatic hydrocarbon (PAH) concentrations have regularly exceeded levels known as harmful to aquatic biota at five of the six sampling sites. *Within this report we provide a summary of Burnt Mill Creek water quality for the four-year period 2004-2008.*

The effectiveness of Ann McCrary wet detention pond and the Kerr Avenue wetland as pollution control devices was decidedly mixed over the past several years. Comparing inflows to outflows, the Kerr Avenue wetland showed statistically significant decreases in nitrate, ammonium and chlorophyll *a* over the four year period, with no significant increases in other parameters. Further downstream, in creek water passing through Ann McCrary Pond there were significant decreases in conductivity and fecal coliform bacteria, and a significant increase in dissolved oxygen. However, there was a significant increase in nitrate and chlorophyll *a*. Several water quality parameters showed a worsening in pollutant levels along the creek from where it exited the detention pond to the downstream Wallace Park and Princess Place sampling stations, including dissolved oxygen, fecal coliform bacteria, nitrogen and phosphorus.

Futch Creek – Futch Creek is situated on the New Hanover-Pender County line and drains a 3,106 acre watershed into the ICW. UNC Wilmington was not funded to regularly sample this creek in 2008. The County employed a consulting firm to sample this creek and data are available on the County website.

Greenfield Lake – This lake drains a watershed of 2,560 acres, covered by about 36% impervious surface area. This urban lake was sampled for physical parameters at three tributary sites and for all parameters at three in-lake sites. The three tributaries of Greenfield Lake (near Lake Branch Drive, Jumping Run Branch, and Lakeshore Commons Apartments) all suffered from severe low dissolved oxygen problems, particularly the Lake Branch station GL-LB.

Algal blooms are periodically problematic in Greenfield Lake, and have occurred during all seasons, but are primarily a problem in spring and summer. In 2008 algal blooms exceeding the

North Carolina water quality standard occurred on two of six sampling occasions at Stations GL-2340 and GL-YD, and three of six occasions at GL-P (at the park). This represents a general increase form 2007 (which was a drought year and likely had less stormwater runoff and lower nutrient inputs as a result of the drought). Low dissolved oxygen was found only at the uppermost lake station GL-2340. High biochemical oxygen demand (BOD5 > 3.0 mg/l) continues to occur at the in-lake stations, and is in part a result of the algal blooms. High fecal coliform counts continue to impact the lake, particularly Station GL-2340.

From 2005 to 2008 several steps were taken by the City of Wilmington to restore viability to the lake. Sterile grass carp were introduced to the lake to control (by grazing) the overabundant aquatic macrophytes and four SolarBee water circulation systems were installed in the lake to improve circulation and force dissolved oxygen from the surface downward toward the bottom. Also, on several occasions a contract firm and City staff applied herbicides to further reduce the amount of aquatic macrophytes. These actions led to a major reduction in aquatic macrophytes lake wide. In 2008 there was good dissolved oxygen at two of the stations (especially nearest the SolarBees), but low dissolved oxygen concentrations were common at GL-2340, in the upper lake. In 2007 and 2008 there was a statistically significant relationship within the lake between chlorophyll *a* and BOD5, meaning that the algal blooms are likely an important cause of low dissolved oxygen in this lake. Thus, a challenge for Greenfield Lake is to continue to reduce the frequency and magnitude of the algal blooms, which will lead to continuing dissolved oxygen improvements.

Hewletts Creek – Hewletts Creek drains a large (5,952 acre) watershed into the Intracoastal Waterway. This watershed has about 19% impervious surface coverage. In recent years this system has been plagued by a number of sewage spills. In 2008 the creek was sampled at four tidal sites and one non-tidal freshwater site. There were several incidents of low dissolved oxygen seen in our sampling in July and September; two each at NB-GLR (the north branch at Greenville Loop Rd.), SB-PGR (the south branch at Pine Grove Rd.), HC-3 (in the upper main creek), and PVGC-9 (drainage from Pine Valley Golf Course); although none were severe (below 3.3 mg/L). No major algal blooms were seen at these stations in 2008.

Fecal coliform bacterial pollution continued to impact Hewletts Creek in 2008, with all stations with the exception of HC-3 exceeding the North Carolina standard of 200 CFU/100 mL 50% of the time or more.

Howe Creek – Howe Creek drains a 3,264 acre watershed into the ICW. This watershed hosts a population of 4,224 with about 19% impervious surface coverage. Three stations were sampled in Howe Creek in 2008. Two major algal blooms were seen at the uppermost station HW-DT in May and July, and a minor bloom occurred at HW-GP in July. The uppermost station sampled was rated poor for fecal coliform bacteria, while HW-GP and HW-FP were fair and good, respectively. Dissolved oxygen concentrations were good to fair in Howe Creek in 2008. Since wetland enhancement was performed in 1998 above Graham Pond the creek below the pond at Station HW-GP has had fewer and smaller algal blooms than before the enhancement.

Motts Creek – Motts Creek drains into the Cape Fear River Estuary. This creek was sampled three times at one station at River Road, only in November and December following an influx of funding from the private sector. Dissolved oxygen concentrations were below the state standard

of 5.0 mg/L on one of the three sampling occasions in 2008. Neither turbidity nor suspended solids were problematic in 2008, and there were no algal blooms encountered in the limited sampling. However, fecal coliform bacteria contamination was a problem in Motts Creek, with the State standard of 200 CFU/100 mL exceeded on two of three occasions. Thus, in November and December of 2008 this creek showed mixed water quality, with no algal bloom or turbidity problems, but minor dissolved oxygen issues and major fecal coliform problems.

Pages Creek – Pages Creek drains a 3,039 acre watershed into the ICW. UNC Wilmington was not funded to regularly sample this creek in 2008. The County employed a consulting firm to sample this creek and data are available on the County website.

Smith Creek – Smith Creek drains into the lower Northeast Cape Fear River just upstream of where it merges with the Cape Fear River. It has a watershed of 2,880 acres that has about 28% impervious surface coverage, with a population of about 26,000. One estuarine site on Smith Creek proper, SC-CH, was sampled by UNCW under the auspices of the Lower Cape Fear River Program (LCFRP) 2008. Overall the water quality can be described as poor due to low dissolved oxygen concentrations and high turbidity, although fecal coliform concentrations were not a problem in 2008.

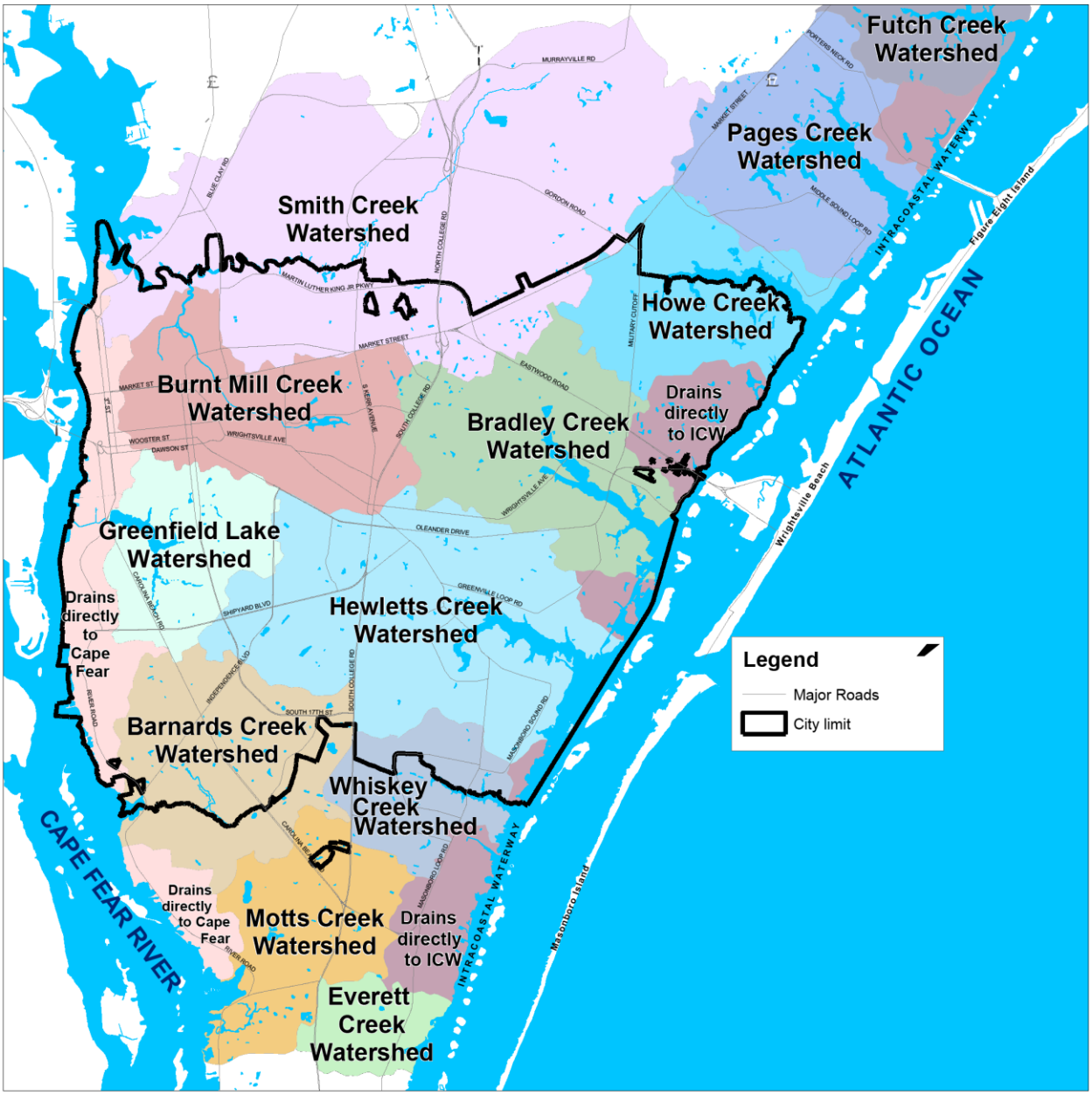
Whiskey Creek – Whiskey Creek is the southernmost large tidal creek in New Hanover County that drains into the ICW. It has a watershed of 1,344 acres, a population of about 7,100, and is covered by approximately 17% impervious surface area. One station, on Masonboro Loop Road, was sampled from shore along this creek in 2008. This site had low to moderate nutrient concentrations and one minor algal bloom. Dissolved oxygen was substandard (3.2-3.4 mg/L) in July and September. Fecal coliform bacteria counts were generally good at this site in 2008.

Water Quality Station Ratings – The UNC Wilmington Aquatic Ecology Laboratory utilizes a quantitative system with four parameters (dissolved oxygen, chlorophyll *a*, turbidity, and fecal coliform bacteria) to rate water quality at our sampling sites. If a site exceeds the North Carolina water quality standard for a parameter less that 10% of the time sampled, it is rated Good; if it exceeds the standard 10-25% of the time it is rated Fair, and if it exceeds the standard > 25% of the time it is rated Poor for that parameter. We applied these numerical standards to the water bodies described in this report, based on 2008 data, and have designated each station as good, fair, and poor accordingly (Appendix B).

Fecal coliform bacterial conditions for the entire Wilmington City and New Hanover County Watersheds system (25 sites sampled for fecal coliforms) showed 16% to be in good condition, 8% in fair condition, but **76%** in poor condition. Dissolved oxygen conditions system-wide (28 sites) showed 25% of the sites were in good condition, 29% were in fair condition, and 46% were in poor condition. For chlorophyll *a*, 61% of the stations were rated as good, 13% as fair and 26% as poor. In terms of turbidity 93% of the sites were rated as good, 4% as fair and 4% as poor. It is important to note that the four water bodies with the worst water quality in the system also have the most developed watersheds with the highest impervious surface coverage (Burnt Mill Creek – 36% impervious coverage; Greenfield Lake – 36% impervious coverage; Smith Creek – 28% impervious coverage; Bradley Creek 23%).

Clearly, the number one pollutant impacting the tidal creeks and other waterways of New Hanover County is fecal bacteria, which has lead to posted warnings for human contact and extensive closures of shellfish beds to harvest. In order to take appropriate remedial action it is important to determine the sources of the fecal contamination; i.e. human, avian, canine, etc. The standard method for fecal coliform pollution measurement enumerates, but does not distinguish between sources. Between December 2005 and June 2007 we conducted a study to determine sources of fecal bacteria in Futch, Pages, Howe, Bradley, Hewletts and Whiskey Creeks. We used standard methods for fecal coliform bacteria enumeration as well as the molecular methods of polymerase chain reaction (PCR) and terminal restriction fragment length polymorphism (T-RFLP) for bacterial source tracking using the genera *Bacteroides* as a target. As such we were able to identify areas with high levels of fecal coliform bacteria pollution as well as distinguish between human, canine and ruminant sources. Of the 54 samples collected during this project, about 23% were positive for canine fecal contamination by PCR; these canine-positive samples were mostly associated with rainfall and would thus be brought to the creek during stormwater runoff. Ruminant sources were found in 12 of the 54 PCR samples (22%) collected during this study, mainly in the upstream sampling areas (deer are likely an important source) and also near a known horse farm. Human fecal contamination was found in 18% of the PCR samples, indicating human waste treatment and conveyance problems. The second molecular process, T-RFLP, produced 40 peaks, each corresponding to a bacterial taxon. Using a Web-available phylogenetic assessment tool, it was possible to identify 13 of the 40 peaks, 11 of which were human-specific. The presence of human-specific fecal contamination is of particular concern, because New Hanover County has been plagued with sewer-system failures. Human fecal contamination in these tidal creeks is indicative of either continued sewer-line problems, septic system failures, or a general persistence in the bacteria itself in sediments from earlier pollution episodes.

Wilmington Watersheds Map



NPDES STORWMATER PERMIT BMPs & 08/09 REPORTING

2008-2009 PROGRAM HIGHLIGHTS

Public Education & Outreach

- Merged the Stormwater Watch Newsletter into the Citywide Public Information Report which has a distribution of approximately 44,000.
- 65 school presentations were conducted in 8th grade science classes for approximately 2,000 students.

Public Involvement & Participation

- 6 watershed clean-up events were held utilizing volunteers from the community.
- 3 public meetings were held in tidal creek watersheds to educate citizens about water quality issues and to gather citizen feedback.

Illicit Discharge Detection and Elimination

- Continued activity by Stormwater Ordinance Team comprised of City staff to help modify existing City stormwater ordinance with respect to NPDES Phase II requirements.
- Established lines of communication with the newly formed Cape Fear Public Utilities Authority regarding sanitary sewer overflows to the City's stormwater system.

Post Construction Site Runoff Control

- Conducted bi-annual inspections on privately owned BMPs located within the City limits in order to ensure that maintenance requirements were being met by property owners. In June 2008, 277 sites were inspected with 34 requiring corrective action. In Dec./Jan. 2008/09, 293 sites were inspected with 64 requiring corrective action.
- Updated field reporting form to help streamline inspections and subsequent correspondence to property owners.

Pollution Prevention and Good Housekeeping

- Began developing Standard Operations Procedures for City Stormwater Maintenance Operations
- Conducted inspections for municipal operations in order to ensure good housekeeping procedures.
- Finalized SPCC plans for Police Headquarters and Operations Complex

Other

- Complete mapping pilot project in preparation for full system inventory and update initiative.
- Updated locations for outfall point location in GIS based on overland flow patterns and best available current inventory mapping.

- Produced a voice narrated slide show about the endangered Shortnose Sturgeon.

PUBLIC EDUCATION AND OUTREACH

1. Objectives for Public Education and Outreach

(a) Distribute educational materials to the community.
(b) Conduct public outreach activities.
(c) Raise public awareness on the causes and impacts of stormwater pollution.
(d) Inform the public on steps they can take to reduce or prevent stormwater pollution.

2. BMPs for Public Education and Outreach

The permittee shall implement the following BMPs to meet the objectives of the Public Education and Outreach Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Identify target pollutants and target pollutant sources	Identify the target pollutant and target pollutant sources the permittee's public education program is designed to address and why they are an issue.	X				

08-09 Accomplishments

This BMP was accomplished in Year 1, however it was refined this year and sources of data were briefly cited. In planning for adoption of the City's new pet waste ordinance, we have been utilizing the target pollutant summary as a guide for developing education efforts and strategies that will be implemented once the ordinance is adopted.

This BMP will continue to be updated as the target audience for each pollutant evolves and changes. This comprehensive summary of target pollutants, sources, and target audience is included in the Public Education & Outreach Appendix of each annual report. The summary identifies the non- point source pollutants that our public education program addresses, an explanation of why these particular pollutants were chosen, the target audience(s) for each pollutant, and suggested strategies for educating the public about each pollutant.

09-10 Proposed Objectives

The target pollutant summary will continue to guide education and outreach efforts. The document will be modified and updated as audience demographics and other variables change over time.

(b) Identify target audiences	Identify the target audiences likely to have significant storm water impacts and why they were selected.	X				

08-09 Accomplishments
This BMP was completed in Year 1. (see explanation above). This comprehensive summary of target pollutants, sources, and target audience is included in the Public Education & Outreach Appendix of each annual report.

09-10 Proposed Objectives
Modify audiences as this variable changes over time.

(c) Informational Web Site	Promote and maintain internet web site. Examples include, but are not limited to: Post newsletter articles on stormwater, information on water quality, stormwater projects and activities, and ways to contact stormwater management program staff.	X				

08-09 Accomplishments
Stormwater Services continues to maintain and update a high quality educational stormwater website. http://www.wilmingtonnc.gov/publicservices/stormwater

The website features general stormwater education info, news and events, capital projects, stormwater brochures & newsletters, Wilmington watersheds map, maintenance information, best management practices (BMPs), school programs, storm drain marking information, UNCW monitoring data, and more. There is also a link to stormwater videos including documentaries, public service announcements, and slide shows. In addition, our website address is included on all educational stormwater literature and materials to drive traffic to the website.

The News & Events webpage was updated continuously to keep citizens informed about stormwater related programs and events.

This year, Stormwater staff has been on a committee to revamp the City's website. Stormwater content will be expanded and more user accessible as part of the new format. The new website should go live in mid 2009.

09-10 Proposed Objectives
Rework stormwater content for the launch of the new City website. Give the public the opportunity to interact through such avenues as online contests, surveys, feedback or reporting forms.

Continue to add pertinent information to the News and Events section on a regular basis and upload new and revised stormwater content including brochures, newsletters, videos, and photos.

(d) Develop and distribute public education materials to identified user groups. For example, schools,	Develop general stormwater educational material to appropriate target groups as likely to have a significant stormwater impact. Instead of developing its own materials, the permittee may rely on state-		X			

homeowners, and/or businesses.	supplied Public Education and Outreach materials, as available, when implementing its own program.					

08-09 Accomplishments

Stormwater Services continues to revise and develop stormwater educational resources including brochures, newsletters, bookmarks, door hangers, BMP citizen's guides, and educational giveaways. Materials are distributed to the public in a variety of ways including targeted mailings, special events, public meetings, school presentations, and community/HOA presentations. In addition, our education department is often contacted by other municipalities who want to "borrow" our literature for use in their stormwater program.

The current offering of stormwater brochures and publications include:

- Stormwater Tips for Homeowners
- Structural BMPs for Homeowners
- Stormwater Tips for Businesses
- Stormwater Top 10 List
- What is a Watershed?
- What Puts the Green in Greenfield Lake?
- Pet Waste
- Car Care
- Lawn Care & Landscaping BMPs
- Yard Waste Disposal
- Household Hazardous Waste
- Think Before you Put it in the Sink or Trash
- Illicit Discharge
- The Shortnose Sturgeon: An Endangered Species of the Cape Fear River
- Lower Cape Fear Stewardship Program
- Stormwater Services General Brochure
- Clean Waterways bookmarks, post-its, water bottles, pens, and magnets, etc.

This year, pet waste, yard waste, and lawn care materials were distributed to persons in violation of City ordinances via the code enforcement officer or were mailed to specific target audiences in response to problem areas and complaints. Public education materials were also distributed at community meetings, the Earth Day Festival, the New Hanover County Library, and by citizen request. Information about enforcement is listed in the Appendix.

09-10 Proposed Objectives

The Homeowner brochure and Structural BMP brochure will be revised, reprinted, distributed at events, and posted on the website.

Continue to send targeted mailings in response to neighborhood complaints and citizen requests for high priority pollutants- pet waste, yard waste, and lawn care.

This year, we will be launching a more intensive pet waste outreach campaign (upon ordinance adoption) to include conducting one-on-one outreach and distributing pet waste education materials to pet owners.

(e) Media Campaign	Document campaign reach and frequency to public for each broadcast media like radio and TV, (including those elements implemented locally or through a cooperative agreement).			X		

08-09 Accomplishments

Stormwater Services funds an annual media outreach campaign on major network and broadcasting stations, including TV, radio, and newspaper. Utilizing mass media outlets has proven to be an effective tool for targeting specific audiences with tailored stormwater messages. Over the years, we have established several valuable partnerships with television and radio stations which have enabled us to extend our dollar by receiving "buy one, get one free" ads or "matching" ads. In essence, we buy a PSA and we get one for free.

Stormwater Services is building on watershed marketing research which indicates that mass media is the most influential medium for reaching a diverse public audience. This research also suggests that the public prefers the comfort and perceived legitimacy of the mass media, particularly television.

