



Photo courtesy of Cal Gray III

CORSICA RIVER TARGETED INITIATIVE

PROGRESS REPORT: 2005-2011

The Corsica River Initiative is nationally recognized for its Watershed Plan and restoration effort that continues to receive attention for its outstanding contributions in research, monitoring and implementation.

*Corsica Targeted Watershed Initiative Funded in part by
US EPA & NOAA's Coastal Zone Management*



BACKGROUND

The Corsica River is a tidal tributary on Maryland’s Eastern Shore that slowly winds through the farmland and forests of rural Queen Anne’s County and the Town of Centreville; it then enters the Chester River and into the Chesapeake Bay, one of the largest estuaries in the world. The Corsica River watershed is 25,299 acres, with agriculture being the largest land use (60%). The second largest land use in the watershed are forested areas (25%), which mainly account for private woodland lots and buffers. Approximately 5% of the watershed is impervious, which accounts for streets, buildings (homes, businesses, etc.) and other hard surfaces.

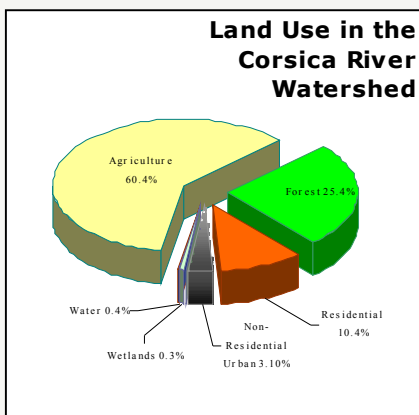


Figure 1: Land Use

The Corsica River and its watershed are strikingly beautiful. The Corsica watershed character is influenced by the rural nature of the area – fishing the river and streams, hunting deer and waterfowl, boating and kayaking. Unfortunately, like many tributaries of the Chesapeake Bay, the river’s water quality is considered degraded and does not meet important water quality standards.



Figure 2: Old Mill Stream

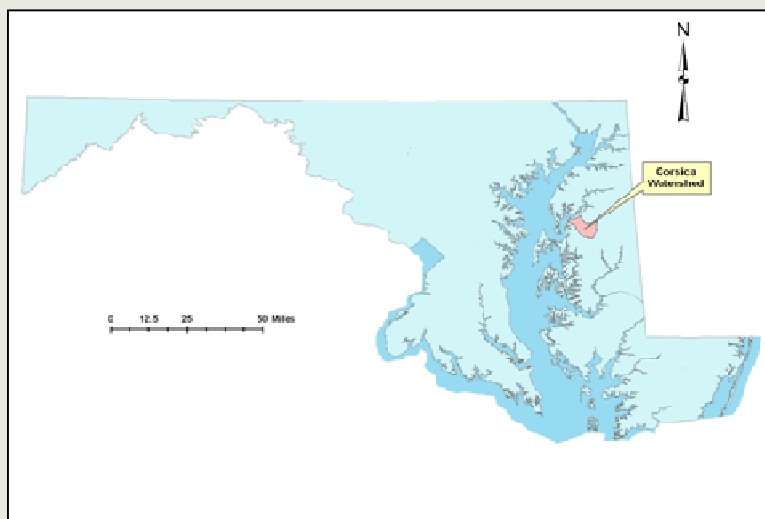


Figure 3: State of Maryland—Corsica Watershed

WATER QUALITY: TOTAL MAXIMUM DAILY LOADS (TMDLS)

The Federal Clean Water Act (CWA) requires that each State assess, monitor, and protect water quality for all rivers and streams. If a waterbody does not meet water quality standards set for that system, then it must be listed as ‘impaired’ for the pollutant causing the impairment. The Total Maximum Daily Load (TMDL) is the assimilative capacity of a water body to remain ‘healthy’ with a certain maximum amount of pollutants.

- The Corsica River was listed as impaired in 1996 due to the presence of excessive **sedimentation, nutrients, fecal coliform (bacteria), and substantial negative impacts to biological communities.**
- The State of Maryland developed a Total Maximum Daily Load (TMDL) **for nutrients in the Corsica River in 2000, bacteria in 2005, and Polychlorinated Biphenyl (PCBs) in 2011.**
- Based on the Nutrient TMDL, the nonpoint source annual load allocation for the Corsica Watershed is **268,211 lbs/year of nitrogen and 19,380 lbs/year of phosphorus.**
- The Corsica River is a **Designated Use II water body**, which means that it must be able to support the basic “swimmable-fishable” goals of the Clean Water Act as well as shellfish harvesting.
- **The water quality impairments stated above have not been delisted as of June 2012**

Due to the impairments listed by the Maryland Department of the Environment (MDE), the Town of Centreville applied for and received funding and technical assistance to develop a **Watershed Restoration Action Strategy (WRAS)**. The Corsica River WRAS is a comprehensive plan that the Town of Centreville developed in 2005 in cooperation with key local partners (Queen Anne’s Soil Conservation District, Queen Anne’s County and the Chester River Association) and with support and cooperation from the Maryland Department of Natural Resources (DNR) and MDE. In September of 2005, Governor Robert Ehrlich proclaimed the Corsica River as the State’s targeted restoration watershed. Following this announcement many local citizen volunteers formed the non-profit organization called the *Corsica River Conservancy (CRC)*. The CRC has grown to more than 600 members in a watershed of approximately 1,200 households.