In addition, Stormwater Services regularly develops and airs a media campaign on the City's cable access channel, GTV-8, to broadcast clean water PSAs, documentaries, and educational slide shows. Utilizing GTV-8, we are able to air a variety of stormwater messages and to repeat messages more frequently. In addition, these videos and PSAs also appear on our website and are available for viewing and downloading.

Visit the Appendix to view media campaign information, including documented reach and frequency of each campaign.

09-10 Proposed Objectives

Develop and produce new public service announcements that highlight the new pet waste and yard waste ordinances. (Ordinances must be adopted by City Council first.)

Broadcast PSAs on network radio and television stations.

Air stormwater messages and media content on the City's cable access channel (GTV).

(f) Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

08-09 Accomplishments

A workgroup was convened to revise the current City stormwater ordinance. Once this revision is complete, it will enable us to establish a hotline for citizens to report illicit discharges and other stormwater infractions. The code enforcement officer will handle most of these reports.
The City is on track to establish a hotline, according to the revised schedule with the State.
Currently, citizen reports and complaints are directed to the phone # for Stormwater Administration, and then given to the appropriate employee to respond.

09-10 Proposed Objectives

Continue to revise ordinance to meet permit requirement to establish reporting hotline.

(g) Establish a Public Education and Outreach Program and implement within 12 months of the permit issue date.	The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least two of the following: • Newspaper articles, press releases and/or paid advertisements (i.e., inserts) • Kiosks and signage • Targeted direct mail • Displays at the point-of purchase • Utility bill inserts The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least two of the following: • Public meetings • Community events • Contest • Storm drain marking • Stream and Litter cleanups • Group presentation and/or speeches The permittee's outreach program, including those elements implemented locally or through a cooperative agreement, must include at least three of the following:	X	X	X	X	X

	• News coverage • Workshops and class room outreach • Distributing promotional giveaways and specialty items • Brochures, displays, signs, welcome packets, and pamphlets • Local cable access • Newsletters For each media, event or activity, including those elements implemented locally or through a cooperative agreement, measure and record the extent of exposure.					

08-09 Accomplishments

Stormwater Services engages in many of these educational activities, above and beyond the required minimum guidelines established by our NPDES permit. These activities are listed in detail in the Public Education and Outreach Appendix.

Due to current billing issues with the newly formed Cape Fear Public Utility Authority, we could not explore the possibility of including stormwater messages in customer utility bills. It is not a feasible option at this time.

This past year, the Stormwater Watch Newsletter was merged into the Citywide Public Information report. This increased our reach from 1,000 recipients, to more than 44,000 recipients. The spring issue is the annual water quality issue featuring data collected by UNC-Wilmington on the state of our waterways.

Stormwater Services partnered with the NC Coastal Federation, UNCW, New Hanover Soil & Water Conservation District, County and City Planning to conduct tidal creek meetings for the public in April 2008. Two separate meetings were held in two tidal creek watersheds.

09-10 Proposed Objectives

Continue to partner with organizations to deliver high quality stormwater education presentations such as Stormwater 101.

Continue to develop and distribute the Stormwater Watch Newsletter in the new combined format with the citywide newsletter.

PUBLIC INVOLVEMENT AND PARTICIPATION

1. Objectives for Public Involvement and Participation

(a) Provide opportunities for the public, including major economic and ethnic groups, to participate in program development and implementation.
(b) Comply with applicable state and local public notice requirements.

2. BMPs for Public Involvement and Participation

The permittee shall implement the following BMPs to meet the objectives of the Public Involvement and Participation Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Administer a Public Involvement Program	Develop and implement a Public Involvement and Participation Program, as outlined in (b) through (e) below.	X	X			
(b) Allow the public an opportunity to review and comment on the Stormwater Plan	Conduct at least one public meeting in year 2 to allow the public an opportunity to review and comment on the Stormwater Plan.		X			

08-09 Accomplishments

A workgroup is currently revising the City's stormwater ordinance. The draft of the new ordinance has been developed and will be available for public review and comment this spring. The City was granted an extension to implementation by the State.

09-10 Proposed Objectives

The City will hold a public meeting to allow citizens to review the proposed stormwater ordinance. This meeting will be advertised in accordance with state and local public notice requirements.

Utilize citizen feedback from public meetings to guide any further ordinance revisions.

(c) Organize a volunteer community involvement program	Organize and implement a volunteer stormwater related program, locally or through a cooperative agreement, to promote ongoing citizen participation. Examples include, sponsoring and participating in Big Sweep, Forming partnerships with local businesses, Adopt	X				

	a stream, Adopt a street, promoting volunteer presentations, Creek crawls, storm drain stenciling, and poster contest					

08-09 Accomplishments

For the past few years, the City of Wilmington has contracted annually with Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD) to implement public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with specified deliverables that enable the City to meet many of its NPDES public education and public involvement requirements. Annual service contracts and a progress report for each agency are included in the Public Involvement and Participation Appendix.

This particular BMP was accomplished by these agencies through watershed clean-up events, volunteer creek monitoring, wetland monitoring and plantings, educational workshops for the community, a Hewletts Creek Watershed newsletter, and the installation of stormwater BMPs on citizen property through NCCCAP Program (administered by NHSWCD).

09-10 Proposed Objectives

Continue to contract with Cape Fear River Watch and New Hanover Soil & Water Conservation District to help us meet NPDES public involvement and public education requirements.

Coordinate with Halyburton Park staff and our Code Enforcement officer to implement a pilot pet waste education project. The idea is to ask pet owners to commit to clean up after their pet by having them sign a public pledge and giving their dog a clean water bandana. Pet owners can then submit photos of their pets as a Canine for Clean Water to post on our website.

This year we will engage volunteers in replacing old plastic storm drain markers with stainless steel markers to raise awareness at the street/storm drain level.

(d) Establish a mechanism for Public involvement	Established mechanism for public involvement, for example, a citizens' or stakeholders' group(s) that provide input on stormwater issues and the stormwater program.	X				

08-09 Accomplishments

Stormwater Services partnered with the NC Coastal Federation, UNCW, New Hanover Soil & Water Conservation District, County and City Planning to conduct tidal creek meetings for the public in April 2008. Citizens were encouraged to ask questions and give input on water quality and stormwater issues during the panel presentations, at the exhibit displays, and on feedback surveys. Feedback is being utilized to plan for future public meetings.

09-10 Proposed Objectives
Continue to provide the public with opportunities to participate throughout the stormwater ordinance revision process.

Investigate the use of an interactive online tool on the Stormwater Services website to allow citizens to offer public input and inquiries.

This year, we will be launching a more intensive pet waste outreach campaign in City parks to include one-on-one outreach and distribution pet waste education materials to pet owners.

(e) Establish Hotline/Help line	Maintain a stormwater hotline/helpline.			X		

08-09 Accomplishments
A workgroup was convened to revise the current City stormwater ordinance. Once this revision is complete, it will enable us to establish a hotline for citizens to report illicit discharges and other stormwater infractions. The code enforcement officer will handle most of these reports.
The City is on track to establish a hotline, according to the revised schedule with the State. Currently, citizen reports and complaints are directed to the phone # for Stormwater Administration, and then given to the appropriate employee to respond.

09-10 Proposed Objectives
Continue to revise ordinance to meet permit requirement to establish reporting hotline.

ILLICIT DISCHARGE DETECTION AND ELIMINATION

1. Objectives for Illicit Discharge Detection and Elimination

(a) Detect and eliminate illicit discharges, including spills and illegal dumping to the Permittee's MS4.
(b) Address significant contributors of pollutants to the MS4. The permittee may require specific controls for a category of discharges, or prohibit that discharge completely, if one or more of these categories of sources are identified as a significant contributor of pollutants to the MS4.
(c) Implement appropriate enforcement procedures and actions.
(d) Develop a map showing the permittee's major MS4 outfalls to state waters receiving discharges.
(e) Inform employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

2. BMPs for Illicit Discharge Detection and Elimination

The permittee shall implement the following BMPs to meet the objectives of the Illicit Discharge Detection and Elimination Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Develop/Implement Illicit Discharge Detection and Elimination Program	Develop and implement an Illicit Discharge Detection and Elimination Program including provisions for program assessment and evaluation.			X		

08-09 Accomplishments

The City continued efforts with our Stormwater Ordinance Team (SWOT) to help address modifications to the existing stormwater ordinance. The ordinance is being developed to address illicit discharges regarding detection, enforcement and elimination. The ordinance modification will help to close the gap between the existing Stormwater ordinance and the Public Utilities ordinance related to illicit discharges to the MS4.

The organization of the Ordinance Team will help develop an Illicit Detection and Elimination Program. Currently, City Staff are finalizing the stormwater ordinance to present to the public.

The newly formed CFPUA regulates sanitary sewer overflows (SSOs) and eliminates any wastewater or other polluted waters from leaving their system. They respond to reports and investigate leads generated by the public or monitoring results as part of their permit requirement and respond using public education, enforcement and maintenance. The CFPUA copies the City on all SSOs. The City has begun to follow up on all reported SSOs with representatives from CFPUA. City and CFPUA staff have begun to schedule field visits to insure post-spill

monitoring results and clean up measures have been adequately conducted and the area restored to pre-existing conditions.

09-10 Proposed Objectives

Continue with Stormwater Ordinance schedule for final draft of Stormwater Ordinance by June 15, 2009 and for the State's review and for adoption by City Council by November 3, 2009.

Continue to coordinate efforts with CFPUA for documentation of SSOs to the City's stormwater system and continue with follow up field visits to insure proper monitoring procedures and clean up measures have been restored to pre-existing conditions.

Utilize the modified Stormwater Ordinance to address the investigation, identification and elimination of illicit discharges and illicit connections to the City's stormwater system.

Document all reported SSOs, illicit connections and illicit discharges through GIS tracking database.

(b) Establish and maintain appropriate legal authorities	Establish and maintain adequate ordinances or other legal authorities to prohibit illicit discharges and enforce the approved Illicit Discharge Detection and Elimination Program.			X		

08-09 Accomplishments

The current Cape Fear Public Utility Authority (CFPUA) ordinance defines wastewaters that are required to be discharged into the sanitary sewer system. The City utilizes CFPUA's ordinance to address discharges of regulated wastewaters to natural outlets. Progress was made to modify the existing stormwater ordinance through the SWOT to address releases to the City's MS4 that are not defined as a regulated wastewater.

09-10 Proposed Objectives

Continue efforts for the adoption of a final modified stormwater ordinance. The adoption of the modified Stormwater Ordinance, as addressed through the efforts of the City's SWOT, will establish legal authorities to address the identification and elimination of illicit discharges.

(c) Develop a Storm Sewer System Base Map and Inventory of Major Outfall.	Map identifying major outfalls and stormwater drainage system components. At a minimum, components include major outfalls and receiving streams. Established procedures to continue to identify, locate, and update map of drainage system.				X	

08-09 Accomplishments

As noted last year, all receiving waterbodies are identified and mapped. Many outfalls along the intracoastal waterway or associated estuarine areas and Burnt Mill Creek have been located and mapped to include attribute information such as size, material, condition, abnormal flow at time of last observation, etc. Preliminary outfall locations have been established for many of the remaining waterbodies within or adjacent to the City. This includes the areas along the Cape Fear River, Smith Creek, and Barnards Creek. Digital terrain model analysis and GPS mapping of drainage infrastructure or open channel systems is continuing in order to meet our year four (4) goal of having a system base map and inventory of major outfalls. The terrain model yields overland flow patterns that have been analyzed to determine preliminary locations of outfalls. System infrastructure and open system mapping is performed in the field by observing features on the ground to record details for GIS mapping and establish an understanding of the connectivity of the major drainage system components.

Full system mapping efforts have been underway since 1999 and have focused mainly on those areas which have been annexed by the City. A pilot project designed to fully map the natural and constructed drainage features as well as enable update and maintenance of MS4 data in the City GIS system was completed in March 2008. The second phase of this most recent mapping project is in the initial stages with the current accomplishments being beta version development of in-house mapping procedures/requirements and appropriation of funds to continue GPS/GIS mapping with the assistance of outside contractors. The City is continuing efforts to bring together the several mapping datasets that have been completed over the years and integrate these into a single dataset of drainage features. Part of this effort also includes finalizing a database design that accommodates all the requirements of our NPDES Phase II permit and anticipates requirements related to TMDL Water Quality Recovery Programs and associated monitoring should that become necessary.

The database design for system inventory was completed as part of the Stormwater System Infrastructure Mapping Pilot Project that concluded in March 2008. This database design will continue to be refined as needed to accomplish multiple goals related to requirements of this permit and in-house needs related to maintenance and improvements. The database design is adopted for use as we go forward with GPS/GIS mapping of stormwater infrastructure and focused consideration is being given to illicit discharge detection/tracing issues, outfall mapping/monitoring, and update and maintenance of existing infrastructure data.

09-10 Proposed Objectives

Conduct stormwater system inventory database design improvements for major outfall identification.

Conduct in-house GPS data collection routine development for update/maintenance of existing data and outfall mapping.

Conduct TMDL Water Quality Recovery Program preparatory actions in anticipation of TMDL classifications for waters in the City's jurisdiction. This will include continued development of terrain and system data to assist in the identification of contributing areas whenever a pollutant of concern is documented.

(d) Inspection/detection program to detect dry weather flows at MS4 outfalls	Establish written procedures for detecting and tracing the sources of illicit discharges and for removing the sources or reporting the sources to the State to be properly permitted.			X		

08-09 Accomplishments

Dry weather flow is common in Wilmington due to the abundant wetlands and the proximity to the ground water table. Any broken pipe will cause ground water to enter the pipe as a path of least resistance resulting in an abundance of stream systems flowing in the storm drain infrastructure. Thus far illicit discharges underground have been detected by routine maintenance crews, or the public by odor or visual observation. The City elected not to focus on dry weather flows until the new stormwater ordinance has been finalized because of the need of authority to enforce, time needed to develop illicit discharge detection tracking policies and procedures as well as determining and acquiring proper field equipment. Currently any suspect flows are reported to CFPUA for investigation.

09-10 Proposed Objectives

Continue to focus attention on finalizing the modified stormwater ordinance for the State's review. Continue to revise ordinance to meet year 3 requirement to establish written procedures. The City will be developing a GIS database to help track illicit discharges and document procedures from first identifying a source to finally removal of source.

(e) Employee training	Conduct training for appropriate municipal staff on detecting and reporting illicit discharges.			X		

08-09 Accomplishments

Through past training sessions for identifying illicit discharges, Stormwater crews are knowledgeable in detecting and reporting suspect discharges to appropriate City staff. Reporting methods are currently in place for detecting and eliminating regulated wastewater to the City's MS4 through the CFPUA.

09-10 Proposed Objectives

The City will continue to reinforce to the field crews the need to report any questionable flows into the City's MS4. Continue to educate City Staff on identifying illicit discharges and provide periodic training refresher sessions to meet year 3 requirements.

(f) Provide public education	Inform public employees, businesses, and the general public of hazards associated				X	

	with illegal discharges and improper disposal of waste.					

08-09 Accomplishments
The City elected not to undertake establishing a reporting mechanism for the public this year.

09-10 Proposed Objectives
The City will reevaluate the above objective this coming year to determine how to accomplish goal and to meet year 4 requirements.

(g) Establish a public reporting mechanism	Establish and publicize reporting mechanism for the public to report illicit discharges. Establish citizen request response procedures.				X	

08-09 Accomplishments
The City elected not to undertake establishing a reporting mechanism for the public this year.

09-10 Proposed Objectives
The City will reevaluate the above objective this coming year to determine how to accomplish goal and to meet year 4 requirements.

(h) Established procedures to identify and eliminate failed septic system and sanitary sewer overflows.	Establish procedures to identify and report to the County health department failed septic systems located within the permittee's planning jurisdiction. Establish procedures to identify and report sanitary sewer overflows and sewer leaks to the system operator.			X		

08-09 Accomplishments
Changes/Justification section for item (h), presented in 2007-2008 Annual Report, were moved to year three upon approval from NCDWQ.

The City coordinated efforts with CFPUA to report all sanitary sewer overflows to the City.

09-10 Proposed Objectives
The City will coordinate with the New Hanover County Health Department to quantify the remaining households that still utilize septic systems and to determine the timeframe for removal (if needed).

The City is working on a GIS database for illicit discharges for tracking purposes. Initial detection of illicit discharges to final removal of source will be discussed so that procedures for eliminating discharges are documented. Sanitary sewer overflows as reported to the City from CFPUA will also be added to this database.

CONSTRUCTION SITE RUNOFF CONTROLS

The permittee relies on New Hanover County to comply with this minimum measure. The New Hanover County Sediment and Erosion Control Program effectively meets the requirements of the Construction Site Runoff Controls by permitting and controlling development activities disturbing one or more acres of land surface and those activities less than one acre that are part of a larger common plan of development. This program includes procedures for public input, sanctions to ensure compliance, requirements for construction site operators to implement appropriate erosion and sediment control practices, review of site plans which incorporates consideration of potential water quality impacts, and procedures for site inspection and enforcement of control measures.

New Hanover County Erosion Control Program information supplied in Appendix D.

POST-CONSTRUCTION SITE RUNOFF CONTROLS

1. Objectives for Post-Construction Site Runoff Controls

(a) Manage stormwater runoff from new development / redevelopment that drains to the MS4 and disturbs an acre or more of land surface, including projects less than an acre that are part of a larger common plan of development or sale.
(b) Provide a mechanism to require long term operation and maintenance of BMPs.
(c) Ensure controls are in place to minimize water quality impacts.

2. BMPs for Post-Construction Site Runoff Controls

The permittee shall implement the following BMPs to meet the objectives of the Post-Construction Stormwater Management Program.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Establish a Post-Construction Stormwater Management Program	Develop and adopt by ordinance (or similar regulatory mechanism) a program to address stormwater runoff from new development and redevelopment. Implement and enforce the program within 24 months of the permit issue date.		X			

08-09 Accomplishments

A stormwater ordinance drafting team has been formed which includes the City Stormwater Services Manager, Environmental and Long Range Planners, a Plan Review Engineer, a Staff Engineer, a Stormwater Specialist, an Outreach & Education Coordinator and a Code Enforcement officer.

The team is drafting a new stormwater ordinance for the management of post-construction stormwater runoff from new development and redevelopment in the framework of the Phase II stormwater model ordinance, an existing City of Wilmington Stormwater Management Ordinance and the Coastal Stormwater legislation. The City Attorney has reviewed the draft ordinance, which will be made available for public review in early April 2009.

The initial draft has been put through a public review process with a public input meeting held in the City Council chambers on January 17, 2008. Additional public input meetings, including targeted stakeholder meetings, are being planned for April and May 2009.

Draft of Stormwater ordinance is underway. The uncertainty of the Coastal Stormwater rules as they were being debated, and their applicability to the City's permit requirements necessitated an extension on the deadline for completing the ordinance, which was granted by DWQ in November, 2008. The new deadline is November 3, 2009.

09-10 Proposed Objectives

The public would be given another opportunity to review the revised draft ordinance in Spring of 2009. Stakeholders' meetings for feedback are planned for the Spring of 2009 before the draft goes for State review in the summer. The final draft would be put forward for Planning Commission review in late summer and City Council adoption in the fall.

- Stakeholders input meetings in Spring 09
- Complete the ordinance for submission to DWQ for review by June 09
- Adoption of the ordinance by City Council by November 3, 09.
- Schedule is subject to change pending review turnaround time from DWQ.

(b) Establish strategies which include BMPs appropriate for the MS4	Develop strategies that include a combination of structural and/or non-structural BMPs. Implement them within 24 months of the permit issue date. Provide a mechanism to require long-term operation and maintenance of structural BMPs. Require annual inspection reports of permitted structural BMPs performed by a qualified professional (i.e., someone trained and certified by NC State for BMP Inspection & Maintenance).		X			

08-09 Accomplishments

The new stormwater ordinance being developed contains provisions addressing the use of combinations of structural and non-structural BMPs to manage stormwater runoff. Under the current stormwater management ordinance of the City, permitees of structural BMPs are required to properly maintain their stormwater management systems to ensure long term operation. Additionally, annual inspections are performed by a qualified professional.

The City conducted biannual compliance inspections for privately owned stormwater BMPs in order to ensure maintenance responsibilities are being undertaken by property owners. Inspections were conducted by a City Staff member who has completed the Stormwater BMP Inspection and Maintenance Certificate offered through NC State's Biological and Agricultural Engineering Department (certification #182). An inspection summary is included in Appendix F. In addition, sample inspection reports are provided.

BMP requirements are part of the ordinance - see above.

09-10 Proposed Objectives

Continue biannual inspections for next year to ensure compliance with maintenance requirements. Report items of non-compliance to property owners.

Discuss with the State how our compliance inspections are conducted in order to determine the information that would be relevant to them when reviewing our program.

Discuss with City staff ,that are responsible for the review of stormwater management plans, the effectiveness of previously permitted BMPs based on observations of 10 years worth of biannual compliance inspections.

(c) Establish nutrient sensitive waters (NSW) protection measures (for programs with development or redevelopment draining to NSW waters)	Develop, adopt, and implement an ordinance (or similar regulatory mechanism) to ensure that the best management practices reduce nutrient loading to the maximum extent practicable. Develop and include a nutrient application (fertilizer and organic nutrients) management program in the Post-construction Stormwater Management Program. In areas where the Environmental Management Commission has approved a Nutrient Sensitive Water Urban Stormwater Management Program, the provisions of that program fulfill the nutrient loading reduction requirement.		X			

08-09 Accomplishments

Per NCDWQ staff, there are no current NSW requirements for our area in the Cape Fear River Basin and there are none on the immediate horizon.

09-10 Proposed Objectives

Staff will continue to track this issue through NCDWQ.

(d) Establish a program under the Post-Construction minimum measure to control the sources of fecal coliform to the maximum extent practicable	Coordinate with County health department to control the known sources of fecal coliform to the maximum extent practicable. Implement within 24 months of the permit issue date.		X			

08-09 Accomplishments

The City is working to establish a domestic animal waste ordinance as part of ordinance revision process.

The City has worked into its modified stormwater ordinance requirements for non-structural BMPs in SA watersheds that help to control sources of fecal coliform to the maximum extent practicable.

09-10 Proposed Objectives
City staff will be working to maintain and update their technical standards for structural BMPs that are determined to be effective for removal of fecal coliform.

Ordinance is set to be adopted by November 09.

(e) City Code, Permitting Regulations, Easement, and/or Deed Restrictions and Protective Covenants	Ensure development activities will maintain the project consistent with approved plans.		X			

08-09 Accomplishments
Current City of Wilmington stormwater management ordinance stipulates among other requirements for stormwater management after construction that:

- Record (as-built) drawings (reproducible mylar) for all stormwater management facilities certified by an authorized registered professional must be provided to the City for permanent record.
- When deemed necessary by the City, an easement in a form approved by the City attorney, granting the City and its agents and representatives adequate and perpetual access to the facility and sufficient area for inspection and maintenance, if necessary, by the City, its agents and representatives. Said easement shall be filed in the New Hanover County Registry, at the expense of the applicant, and shall bind all subsequent owners and assigns of the facility and of the property on which the facility is located.
- Draft maintenance provisions are part of the draft ordinance.

09-10 Proposed Objectives
The following excerpt from the new stormwater ordinance under draft would become operational upon the adoption of the final draft by City council, that:

> *The approval of the stormwater permit shall require an enforceable restriction on property usage that runs with the land, such as recorded deed restrictions or protective covenants, to ensure that future development and redevelopment maintains the site consistent with the approved project plans.*

Additionally, the new ordinance has provisions to ensure that conveyance of the property does not terminate the original developer's obligations until a replacement permit has been issued. The original developer will be required to record in the deed conveying the property a notice of the existence of any stormwater devices and the purchaser's obligations to maintain and inspect them and to obtain a permit. There are also specific and detailed special requirements for homeowner and other associations regarding operation and maintenance of stormwater devices, escrowing funds to ensure maintenance and remedies for the City in the event of failed compliance.

Ordinance is set to be adopted by November 09

(f) Operation and Maintenance Plan	Implement or require an operation and maintenance plan that ensures the adequate long-term operation of the structural BMPs required by the program. The operation and maintenance plan may require the owner of each structural BMP to submit a maintenance inspection report on each structural BMP annually to the local program.					X

08-09 Accomplishments
The City currently conducts its own compliance inspections for BMP maintenance and operations as addressed above in item (b). Draft maintenance provisions as part of the draft ordinance.

09-10 Proposed Objectives
City staff will continue to inspect all privately owned BMPs and submit inspection reports as necessary for this annual report.

Ordinance adopted by November 09.

(g) Setbacks for Built-upon Areas	Require built upon areas to be located at least 30 feet landward of all perennial and intermittent surface waters except as provided for in the Permittee's approved Post-Construction Stormwater Ordinance. For purposes of this section, a surface water shall be present if the feature is shown on either the most recent version of the soil survey map prepared by the Natural Resources Conservation Service of the United States Department of Agriculture or the most recent version of the 1:24,000 scale (7.5 minute) quadrangle topographic maps prepared by the United States Geologic Survey (USGS). Relief from this requirement may be allowed when surface waters are not present in accordance with the provisions of 15A NCAC 02B .0233(3)(a).		X			

08-09 Accomplishments
30 foot setback as part of draft ordinance.

09-10 Proposed Objectives
Ordinance adopted by November 09.

POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

1. Objective for Pollution Prevention and Good Housekeeping for Municipal Operations

Prevent or reduce stormwater pollution from municipal operations.

2. BMPs for the Pollution Prevention and Good Housekeeping for Municipal Operations

The permittee shall implement the following BMPs to meet the objectives of the Pollution Prevention and Good Housekeeping Program and shall notify the Division prior to modification of any goals.

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
(a) Develop an operation and maintenance program	Develop an operation and maintenance program for structural stormwater BMPs , storm sewer system maintenance which may include street sweeping, and municipal operations such as recycling and household hazardous waste and oil collection.		X			

08-09 Accomplishments

The City currently has a program for the operation and maintenance of all City owned structural BMPs, storm sewer system, and street sweeping. In addition, there is a recycled oil program for City operations and an annual Household hazardous waste collection day (conducted in cooperation with New Hanover County).

The City began developing SOPs for maintenance activities for stormwater municipal operations. City staff met on several occasions to discuss the City's current activity codes for municipal operations in order to develop these codes into SOPs.

09-10 Proposed Objectives

The City will be developing SOPS, with interaction from field crews, in order to formalize our approach to conducting our stormwater municipal operations. These SOPS will be reviewed by our field crews in order to insure that proper procedures are being undertaken on a day to day basis.

(b) Develop Site Pollution Prevention Plan for Municipal Facilities	Develop and implement Site Pollution Prevention Plan for Municipal Facilities owned and operated by the permittee with the potential for generating polluted stormwater runoff that has the ultimate			X		

	goal of preventing or reducing pollutant runoff.					

08-09 Accomplishments
The City currently holds one Stormwater Pollution Prevention plan (SP3) for one of its municipal facilities to address the above goal:

- Wilmington Transit Authority -NPDES General Permit NCG080000 (date of issuance 7/13/03)

The two treatment plant facilities that previously held permits under the City were transferred to the CFPUA.

The City, with help from its consultant, worked to finalize two SPCC plans for its Operations Complex and Police Headquarters.

09-10 Proposed Objectives
Continue to review and update SP3s as needed. Implement the SPCC plans for the two additional facilities. Staff training will be conducted in April 09 with regards to the site specific SPCC plans.

(c) Inspection and evaluation of facilities, operations, and the MS4 system and associated structural BMPs.	Maintain an inventory of facilities and operations owned and operated by the permittee with the potential for generating polluted stormwater runoff, including the MS4 system and associated structural BMPs. Conduct inspections at facilities and operations owned and operated by the permittee for potential sources of polluted runoff, the stormwater controls, and conveyance systems. Evaluate the sources, document deficiencies, plan corrective actions, implement appropriate controls, and document the accomplishment of corrective actions.				X	

08-09 Accomplishments
The existing SP3 plan and SPCC plans the City currently holds, as mentioned in item (b) accomplish this goal. The plans are reviewed each year and updated as necessary with regard to any changes to the existing plan.

09-10 Proposed Objectives
Continue monitoring City operated sites for compliance with existing SP3 and SPCC plan. Update as needed.

(d) Conduct staff training	Conduct staff training specific for pollution prevention and good housekeeping procedures.		X			

08-09 Accomplishments
The City opted to conduct staff training for department supervisors and crew leaders on Pollution Prevention and Good Housekeeping for its City facilities in year one. City staff has followed up site inspections for City municipal operations and have addressed areas of concerns with individual site managers.

09-10 Proposed Objectives
Conduct random site inspections for City municipal operations. Address problems as needed.

(e) Review of municipality owned or operated regulated industrial activities	Conduct annual review of the industrial activities with a Phase I NPDES stormwater permit owned and operated by the permittee. Review the following aspects: the Stormwater Pollution Prevention Plan where one is required, the timeliness of any monitoring reports required by the Phase I permit, and the results of inspections and subsequent follow-up actions at the facilities.			X	X	X

08-09 Accomplishments
No Phase I NPDES stormwater permit is owned and operated by the permittee now that the wastewater treatment plants and the water treatment facility have been turned over to CFPUA.

09-10 Proposed Objectives
The City will address this measure in the event anything changes.

(f) Spill Response Procedures	Establish spill response procedures for municipal operations owned and operated by the permittee with the potential to generate polluted stormwater runoff.		X			

08-09 Accomplishments
The City's Operations Complex and the Police Headquarters each required an SPCC plan as recommended by our hired consultant. The City finalized the two plans in late March 09 and will begin implementing them in 2009. Each plan addresses spill response procedures for each site.

09-10 Proposed Objectives

The City's consultant will conduct on-site training to designated City staff with regards to spill response and procedures in April/May 2009.

Follow through on plans for each site with appropriate staff and their related to duties outlined in plans.

(g) Prevent or Minimize Contamination of Stormwater Runoff from all areas used for Vehicle and Equipment Cleaning	Describe measures that prevent or minimize contamination of the stormwater runoff from all areas used for vehicle and equipment cleaning. Perform all cleaning operations indoors, cover the cleaning operations, ensure washwater drain to the sanitary sewer system, collect stormwater runoff from the cleaning area and providing treatment or recycling, or other equivalent measures. If sanitary sewer is not available to the facility and cleaning operations take place outdoors, the cleaning operations shall take place on grassed or graveled areas to prevent point source discharges of the washwater into the storm drains or surface waters. Where cleaning operations cannot be performed as described above and when operations are performed in the vicinity of a storm drainage collection system, the drain is to be covered with a portable drain cover during clean activities. Any excess ponded water shall be removed and properly handled prior to removing the drain cover. The point source discharge of vehicle and equipment wash waters, including tank cleaning operations, are not authorized by this permit and must be covered under a separate NPDES permit or discharged to a sanitary sewer in accordance with applicable industrial pretreatment requirements.		X			

08-09 Accomplishments

Maintenance and cleaning conducted at the City's Operations complex, which was completed in 2006, continues to occur at a wash down station equipped with an oil water separator that accepts wash water and directs it to the sanitary sewer.

Small engine repair (line trimmers, blowers, chain saws, compacters, etc.) and cleaning for various City activities occurs in individual departments maintenance garages. In the event of an accidental discharge, the garages have drains located within the floor that connect to an oil water separator located on each site within the Operations Complex.

Vehicle maintenance for all City vehicles is conducted at the Fleet Maintenance building located at the Operations Complex. In the event of an accidental spill, floor drains are connected to on site oil water separators. Used vehicle fluids are collected and disposed and/or recycled of properly in their respective, protective containers.

The current SP3 plan and SPCC plans for the individual City sites address the above concerns for Good Housekeeping procedures.

09-10 Proposed Objectives

Continue monitoring each respective SP3 and SPCC plan for compliance. Update as needed.

SECTION H: THREATENED OR ENDANGERED SPECIES

1. Certain waters provide habitat for federally-listed aquatic animal species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under the provisions of the Endangered Species Act, 16 U.S.C. 1531-1544 and subsequent modifications.

2. The shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered on March 11, 1967 (32 FR 4001) and remained on the endangered species list with enactment of the ESA in 1973. Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. Shortnose sturgeon inhabit the main stems of their natal rivers, migrating between freshwater and mesohaline river reaches. Spawning occurs in upper, freshwater areas, while feeding and overwintering activities may occur in both fresh and saline habitats.

3. Under the provisions of the Final Recovery Plan published by the National Marine Fisheries Service (NMFS) in December 1998, the permittee shall implement measures to increase awareness of shortnose sturgeon and their status by formulating a public education program that generates public interest in sturgeon and sturgeon recovery by contacting media outlets, suggesting feature stories, and using existing forums for educating the public (e.g., public aquaria, FWS Partners for Wildlife Program, private foundations). Articles, posters, and pamphlets should be published to increase public knowledge of shortnose sturgeon and their unique and complex life history. This information may include identifiable features of the species, listing status, range, susceptibility to incidental captures, and a number or address to report sightings or captures. The permittee shall offer to work with schools to develop and evaluate educational materials and curricula that introduce students to sturgeons, the river/estuarine environment, and the ESA.

08-09 Accomplishments

Stormwater staff implemented several key elements established in the Shortnose Sturgeon Education Plan formulated last year. This tool guides public education efforts about the endangered Shortnose Sturgeon.

This year, informational bookmarks and brochures were distributed to students and the public at schools, the Earth Day festival, and Tidal Creek public meetings. The public can access a slide show and brochure about the Shortnose Sturgeon on Stormwater Services webpage or watch a narrated slide show on the City's cable access channel (GTV-8).

All of these education materials incorporate the following information about this endangered fish: federal listing status, identifiable features, life history, range/local habitat, reasons for decline in species population, susceptibility to incidental captures, barriers to recovery (threats and solutions), and a contact agency/phone number to report sightings or captures.

09-10 Proposed Objectives

Distribute educational brochures and bookmarks at community events and speaking engagements.

Partner with Cape Fear River Watch, the NC Aquarium at Fort Fisher, and other agencies to provide public education about the Shortnose Sturgeon (ie. website, speakers, smart cart).

Include information about the Shortnose Sturgeon in 8th grade Enviroscape presentations.

APPENDIX

APPENDIX A - PUBLIC EDUCATION AND OUTREACH

APPENDIX B - PUBLIC INVOLVEMENT & PARTICIPATION

APPENDIX C - ILLICIT DISCHARGE DETECTION & ELIMINATION

APPENDIX D - CONSTRUCTION SITE RUNOFF CONTROL

APPENDIX E - POST-CONSTRUCTION SITE RUNOFF CONTROLS

APPENDIX F - POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

APPENDIX G - THREATENED & ENDANGERED SPECIES

APPENDIX H – ENFORCEMENT ACTIONS

APPENDIX A

PUBLIC EDUCATION AND OUTREACH

Included in this section:

- BMP Reporting Table
- Identification of Target Pollutants, Sources, And Target Audiences

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
BMP(a) Identify Target Pollutants & Sources					
Pollutants and sources are identified in the Appendix					
BMP(b) Identify Target Audiences					
Target audiences are identified for each pollutant in the Appendix.					
BMP(c) Stormwater Website					
Ongoing/ Monthly	City of Wilmington Stormwater Services webpages	General public; website viewers	Stormwater staff	Update website with stormwater news & events and other educational content	Update stormwater webpages during the year
5/15/08	Website article	City website viewers	Stormwater staff	Article on proper yard waste disposal posted on City's main website page	Article for public consumption
9/5/08	Website updates	City website viewers	Stormwater staff	Update website with stormwater news, events, and other pertinent information	Updated in Sept. 08: News & Events Capital Projects Stormwater Billing Info Maintenance
11/3/08	Website updates	City website viewers	Stormwater staff	Added educational brochure & news/events	Uploaded the new Recycling & Proper Disposal brochure
12/5/08	Website updates	City website viewers	Stormwater staff	Added article about Rain Barrel Sale to main page of City's website	Rain Barrel Sale info
2/3/09	Website updates	City website viewers	Stormwater staff	Added Shortnose Sturgeon slide show	Shortnose Sturgeon education for citizens
BMP(d) Develop & Distribute Public Education Materials to Identified User Groups					
In addition to public outreach efforts in this category, the Compliance/Code Enforcement Officer distributes materials to user groups that have been identified as non-compliant with the City's stormwater codes. A summary of Enforcement Actions is included in the Appendix.					
3/8/08	City Planning & Development Center	Walk-in customers	City staff	Brochures displayed in Dev. Center for pick-up by walk in customers	Citizens can pick up literature at their convenience

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
4/1/08	Stormwater Office	Lawn Care letter	Stormwater staff	Developed lawn care letter to mail to residents	Informed residents about water quality-friendly lawn care practices
4/4/08	Targeted Direct Distribution	Princess Street residents (1 block)	Compliance officer	Pet waste brochures distributed in response to complaint	11 brochures and letters distributed
4/7/2008	Targeted Direct Distribution	Verbenia Drive	Stormwater staff	Citizen notice - notification of drainage improvement project with stormwater pollution tips	150 door hangers distributed to residents
4/11/08	Targeted Direct Distribution	Dock Street & Front Street (1 block)	Stormwater staff	Pet waste brochures distributed in response to complaint	10 brochures and letters distributed
4/10/08	Targeted Direct Mail	Highland Hills Neighborhood (Brookhaven, Chruchill, Gillete, Hillsboro, Knorrwodd)	Stormwater staff	Lawn Care letters and brochures mailed to residents	109 mailed
4/21/08	Stormwater Office	Hewletts Creek Watershed Residents	Stormwater staff	Developed brochure - Stormwater capital projects in the Hewletts Creek Watershed	Distributed at Tidal Creek public meetings
7/24/08	NC Cooperative Extension Auditorium	Wilmington Newcomers Gardening Club	Stormwater staff	Stormwater 101 powerpoint presentation Q&A session Brochure & Citizen's Guide distribution	Lawn Care brochure Yard Waste brochure Pet Waste brochure Citizen's Guide
9/6/08	Wilmington Dog Jog	Dog Jog participants	Stormwater staff	Pet waste brochures, magnets, pooper scooper prize pack for distribution to participants	*Dog Jog postponed due to Hurricane Hanna*
9/5/08	City Website - main page, article rotator	City website viewers	City staff	Article on proper disposal of yard waste targeted for yard waste professionals, homeowners	Article on City website for public consumption
10/1/2008	City Website - main page, article rotator	City website viewers	Stormwater staff Communications staff	Article on the benefits of rain barrels and our rain barrel sale	Advertise rain barrel sale
10/10/2008	Civic Group	Leadership Wilmington	Nikki Mitchell, NCSU Cooperative Ext.	Distribute stormwater brochures, magnets, pens	40 people
10/10/2008	1st Annual Dog Fest	Dog owners	Stormwater staff	Gave 100 pet waste brochures, magnets for event	100+ people
11/4/2008	Recycling/Proper Disposal Brochure	General Public	Stormwater staff	Redesigned brochure for distribution	Code Enforcement officer distributed at Latino Festival

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
BMP(e)	**Media Campaign**				
March - June 2008	TV - WECT-6	TV viewers ages 35-65 in Wilmington	State Stormwater TV Spot: Johnny Fishpatrick Ads also ran simultaneously on 87.7FM radio	:30 second stormwater PSA on network TV 39 spots total	Target Audience: General public Reach: 77.5% for viewers age 35-65 age of 174,000 homes in Wilm Frequency: 2.9 Total cost: $3,730
April - May 2008	LaGranD, 98.7FM (NextMedia Co.)	Latino community	Yard Waste PSA (in Spanish)	:45 second PSA ad on new Latino radio station	Target Audience: Spanish speaking audience Reach: unknown, new station Frequency: random Total cost: free PSAs aired in random rotation
April - May 2008	Wilmington Traffic On Demand – in connection with NextMedia Radio & WECT TV	TV viewers Radio listeners	Stormwater reminder	Stormwater message tags at the end of traffic reports on TV and radio	Target Audience: General public Reach: random Frequency: 73 ads Total cost: $876
April - May 2008	Wilmington Star News	General public, adults,Star News readers	What Goes in Here stormwater print ad	Stormwater print ads in Cape Fear Outdoors Section	Target Audience: Adults/general public Outdoor recreation enthusiasts
April - June 2008	Radio - Cumulus Broadcasting/WGNI	Landscapers, homeowners, pet owners, general public	Yard Waste & Pet Waste :30-second PSAs	Two :30 second stormwater PSAs on broadcast radio stations 120 ads total: (60 purchased, 60 free)	Target Audience: Yard caregivers, pet owners, general public Reach: 43,800 adults ages 25-54 Frequency: 10.7 Total cost: $1,800
April - May 2008	Newspaper - Wilmington Star News	General public, adults, Star News readers	What Goes in Here stormwater print ad	Stormwater print ads in newspaper 8 ads total, 2x3" (B&W) 1/4 page color ad in Outdoor Section on Sunday 5/4/08 Ran Weds. & Sun. April-May 2007	Target Audience: Adults/general public Reach/daily: 55.8 % or 138,000 adults in New Hanover, Pender & Brunswick Counties Reach/weekly: 57.7% or 143,100 adults in New Hanover, Pender, and Brunswick Counties Frequency: 8 ads total & 1 color ad Total cost: $1542

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
Ongoing	City GTV-8 and City website	GTV-8 cable access TV viewers	Stormwater PSAs Narrated Slide Shows Short documentaries Videos	Educational :30 second PSAs Several different PSAs airing concurrently or alternating	Target Audience: General public Reach & Frequency: varies due to government programming Total cost: Free
Feb – March 2009	Radio - Cumulus Broadcasting/ WGNI & WAAV	Youth, students, drivers, homeowners, landscapers, general public	Litter & Fertilizer :30-second PSAs	Two :30 second stormwater PSAs on broadcast radio stations 180 ads total: (90 purchased, 90 free)	Target Audience: Youth, students, drivers, homeowners, landscapers, general public Reach: 87,100 listeners age 25-54 Frequency: 4.0 Total cost: $2250
Jan - March 2009	TV - WECT-6	TV viewers ages 25-65 in Wilmington	State Stormwater TV Spot: Johnny Fishpatrick	:30 second stormwater PSA on network TV 39 spots total	Target Audience: General public Reach: 84,600 viewers age 25-65 Frequency: 3.3 Total cost: $3,000

BMP(f) Establish Hotline / Helpline

This BMP will occur according to schedule in Year 3.

BMP(g) Establish Public Outreach & Education Program & Implement Within 12 Months.