The WRAS Plan has been the road map to help guide the restoration and protection activities to date. The Corsica Implementation Committee (CIC), which formed as an outcome of the planning process, is made up of stakeholders from state and local government agencies and local concerned citizens. The CIC currently works together to track the progress of the Corsica initiative, understand the problems facing the watershed, and develop solutions to address water quality problems in the Corsica watershed.

CONSERVATION & PROTECTION AREAS

Restoring the Corsica River is vital to its recovery and equally important is conserving and protecting areas within the watershed. Once healthy components of watersheds are identified, a variety of conservation and protection approaches are available. **Protection efforts in the watershed include a variety of easements, open space, and rural legacy land programs, which are currently protecting approximately 5,852 acres (more than 20%) of the land in the watershed.** The Maryland Agriculture Land Preservation Foundation (MALPF) and the Rural Legacy Program are programs specifically tailored to agriculture and farm land protection. Program Open Space (POS) is a unique program in Maryland that provides funding to counties and municipalities for parks, ball fields, playgrounds, and a variety of other open space land preservation opportunities.

Transfer of Development Rights (TDR) is a type of land protection program that some counties currently adopt that provide incentives for developers to build in existing areas with infrastructure, and save open space or farm land in return for increased development or density.

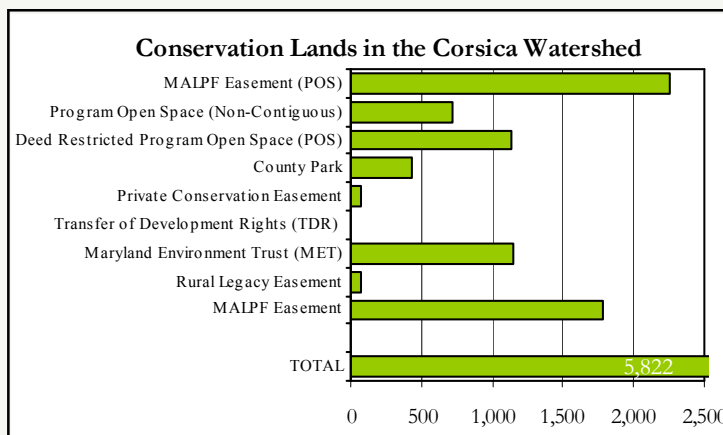


Figure 4: Conservation Lands in the Corsica Watershed

PROGRESS TO DATE:

SLIGHT IMPROVEMENTS IN RIVER HEALTH

The Corsica River Targeted Watershed initiative has been an on-going endeavor with federal, state, and local agencies, conservation organizations, universities, research institutions and local watershed groups. This effort involves outreach to the community, monitoring, research, and implementation of water quality and habitat enhancement projects. The restoration activities in the Corsica watershed have been substantial on farm land, suburban residential areas, and in the Town of Centreville by utilizing Best Management Practices (BMPs) and educating citizens on the importance of water quality, nutrient management, and natural resources. The figures 5 and 6 illustrate both progress to date and dollars spent by major source sector.

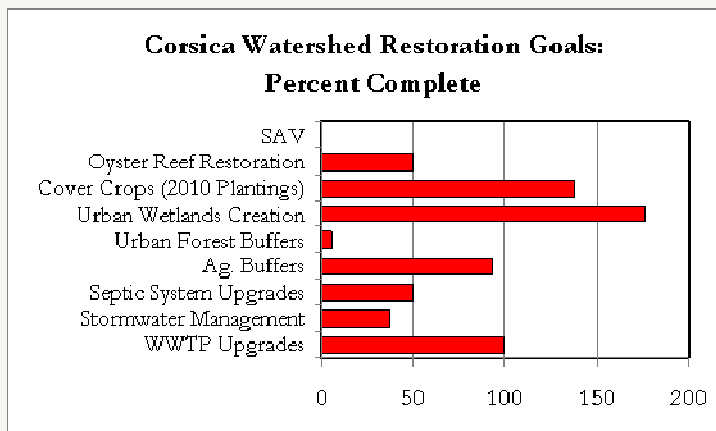


Figure 5: Percent Complete

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

Significant changes to water quality at a basin/watershed scale can take many years to show improvements due to groundwater transport lag time, geochemical processes, and other factors. The Corsica River may be starting to respond to the efforts that have been underway since 2005, with approximately **700 water quality and habitat projects** completed.

Concentrations of both nitrogen and phosphorous have shown decreasing trends in the non-tidal portion of the Corsica Watershed at Three Bridges Branch and Gravel Run over the last five years. No nutrient trends have been observed in Old Mill Stream at this time.

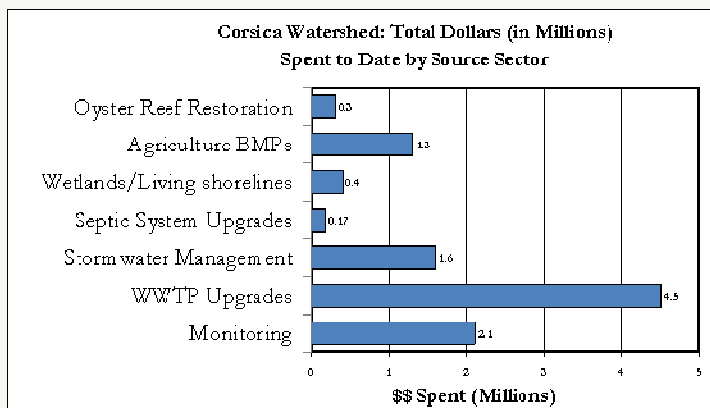


Figure 6: Cost per Source Sector

Funding Sources: EPA/MDE 319 Program, MD DNR, QA Soil Conservation District, Maryland Department of Agriculture, Bay Restoration Fund, Chesapeake and Atlantic Coastal Bays 2010 Trust Fund, Town of Centreville, Queen Anne's County, Chesapeake Bay Trust, National Fish and Wildlife Foundation, Corsica

AGRICULTURE

Agriculture makes up more than half of the land use in the Corsica watershed, and is vital to the local economy and to maintaining the heritage and rural character of the Eastern Shore. The main crops planted in the Corsica watershed include corn, soybeans, and wheat. Vegetables are grown for farmers markets in the area. The watershed also has numerous equine and two poultry operations. The agriculture community has been investing significant time and effort toward protecting water quality, which should ensure a sustainable agriculture presence in the Corsica watershed.



BMPs utilized in the Corsica watershed by the agricultural community include: cover crops, forested and grassed buffers, manure storage, and nutrient management plans. There are several programs at the state and federal level, administered by the Queen Anne County Soil Conservation District, to provide funding for a variety of practices including the Wildlife Habitat Incentive Program (WHIP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Maryland Agricultural Cost Share program (MACS), and the Woodland Incentive Program (WIP) which is coordinated by DNR Forestry Service.

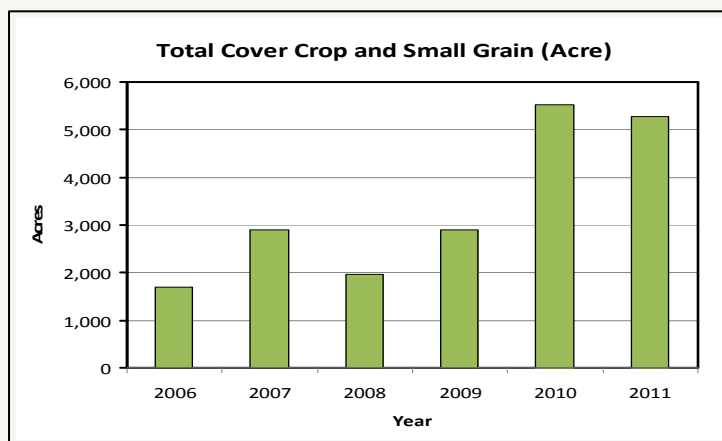


Figure 7: Cover Crops planted in the Corsica Watershed per year

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

STORMWATER

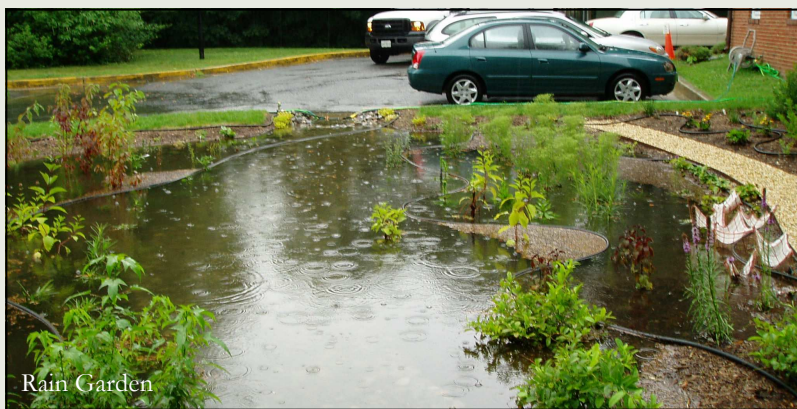
Stormwater is a significant problem for water quality and clarity when there is a high level of sedimentation and other pollutants. There are many effective ways to treat and prevent stormwater from entering our rivers and streams; one of the most effective of these practices is forested buffers, which protect waterways by intercepting sediments and nutrients, stabilizing stream banks, increasing and improving local biodiversity, and maintaining cooler stream water temperatures. The Corsica River watershed currently contains approximately 5000 acres of forested riparian buffers.

Stormwater wetland ponds and bio-retention practices (also known as Low Impact Development (LID), or Environmental Site Design) are common types of stormwater BMPs implemented in the Corsica. These new or retrofitted retention areas capture and hold excess stormwater during rain/snow events and prevent high flow into nearby streams and rivers, thereby reducing nutrient runoff, bank erosion, and heavy sedimentation. Infiltration practices can greatly improve ground water levels, reduce flooding, and are generally cheaper to install than traditional stormwater practices.

The Town of Centreville has installed many stormwater retrofits and now treats an additional 112 acres of run off. The Town also has a street sweeping program. In addition, 308 rain gardens have been installed by CRC. Queen Anne’s County Department of Public Works has introduced permeable concrete and asphalt. Permeable pavement allows some water to penetrate parking lot surfaces rather than rush into storm drains.