Newspaper Articles, Press Releases, or Paid Advertisements (print)

4/9/08	Wilmington Star News	General public, creek residents	By Tom Grady	Newspaper Article - Meetings to Focus on Area Tidal Creeks	Informing the public about tidal creek meetings
4/23/08	Wilmington Star News	General public	By Scott Nunn	Newspaper Article - Greenfield Lake Had Small Boats, Train	History of Greenfield Lake
4/24/08	Lumina News	General, beach patrons	By Jules Norwood	Lumina News Article - NCCF Addresses 'Creeks in the Balance'	About tidal creek public meetings
4/24/08	Lumina News	General, beach patrons	By Jules Norwood	My Thoughts - Editorial	Water quality, environmental
4/25/08	Wilmington Star News	General public	By Paul Stephan	Newspaper Photo - Greenfield Lake Spiffing Up the Spillway	Greenfield Lake spillway improvement project
5/1/08	Going Green Magazine	General public	By Valerie Robertson	Magazine Article - Spring Rain Barrel Sale a Success	Rain Barrel Sale Other area RB retailers
6/2/08	News Media Outlets	General public	Stormwater staff	Press Release to media outlets	319 Grant ceremony at Gregory Elementary School
8/21/08	Wilmington Star News	General public	By Star News	Star News Article - Give Plants Better Water & Conserve with Rain Barrels	Rain barrel benefits and sale information

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
8/27/08	News Media Outlets	General public	Stormwater staff	Press Release to media outlets	Rain Garden & Cistern Installation at Williston Middle School
8/28/08	Star Newspaper Coverage	General Public	Williston Rain Garden Installation - 319 grant project	Viewing audience	EPA 319 grant - Rain Garden & Cistern installation at Williston Middle School
9/3/08	News Media Outlets	General public	Stormwater staff	Press Release to media outlets	Monthly Rain Barrel Sale
10/1/2008	Going Green Magazine	General public	By Valerie Robertson	Magazine Article - Spring Rain Barrel Sale a Success	Informing citizens of monthly sale
10/8/08	Star Newspaper Coverage	General Public	Editorial: Two (green) Thumbs Up	Viewing audience	Tree ordinance revisions and impacts on water quality
10/21/08	Star Newspaper Coverage	General Public	Landscaped Roof Blends Pretty & Practical	Viewing audience	Green roofs in Wilmington to help with stormwater runoff
11/18/08	Lumina News	General Public	Restoring the Cape Fear's Fish	Viewing audience	CFRW effort to restore fish populations to the Cape Fear River
1/29/2009	Wade Wetland Park	General public Elected officials	City staff	Ribbon-cutting ceremony for Bethel Road Wetland	Official Wade Park & Stormwater Wetland grand opening
12/1/08	Going Green Magazine	General public	By Valerie Robertson	Magazine Article - Winter issue Spring Rain Barrel Sale a Success	Rain Barrel Sale Other area RB retailers
2/12/09	Wilmington Star News	General public	By Patrick Gannon	Newspaper Article - Look Out Litterbugs, Tattlers on the Rise	Swat a litterbug statewide program
2/10/09	Wilmington Star News	General public	By Patrick Gannon	Newspaper Article - New City Street Sweeper Garage to Showcase Green Technology	City's new street sweeper garage built with solar

Kiosks and signage

Targeted Direct Mail

April 2008	Verbenia Dr & 58th Street	Residents	Stormwater Maintenance staff	Citizen Notice - notification of drainage Improvement project in Verbenia & 58th Street area from 4/14/08 to 6/13/08	150 door hanger notifications distributed to Verbenia Dr/58th St. residents
4/14/08	Targeted Direct Mail	Churchill, Hillsborough, Gillette, and Knollwood Drives	Beth Nunnally - Code Enforcement officer	Citizen Notice - lawn care education in response to complaint from Churchill Drive resident	109 Lawn Care letters mailed to Highland Hills citizens

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
11/6/08	Targeted Direct Mail	Property Mgrs & Garden Club	Stormwater Staff	Mailed & followed up about Stormwater 101 Info Session	Bryant Realty - no Chris Blake Mgt - no response CF Garden Club -

Displays at Point of Purchase

Ongoing	Veterinarians in New Hanover County	Pet Owners; veterinarians	Stormwater staff NHSWCD staff	Display pet waste poster and brochures at all vet offices in New Hanover County	Partnership with New Hanover Soil & Water Conservation District to educate pet owners via vet offices

Utility Bill Inserts

The Cape Fear Public Utility Authority formed; therefore the City no longer sends bills for stormwater, billing is handled by the authority.

Public Meetings

3/1/08	319 grant workshop for the Bottom Neighborhood	Bottom Neighborhood residents	Stormwater staff NCSU WECO NCSU BAE NHSWCD staff	Public input	Stormwater 101, BMPs and tour of school BMPs, free rain barrels given away Held at Williston Middle 10 attendees
4/15/08	Tidal Creek Meeting (Futch, Pages, Howe creeks)	Citizens, businesses	Stormwater staff NCCF NHSWCD City Planning UNCW	Public information meeting	150+ attendees Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 120 attendees
4/15/08	Tidal Creek Meeting (Bradley, Hewletts, Whiskey creeks)	Citizens, businesses	Stormwater staff NCCF NHSWCD City Planning UNCW	Public information meeting	100+ attendees Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 100 attendees
5/8/08	Smith Creek Community Meeting	Citizens, businesses	City of Wilmington New Hanover County NHSWCD CFRW UNCW	Public information meeting	100+ attendees Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 100 attendees

Community Events

3/1/08	Annual Rain Barrel Sale at Halyburton Park	General public	Stormwater staff NHSWCD Rainwater Solutions	Annual Rain Barrel Sale to promote rain barrels and water conservation	241 rain barrels sold Stormwater Services donates raffle for $35 off for 10 people
4/25/07	Lower Cape Fear Earth Day Celebration at Hugh MacCrae Park	Festival attendees, general public	Stormwater staff (SWS is an annual sponsor of Lower Cape Fear Earth Day Festival)	Display booth to promote stormwater pollution prevention	Stormwater information distributed. 4,000+ attendees

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
9/8/08	Wilmington Dog Jog	Dog owners	Parks and Recreation Dept.	250 pet waste magnets and brochures distributed	Annual event (postponed due to Hurricane Hanna)
6/2/08	319 EPA Grant Celebration; Gregory Elementary School	Grant partners; BMP installations	Christy Perrin Mayor Bill Saffo	Ceremony and ribbon cutting at Gregory Rain Garden; BMP Tour followed	Culmination of grant activities
2/8/09	Pet Expo	Pet owners	Stormwater staff NHSWCD staff	Direct outreach, contest	Educated pet owners Got suggestions for pet waste campaign slogans
Ongoing	Monthly Rain Barrel Sale	General public	Stormwater staff NHSWCD staff	Monthly rain barrel sale to the general public	Encourage water conservation and stormwater mitigation

Contest

N/A					

Storm Drain Marking

Ongoing	Campaign to place storm drain markers and educational doorhangers downtown and Greenfield Lake	City residents, businesses, landscapers	Stormwater staff Code Enforcement officer Volunteers	Stormwater awareness and pollution prevention	SWS works with citizens, neighborhoods, school groups, UNCW, and our Code Enforcement officer to place storm drain markers

Stream & Litter (Watershed) Clean-ups

9/27/2008	Greenfield Lake "Big Sweep"	Lake shore line and Lake Branch feeder	CFRW Volunteers	55 volunteers/ 175 hours donated	50 bags/1000 lbs. of trash collected
10/26/2008	Cape Fear River	Keg Island	CFRW Volunteers	70 volunteers/ 208 hours donated	90 bags/4000 lbs. of trash collected
11/15/2008	Burnt Mill Creek	Downey Branch	CFRW Volunteers	9 volunteers/ 36 hours donated	6 bags/120 lbs. of trash collected
11/29/2008	Burnt Mill Creek	Kerr Ave. Wetland	CFRW Volunteers	10 volunteers/ 30 hours donated	5 bags/150 lbs. of trash collected
12/13/2008	Smith Creek	½ mile eastern shoreline south of Smith Creek Rd.	CFRW Volunteers	10 volunteers/ 35 hours donated	50 bags/2000 lbs. of trash collected

Group Presentations, Speeches

4/1/08	Website Direct Mail Special Events	HOAs Garden Clubs Civic Groups	Stormwater staff NHSWCD staff	Stormwater 101 powerpoint presentation Q&A session	Educate residents and businesses about stormwater pollution, solutions, BMPs, and how to get involved
7/24/08	NC Cooperative Extension Auditorium	Wilmington Newcomers Gardening Club	Stormwater staff	Stormwater 101 powerpoint presentation Q&A session	Educate community group about stormwater pollution, solutions, BMPs, and how to get involved

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
12/6/08	Newbridge Bank	Pages Creek HOA	NHSWCD	Stormwater 101 powerpoint presentation Q&A session	Educate HOA about stormwater pollution, solutions, BMPs, and how to get involved

News Coverage

6/2/08	TV News Coverage - WWAY	General Public	Watershed Kids Award	Viewing audience	EPA 319 grant celebration at Gregory Elementary School
6/2/08	TV News Coverage - WECT	General Public	Burnt Mill Creek Celebration	Viewing audience	EPA 319 grant celebration at Gregory Elementary School
11/18/08	TV News Coverage - WECT	General Public	Large Sinkholes in Wilmington	Viewing audience	Sink holes caused by old stormwater pipes
1/29/2009	WECT & WWAY TV stations	General public Elected officials	City staff	Ribbon-cutting ceremony for official Wade Park & Stormwater Wetland grand opening	Local coverage on network TV stations

Workshops and Classroom Outreach

3/11/08	Noble Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
3/13/08	Noble Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
3/18/08	Noble Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
3/25/08	Myrtle Grove Middle	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
4/3/08	Myrtle Grove Middle	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
4/15/08	Myrtle Grove Middle	2 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	60 students
4/17/08	Trask Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
4/29/08	Trask Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
5/6/08	Trask Middle School	2 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	60 students
10/2/08	Murray Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
10/7/08	Murray Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
10/9/08	Murray Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
10/16/08	Virgo Middle School	5 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	150 students
11/18/08	Williston Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
12/2/08	Williston Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
12/4/08	Williston Middle School	3 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	90 students
2/3/2009	Roland Grise Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
2/5/2009	Roland Grise Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
2/10/2009	Roland Grise Middle School	2 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	60 students
2/17/2009	Noble Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
2/19/2009	Noble Middle School	4 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	120 students
2/24/2009	Noble Middle School	2 classes / 8th graders	Stormwater Services, NHSWCD, CFRW	Enviroscape Presentations	60 students

Distributing promos giveaways

5/1/08	WGNI Beach Bag Giveaway	Radio listeners	Cumulus/102.7 FM radio staff	Beach bag giveaway with 500 stormwater education magnets distributed	Media partnership
Ongoing	Public meetings, displays, city buildings, Dog Jog	General public	Stormwater staff	Distribute items or leave in strategic locations where citizens will pick them up	Spread stormwater messages via freebies/promos
9/1/2008	Citywide Commuter Challenge	General public Businesses	Stormwater staff	Gave 50 stormwater message items for event	Spread stormwater messages via freebies/promos
9/15/2008	Senior Fun Day	Local senior citizens	Stormwater staff	Gave 50 stormwater message items for event	Spread stormwater messages via freebies/promos

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
10/10/2008	Civic Group	Leadership Wilmington	Nikki Mitchell, NCSU Cooperative Ext.	Distribute stormwater brochures, magnets, pens	40 people
10/10/2008	1st Annual Dog Fest	Dog owners	Stormwater staff	Gave 100 pet waste brochures, magnets for event	100+ people

Brochures, Displays, Signs, Welcome Packets, Pamphlets

4/22/08	Tidal Creek Meeting (Futch, Pages, Howe creeks)	Citizens Businesses	Stormwater staff	Display booth to promote Stormwater Pollution Prevention	Education materials & stormwater giveaways 120 attendees
4/22/08	Tidal Creek Meeting (Futch, Pages, Howe creeks)	Citizens Businesses	Stormwater staff	Display booth to promote Stormwater Pollution Prevention	Materials & giveaways 100 attendees
4/27/07	Lower Cape Fear Earth Day Celebration at Hugh MacCrae Park	Festival Attendees, General Public	Stormwater staff (SWS is an annual sponsor of Earth Day)	Display booth to promote Stormwater Pollution Prevention	Stormwater information distributed. 4,000+ attendees
11/4/2008	Recycling/Proper Disposal Brochure	General Public	Stormwater staff	Redesigned brochure	Code Enforcement officer distributed at Latino Festival
11/12/08	Stewardship Development Banquet	Realtors, Developers, Environmental Groups	Stormwater staff	Direct contact with attendees; distributing stormwater educational messages	Stormwater information distributed. 200 attendees
10/26/09	Birch Creek Week	Condo owners	Stormwater staff	Displays, brochure handout, freebie giveaways	Educated pet owners and expo attendees
2/8/09	Pet Expo	Pet owners	Stormwater staffNHSWCD	Direct outreach, contest	Educated pet ownersGot suggestions for pet waste campaign slogans

Local Cable Access

Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	Narrated slide show	Stormwater 101: Fertilizer
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	5 minute mini-documentary	Amazing Oyster (Sea Grant NC) - intro
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Ashtray/Litter PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	30 minute documentary	Best Management Practices
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Car Wash PSA

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 Staff	:30 second PSA	Cigarette Butts PSA - birds (KAB)
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Cigarette Butts PSA - gunfighters
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Fertilizer PSA UNCW
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Fish PSA - NC DENR
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Illicit Discharge PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Keep America Beautiful PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Pet Waste PSA UNCW 2006
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	Pet Waste PSA UNCW pigs
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	:30 second PSA	SW Raincoat Girl PSA
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	Narrated slide show featuring 7 stormwater pollutants	Stormwater 101 Slideshow series
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	Narrated slide show	Yard Waste video
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	Meeting replay	Video of public meeting to modify stormwater ordinance
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	Scrolling slides	Upcoming events slides (i.e. monthly rain barrel sale)
Airs on rotating schedule	GTV-8 City's cable access channel	Cable access TV viewers	Stormwater staff GTV-8 staff	Narrated slide show	Shortnose Sturgeon - federally listed endangered fish species

Newsletters

Spring 08	Stormwater Watch Insert in Citywide Public Information Report	City residents Public library Special events Public meetings	Stormwater staff PIO Staff	40,000+ distributed	What is Stormwater? What is a watershed? UNCW Annual Report Top 10 List Bon Appetit Fish Ad

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
Fall 08	Stormwater information in Citywide Public Information Report	City residents Public library Special events	Stormwater staff PIO Staff	40,000+ distributed	New Stormwater Billing Information Big Sweep Clean-Up
Winter 08	Stormwater information in Citywide Public Information Report	City residents Public library Special events	Stormwater staff PIO Staff	40,000+ distributed	Stormwater 101 program Rain Barrel Sale info

Citizen Contacts

Ongoing	Stormwater Office via phone or email	Citizen	Stormwater staff	Email or phone responses to requests for information, literature, etc.	Information provided for specific nature of contact; 50 contacts recorded

Weekly Update Articles for City Council / Media / City Staff

Weekly	Email	City Council, media, City employees	City staff	Weekly update of events, news, projects, etc.	Stormwater information was included in 16 Weekly Updates this year

Stormwater Staff Training

12/3/2008	Stormwater Maintenance Bldg.	SW Maintenance Staff	CFRW Rob Moul & Ashley Futtrell with Land Management Group	20 stormwater field crew staff members: Classroom presentation followed by field ID exercise	Invasive & Non-Invasive plants - aquatic & terrestrial ID

Identification of Target Pollutants, Sources and Audiences

The following pollutants have been identified as significant sources of pollution in our waterways. Many of these pollutants also negatively impact the proper function of the storm drainage system. These particular pollutants were chosen to be the focus of our education program based on several sources of data including UNC-Wilmington water quality monitoring data, New Hanover County Animal Control statistics, and the 2006 NC Statewide Stormwater Survey of North Carolina residents. This particular survey has provided valuable insight and documentation into residents' awareness, perceptions, and behaviors about stormwater runoff pollution in NC.

Target Pollutant	**Pollutant Source**	**Target Audience(s)**
Bacteria, viruses, parasites, and nutrients	Pet Waste (Education regarding sanitary sewer overflows is conducted by CFPUA)	-Pet owners -Pet industry professionals -General public
Nutrients such as nitrogen and phosphorous	Fertilizer	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Toxic chemicals including herbicides, fungicides, and insecticides	Pesticides	-Homeowners/residents -Landscapers -Pest Control Applicators -General public
Organic materials including leaves, grass clippings, pine straw, sticks, limbs, and other yard trimmings	Yard Waste/Debris	-Homeowners/residents -Landscape/Turf Maintenance Professionals -General public
Sand, dirt, gravel, clay, soil, etc.	Sediment	-Homeowners/residents -Businesses -Construction/developers -Landscape/Turf Maintenance Professionals -General public
Plastics, paper, cigarette butts, etc.	Litter	-Smokers -Youth -General public
Motor oil, antifreeze, grease, gas, and other vehicle fluids	Auto Fluids	-Do-it-yourself oil changers -Vehicle owners -Vehicle maintenance & repair shops -General public
Phosphorous, soaps, grime	Car Washing Soaps	-Homeowners/residents -General public

Target Pollutant: Bacteria, Viruses, Parasites, Nutrients
Pollutant Source: Pet Waste
Pet waste contains a host of bacteria, viruses, parasites and nutrients that contribute to surface water pollution and public health risks.

Pollutant Info
Animal waste is generated from the natural biological processes of domesticated and wild animals. Although waste from wild animals contributes to pollutant levels in our waters, the focus of our efforts are to inform the public of the problems and solutions associated with waste from domesticated pets.

Problem/Issue
According to 2006 data provided by New Hanover County Animal Control Services, there were 53,630 registered dogs and cats in New Hanover County (33,828 registered dogs and 19,802 registered cats). In addition, it is estimated that there are 5 unregistered pets for every 1 registered pet.

These numbers, in conjunction with the average defecation rate of pets, are a significant source of bacterial pollution draining to our area waterways. Canines produce an average of ¾ lb of waste per day; applying that rate to the number of dogs registered in New Hanover County in 2006 equates to 25,371 pounds of excrement produced daily by canines in New Hanover County. If we consider the estimated number of unregistered dogs, that figure climbs significantly.

Stormwater contamination from pet waste poses serious health risks for humans. When pet waste is left on the ground, stormwater runoff can carry viruses, bacteria, and parasites from pet waste into local surface waters via the stormwater drainage system. Humans can become ill by swimming or recreating in waters contaminated by pet waste, eating shellfish from contaminated waters, coming in direct contact with pet waste, or from flies which spread diseases. Wilmington's creeks and waterways are regularly monitored by UNCW Center for Marine Science Research staff, and surface waters in the Wilmington area consistently exceed the state standards for fecal coliform counts in human contact waters as set by NC DEHNR (Mallin et. al). High fecal coliform counts in Wilmington's waterways are a direct result of pet waste contaminated stormwater runoff. The health risks to humans associated with the bacteria and parasites polluting surface water from pet-waste contaminated stormwater runoff make education and outreach on pet waste a top priority.

Several diseases that humans can contract from pathogens in pet waste include:

- ***Toxoplasmosis*** - Toxoplasmosis is a parasitic disease caused by the protozoan *Toxoiplasma gondii* and infects most warm-blooded animals including humans. The primary host is the felid (cat) family. Humans can contract the disease by ingestion of infected animal (especially cat) feces through hand-to-mouth contact following activities that involve touching anything that has come into contact with animal feces such as gardening, cleaning a litter box, etc. Humans can also contract the disease by ingestion of water contaminated with Toxoplasma, such as contact recreation in water contaminated with the Toxoplasma. A person suffering from acute toxoplasmosis show flu-like

symptoms, swollen lymph nodes, or muscle aches and pain that lasts for a month or more. Young children, elderly people, pregnant women, and immuno-compromised patients, such as those with HIV/AIDS, are especially susceptible to toxoplasmosis. Severe toxoplasmosis can cause damage to the brain or the eyes and birth defects in newborns ("Toxoplasmosis: Fact Sheet" CDC Division of Parasitic Diseases).

- ***E. Coli*** - Escherichia coli (E. coli) are one of the main species of bacteria living in the lower intestines of mammals such as dogs and cats. Humans can contract E. coli through ingestion of water contaminated with the bacteria through drinking or contact recreation. People generally become ill from E. coli two to eight days after being exposed to the bacteria, and infection often causes severe bloody diarrhea and abdominal cramps; complications from severe E. coli infection can lead to death. In some people, E. coli infection can cause a complication called hemolytic uremic syndrome (HUS), a life-threatening condition that is usually treated in an intensive care unit through blood transfusions and kidney dialysis. A small percentage of persons with HUS have immediate complications with lifelong implications such as blindness, paralysis, persistent kidney failure, and mild abnormalities in kidney function ("Disease Listing, Escherichia Coli O157:H7, General Information" CDC Division of Bacterial and Mycotic Diseases).

- ***Salmonella*** - Salmonellosis is an infection of the intestines caused by Salmonella bacteria, which are found in the feces of people and animals infected with Salmonella. Humans can contract Salmonella infections through contact with infected animals or their feces, including contact recreation or drinking water contaminated with the bacteria. Salmonella in humans can cause diarrhea, stomach pain, nausea and vomiting, and fever and headache, usually within 6 to 72 hours after exposure to Salmonella ("Disease Listing, Salmonellosis, General Information" CDC Division of Bacterial and Mycotic Diseases).

- ***Gastroenteritis*** - Gastroenteritis is a general term referring to inflammation or infection of the gastrointestinal tract, primarily the stomach and intestines. Gastroenteritis is the most common illness associated with swimming in water polluted by sewage and/or pet waste, and it occurs in a variety of forms that can have one or more of the following symptoms: nausea, vomiting, stomach ache, diarrhea, headache, and fever ("Viral Gastroenteritis" Center for Disease Control and Prevention, Respiratory and Enteric Virus Branch.).