Stormwater Drain



Rain Garden



Street Sweeper

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

WASTEWATER TREATMENT PLANT (WWTP)

There is one wastewater treatment plant in the Corsica watershed on Gravel Run, a tributary to the Corsica River. **This plant was upgraded to Biological Nutrient Removal (BNR) in 2010.** The WWTP current capacity is 542,000 gallons/day. *The new system greatly reduces the amount of nutrients exiting the plant through treated water: nitrogen to approximately 5-7 mg/liter and phosphorus to 0.3 mg/liter.* This should reduce algae blooms and dead zones along Gravel Run and the Corsica main stem. The use of spray irrigation onto farm land for eight months of the year has significantly reduced nutrient outputs from the plant as well. **Upgrades to the Centerville wastewater treatment have reduced nitrogen and phosphorus pollution to the river by 50,770 lbs/year and 4,260 lbs/year.**

SEPTIC SYSTEM NITROGEN REDUCTION RETROFITS

Best Available Technology (BAT) retrofits to septic systems reduce nitrogen output by 50 percent on average. The Maryland Department of the Environment gives counties in Maryland funding to install retrofit septic systems from the State's Bay Restoration Fund. The majority of State funding to date is used for septic systems in the Chesapeake Bay Critical Area, as well as for failing septic systems elsewhere. In the Corsica watershed, **sixteen (16) de-nitrifying septic system retrofits have been installed – more than half way to the 30 retrofit goal set for the watershed.** In the future, all new homes needing on-site systems may be required to install BAT.

OYSTERS

Oysters are an important component of restoration because of their water filtering capacity. A single adult oyster can filter up to 50 gallons of water a day. Because of the Corsica's depth and physical characteristics, small improvements in water clarity can lead to larger increases in habitat restoration and overall water quality. The Oyster Recovery Partnership (ORP) is working to restore original oyster bars and populations in rivers all over Maryland. This partnership has **provided research and funding to help replenish 10 acres of oysters in the Corsica River.** The CRC also has an active restoration program, currently in its fourth year, which helps residents grow oysters for reef replenishment through the State's Maryland Grows Oysters (MGO) program at Department of Natural Resources.



The Department of Natural Resources designated the entire Corsica River as an Oyster Sanctuary in 2010, which states that the entire river is closed to shellfish harvesting. This should have a positive effect on restoring oyster populations to near historic levels, if water conditions and other factors can support the native oysters.

Project Highlight

As part of the Town of Centreville's stormwater management effort to reduce stormwater runoff and to meet the goals of the Corsica River Watershed Restoration Strategy, the Town made outfall improvements to the existing 24" storm drain outfall located at the Centreville Waste Water Treatment Plant. The existing storm drain system consisted of a concrete headwall that was severely damaged which resulted in erosion at the outfall and receiving channel. The project removed and disposed of the damaged concrete headwall and broken 24" concrete pipe, re-graded the slopes at the outfall, and installed three vegetated plunge pools in a stepped fashion constructed with large sandstone boulders and smaller silica cobbles.



CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

STREAMS

There are several tributaries in the Corsica River, including Three Bridges Branch, Gravel Run, Old Mill Stream, Emory Creek, Alder Branch and Earle Creek which all empty into the river proper. The DNR Maryland Biological Stream Survey (MBSS) has monitored 22 sites overall in the river for benthic macro invertebrates (stream bugs), physical conditions, and fish populations to help determine overall stream health. Their findings show that from 2006 to 2011, the majority of sites in the watershed had no change in their biological condition. This would suggest that habitat and water quality



Endangered Dwarf Wedgemussel Photo by:
Susi von Oettingen/USFWS

conditions have not changed at these sites during that same time period. The analysis of Indicator of Biotic Integrity (IBI) scores in the Corsica River watershed indicate that higher scores are associated with sites that have greater habitat diversity. **Most sites within the sub-watershed areas have an average of good to fair conditions.** Research has shown fish and benthic community diversity to be closely linked with habitat conditions; these include intact riparian forest buffers, low sedimentation, and stream temperature. There is stream restoration potential in the watershed, and specific opportunities are being considered. The dwarf wedge mussel, which is a State and Federally listed endangered species, is found in some of the upper tributaries of the Corsica River.

FORESTS, WETLANDS & LIVING SHORELINES

Forests occupy over 25% of the land within the watershed, with approximately 75% being privately owned. Forest Stewardship Plans have been prepared within the past six years covering 702 acres. Since 2007 approximately five Timber Harvest Plans have been written for 152 acres. The healthiest rivers and streams are usually found in highly forested areas. Forests, wetlands, and living shorelines help protect water quality, host an abundance of living habitat, and buffer the landscape from storms and rising sea levels.

To date, 88.3 acres of wetlands have been restored in the watershed, which is above the original goal of 50 acres.

Also, approximately 1,475 linear feet of living shoreline has been restored or enhanced.

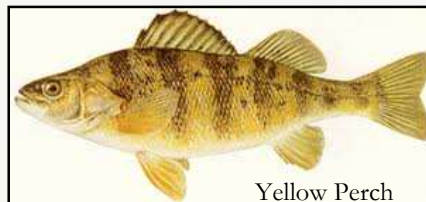


CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

AQUATIC RESOURCES

Extensive monitoring is being conducted to track changes in both habitat and biota. The tidal fish community has been monitored by Maryland's Fisheries Service since 2003.