- ***Roundworm*** - Roundworms, or nematodes, are a group of invertebrates whose larvae can be found in animal feces. Human can contract roundworm infections either by ingestion or through the skin ("Toxocariasis: Fact Sheet" CDC Division of Parasitic Diseases).

  Some of the most common parasitic roundworms that can be transmitted to humans are:

  - *Enterobius vermicularis*, the pinworm that causes **enterobiasis**
  - *Ascaris lumbricoides*, the large intestinal roundworm that causes **ascariasis**
  - *Necator* and *Ancylostoma*, two types of hookworms that cause **ancylostomiasis**

- *Trichuris trichiura*, the whipworm that causes **trichuriasis**
- *Strongyloides stercoralis* that causes **strongyloidiasis**
- *Trichinella spiralis* that causes **trichinosis**

Pet waste also seriously impacts a waterway by contributing nutrients that spur excessive weed and algae growth. When algal biomass decomposes, it consumes large amounts of dissolved oxygen (DO) from the water that can lead to dangerously low dissolved oxygen levels and fish kills. This nutrient-rich water impairs aquatic habitat and is unattractive and unhealthy for drinking, swimming, fishing, and other recreational activities.

Target Audience
Based on the results of the 2005 Survey of North Carolina residents' stormwater behaviors and the City of Wilmington demographics, it was determined that education and outreach efforts should target the following audiences *(Note: A target audience is subject to modification over time pending results of periodic assessment and evaluation):*

1. Pet Owners
   Pet owners are considered the primary focus for outreach and education. By right of ownership, a pet owner is empowered with the ability to reduce pet waste-contaminated stormwater runoff by cleaning up after his/her pet. Successful and continued education and outreach to pet owners has the potential to significantly reduce bacterial pollution and eutrophication of Wilmington's waterways.

   Pet owners offer a variety of reasons for not picking up after their pets, including:
   - Not wanting to touch it
   - Thinking of it as fertilizer
   - Believing it will decompose quickly and go back into the soil
   - Being unaware of the health risks
   - Feeling it is their private property and therefore can do whatever they wish

   The habit of NC pet owners cleaning up after their pets reflects these attitudes. Significantly more than half of each demographic (age, sex) in the survey responded to picking up after their pet as "Sometimes," "Rarely," or "Never" (Bartlett C-51). This data leads to the conclusion that the primary target audience for education and outreach should be broad initially, and adjusted to target more specific demographics pending the results of assessment and evaluation of education efforts.
   - 18 to 64 year olds: Based on the survey results, the target audience's age is very broad. Pet owners aged 65 and older exhibit slightly better waste clean-up habits; the survey did not include pet owners under the age of 18.

   - Males and Females: Females were reported as having slightly better pet waste clean-up habits than males, but significantly more than half of each group still reported cleaning up after their pet as "Sometimes," "Rarely," or "Never."

2. Pet Industry Professionals/Businesses/Events
   Education and outreach to pet industry professionals is extremely important because of their regular contact with pet owners. Targeting businesses, professionals, and events that cater to pet owners will enable us to educate those in the profession as well as have them serve as a conduit to deliver education and outreach messages. Businesses, professionals, and events that should be targeted include:

   - Veterinarians
   - Animal hospitals
   - Pet sitters
   - Doggie day cares
   - Pet trainers
   - Pet exercisers
   - Kennels and animal shelters
   - Groomers and pet spas
   - Pet supply stores
   - Pet magazines
   - Dog Jog, Paw Jam and other special events for pets
   - Local adoption agencies
   - Animal Control & the Humane Society

3. General Audience
   By targeting a general audience for education and outreach efforts, we will be able to encourage more environmental stewardship of citizens in the community. Both pet owners as well as non-pet owners will understand the connection between pet waste and poor water quality, and as a result more pet owners will feel obligated to clean up after their pet as they will feel pressure from other citizens to do so. As more citizens are aware of the health consequences as well as the impacts to Wilmington's waterways, the more likely they are to report pet waste violators, or interject when witnessing a pet waste violation.

Key Messages for Pet Waste Education

- Uncollected pet waste pollutes Wilmington's waterways and threatens public health.
- Bacteria in pet waste can cause diseases and infections in humans and other animals.
- Bacteria and nutrients in pet waste can cause serious water quality problems.
- Pet owners/custodians should always clean up and properly dispose of pet waste by methods such as bagging, burying waste, using a pet waste digester, using a covered letterbox, etc.
- Pet waste should not be flushed down the toilet in New Hanover County.

Message Distribution

- Distribute pet waste education brochures through all veterinarian offices in New Hanover County.
- Add more pet waste educational signs to the pet waste stations in City Parks.
- Revise pet waste ordinance and require pet owners to pick up after their pet on public property. Include a clause that requires pet owners to show they have something on their person to do so (i.e. bag, scooper, etc).
- Mail a pet waste education brochure to all registered pet owners in New Hanover County.

- Using male-oriented media, target males, ages 18-64 through a mass media campaign for pet waste.
- Establish contact with pet industry professionals and businesses to disseminate pet waste education messages, such as mailing them informational and educational materials, giving presentations at their businesses or community events, meeting with them and highlighting education outreach materials, etc.
- Participate annually in the Wilmington Dog Jog event and Paw Jam event to disseminate pet waste messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper pet waste disposal
- Develop and distribute public service announcements on pet waste on cable access and paid media as the budget permits

Assessment and Evaluation

- Periodically assess the habits of pet owners and pet industry professionals by:
  - Direct observation of habits *(collects vs. doesn't collect, where dispose, etc.)*
  - Count of citations issued for pet waste violations
  - Count of reported complaints to Stormwater Hotline regarding pet waste violations
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Fecal Coliform counts in local waters

Target Pollutant: Nutrients (nitrogen, phosphorous)
Target Pollutant Source: Fertilizer
Nutrients found in fertilizer, including phosphorous and nitrogen, cause algal blooms, low dissolved oxygen levels, fish kills, and poor aquatic habitat.

Pollutant Info
Fertilizers are substances spread on or worked into soil to increase its capacity to support plant growth. Fertilizers can be composed of organic and inorganic chemicals and compounds, and typically provide, in varying proportions, three major plant nutrients: nitrogen, phosphorous, and potassium. Sources of fertilizers include residential and commercial applications, applied by a wide variety of people ranging from the novice homeowner and gardener to professionally-trained landscapers and turf maintenance workers. Although not typically found in the City of Wilmington, another major source of fertilizer application is the farming of crops.

Problem/Issue
Proper application of fertilizer results in minimal environmental concerns, however negligent or improper application of fertilizers results in the introduction of nutrients and chemicals into local waterways via stormwater runoff. Improper application includes over-applying by frequency or volume, applying the wrong fertilizer compound, applying before rain, and failure to clean excess fertilizer from driveways and streets after application.

The chemicals and nutrients in fertilizers wash into surface waters during rain events or irrigation practices and result in eutrophication, which is the abundant accumulation of nutrients that support a dense growth of algae and other organisms. Decaying algae depletes dissolved oxygen from the water, resulting in a decrease of available oxygen for aquatic inhabitants like fish. This leads to a decline in aquatic organism populations from oxygen deprivation, or hypoxia.

Harmful algal blooms also prevent sunlight from penetrating surface waters, making it difficult for benthic, or bottom dwelling plants, to perform photosynthesis, which also further reducing the oxygen content of the water. Some algal blooms can be toxic to plant and animals, including humans.

Target Audience
The target audience for fertilizer education and outreach includes homeowners, business owners, and landscape and turf maintenance professionals. Generally, trained landscape business professionals have had some training and special knowledge on proper fertilization measures, however continuing education for alternatives to fertilizer application and frequent over-application is still very necessary for this sector. Homeowner education should be a top priority.

1. Homeowners
   About 5% of residents who apply fertilizer to their yard apply it monthly. The majority of responses to "monthly" were of the highest income level of the survey respondents. The most responses to applying fertilizer 2-3 times per year were from the two highest income brackets in the survey (Bartlett 14).

Male homeowners who spend less than $500 per year on lawn care are the group that applies the most fertilizer themselves and not by hiring a professional service. Those who spend more tend to hire a professional service ("Toolbox – Audience Data").

2. Landscape and Turf Maintenance Professionals
   Professionals employed in landscaping and turf maintenance should be a target audience due to their frequent use of fertilizers.

Key Messages for Fertilizer Education

- There is a direct link between improper fertilizer application and poor water quality impacts, including fish kills, habitat destruction, and water quality degradation.
- Promote time and money-saving alternatives to traditional fertilizer application including "grasscycling" (leaving grass clippings on the lawn as a natural fertilizer and soil conditioner), composting, using organic fertilizers, and getting a free soil test to determine the correct nutrient needs of a lawn and the proper application rates.
- If you use fertilizer, read the label and apply correctly (i.e. not before it rains).
- Fertilizer should be collected off of paved surfaces such as sidewalks and driveways.
- Yard waste is also a source of nutrients because of the fertilizer attached and the nature of the organic matter, so yard waste should always be disposed of properly.
- Citizens should employ a sense of responsibility and environmental stewardship to apply fertilizer properly.

Message Distribution

- Distribute fertilizer education brochures to all yard maintenance and turf management businesses in New Hanover County.
- Mail a fertilizer education brochure to all City of Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.
- Establish contact with local homeowners associations to disseminate fertilizer education messages through mailings, newsletters, presentations, and meetings, etc.
- Establish contact with yard maintenance and turf management businesses to disseminate fertilizer education messages and encourage and ensure proper staff training.
- Establish contact with management staffs of the golf courses in New Hanover County to disseminate fertilizer education messages and ensure proper staff training.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper fertilizer application.
- Develop and distribute public service announcements on the importance of proper fertilizer application.

Assessment and Evaluation

- Periodically assess the habits of homeowners and landscape industry professionals by:
  - Direct observation of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area
  - Surveys of the fertilizer application habits of homeowners and landscape industry professionals in the Wilmington area
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Toxic chemicals
Target Pollutant Source: Pesticides
Pesticides include herbicides, fungicides, and insecticides which are chemicals that can persist in the environment and disrupt aquatic habitat, contaminate water resources, and cause toxicity in humans, animals and aquatic habitat.

Pollutant Info
Pesticides are applied by homeowners, business owners, landscape and turf maintenance professionals, and exterminators and pest control professionals.

As defined by the Environmental Protection Agency (EPA), a pesticide is "any substance or mixture of substances intended for preventing, destroying, repelling, or lessening the damage of any pest." Sources of pesticides include applications to homes and businesses by homeowners, business owners, or commercial pesticide professionals. Agricultural application of pesticides is not considered a source in Wilmington because of the absence of agricultural operations in the area.

Problem/Issue
Commonly used organophosphate pesticides are present in urban stormwater runoff and are responsible for toxicity to aquatic life in receiving water bodies. Pesticides can bio-accumulate up the food chain and pose a threat to beneficial bugs, the aquatic environment, wildlife, and humans.

Target Audience
1. Homeowners and Residents
   A majority of the target pollutant pesticides are commonly available from home improvement and gardening stores and do not require training or licensing as a prerequisite to purchase or application. Thus, home and residential applications by citizens potentially contributes to the contamination of stormwater and surface water from pesticides. Education and outreach to Wilmington's residents on the proper application techniques and practices for pesticides would potentially reduce improper application, and thus reducing the potential for contamination of stormwater runoff. Owners or operators of small businesses that perform their own landscape maintenance should be addressed in this target audience group also.

2. Yard Maintenance, Turf Management, Exterminator/Pest Control Professionals
   It can be assumed that professionals in this industry have been properly trained and educated in application practices for pesticides and thus this group is the second tier priority target audience. However, due to the frequency of applications by members of this target audience group, the potential for contamination of stormwater runoff by pesticides through improper application by members of this target audience group is still present. Consequently, education and outreach on proper application techniques to this target audience group is needed.

Key Outreach and Education Messages for Pesticides
- Awareness of the impact of pesticides on surface waters via stormwater runoff.
- A direct link exists between animal and habitat impacts and the application of pesticides.

- Citizens/landscapers should be encouraged to use native plants which don't require pesticides, use natural controls such as ladybugs and weeding by hand, using organic pesticides, reading the label to apply correctly (i.e. not before it rains) and using pesticides as a last resort.
- Citizens should employ a sense of responsibility and environmental stewardship to apply pesticides properly.

Message Distribution

- Establish contact with yard maintenance, turf management, and exterminator/pest control professionals in New Hanover County to disseminate pesticide education messages and encourage and ensure proper staff training.
- Distribute pesticide education brochures to all yard maintenance, turf management, exterminators, and pest control professionals in New Hanover County.
- Establish contact with local homeowners association and property management companies to disseminate pesticide education messages.
- Mail a pesticide education brochure to all Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all Wilmington citizens.
- Work with NC Cooperative Extension Service to implement educational workshops focused on proper pesticide use for professionals needing NC Pesticide credits.
- Contact local media outlets to suggest feature stores and/or articles regarding the importance of proper pesticide application.
- Develop and distribute a public service announcement on the importance of proper pesticide application.

Assessment and Evaluation

- Periodically assess the pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals by:
    - Direct observation pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
    - Surveys of pesticide application habits of homeowners, yard maintenance, turf management, and exterminator/pest control professionals
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Organic material, nutrients (nitrogen, phosphorous)
Target Pollutant Source: Yard Waste/Debris

Organic matter such as grass clippings, leaves, and other yard trimmings contribute nutrients to waterways that result in aquatic weed and algae growth, low dissolved oxygen levels, fish kills, and impaired habitat. Sediment is often attached to this organic matter.

Pollutant Info
Yard waste is produced as a result of landscaping, mowing, clipping, pruning, and gardening around homes and businesses. Yard waste consists of organic matter such as grass clippings, leaves, and branches, etc., and is produced by landscape maintenance performed by homeowners and commercial landscapers.

Problem/Issue
Yard waste can clog the storm drainage system causing flooding of streets, homes and businesses.

Yard waste that ends up traveling all the way through the drainage system ends up in local surface waters, which impacts aquatic life and habitat by introducing excess nitrogen and phosphorus to the water. This overabundance of nutrients is called eutrophication and can lead to severe algal blooms. As the algal blooms decompose, it uses up the dissolved oxygen in the water that aquatic organisms, like fish, need to survive. In addition, yard waste often carries fertilizers, pesticides, and sediment attached to it that compounds the problem of eutrophication and threatens the flora and fauna in our waterways.

Target Audience
96% of North Carolina residents surveyed reported having a yard that they personally mow. 95% of urban respondents to the survey reported either leaving their grass clippings on their lawn, collecting them and throwing them in the garbage, or using them for mulch and/or compost. Less than 2% of urban respondents reported as to blowing or raking their yard waste down the storm drain. Reponses to the survey were broken down by education level, with the largest percentages as 'High School Graduates' and 'Some College' (Bartlett, C-21).

1. <u>Lawn Maintenance and Landscape Industry Professionals</u>
   Since lawn maintenance professionals are more frequent to generate yard waste than the average home owner, they are potentially a greater contributor to the introduction of yard waste into the storm drainage system.

2. <u>Homeowners</u>
   Based on survey results, as well as the fairly even distribution of respondents by education level who reported to rake or blow their yard waste down the storm drains, the target audience should be a broad, encompassing audience. A slight priority may be given to high school and college aged audience. Based on the survey results, audience members with experience in a vocational or technical school should be given the lowest priority.

Key Outreach and Education Messages for Yard Waste

- A direct link exists between fish kills and aquatic habitat destruction as a result of improper yard waste disposal habits.
- A direct link exists between flooding of streets and property as a result of improper yard waste disposal habits.
- Landscapers/citizens should practice proper disposal methods such as grasscycling, composting, collecting/containing yard waste for pick-up and not blowing or placing debris into any part of the storm drainage system.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly.

Message Distribution

- Establish contact with yard maintenance and turf management professionals in New Hanover County to disseminate yard waste education messages and encourage and ensure proper staff training.
- Distribute yard waste educational brochures to all yard maintenance, turf management, and property management professionals in New Hanover County.
- Establish contact with local homeowners association and property management companies to disseminate yard waste education messages.
- Mail a yard waste educational brochure to all Wilmington residents.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the importance of proper yard waste disposal habits.

Assessment and Evaluation

- Elicit counts of Stormwater Maintenance Department responses to clogged stormwater system components as a result of yard waste
- Periodically assess the yard waste disposal habits of property owners and landscape/maintenance industry professionals in Wilmington by:
  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper yard waste disposal habits
  - Count of reported violations to Stormwater Hotline
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically nitrogen, phosphorus, BOD, and algal bloom frequencies and locations

Target Pollutant: Sand, dirt, gravel, clay, soil
Target Pollutant Source: Sediment
Sediment includes particles of sand, dust, dirt, gravel and soil that cause turbidity and problems for aquatic life.

Pollutant Info
Sediment is generated by the processes of natural or accelerated erosion. Natural erosion is the process of weathering that forms soil. Accelerated erosion is a result of land-disturbing activities by humans that loosens topsoil and makes it more prone to erode; construction-related activities are an example of accelerated erosion. Another example is an eroding stream bank caused by lack of a vegetated buffer.

While natural erosion contributes sediment to our waterways, the majority of the sediment comes from areas where accelerated erosion has occurred. Other sources of sediment include poorly vegetated areas in yards of homes and businesses.

Problem/Issue
Sedimentation occurs when stormwater runoff carries soil particles from an area, such as a construction site, and transports them to surface waters such as a stream or creek. Sediment can fill in a waterbody or clog the storm drainage system, which can lead to flooding of streets and property.

Excessive sedimentation clouds the water, a condition known as turbidity. Increased turbidity causes problems for aquatic plants and animals. Aquatic plants, like all other plants, require sunlight to perform photosynthesis. As water turbidity increases, the amount of sunlight able to penetrate through the water column decreases. This reduces the amount of sunlight that reaches aquatic plants, and therefore impairing plants' abilities to photosynthesize. Turbid water impairs the vision of animals, like fish, and their ability to hunt prey. Sediment in the water also impairs the ability of fish and other animals to breathe because sediment can clog their gills.

As sediment in water settles, it covers the benthic (bottom-dwelling) environment. Settling sediment smothers fish eggs, shellfish, coral, and benthic plants.

Sediment also serves as a vehicle for other pollutants like phosphorus, pathogens, and heavy metals to enter the aquatic environment. These other pollutants are often attached to sediment that ends up in surface waters, and as a result, cause their own myriad of problems to the environment.

Target Audience
Sources of sediment in our surface waters are primarily the result of accelerated erosion or erosion from any land-disturbing activity such as gardening, planting, construction, etc. The environmental consequences of sedimentation of surface waters are not widely understood by citizens, and an effective education and outreach campaign should convey the key messages to a wide target audience.

1. Homeowners and Business Owners
   A broad audience should be blanketed by education and outreach efforts. Addressing citizens and businesses that only have bare spots in their yards is unfeasible and impracticable, and therefore the efforts for education and outreach should be as far-extending as possible, relaying the key messages in a package rather than tailoring key messages to specific target audience groups. These messages should also target homeowners that live along water conveyances that have significant erosion due to lack of a vegetated buffer to stabilize the bank.

2. Construction, Landscape, and Related Business Professionals
   Due to the high amount of construction and development in Wilmington, a second-tier target audience group should be addressed that includes construction, landscape, and related industry professionals. The activities executed by members of these industries have very high potential to significantly contribute to sediment loading of stormwater runoff. Sediment and erosion control techniques are generally legally required when performing construction and landscape activities, and targeting this group with education and outreach on the environmental and legal importance of these methods can prevent a potentially large amount of sediment from being carried off by stormwater runoff.

Key Outreach and Education Messages for Sediment

- A direct link exists between sediment and poor water quality.
- Sedimentation impacts aquatic life and habitat.
- Citizens can plant groundcover, shrubs, and trees to hold soil in place and reduce erosion.
- Sediment should be collected off streets, driveways and other hard surfaces.
- Developers should follow all sedimentation and construction site laws and practices.
- Citizens and businesses should employ a sense of responsibility and environmental stewardship to contain and control sources of sediment.

Message Distribution

- Promote the NC Division of Land Resources "1-866-STOP-MUD" toll free hotline to report possible violations of the Sedimentation Pollution Control Act.
- Establish contact with construction, landscaping, and related business professionals in New Hanover County to disseminate sediment education messages and encourage and ensure proper staff training.
- Distribute sediment educational brochures to all construction, landscaping, and related business professionals in New Hanover County.
- Establish contact with local home owners associations and property management companies to disseminate sediment education messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles regarding the problems caused by sediment entering the stormwater drainage system.

Assessment and Evaluation

- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting, specifically Total Suspended Solids (TSS)

Target Pollutant: Plastic, paper, cigarette butts, etc.
Target Pollutant Source: Litter
Litter includes plastics, paper, cigarette butts, and any other trash not properly disposed of that can end up in waterways and affect aquatic habitat, wildlife, and water quality.

Pollutant Info
Litter is generated as a result of the intentional or unintentional disposal of trash, cigarette butts, paper scraps, food wrappers, etc. onto the open ground or anywhere other than a trash can, dumpster, or recycling bin.

Problem/Issue
Litter is carried by stormwater runoff into the drainage system where it can clog storm drains and drainage routes and cause flooding onto streets and property.

Litter that travels all the way through the drainage system ends up in local surface waters where it causes many problems:

- Fish, birds and other wildlife often mistake litter for food and become sick or die from ingesting it.
- Fish, birds and other wildlife become entangled in litter and perish because they become strangled or are not able to properly ingest their food.
- Litter can introduce chemical pollutants into waterways. Cigarette butts can leach chemicals such as cadmium, lead, and arsenic into the marine environment within one hour of contact with water.
- Litter is extremely costly to clean up, yet very easy to prevent. The North Carolina Department of Transportation alone spent $16 million in 2006 cleaning up roadside litter.

Target Audience
Although no surveys has been performed in Wilmington or North Carolina targeting the litter habits of citizens, other research can be considered applicable in defining the target audience. Based on an inquiry to the North Carolina Administrative Office of the Courts, a summary of the littering offenses for calendar year 2006 showed that there were 218 littering charges including six offense codes, with 81 convictions. The majority of the offenses were: *Littering not more than 15 pounds* (132) and *Improper Loading/Covering of Vehicle* (69) ("Litter Data").

Research on litter habits of Victoria, Australia citizens has shown that men litter more than women, students are more likely to litter than other people, most littering occurs in transport sites, smoking areas and market sites, and the most common reasons for littering are: "too lazy" (24%), " no ashtray" (23%), and "no bin" (21%) ("VLAA – Facts About Butt Litter"). Finally, an abundance of research has shown that cigarettes are the largest source of litter. The public education and outreach for litter should target the following audiences:

1. <u>General, Encompassing Audience</u>
   Despite several surveys and research, there is no such thing as a stereotypical litterbug. Litter habits cannot be confined to a particular demographic, and therefore education and outreach efforts should extend to every citizen in Wilmington.

2. Smokers
   Cigarette butts are the largest environmental litter problem both locally and worldwide. Smokers should be educated that cigarette butts are a major source of litter and that they negatively impact the environment.

3. Drivers of Pickup Trucks and/or Open Trailers
   A lot of roadside litter in North Carolina results from poor securing of cargo loads. Drivers that may be transporting loads of debris, yard waste, trash, etc often do not secure their loads in their truck beds or open trailers and then the load gets blown off of the vehicle and onto the roads and surrounding areas *(Keep It In Your Bed…).*

Key Outreach and Education Messages for Litter

- A direct link exists between animal kills, habitat destruction, and water quality degradation as a result of littering.
- There is a direct link between flooding of streets/property as a result of litter being carried by stormwater into the drainage system.
- Messages should encourage the use of trash bins and reducing, reusing, and recycling.
- Messages should include the specific impacts of litter on local waterways and inhabitants (i.e. plastic bags get mistaken as jellyfish by sea turtles) and litter decomposition rates to raise awareness of the longevity of litter in our environment.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

- Distribute pocket ashtrays to residents of New Hanover County to encourage proper cigarette butt disposal.
- Work with Keep America Beautiful of New Hanover County to develop and implement a public service campaign for litter education and outreach.
- Develop and distribute posters to disseminate litter education and outreach messages
- Distribute educational giveaways (i.e. pencils) about littering to students in New Hanover County.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Educate citizens and students about using North Carolina's Swat-A-Litterbug program.
- Establish contact with local sanitary disposal services to disseminate messages on proper load securing.
- Contact local media outlets to suggest feature stories and/or articles regarding problems caused by litter entering the stormwater drainage system
- Working with other local agencies, conduct volunteer litter clean-ups.

Assessment and Evaluation

- Elicit count of Stormwater Maintenance Department responses to clogged stormwater sewer system components as a result of litter.
- Have Stormwater Maintenance crews continually provide field observations of problem litter areas for clean-up by KAB community service workers or Cape Fear River Watch.
- Periodically assess the litter disposal habits of Wilmington residents by:

  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper litter disposal habits
  - Count of reported violations to Stormwater Hotline
  - Count of reported violations to Keep America Beautiful of NHC
  - Count of reported violations to Swat-a-Litterbug from New Hanover county
- Water quality levels, specifically litter quantities observed
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Motor oil, antifreeze, grease, gas, and other vehicle fluids
Target Pollutant Source: Auto Fluids

Auto fluids include gas, motor oil, gear oil, grease, and antifreeze which do not dissolve in water. These fluids can spread quickly in water poisoning fish and other organisms and bonding to birds. Petroleum products are especially harmful to plants, wildlife, and humans.

Pollutant Info

Vehicle fluids and chemical pollutants can come from intentional or unintentional disposal of fluids such as motor oil, antifreeze, grease, gas, and other vehicle fluids. Sources of these fluids are leaking vehicles or machinery, leaking oil containment devices, industrial facilities, vehicle and machinery repair facilities, storage areas (including marinas), fuel stations, parking lots, and improper disposal of chemicals by homeowners or businesses, such as the do-it-yourself homeowner.

Problem/Issue

The types and sources of this pollutant class vary considerably. As of April 2, 2007, there were 178,091 registered vehicles in New Hanover County and 83,087 within the City of Wilmington limits (Cochran, D.).

Vehicles have seals and gaskets that are leaking or have the potential to leak a variety of fluids. An accumulation of oil and grease on roadways and parking lots gets carried away by stormwater runoff. Once in water, it forms a film and makes oxygen transfer difficult and toxic for aquatic animals and plants. In fact, 1 quart of motor oil can contaminate 250,000 gallons of water.

Chemicals can also enter surface waters by accumulating on sediment that is picked up by runoff. In this case, the sediment eventually settles to the bottom of the water column and adversely affects benthic organisms.

Target Audience

1. Do-It-Yourself Oil Changer
   Citizens who perform maintenance on their own vehicles should be given a high priority for education and outreach efforts based on the potential for improper disposal methods. Only about a fifth of respondents who reported owning a vehicle also reported servicing the vehicle at home; the remainder of the respondents reported using a commercial oil change facility. Males are the typical at-home vehicle oil-changer, grouped by following age brackets (listed from the largest group to smallest): 35-44, 45-54, 18-24, over 65, 55-64, and 25-34. Race could also be considered in defining the target audience; Asian respondents reported the highest percentage of pouring used oil down the stormwater drain following servicing their vehicle. White respondents reported the highest percentage of pouring used oil in a designated section of their yard following servicing their vehicle (Bartlett C-37).

2. Vehicle Maintenance and Repair Businesses
   It could be assumed that the highest density of vehicles leaking oils and greases are located in and around commercial businesses that perform maintenance and repair on vehicles and machinery. While these vehicles await repair, they are usually stored in open (non-covered) parking lots; the runoff from large parking lots are a large contributor to oil and grease

entering our surface waters. Also, these businesses generally have on-site storage for both new and used oils, and both have the potential to leak during filling, emptying, and storage unit failure.

3. Owners of Vehicles, Machinery, and Equipment
   This target audience is large, broad, and encompassing of residents and businesses. All vehicles, machinery, and equipment that utilize oil and grease for operation have the potential to leak and contribute to stormwater pollution. In particular, vehicle owners should be educated to check for leaks, keep vehicles tuned up, repair leaks, check tire pressure and recycle vehicle fluids and batteries. In addition, citizens should be encouraged to utilize the stormwater hotline (future) to report instances of illegal fluid dumping.

Key Outreach and Education Messages for Chemicals

- There is a direct link between plant and animal kills, habitat destruction, and water quality degradation as a result of the introduction of vehicle fluids into stormwater runoff.
- Vehicle owners should be educated to check for leaks, repair them, keep vehicles tuned up, check for proper tire pressure and recycle vehicle fluids and batteries.
- Citizens should employ a sense of responsibility and environmental stewardship to dispose of yard waste properly to dispose of litter properly and encourage the reporting of litter violators and the enforcement of litter offenses.

Message Distribution

- Develop and distribute educational brochures to the community.
- Distribute educational brochures to vehicle repair/maintenance facilities to disseminate proper chemical storage and disposal messages.
- Establish contact with local home owners association and property management companies to disseminate chemical education messages.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by chemicals entering the stormwater drainage system.
- Distribute educational brochures on chemicals to all automobile owners in New Hanover County to encourage proper vehicle maintenance and chemical storage/disposal methods.

Assessment and Evaluation

- Periodically assess vehicle fluid disposal habits of Wilmington residents and businesses
  - Direct observation of habits
  - Surveys of habits
  - Count of citations issued pertaining to improper chemical disposal habits
  - Count of reported violations pertaining to chemical leaks or disposal habits to Stormwater Hotline
- Assess and evaluate local water quality utilizing yearly UNCW Center for Marine Science annual water quality reporting

Target Pollutant: Phosphorous, Dirt/Grime, Detergents
Target Pollutant Source: Car Washing Soap
Soaps used to wash vehicles often contain phosphorous, a primary nutrient of aquatic weeds and algae. Dirt and grime from vehicle washing activities are also washed into waterways.

Pollutant Info
Washing cars, boats, homes, and driveways can send soap, dirt and grime into our waterways via stormwater runoff or hose water. Some cleaning agents are more toxic to aquatic and marine organisms than others, but improper washing of cars or boats utilizing cleaning agents of any toxicity level can negatively affect water quality by contaminating the water with sediment, debris, or chemicals washed off of vehicles, driveways, etc.

Problem/Issue
Chemicals and cleaning agents that wash into storm drains and then our waterways can destroy the external mucus layers of fish that protect them from bacteria and parasites. This leads to fish kills as a result of bacterial or parasitic infections.

Many detergents also contain phosphates which promote excessive algae and aquatic weed growth. Phosphates are nutrients that promote the growth of plants and cause the growth of algae and aquatic weeds.

During the process of washing cars, boats, etc, other pollutants such as sediment, heavy metals, and chemicals may be washed away too. These pollutants are then picked up by stormwater runoff and cause their own negative consequences to the aquatic ecosystems in our area.

Target Audience
1. Homeowners/Do-it-Yourself Car Washers
   The most important group to target concerning this pollutant is citizens that wash their cars in residential areas. Based on the survey of NC residents' habits, the members of this target group that should be given priority are people in the income bracket of $35,000 to $75,000, age group 35-44, and female (Bartlett C-37). These groups accounted for the most responses to letting their soapy water run into the street or driveway.

2. Do-it-Yourself Boat Washers
   Although the survey did not include any questions on the washing habits of boat owners, this group should be given a high priority because of the potential to directly contaminate surface waters when washing their boats at moor. Boat owners that wash their boats at home on the trailer should be included in the same group as the do-it-yourself car washer.

3. Businesses Related to Home, Car, and Boat Cleaning
   It is important to include businesses that perform cleaning or detailing of cars and boats in education and outreach efforts. These businesses include:
   - Mobile Cleaning Businesses, including pressure washing and boat cleaning services
   - Car Detailing Facilities (stationary)
   - Automobile Sales Businesses

4. General, Encompassing Audience
   A general target audience is necessary because all residents and/or businesses have the potential to contribute to this target pollutant through simply washing something outdoors, such as driveways, homes, lawn furniture, or just about anything else.

Key Outreach and Education Messages for Soaps and Detergents

- Create awareness of the impact of the vehicle washing activities into surface waters either directly or via stormwater runoff.
- There is a direct link between aquatic impacts such as algal blooms and fish kills as a result of improper vehicle care habits.
- Messages should encourage citizens to wash vehicles on the grass, use a phosphate-free detergent, and/or use a commercial car wash.
- Citizens should employ a sense of responsibility and environmental stewardship to practice vehicle washing so that it does not harm the environment or our waterways.

Message Distribution

- Distribute educational brochures to automobile owners in New Hanover County to disseminate messages on proper automobile washing practices.
- Distribute educational brochures to boat owners in New Hanover County to disseminate messages on proper boat washing practices.
- Establish contact with business related to automobile or boat cleaning and pressure washing to disseminate messages on cleaning agents entering the stormwater drainage system.
- Partner with commercial car wash businesses to promote their use as an alternative to washing on the street or driveway.
- Develop and distribute advertisements about vehicle washing to run in print media.
- Establish contact with local home owners associations and property management companies to disseminate educational messages on cleaning agents.
- Include blurbs in the citywide newsletter mailed quarterly to all citizens.
- Contact local media outlets to suggest feature stories and/or articles pertaining to problems caused by cleaning chemicals/agents entering the stormwater drainage system.

Assessment and Evaluation

- Periodically assess vehicle washing and exterior home washing habits of Wilmington residents by:
  - Direct observation of habits
  - Surveys of habits

APPENDIX B

PUBLIC INVOLVEMENT AND PARTICIPATION

Included in this section:

- BMP Reporting Table
- Contracts/Cooperative Agreements with:
  - New Hanover Soil & Water Conservation District
  - Cape Fear River Watch

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED

BMP(a) Administer a Public Involvement Program
This requirement is being met as outlined in BMPs (b-e) below

BMP(b) Allow the Public and Opportunity to Review & Comment on Stormwater Plan
Results and a video of the public input meeting held in 2008 were posted on the Stormwater Services website. The meeting was also played on the City's cable access channel (GTV-8). Citizen surveys and feedback was utilized to revise the ordinance.

BMP(c) Organize a Volunteer Community Involvement Program
The City of Wilmington contracts annually with two local agencies, Cape Fear River Watch (CFRW) and New Hanover Soil & Water Conservation District (NHSWCD), to implement public involvement and participation activities, as well as education and outreach activities. Both organizations sign a yearly contract with specified service deliverables that enable the City to meet many NPDES requirements for public education and public involvement. Copies of the annual reports and progress reports are included in the Appendix. Below is a summary of each organization's deliverables in regards to NPDES:
CFRW - implement volunteer watershed monitoring program and incorporate the Muddy Waters program, participate and provide assistance for public meetings and hearings conducted by Stormwater Services, implement volunteer creek/watershed cleanups, monitor/maintain/provide public education for the Kerr Avenue Wetland, coordinate workshops for City personnel, provide educational programs for City residents (i.e. Saturday seminars, Greenfield Lake eco-tours, presentations for civic groups, etc.), partner on grant projects (i.e. CWMTF grant), implement backyard BMPs, conduct Enviroscape presentations for 8th grade students, monitor and report monthly on Greenfield Lake, provide quarterly progress reports and a year end summary of all deliverables.
NHSWCD - provide Enviroscape presentations to 8th grade students, coordinate monthly rain barrel sale, conduct presentations for civic and community groups, provide LID education, assist with City's public involvement efforts, administer statewide NCCCAP BMP program in area watersheds and work with citizens to identify and install backyard BMPs through NCCCAP, increase awareness of fecal coliform pollution, organize/facilitate environmental field days and teacher workshops, facilitate Stewardship Development Award Program to promote outstanding environmental stewardship, participate in community outreach events, serve as lead agency for land conservation efforts in the Hewlett's Creek Watershed, conduct watershed-based community outreach.

Visit the Appendix to review the annual contracts, reports, and activities conducted by each organization.

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
BMP(d) Establish a Mechanism for Public Involvement					
11/18/08	The Keys Apartment Community 4129 Hearthside Dr.	Property owners affected by stream bank stabilization project at Doctor's Branch.	McKim & Creed, PA City of Wilmington SWS	Show community results of site survey and stream evaluation. Gather public input about project.	Move forward with project and incorporate public input into project.
8/21/08	Winter Park Presbyterian Church	Property owners affected by drainage project along Cedar Avenue	Kimley Horn and Associates City of Wilmington SWS	Show community results of site survey and stream evaluation. Gather public input about project	Move forward with project and incorporate public input into project.
10/22/09 & 10/23/09	New Hanover Coop Ext office	Property owners affected by drainage project on S. Branch of Bradley Creek	Dewberry Inc City of Wilmington SWS	Show community results of site survey and stream evaluation. Gather public input about project	Move forward with project and incorporate public input into project.
12/18/08	NE New Hanover Library	Property owners affected by drainage project on Cavalier Dr	Moffatt and Nichol City of Wilmington SWS	Show community results of site survey and modeling results. Gather public input about project	Move forward with project and incorporate public input into project.
9/27/08	Big Sweep Nationwide Cleanup	Greenfield Lake & Area Beaches	Volunteers	Stream bank, shoreline, and canoe cleanup of Greenfield Lake	55 volunteers contributed a total of 175 hours. Collected 50 bags of trash; approximately 1,000 lbs.
Ongoing	Stormwater office via phone or email, public meetings, etc.	General public, citizens, businesses	Stormwater staff	Email or phone responses to citizen requests for information, literature, etc.	Information provided for specific nature of contact
4/15/2008	Tidal Creek Meeting (Futch, Pages, Howe creeks)	Citizens, businesses	Stormwater staff NCCF NHSWCD City Planning UNCW	Public information meeting	150+ attendees Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 120 attendees

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
4/15/2008	Tidal Creek Meeting (Bradley, Hewletts, Whiskey creeks)	Citizens, businesses	Stormwater staff NCCF NHSWCD City Planning UNCW	Public information meeting	100+ attendees for Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 100 attendees
5/8/2008	Smith Creek Community Meeting	Citizens, businesses	City of Wilmington New Hanover County NHSWCD CFRW UNCW	Public information meeting	100+ attendees for Stormwater 101, health of the creeks, CCAP, LID, participation opportunities 100 attendees
2/8/09	Pet Expo	Pet owners	Stormwater Staff NHSWCD	Direct outreach with pet owners	Educated pet owners
BMP(e) Establish a Hotline/Helpline					
This BMP will occur according to schedule in Year 3.					

CAPE FEAR RIVER WATCH
617 Surry Street
Wilmington, NC 28401
(910) 762-5606
www.cfrw.us

RE: Annual Request Letter, FY 08/09

January 30, 2008

Dave Mayes, Manager
City of Wilmington, Stormwater Services
PO Box 1810 / 305 Chestnut Street
Wilmington, NC 28402

Dear Dave,

Enclosed is the Annual Service Contract proposal for FY **08/09**. The requested amount of funding is **$15,000**.

The opportunity to work with the City of Wilmington through a mutually- beneficial agreement that enhances the City's outreach and education efforts and supports Cape Fear River Watch's (CFRW) mission to improve the water quality of the Lower Cape Fear River, has grown into a valued partnership. The scope of services proposed for 2008- 2009 will enable us to continue to build on the significant progress we have made over the last two years by focusing our efforts on education programs, watershed clean-ups, and advancing the volunteer watershed monitoring program.

Many of the services that CFRW provides address specific requirements of the City's National Pollutant Discharge Elimination System (NPDES) Phase II Federal Stormwater Permit. These Permit requirements include the following *Objectives* and *BMPs specified* to meet NPDES *Permit Requirements*:

Distribute educational materials to the community. CFRW assists in the development and distribution of public educational material.

Conduct public outreach activities. Raise public awareness on the causes and impacts of stormwater pollution. CFRW plans, implements and documents community events, stream and watershed litter clean-ups, numerous educational programs, and presentations to community groups.

Public Involvement and Participation. Organize a volunteer community involvement program. CFRW plans, implements and documents a volunteer community involvement program that includes waterway clean-ups, watershed monitoring, Enviroscape presentations in schools, eco-tours of Greenfield Lake, college intern education, and wetland and open space stewardship.

Examples of CFRW contributions to the city's NPDES goals during the 2006-2007 Scope of Services period included:

7 clean-ups completed by 141 volunteers who removed over 3 tons of trash from Wilmington watersheds. 118 outreach and educational programs that served over 400 adults and more than 1000 students. These programs included: 10 First Saturday Seminar Programs, Greenfield Lake School Field Trips, Enviroscape School Presentations, and 61 Greenfield Lake Eco-tours.

At this point, a little more that half way through the current 2007-2008 scope of services period CFRW is on track to duplicate and improve on all we are able to accomplish in 2006-2007.

For fiscal year 08-09, we are requesting $15,000 to continue to build on our accomplishments, to expand education programs, to attract more volunteers and provide the continuity necessary to retain volunteers, and keep pace with increased expenditures required to sustain high quality services. As a non-profit organization, we are not immune to the rising costs of doing business. The cost of insurance, utilities, phone service, fuel, and computer access have all increased. These are all necessary for us to plan/host programs, attract volunteers, and provide working space for staff.

$1100 of the increased funding we are requesting will be dedicated to purchasing a wetlands Enviroscape Model. We currently borrow a model. Staff and volunteer time is used to pick-up and return the borrowed model. On a few occasions we have turned down groups requesting an Enviroscape presentation because there was not one available for us to borrow. Owning a model will be much more efficient, cost-effective, and well-utilized.

Funding this Scope of Services agreement is a great investment in securing our mutual goal of water quality improvements for both the City and Cape Fear River Watch. This is an investment that provides great return in terms of volunteer hours devoted to water quality improvements and expansion of public understanding, support, and action through outreach and education.

Sincerely,

Sue Y. Hayes
President, Cape Fear River Watch

CAPE FEAR RIVER WATCH
617 Surry Street
Wilmington, NC 28401
(910) 762-5606
www.cfrw.us

Annual Service Contract: July 1, 2008-June 30, 2009

Cape Fear River Watch, Inc. (CFRW), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2008** through **June 30, 2009** for the agreed amount of $**15,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Service #1: Coordinate volunteer clean-ups of local watersheds.
These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, and as the need is discovered by the City or volunteer watershed monitors. This will include the coordination of at least one site for Big Sweep, an annual international clean-up. A minimum of 7 clean-ups will be completed. A summary of each clean-up will be completed and submitted to Stormwater Services. The summary will include the specific areas/waterways cleaned, number of participants, hours worked, estimate of quantity of waste materials removed, and if possible photographs to document the work completed.

Service #2: Monitor and maintain the Kerr Avenue Stormwater Wetland on a monthly basis. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A summary of these activities will be completed and submitted to Stormwater Services. The summary will include the number of participants, hours worked, brief description of activity, and if possible photographs to document the work completed.