Sixteen species comprise 90% of seine or trawl catches collected in the Corsica River annually during 2004-2011, including Atlantic silverside, striped killifish, banded killifish, white perch, spot-tail shiner, blueback herring, alewife, spot, Atlantic menhaden, pumpkinseed, striped bass, channel catfish, yellow perch, striped and bay anchovy. Blue crabs are common in the Corsica River and support local recreational and commercial fisheries.



Yellow Perch

At this time, there is no indication that the Corsica River is exhibiting improvements or declines in habitat quality based on water quality and fish assemblages. Anadromous fish spawning and larval surveys, and species richness and relative abundance during summer indicated that Corsica River functions as spawning, nursery, and adult habitat for important Bay species.

COMMUNITY INVOLVEMENT

The Corsica River Conservancy (CRC) mission is to restore and preserve the Corsica River and its watershed. *Their goal is to reduce pollution, sedimentation and loss of habitat to a level that will remove the Corsica from the EPA list of impaired rivers.* The CRC sponsors an annual **Corsica Watershed Awareness Day** that is held on the 3rd Saturday in September from noon to 4 p.m. at Bloomfield Farm on Route 213, just north of Centreville. This is a free event, which combines family fun with engaging environmental education.

During the past six years this has become a local tradition attracting over 1,000 visitors each year.



Corsica River Awareness Day



Corsica River Awareness Day

WATER QUALITY TRENDS: *WHAT ARE THEY TELLING US?*

In order to be able to measure water quality improvements as a result of BMP implementation efforts, a comprehensive monitoring program was developed and initiated in the Corsica Watershed by the Maryland Department of the Environment, Department of Natural Resources, and the US Geological Survey in 2005. The water quality monitoring efforts focused on both the non-tidal and tidal portions of the Corsica watershed.

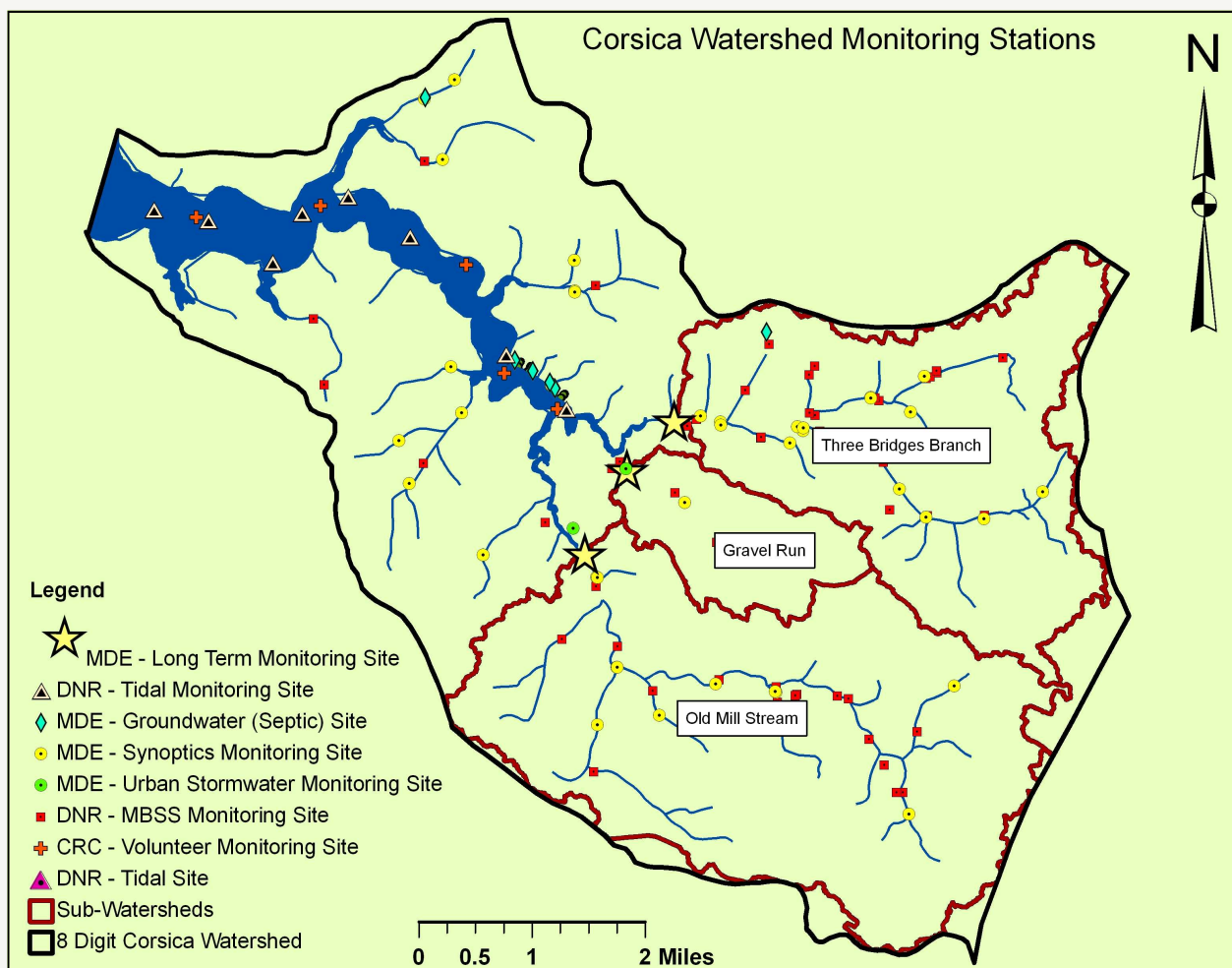


Figure 8: Water quality, biology and habitat monitoring sites in the Corsica Watershed