Service #3: Provide outreach and education for the Kerr Avenue Stormwater Wetland.
This will include of presentations to various groups, such as conference attendees, homeowner associations, students at all levels, and periodic outreach to inform and educate business owners/operators and property owners in close proximity to the wetland.

Service #4: Coordinate Stormwater Workshops for City of Wilmington personnel.
Educational and when appropriate hands-on workshops for city personnel will be planned and conducted during the year. Other City departments, such as the Streets Division, will be encouraged to attend these workshops. Topics and specific dates for these workshops will be presented for approval not later than August 31, 2008. Target workshop dates will be November and/or April.

Service #5: Provide educational programs for Wilmington residents. Educational programs will include First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the community. Educational programs for homeowners associations should be planned and coordinated with Stormwater Services. Educational programs will also include eco-tours at Greenfield Lake and winter, spring, and fall birding tours and Smith Creek paddling tours.

Service #6: Continue to serve as an active partner organization on local grant projects and water quality initiatives. These projects include the Clean Water Trust Fund Planning Grant for Burnt Mill Creek, the Smith Creek Initiative, and may include new grants the City is successful in partnering/securing.

Service #7: Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each school year. Presentations will focus on specific NC 8th grade science goals and objectives for the hydrosphere/water quality and will be done in coordination with other environmental educators. CFRW will complete a minimum of 1/3 of the presentations to 8th grade science classes in New Hanover County Schools. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade program as requested. A new Enviroscape Wetlands Model will be purchased with funding provided in this Scope of Services agreement. A summary will be provided for each presentation given that is not a part of the 8th grade initiative. Summary information will include the date, location and number of student participants.

Service #8: Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. Monitoring will include monthly, weekly and daily observations as applicable and as coincides with the assignment of staff and volunteers to Greenfield Lake. A brief monitoring report will be sent via email to Stormwater Services for the period from April through November.

Service #9: Establish a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas. Volunteer monitoring of target high priority creeks or creek sections identified in cooperation with Stormwater Services will begin in September. The Waterkeeper Alliance *Muddy Waters Program* will be included as an integral part of volunteer monitoring. CFRW will incorporate *Muddy Waters* training and support materials into materials that will be designed and utilized for watershed monitoring. A monitoring report format with basic field observations and photo documentation will be submitted for review and approval in August. The number, frequency, and quality of monitoring reports will increase as the number of volunteers involved increases and as their skills and abilities grow.

Service #10: Participate in and provide support and assistance for public meetings and hearings conducted by Stormwater Services.

Service #11: Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES

stormwater permit. Summary reports and information may be included in the City's NPDES yearly report to the State.

<u>Service #12</u>: Submit quarterly progress reports and invoices (for 1/4 of annual contracted funding amount) according to the following schedule: July 1 - Sept 30, 2008; October 1 - Dec. 31, 2008; January 1 - March 31, 2009; April 1 - June 30, 2009. Each quarterly distribution will be paid once quarterly progress report and invoice are received and reviewed for adequate progress. Also provide a compiled Year End Summary Report by June 30.

CAPE FEAR RIVER WATCH
617 Surry Street
Wilmington, NC 28401
(910) 762-5606
www.cfrw.us

Quarterly Progress Report #2: October 1-December 31, 2008

Cape Fear River Watch, Inc. (CFRW), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2008** through **June 30, 2009** for the agreed amount of $**15,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Service #1: Coordinate volunteer clean-ups of local watersheds.
These cleanups will focus on Greenfield Lake, Smith Creek, Burnt Mill Creek, and as the need is discovered by the City or volunteer watershed monitors. This will include the coordination of at least one site for Big Sweep, an annual international clean-up. A minimum of 7 clean-ups will be completed. A summary of each clean-up will be completed and submitted to Stormwater Services. The summary will include the specific areas/waterways cleaned, number of participants, hours worked, estimate of quantity of waste materials removed, and if possible photographs to document the work completed.

Creek/Watershed Clean-ups				
Date	**Watershed**	**Area Cleaned**	**Volunteers/Hours**	**Trash Collected**
9/ 27/ 08	Greenfield Lake "Big Sweep"	Lake shore line and Lake Branch feeder	55/ 175 hrs.	50 bags/1000 lbs.
10/26/08	Cape Fear River	Keg Island	70/208 hrs.	90 bags/4000 lbs.
11/15/08	Burnt Mill Creek	Downey Branch	9/36 hrs.	6 bags/120 lbs.
11/29/08	Burnt Mill Creek	Kerr Ave. Wetland	10/30 hrs.	5 bags/150 lbs.
12/13/08	Smith Creek	½ mile eastern shoreline south of Smith Creek Rd.	10/35 hrs.	50 bags/2000 lbs.

Service #2: Monitor and maintain the Kerr Avenue Stormwater Wetland on a monthly basis. Activities include supporting school group clean-ups, maintenance of plants as needed, evaluation and consulting on larger maintenance needs. A summary of these activities will be

completed and submitted to Stormwater Services. The summary will include the number of participants, hours worked, brief description of activity, and if possible photographs to document the work completed.

Monitoring reports were completed and submitted for July, August, October and November. A watershed clean-up was completed on November 29, 2008. This clean-up was coordinated and lead by a Laney High School senior as part of his senior project requirement.

Service #3: Provide outreach and education for the Kerr Avenue Stormwater Wetland. This will include of presentations to various groups, such as conference attendees, homeowner associations, students at all levels, and periodic outreach to inform and educate business owners/operators and property owners in close proximity to the wetland.

Service #4: Coordinate Stormwater Workshops for City of Wilmington personnel. Educational and when appropriate hands-on workshops for city personnel will be planned and conducted during the year. Other City departments, such as the Streets Division, will be encouraged to attend these workshops. Topics and specific dates for these workshops will be presented for approval not later than August 31, 2008. Target workshop dates will be November and/or April.

City of Wilmington Personnel Workshops			
Date	**Topic**	**Attendance**	**Comments**
12/3/08	Plant Identification, Invasive and desirable	20	Instruction included identification basics through pictures and samples followed up by field application

Service #5: Provide educational programs for Wilmington residents. Educational programs will include First Saturday Seminars, presentations to community and civic organizations, and other scheduled talks in the community. Educational programs for homeowners associations should be planned and coordinated with Stormwater Services. Educational programs will also include eco-tours at Greenfield Lake and winter, spring, and fall birding tours and Smith Creek paddling tours.

First Saturday Seminars			
Date	**Organization**	**Topic**	**Attendance**
9/ 6/ 08	CFRW, public	Black River History by Kemp Burdette	23
10/4/08	CFRW,public	Two Square Miles, movie about successful grass roots response to proposed industrial development, Doug Springer	27
11/1/08	CFRW, public	Cape Fear Weather Extremes and Trends, Erik Heden National Weather Service	10

12/6/08	CFRW, public	The Role of the Cape Fear River during the Civil War, Dr. Chris Fonvielle, UNCW	28
Other Presentations by CFRW Staff			
8/1/08	Home Builders Alliance	Muddy Waters Program	6
8/16/ 08	CFRW Volunteers	Muddy Waters Introduction	12
9/4/ 08	Home Builders Alliance	Muddy Waters Program	8
9/ 20/08	Local gov't Officials	Eagle Island Tour	7
9/23/08	Civil Engineers	Pervious Solutions Seminar Features installation of pervious pavement adjacent to CFRW building	6
9/27/08	Coast Guard, Marine Safety Unit	Contingency planning for environmental emergencies	12
10/24/08	Cape Fear Men's Club	CFRW overview, CF River fishery restoration, water quality education, actions, and advocacy	28
Greenfield Lake School Field Trips			
7/11/08 – 8/8/08 weekly	UNCW Marine Quest Summer Camp (age 10-12)	Basic water quality and basic aquatic ecology	200
7/12/08- 8/9/08 weekly	Guppy Summer Camp (age 9-10)	Basic water quality and basic aquatic ecology	120
12/8/08	New Hanover Soil and Water Conservation Education Program Trask 6th Grade	Eco-tour included: cypress tree ecology, tree & plant identification, wild life observation, basic water quality	101
12/9/08	New Hanover Soil and Water Conservation Education Program Trask 6th Grade	Eco-tour included: cypress tree ecology, tree & plant identification, wild life observation, basic water quality	98
12/10/08	New Hanover Soil and Water Conservation Education Program Trask 6th Grade	Eco-tour included: cypress tree ecology, tree & plant identification, wild life observation, basic water quality	100

18 Greenfield Lake eco-tours were conducted for a total of 54 people during the first quarter.
11 Greenfield Lake eco-tours were conducted for a total of 68 people during the second quarter.

<u>Service #6</u>: Continue to serve as an active partner organization on local grant projects and water quality initiatives. These projects include the Clean Water Trust Fund Planning Grant for

Burnt Mill Creek, the Smith Creek Initiative, and may include new grants the City is successful in partnering/securing.

Field monitoring and water sample collection for enterococcus and ecoli was completed during rain events on 8/27/2008, 9/25/ 2008, and 11/13/2008 at the following locations: Laney wetland bio-retention area, Port City Java BMP, Stone's Throw bio-retention area, West Sig retention pond, and Barclay Place retention pond.

4 Backyard BMP rain gardens were monitored and maintained during the second quarter. The maintenance completed included weeding, mulching and adding native plants.

Service #7: Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each school year. Presentations will focus on specific NC 8th grade science goals and objectives for the hydrosphere/water quality and will be done in coordination with other environmental educators. CFRW will complete a minimum of 1/3 of the presentations to 8th grade science classes in New Hanover County Schools. CFRW will also work cooperatively with Stormwater Services to provide additional presentations in addition to the 8th grade program as requested. A new Enviroscape Wetlands Model will be purchased with fun ding provided in this Scope of Services agreement. A summary will be provided for each presentation given that is not a part of the 8th grade initiative. Summary information will include the date, location and number of student participants.

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/02/2008	Murray	8th	2	44
10/07/2008	Murray	8th	2	41
10/09/2008	Murray	8th	2	40
10/16/2008	Virgo	8th	3	64

Other Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
11/17/2008	Gregory	5th	2	43
11/18/2008	Gregory	5th	2	38

A new Enviroscape Model has been purchased and was delivered to CFRW in August. A two hour workshop for new volunteer instructors was held on September 30, 2008. We are currently working to qualify 2 new volunteer instructors.

Service #8: Monitor, evaluate, and consult on aquatic vegetation management techniques implemented to improve the water quality of Greenfield Lake. Monitoring will include monthly, weekly and daily observations as applicable and as coincides with the assignment of staff and volunteers to Greenfield Lake. A brief monitoring report will be sent via email to Stormwater Services for the period from April through November.

Monitoring reports were completed and submitted for July, August, September, October, November, and December.

Service #9: Establish a volunteer watershed monitoring program and alert Stormwater Services when volunteers find problem areas.

Volunteer monitoring of target high priority creeks or creek sections identified in cooperation with Stormwater Services will begin in September. The Waterkeeper Alliance *Muddy Waters Program* will be included as an integral part of volunteer monitoring. CFRW will incorporate *Muddy Waters* training and support materials into materials that will be designed and utilized for watershed monitoring. A monitoring report format with basic field observations and photo documentation will be submitted for review and approval in August. The number, frequency, and quality of monitoring reports will increase as the number of volunteers involved increases and as their skills and abilities grow.

CFRW completed the first four sessions of the *Muddy Waters* volunteer training program. As a result, there are now six volunteers qualified to complete construction site inspections and file completed construction site report cards with the Waterkeeper Alliance and the appropriate permit issuing and inspection authority. A second, four session volunteer training program begins in October.

CFRW staff has been working with a UNCW intern and two UNCW graduate students in the Environmental Policy program to develop a volunteer watershed monitoring program for Barnard's Creek and Smith Creek. Roger Shue, a UNCW instructor who teaches environmental forensics, is working to incorporate Smith Creek Monitoring into his class requirements for the 2009 spring semester.

Volunteer recruitment will be completed in January and early February.
Volunteer Training and monitoring activity will begin on the third Saturday in February.

Service #10: Participate in and provide support and assistance for public meetings and hearings conducted by Stormwater Services.

Service #11: Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information may be included in the City's NPDES yearly report to the State.

Service #12: Submit quarterly progress reports and invoices (for 1/4 of annual contracted funding amount) according to the following schedule: July 1 - Sept 30, 2008; October 1 - Dec. 31, 2008; January 1 - March 31, 2009; April 1 - June 30, 2009. Each quarterly distribution will be paid once quarterly progress report and invoice are received and reviewed for adequate progress. Also provide a compiled Year End Summary Report by June 30.

Report compiled by: Bill Murray ***Date: January 8, 2009***

New Hanover Soil & Water Conservation District
230 Market Place Drive
Suite 100
Wilmington, NC 28403

RE: Annual Request Letter, FY 08/09

February 20, 2008

Dave Mayes, Manager
City of Wilmington Stormwater Services
PO Box 1810
Wilmington, NC 28402

Dear Mr. Mayes,

Enclosed is the Annual Service Contract proposal for FY **08/09**. The requested amount of funding is **$28,000**.

The New Hanover Soil and Water Conservation District has served as a valuable and productive partner to the City of Wilmington Stormwater Services Department for the past four years. Accomplishments include: protecting 33 acres in the Hewletts Creek Watershed, protecting 500 acres on Eagles Island (adjacent to downtown Wilmington), providing over $10,000 in residential BMP funds, receiving upwards of $50,000 in BMP funds for FY08, providing outreach to numerous community groups, educating over 1,000 NHC students and more!

The District hopes to continue to provide these services and more in the future, but this can only be accomplished through an increase in support. As our programs grown and expand, so do our operating expenses and staff needs. The new NC Community Conservation Assistance Program and the successful Lower Cape Fear Stewardship Development Award exemplify our need for District restructuring. Our FY09 budget request includes 1.5 new positions. The New Hanover Soil and Water Conservation District is therefore requesting $28,000 for FY 08/09 to assist in these areas identified in our Services Contract and to support the Stormwater Services with its NPDES federal stormwater permit requirements.

Sincerely,

Dave Thomas, Board Chairman

cc: Jennifer Butler, Stormwater Services Outreach & Education Program Coordinator

NEW HANOVER SOIL & WATER CONSERVATION DISTRICT
230 Market Place Drive, Suite 100
Wilmington, NC 28403

Annual Service Contract: July 1, 2008 – June 30, 2009

New Hanover Soil & Water Conservation District (NHSWCD), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2008** through **June 30, 2009** for the agreed amount of $**25,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Service #1: Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each school year. Efforts also include training instructors, assisting with outreach, and teacher relations.

Service #2: Conduct at least three "Stormwater 101" powerpoint presentations to HOAs, garden clubs, community/civic groups, developers, or during watershed-wide meetings. Coordinate with the City to implement marketing, initiate contact, and schedule presentations.

Service #3: Partner with Rainwater Solutions, Inc. to organize and hold an annual rain barrel sale or develop a monthly public sale for New Hanover County residents.

Service #4: Increase awareness and public education on the issue of fecal coliform pollution. Assist with the development and outreach of a new City pet waste ordinance including an intensive outreach and media campaign to occur once the ordinance passes, establish and maintain communication and engage in contact education and with vets, pet stores, adoption agencies, etc., and develop and maintain educational displays and materials at local veterinarian offices and pet-related businesses.

Service #5: Serve as an integral partner to facilitate the Stewardship Development Award Program which recognizes developers for demonstrating outstanding environmental stewardship through the protection and awareness of our natural resources.

Service #6: Promote LID to developers, architects, engineers, etc. NHSWCD has assisted with the creation of the Low Impact Development (LID) ordinance for the City and County.

Service #7: Administer the NC Community Conservation Assistance Program (CCAP) in New Hanover County. Provide assistance with the demonstration, purchase, and installation of stormwater Best Management Practices (BMPs) for City/County residents. Activities include serving on the NC CCAP technical review committee to identify new

BMPs/standards and update cost estimates, developing conservation plans, designing and installing stormwater BMPs in New Hanover County using CCAP funds ($72,679), conducting annual BMP CCAP spot checks, and providing outreach for the City's Stormwater BMP Demonstration Sites.

Service #8: Participate as a member of the Smith Creek Watershed Planning Initiative to develop a watershed plan, identify potential stormwater BMP locations, and grant opportunities.

Service #9: Participate in local annual community outreach events. NHSWCD is a founding member of the Earth Day Alliance which organizes, implements, fundraises, and provides publicity for the Lower Cape Fear Earth Day Festival each spring. In addition, NHSWCD assists with TreeFest, an annual program which distributes over 10,000 tree saplings to New Hanover County citizens.

Service #10: Serve as the lead agency for land conservation efforts throughout the Hewletts Creek Watershed. To date, the district has protected 33 acres along the "Conservation Greenway" through grant-funded acquisitions or donations. FY08-09 goals are to monitor and manage conservation easements, explore potential conservation options on the "landscape buffer" at The Woods at Holly Tree and properties in the proposed Hewletts Creek south branch greenway, and identify management goals for the YWCA easement area, including partnering on the proposed Safe Routes to School trail, which will traverse 2 district-owned conservation easements.

Service #11: Continue a watershed-based community outreach effort in tidal creek watersheds that fall within the city limits to include a watershed newsletter to residents in the Hewletts Creek Watershed, stormwater education, and potential workshops and community meetings.

Service #12: Assist the CFPUA with its Water Conservation ordinance and efforts including the landscaper water conservation and certification initiative.

Service #13: Organize and promote at least one Teacher Workshop a year to include an annual week long summer workshop. Workshops will include at least one of the following curricula: Project Wet; Food, Land and People; Project Learning Tree; and Wonders of Wetlands.

Service #14: Develop and facilitate additional environmental education presentations. Topics include, but are not limited to, natural resource management, sustainability, and wildlife. Presentation topics will tie into stormwater, water quality, and conservation issues.

Service #15: Organize and facilitate at least one Environmental Field Day a year serving over 90 New Hanover County School students. Topics include aquatics, forestry, wildlife, soils, and other environmental issues.

Service #16: Provide an opportunity for 3-8th grade students to learn about watersheds, water quality, and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "Soil & Water – Yours for Life".

Service #17: Research grant opportunities and contact interested teachers for the creation of an Outdoor Education Learning Center on a NHCS campus. This site can be used to increase hands-on education on stormwater, water quality, wildlife habitat, and more.

Service #18: Develop new agency website. The website will include stormwater education, stormwater BMPs, fecal coliform education materials, K-12 and community based educational programs, teacher workshop information, a link to the City of Wilmington's stormwater education website, as well as, other local, regional and national environmental organizations.

Service #19: Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information may be included in the City's NPDES yearly report to the State.

Service #20: Submit quarterly progress reports and invoices (for 1/4 of annual contracted funding amount) according to the following schedule: July 1 - Sept 30, 2008; October 1 - Dec. 31, 2008; January 1 - March 31, 2009; April 1 - June 30, 2009. Each quarterly distribution will be paid once quarterly progress report and invoice are received and reviewed for adequate progress. Also provide a compiled Year End Summary Report.

NEW HANOVER SOIL & WATER CONSERVATION DISTRICT
230 Market Place Drive, Suite 100
Wilmington, NC 28403
www.nhswcd.org

Quarterly Progress Report #2: October 1st- December 31st, 2008

New Hanover Soil & Water Conservation District (NHSWCD), under contract with the City of Wilmington Stormwater Services, will provide the following services for the time period consistent with the City's fiscal year from **July 1, 2008** through **June 30, 2009** for the agreed amount of $**25,000**. These contracted services assist the City in meeting requirements of the federal NPDES Stormwater Permit.

Service #1: Conduct Enviroscape Presentations for at least 1/3 of 8th grade science classes in New Hanover County Schools each school year. Efforts also include training instructors, assisting with outreach, and teacher relations.

8th Grade Enviroscape Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/7/08	Murray Middle School	8th	2	51
10/9/08	Murray Middle School	8th	1	24
11/18/08	Williston Middle	8th	1	29
12/2/08	Williston Middle	8th	2	63
12/4/08	Williston Middle	8th	2	52

Service #2: Conduct at least three "Stormwater 101" powerpoint presentations to HOAs, garden clubs, community/civic groups, developers, or during watershed-wide meetings. Coordinate with the City to implement marketing, initiate contact, and schedule presentations.

Stormwater 101 Presentations			
Date	**Organization**	**Topic**	**Attendance**
10/27/08	Birch Creek HOA	Local Environmental Issues	5
12/6/08	Page's Creek HOA	Stormwater 101	11

Service #3: Partner with Rainwater Solutions, Inc. to organize and hold an annual rain barrel sale or develop a monthly public sale for New Hanover County residents.

October 9th Sale sold 21 rain barrels, November 13th sale sold 13 rain barrels, December 11th Sale sold 9 rain barrels.

Service #4: Increase awareness and public education on the issue of fecal coliform pollution. Assist with the development and outreach of a new City pet waste ordinance including an intensive outreach and media campaign to occur once the ordinance passes, establish and maintain communication and engage in contact education and with vets, pet stores, adoption agencies, etc., and develop and maintain educational displays and materials at local veterinarian offices and pet-related businesses.

Contacted coordinator for Wilmington Dog Fest event held October 25th at Empie Park. NHSWCD sent the event coordinator 100 pet waste education brochures to distribute to participants and delivered "doggie pooper scooper prize pack". Staff contacted coordinator for Pet Expo (February 2009) to discuss ways to distribute and educate the public about pet waste relating to local water quality issues.

Service #5: Serve as an integral partner to facilitate the Stewardship Development Award Program which recognizes developers for demonstrating outstanding environmental stewardship through the protection and awareness of our natural resources

Staff played a vital role in planning and coordinating the Stewardship Banquet. The banquet was held at UNCW Burney Center with over 140 guests in attendance. Staff is currently serving on the audit committee for the overall group.

Service #6: Promote LID to developers, architects, engineers, etc. NHSWCD has assisted with the creation of the Low Impact Development (LID) ordinance for the City and County.

Staff joined the NC Cooperative Extension Advisory Committee. The group is identifying ways to incorporate LID practices into the New Hanover County High Schools curriculum.

Staff contacted the Wilmington Board of Realtors about presenting LID information at a meeting in January 2009.

Service #7: Administer the NC Community Conservation Assistance Program (CCAP) in New Hanover County. Provide assistance with the demonstration, purchase, and installation of stormwater Best Management Practices (BMPs) for City/County residents. Activities include serving on the NC CCAP technical review committee to identify new BMPs/standards and update cost estimates, developing conservation plans, designing and installing stormwater BMPs in New Hanover County using CCAP funds ($72,679), conducting annual BMP CCAP spot checks, and providing outreach for the City's Stormwater BMP Demonstration Sites.

The first CCAP residential rain garden has been installed and payment reimbursement has been sent to Raleigh. Two CCAP contracts have been approved for a residential rain garden and three pet waste stations to be installed in the Hewletts Creek watershed. We have accepted and

approved three new CCAP applications including Carolina Beach State Park and two residential sites.

Staff identified two Wildlife Resource Commission Public Boat Access sites in Castle Hayne and Kure Beach that are interested in implementing CCAP BMPs as part of the reconstruction process.

Four CCAP sites are currently being designed by DENR engineering staff. Project sites include: the Government Complex Center, Believers Destiny Church, Alderman Elementary and the Arboretum.

Service #8: Participate as a member of the Smith Creek Watershed Planning Initiative to develop a watershed plan, identify potential stormwater BMP locations, and grant opportunities.

Smith Creek Meetings		
Date	**Topic/Discussion**	**Progress Made/Next Steps**

Staff continues to communicate with NHC Planning Department staff regarding Smith Creek property acquisitions. Several non-motorized boat access areas have been identified. Staff has reviewed the latest draft of the Smith Creek Watershed Plan and comments have been submitted.

Service #9: Participate in local annual community outreach events. NHSWCD is a founding member of the Earth Day Alliance which organizes implements, fundraises, and provides publicity for the Lower Cape Fear Earth Day Festival each spring. In addition, NHSWCD assists with TreeFest, an annual program which distributes over 10,000 tree saplings to New Hanover County citizens.

Community Outreach Events				
Date	**Location**	**Event**	**Attendance**	**Theme/Comments**
10/30/08-11/8/08	ILM Airport	Cape Fear Fair & Expo	1,000 +	Ed. & Outreach to public. Won 1st place in expo w/in division.
10/11/2008	Greenfield Lake	Cypress Festival	50	Tabled at event; turn out was low due to heavy rain.

Service #10: Serve as the lead agency for land conservation efforts throughout the Hewletts Creek Watershed. To date, the district has protected 33 acres along the "Conservation Greenway" through grant-funded acquisitions or donations. FY08-09 goals are to monitor and manage conservation easements, explore potential conservation options on the "landscape buffer" at The Woods at Holly Tree and properties in the proposed Hewletts Creek south branch greenway, and identify management goals for the YWCA easement area, including

partnering on the proposed Safe Routes to School trail, which will traverse 2 district-owned conservation easements.

Service #11: Continue a watershed-based community outreach effort in tidal creek watersheds that fall within the city limits to include a watershed newsletter to residents in the Hewletts Creek Watershed, stormwater education, and potential workshops and community meetings.

Service #12: Assist the CFPUA with its Water Conservation ordinance and efforts including the landscaper water conservation and certification initiative. Staff attended planning meeting September 16th, 2008. The group discussed ways to continue education and outreach to the community about water conservation.

Staff continues to attend planning meetings of the CFPUA green team. Staff attended the November 18th, 2008 meeting. Staff also held a separate meeting with Jacqueline Major and Carey Disney Ricks to discuss ways to educate the public on how to conserve water on December 3rd, 2008.

Service #13: Organize and promote at least one Teacher Workshop a year to include an annual week long summer workshop. Workshops will include at least one of the following curricula: Project Wet; Food, Land and People; Project Learning Tree; and Wonders of Wetlands.

Teacher Workshop			
Dates	**Topics/Activities**	**Attendance**	**Comments**
11/7/08	FLP workshop for EENC workshop	11	

Service #14: Develop and facilitate additional environmental education presentations. Topics include, but are not limited to, natural resource management, sustainability, and wildlife. Presentation topics will tie into stormwater, water quality, and conservation issues.

Environmental Education Presentations				
Date	**School/Event**	**Grade**	**# of presentations**	**# of students**
10/10/08	College Park Elementary ~ Geology	4	3	75
11/13/08	Cape Fear Center for Inquiry ~ Enviroscape	8	2	32
12/3/08	Wrightsville Beach Elementary Field Day ~ Water Cycle Station	4	4	105

Service #15: Organize and facilitate at least one Environmental Field Day a year serving over 90 New Hanover County School students. Topics include aquatics, forestry, wildlife, soils, and other environmental issues.

Environmental Field Day				
Date	**School(s)**	**Grade**	**Attendance**	**Topics/Activities**
12/8/08	Trask Middle School	6	101	Soils/Forestry/Wildlife/Aquatics/Greenfield Lake Eco Tour
12/9/08	Trask Middle School	6	98	Soils/Forestry/Wildlife/Aquatics/Greenfield Lake Eco Tour
12/10/08	Trask Middle School	6	100	Soils/Forestry/Wildlife/Aquatics/Greenfield Lake Eco Tour

Service #16: Provide an opportunity for 3-8th grade students to learn about watersheds, water quality, and stormwater through the Statewide District Poster, Essay and Speech contests. This year's theme is "Soil & Water – Yours for Life". Materials were distributed to Elementary Schools at the county elementary science teachers meeting on September 15th, 2008.

Service #17: Research grant opportunities and contact interested teachers for the creation of an Outdoor Education Learning Center on a NHCS campus. This site can be used to increase hands-on education on stormwater, water quality, wildlife habitat, and more.

Staff is working with NHC Planning staff to submit a CWMTF grant for stormwater restoration on an existing County property. The long term goal is that the site will serve as an outdoor education facility for local schools to educate students about stormwater and water quality.

Service #18: Develop new agency website. The website will feature stormwater education, stormwater BMPs, fecal coliform education materials, K-12 and community based educational programs, teacher workshop information, a link to the City of Wilmington's stormwater education website, as well as, other local, regional and national environmental organizations.

Service #19: Assist Stormwater Services in implementing additional public outreach, education, involvement, and participation activities required by federal NPDES stormwater permit. Summary reports and information may be included in the City's NPDES yearly report to the State.

Service #20: Submit quarterly progress reports and invoices (for 1/4 of annual contracted funding amount) according to the following schedule: July 1 - Sept 30, 2008; October 1 - Dec. 31, 2008; January 1 - March 31, 2009; April 1 - June 30, 2009. Each quarterly distribution will be paid once quarterly progress report and invoice are received and reviewed for adequate progress. Also provide a compiled Year End Summary Report.

Report compiled by Jennifer Braswell Date: December 29, 2008

APPENDIX C

ILLICIT DISCHARGE DETECTION AND ELIMINATION

See Appendix H (Enforcement Actions).

APPENDIX D

CONSTRUCTION SITE RUNOFF CONTROL

Included in this section:

- New Hanover County Erosion & Sedimentation Control Ordinance

New Hanover County Ordinance:
The following are excerpts culled from the New Hanover County Erosion and Sedimentation Control Ordinance:

The New Hanover County erosion and sedimentation control ordinance is adopted for the purposes of:
(1) Regulating certain land disturbing activity to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes, watercourses, and other public and private property by sedimentation; and
(2) Establishing procedures through which these purposes can be fulfilled.

General requirements of the permit include among others:

(a) *Plan required.* No person shall initiate any land disturbing activity which uncovers more than one acre without having an erosion control plan approved by the county. No land disturbing activity may be initiated until the county is notified of the date that the land disturbing activity will begin.
(b) *Protection of property.* Persons conducting land disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activity.
(c) *More restrictive rules shall apply.* Whenever conflicts exist between federal, state, or local laws, ordinances, or rules, the more restrictive provision shall apply.
(e) *Inspections.* Any and all applicable intermediate inspections may be held in any trade (building, mechanical, electric and/or plumbing) if any land disturbing activity, on a tract, including single-family residences, is found not to be in compliance with any part of this article.
(f) *Building finals.* Building finals and/or certificates of occupancy may not be issued if any land disturbing activity, including single-family residences, is found not to be in compliance with any part of this article.

Mandatory standards for land disturbing activity
No land disturbing activity subject to the control of this article shall be undertaken except in accordance with the following mandatory standards:
(1) *Buffer zone*.
a. No land disturbing activity during period of construction or improvement to land shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the 25 percent of the buffer zone nearer the land disturbing activity. Waters that have been classified as trout waters by the environmental management commission shall have an undisturbed buffer zone 25 feet wide or of sufficient width to confine visible siltation within the 25 percent of the buffer

zone nearest the land disturbing activity, whichever is greater. Provided, however, that the county may approve plans which include land disturbing activity along trout waters when the duration of said disturbance would be temporary and the extent of said disturbance would be minimal. This subdivision shall not apply to a land disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

b. Unless otherwise provided, the width of a buffer zone is measured from the edge of the water to the nearest edge of the disturbed area, with 25 percent of the strip nearer the land disturbing activity containing natural or artificial means of confining visible siltation.

c. The 25-foot minimum width for an undisturbed buffer zone adjacent to designated trout waters shall be measured horizontally from the top of the bank.

d. Where a temporary and minimal disturbance is permitted as an exception by subsection (1)a. of this section, land disturbing activities in the buffer zone adjacent to designated trout waters shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 100 linear feet of disturbance in each 1,000 linear feet of buffer zone. Larger areas may be disturbed with the written approval of the director.

e. No land disturbing activity shall be undertaken within a buffer zone adjacent to designated trout waters that will cause adverse temperature fluctuations, as set forth in 15 NCAC 2B.0211 "Fresh Surface Water Classification and Standards", in these waters.

(2) Graded slopes and fills. The angle for graded slopes and fills shall be no greater than the angle, from zero to nineteen degrees, which can be retained by vegetative cover or other adequate erosion control devices or structures. Only when approved by the county may slopes be steeper than two foot of run to one foot of rise. In any event, slopes left exposed will, within 15 working days or 30 calendar days, whichever is shorter, of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient to restrain erosion.

(3) Ground cover. Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one acre is uncovered, the person conducting the land disturbing activity shall install such sedimentation and erosion control devices and practices as are sufficient to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction upon and development of said tract, and shall plant or otherwise provide a permanent ground cover sufficient to restrain erosion after completion of construction or development. Except as provided in section 23-238(b)(5), provisions for a ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days following completion of construction or development whichever period is shorter.

(4) Prior plan approval. No person shall initiate any land disturbing activity on a tract if more than one acre is to be uncovered unless, 30 or more days prior to initiating the activity, an erosion and sedimentation control plan for such activity must be both filed with and approved by the county. The county shall forward to the director of the division of water quality a copy of each erosion and sedimentation control plan for a land disturbing activity that involves the utilization of ditches for the purpose of dewatering or lowering the water table of the tract.

Design and performance standards.

(a) Except as provided in subsection (b)(2) of this section, erosion and sedimentation control measures, structures and devices shall be so planned, designed and constructed as to provide protection from the calculated maximum peak of runoff from the ten-year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices," or other acceptable calculation procedures.

(b) In high quality water (HQW) zones, the following design standards shall apply:
(1) Uncovered areas in HQW zones shall be limited at any time to a maximum total area within the boundaries of the tract of 20 acres. Only the portion of the land disturbing activity within an HQW zone shall be governed by this section. Larger areas may be uncovered within the boundaries of the tract with the written approval of the director.
(2) Erosion and sedimentation control measures, structures and devices within HQW zones shall be so planned, designed and constructed to provide protection from the runoff of the 25-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Service's "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.
(3) Sediment basins within HQW zones shall be designed and constructed such that the basin will have a settling efficiency of at least 70 percent for the 40-micron (0.04 mm) size soil particle transported into the basin by the runoff of that two-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the United States Department of Agriculture Soil Conservation Services "National Engineering Field Manual for Conservation Practices" or according to procedures adopted by any other agency of this state or the United States or any generally recognized organization or association.
(4) Newly constructed open channels in HQW zones shall be designed and constructed with side slopes no steeper than three horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices or other acceptable ditch liners. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion.
(5) Ground cover sufficient to restrain erosion must be provided for any portion of a land disturbing activity in a HQW zone within 15 working days or 60 calendar days following completion of construction or development, whichever period is shorter.

Responsibility for maintenance.
During the development of a site, the person conducting the land disturbing activity shall install and/or maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan or any provision of this article, the act, or any order adopted pursuant to this article or the act. After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road or street right-of-way or easement accepted for maintenance by a governmental agency.

The full text of this article can be found under Chapter 23, Article VI of the
Code of Ordinances County of New Hanover, North Carolina.

APPENDIX E

POST-CONSTRUCTION SITE RUNOFF CONTROLS

Included in this section:

- Inspection Reporting Summary
- Inspection Letter
- Stormwater Detention Facility Compliance Inspection Report

2008 BMP Compliance Inspection Summary

Dates of Inspections	June	December/Jan.
Total # sites Inspected	277	293
# Sites Requiring Maintenance	34	64

SAMPLE LETTER

Date

«OWNER»
«CO_OWNER»
«OWN_ADDR»
«OWN_CITY», «OWN_STATE» «OWN_ZIP»

RE: Storm Water Maintenance Inspection - «SUBD_NAME»
(Parcel # «PIN»)

The City of Wilmington Storm Water Services Section has recently completed a routine inspection of the storm water management facilities at «SIT_ADDR» for the above referenced site. The facility was inspected for compliance with the operation and maintenance requirements as outlined in the City's Technical Standards Manual. The City will be conducting these inspections a minimum of twice a year. Our ---------- (date) inspection indicates that the storm water facilities at the above property does not comply with current maintenance standards as listed on the attached Compliance Inspection Report.

According to the storm water management specifications and standards and the inspection and maintenance agreement from the responsible entities, corrective action must be taken within a reasonable time period. The City will be reinspecting the above storm water facilities to track the progress of any corrective action. I will be happy to work with you toward a satisfactory resolution of this matter. If you have questions, please contact me at 341-4694. Your cooperation and assistance in the City's storm water management efforts is greatly appreciated.

Sincerely,

Jim Quinn
Stormwater Specialist
Storm Water Services

209 Coleman Drive, PO Box 1810, Wilmington, NC 28402
Phone: (910) 343-4777 Fax: (910) 341-0099

Stormwater Detention Facility

Compliance Inspection Report

SITE:
DATE:
LOCATION:

The Stormwater Management for Post-Construction Ordinance requires a bi-annual inspection of all structural water quality detention facilities to ensure that they are being properly maintained and are functioning as originally designed.

The results of this inspection are as follows:

☐ **Visual inspection found no apparent problems with the facility.**

☐ **Please complete the following repairs and/or maintenance items within 60 days of this report**

Slopes
- ☐ Repair eroded pond slopes
- ☐ Repair erosion at pond inlet
- ☐ Repair erosion at outlet structure
- ☐ Re-seed and/or repair bare areas
- ☐ Mow and regularly maintain vegetation
- ☐ Regrade slopes and/or aquatic shelf

Inlets
- ☐ Remove vegetative obstruction
- ☐ Remove sediment accumulation within pipes

Emergency Spillway
- ☐ Remove debris located in spillway
- ☐ Remove trees and woody vegetation
- ☐ Repair eroded areas and/or rip-rap

Outlet Structure
- ☐ Remove debris obstructing outlet structure
- ☐ Remove obstruction to orifice
- ☐ Repair and/or replace trash rack
- ☐ Repair trash screen for lower orifice
- ☐ Remove vegetation around outlet structure

Pond Main Body
- ☐ Repair vegetative shelf
- ☐ Remove sediment accumulation
- ☐ Remove floating debris and/or debris on slopes
- ☐ Remove vegetation in pond that has reduced surface area

Other
- ☐ _____
- ☐ _____

Additional comments and maintenance concerns:

_____
_____
_____
_____
_____
_____
_____

Proper operation and maintenance are the sole responsibility of the property owner, and a vital part of ensuring the effectiveness of your detention facility. If you fail to complete the above maintenance in a timely manner, please be advised that the City of Wilmington reserves the right to complete the maintenance, and assess the owner for any costs or damages incurred. You will be notified if the City chooses to pursue this action.

Please inform this office of the date when work is completed, and if you should have any questions or comments concerning these items or future maintenance issues, please feel free to contact me at (910) 341-4694.

Inspected by: Jim Quinn Title: Stormwater Specialist

APPENDIX F

POLLUTION PREVENTION & GOOD HOUSEKEEPING
FOR MUNICIPAL OPERATIONS

Stormwater staff conducted site inspections for its Operations Complex and Public Transit facilities on 5/12/08 and 12/10/08. Minor items were observed from the facilities with regards to Good Housekeeping procedures and discussed with the individual facility managers. These were corrected during follow up visits.

APPENDIX G

THREATENED & ENDANGERED SPECIES (Shortnose Sturgeon)

Included in this section:

- BMP Reporting Table

DATE / TIME	PLACE / EVENT	AUDIENCE	INDIVIDUALS WHO PERFORMED ACTIVITY / CONTENT	TECHNIQUES/ METHODS USED	RESULTS OF ACTIVITY / INFO COLLECTED
Create Public Education Program to Increase Awareness of the Shortnose Sturgeon					
Ongoing	Special events, public meetings	General public	Stormwater staff	Distribute educational brochures and bookmarks at special events and public meetings	Education about the Shortnose Sturgeon provided to the public
Spring 08	New Hanover County Schools	8th grade science classes	Stormwater staff NHSWCD staff CFRW staff	Highlight the Shortnose Sturgeon during classroom presentations and/or direct teachers to our resources about the sturgeon	Shortnose Sturgeon education in public schools in NHC
2/3/09	Website updates	City website viewers	Stormwater staff	Posted the Shortnose Sturgeon slideshow	Shortnose Sturgeon education for the public
2/3/09	City's Cable Access Channel (GTV-8)	TV viewers	Stormwater staff GTV staff	Narrated the Shortnose Sturgeon slideshow and aired on GTV-8	Shortnose Sturgeon education for the public

APPENDIX H

REGULATORY & ENFORCEMENT ACTIONS

Included in this section:

- **Enforcement Action Reporting Summary**
- **Enforcement Letters**

The Public Services Department added to its staff a Code Enforcement officer in anticipation of the new Phase II requirements and Stormwater Ordinances regulating illicit discharges that are being drafted at this time. The Stormwater Ordinance Enforcement Program currently consists of enforcing Wilmington's Code of Ordinance Sec 18-734 which prohibits obstructions and organic yard waste from purposefully being placed into any stormwater conveyance. Any other water quality concerns that are reported are investigated and resolved through our public education program. Until our ordinance is in place regulating illicit discharges, any complaints needing pressure from regulatory authority are referred to DENR DWQ's Wilmington Regional Office.

In 08-09, the Public Services Department investigated approximately 92 stormwater complaints. The majority of reports consisted blowing yard waste in the storm drain and improper management of yard waste. When the department receives a complaint the date, time, location, contact, nature of the complaint, actions, recommendations and follow up are documented, as well as distribution of educational material, and enforcement actions. A summary of this year's activities are as follows:

ENFORCEMENT ACTIONS 2008-2009

Nature of Complaint	Number of reports	Resolved thru Public Education	NOV Issued	Referred to DWQ
Yard Waste	55	100%	0	0
Illicit Discharge/ Sediment	18	74%	0	4
Pet Waste	6	100%	0	0
Blockages	14	100%	0	0
Litter	2	100%	0	0

Public Services
Stormwater Services
209 Coleman Drive
PO Box 1810
Wilmington, NC 28402-1810

910 343-4777
910 341-0099 fax
wilmingtonnc.gov
Dial 711 TTY/Voice

(Date)

(Address)

RE: Wilmington City Ordinance, Sec. 18-734

Dear Mr. Landscaper,

A report was made to our department that on April 10, 2008, one of your landscape crews was seen blowing lawn debris into 3rd Street, in front of _____.

I am sure you are aware that this is a violation of the City of Wilmington's Ordinance that states; It is unlawful to place leaves, grass clippings, trash debris of any kind in streams, storm drains, ditches, and streets or to cause an obstruction to any part of the storm drain system. We are obligated to address all reports of this nature and issue civil penalties to ***repeat*** offenders.

Enclosed you will find our educational material stating the ordinance and the requirements, for you to share with your employees. It is our goal to provide the public with the right information in order for them to reduce stormwater pollution and avoid potential fines.

We hope you will take this opportunity to make sure each of your employees is well informed of this regulation and that you will put the proper mechanism in place to ensure your future employees receive this information as well. For more information, you may visit our website at www.wilmingtonnc.gov.

Please help us, and do your part, to protect the surface waters in the Cape Fear River Region. If you have any questions or concerns, please do not hesitate to contact me.

Regards,

Beth Nunnally
Code Enforcement Officer
Public Services Department