NON-TIDAL WATER QUALITY MONITORING

The Maryland Department of the Environment focused on four monitoring initiatives:

- Continuous Long-Term Tributary Water Quality Monitoring
- Synoptic Survey Nutrient Monitoring
- Septic System Nitrogen Reducing Retrofit Monitoring
- Stormwater and Stormwater Retrofit Monitoring

CONTINUOUS LONG-TERM TRIBUTARY WATER QUALITY MONITORING

There are three continuous long-term water quality monitoring sites located on the three main tributaries that feed into the Corsica River: Three Bridges Branch, Gravel Run, and Old Mill Stream. These monitoring sites were established to measure the nutrient levels coming from the headwaters of the Corsica Watershed into the main stem of the Corsica River.

Water quality data collected at these sites gives watershed managers some insight into trends over time. **In the non-tidal portion of the Corsica Watershed, concentrations of both nitrogen and phosphorous have shown statistically significant decreasing trends in Three Bridges Branch and Gravel Run over the last five years. No nutrient trends have been observed in Old Mill Stream at this time.**

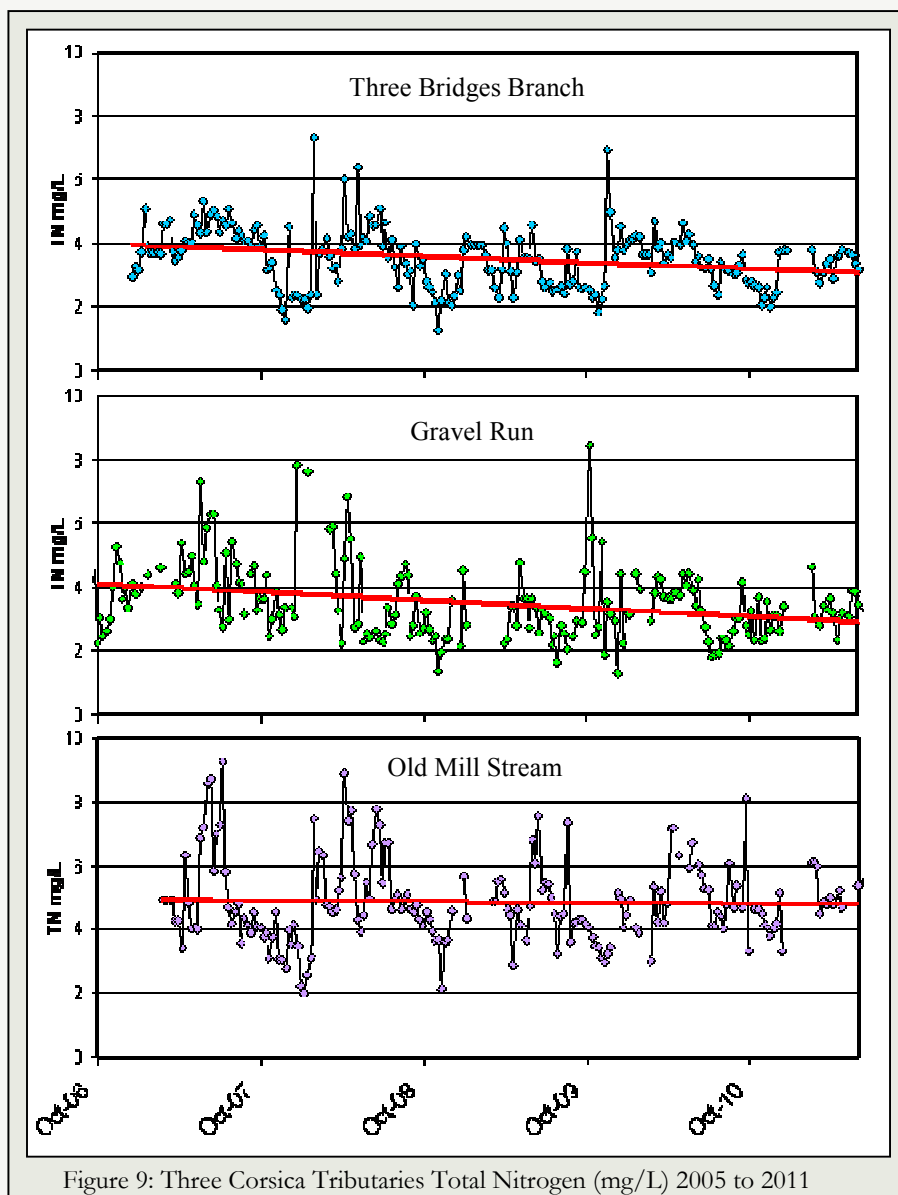
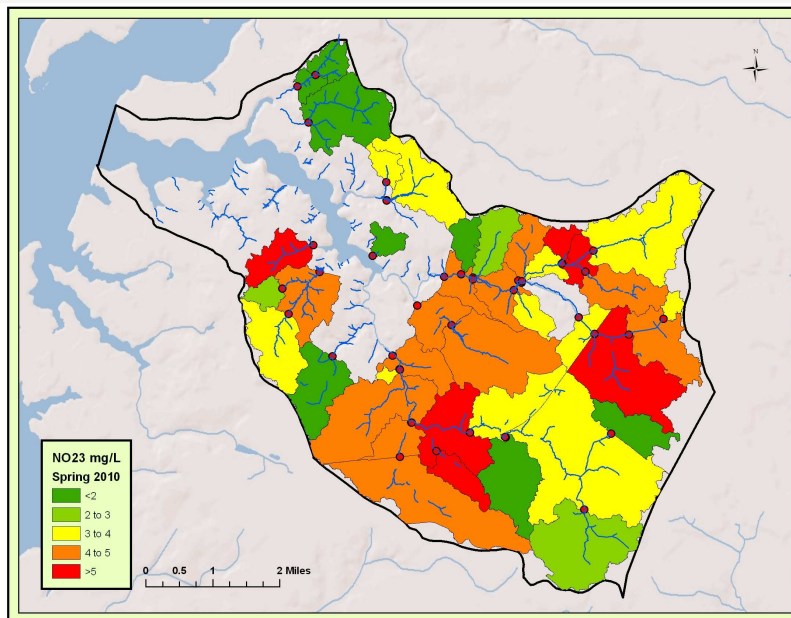


Figure 9: Three Corsica Tributaries Total Nitrogen (mg/L) 2005 to 2011

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

SYNOPTIC SURVEY NUTRIENT MONITORING

While the continuous long-term monitoring focuses on the larger scale of the three main tributaries draining into the Corsica Watershed, “synoptic” survey monitoring focuses on the smaller scale or streams draining into the three Corsica tributaries. A nutrient “synoptic” survey is comprised of many nutrient water quality samples collected at one time throughout the watershed at approximately fifty sites. **The synoptic survey creates a “snap shot” of water quality conditions that watershed managers can use to help locate nutrient sources or “hot spots” and therefore focus BMP implementation and track watershed nutrient characteristics.**



SEPTIC SYSTEM NITROGEN REMOVAL RETROFIT MONITORING

Septic systems have been the traditional method for treating wastewater from residential homes not attached to city sewer. As a large portion of the non-agricultural non-point source nutrients, septic systems are believed to be a critical priority for addressing the nutrient TMDL in the Corsica River watershed. Groundwater wells were installed in waterfront homes with traditional septic systems and a septic system with a nitrogen retro-fit system installed. These wells have been monitored once a month for five years. **A 50% reduction in groundwater nitrogen concentrations has been observed at the site with the nitrogen reducing septic system installed.**

STORMWATER & STORMWATER RETROFIT MONITORING

Urban stormwater discharges into the Corsica River carry sediment, nutrients and contaminants. The Town of Centreville is located in the middle of the Corsica watershed which makes stormwater runoff an important factor in any attempt to control runoff entering the river. One such stormwater control effort is the diversion of a direct stormwater outflow pipe that drained into Gravel Run into a created stormwater wetland. The wetland was designed to capture sediment and treat stormwater runoff from the Town of Centreville before it enters Gravel Run. One way of measuring success of the stormwater wetland is how much sediment was captured. **After only eighteen months in operation, four cubic yards of sediment were removed from the forebay (or main sediment capture pond) which would have gone directly into Gravel Run before the diversion into the wetland.** In addition, the wetland significantly improved water quality by removing petroleum and heavy metal contaminants in the stormwater runoff.

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

TIDAL WATER QUALITY MONITORING

Maryland DNR’s Tidewater Ecosystem Assessment division is responsible for the tidal water quality monitoring and assessment that helps support the management actions of this project. There are five continuous water quality monitors at three locations in the tidal portion of the Corsica River that collect dissolved oxygen, chlorophyll, turbidity, water temperature, salinity and pH data. In addition, there are monthly water quality research vessel cruises that collect samples from April through October.

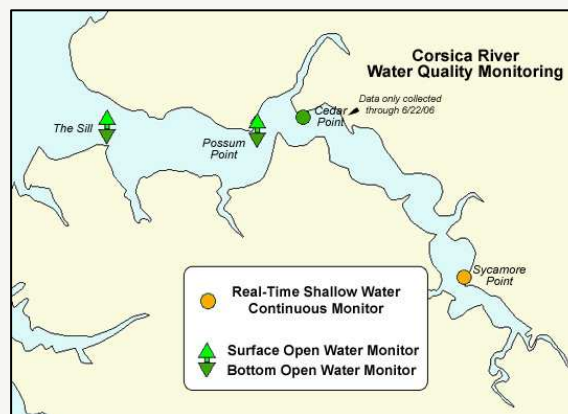


Figure 10: DNR Tidal Monitoring Stations

The observed positive trends toward nutrient reductions in two of the non-tidal tributaries entering into the Corsica have been encouraging. Due to many influential factors such as slow transport of groundwater, tidal mixing, and suspension of legacy sediments similar results have not been observed in the tidal portion of the Corsica River. As we continue implementation efforts in the watershed, future trends may show observable improvements in the tidal portion of the Corsica River as well.

VOLUNTEER MONITORING (CORSICA RIVER CONSERVANCY–CRC)

A team of local resident volunteers, trained by the Maryland Department of the Environment, conducts weekly water quality testing all along the Corsica River from May to October each year. Tests include temperature, salinity, clarity, conductivity, dissolved oxygen, pH, and bacteria (Enterococci). The bacteria samples are analyzed by the Maryland Department of Health. Weather conditions surrounding each sampling event are documented. Results are submitted to state and federal databases and published locally.

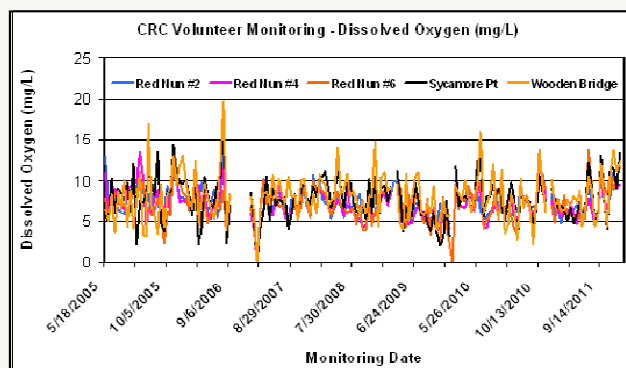


Figure 11: Corsica Volunteer DO Monitoring Results

The CRC has been monitoring water quality at five sites in the Corsica River since 2005.

The data collected is very important for tracking the ecological health of the Corsica River. At this time, it is difficult to discern any water quality trends in the tidal portion of the Corsica River.

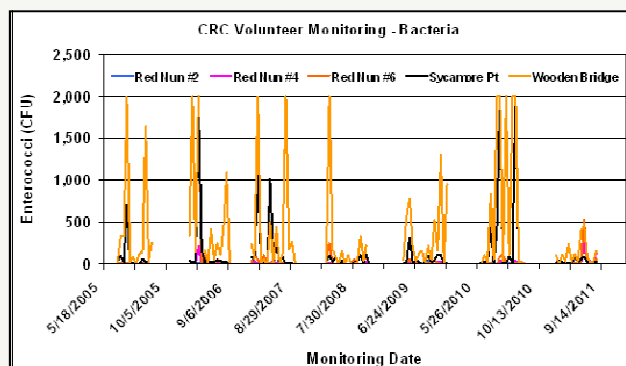


Figure 12: Corsica Volunteer Bacteria Monitoring Results

COMPREHENSIVE IMPLEMENTATION STRATEGIES FOR THE CORSICA RIVER: 2012 TO 2016

The Corsica Watershed Initiative started in 2005 with specific goals established to move toward the restoration of the Corsica River. Now, six years into the project, it is time to revisit the original goals, see what worked, apply lessons learned, and adapt to move forward with the continued restoration of the Corsica River. The following table lists the original restoration goals, and the updated (new) goals.

Table 1: Corsica Watershed Implementation Strategies/Goal Status and Future Plans

Best Management Practice (BMP)	Previous 2005 - 2011		New 2012 - 2016	Cost \$/Unit or \$/Acre	Nutrient (N & P) Reductions
	Original Goal	Status End of 2011	NEW Goal		
1. Agricultural Buffers	100 acres	94.3 acres	125 ac re-enroll 25 ac new enroll	Grass Buffers: Avg Implementation \$ = Cool Season = \$425/ac Warm Season = \$500/ac Forested Buffers: Avg Implementation \$ = \$600/ac. This does not include additional annual rental payments	Grass Buffers: N Removal = 16.92lbs/ac/yr P removal = 1.08lbs/ac/yr Forest Buffers: N Removal = 27.28lbs/ac/yr P removal = 2.15lbs/ac/yr Based on the Summary of BMP Nutrient Reduction Calculations (MDA source)
2. Agricultural Cover Crops	3,000 acres Annually	3,374 acres Annual avg.	Maintain 5,500 acres annually	\$45/acre is the base payment for cover crops with additional environmental incentives added	Cover Crops: N Removal = 9.48lbs/ac P Removal = 0.13lbs/ac Small Grain: N Removal = 6.31lbs/ac P Removal = 0.07lbs/ac Based on the Summary of BMP Nutrient Reduction Calculations (MDA Source)
3. Agricultural Nutrient Mgmt. /Horse Farms	5 Projects	3 Farms are currently being planned	This issue has been addressed through outreach efforts and will not be part of the project going forward	The cost on a per farm basis to write a nutrient management plan for equine ranges from \$250-\$300 based on estimates received for small operations	
4. Implement additional BMPs on Agricultural land	NA	NA	50	The cost of implementing BMPs varies depending on the type and extent of each practice.	The nutrient reduction varies depending on which BMP is implemented
5. Catalog all BMPs on farms including farmer funded.	NA	NA	125 Individual parcels	The cost associated with this work is included in the funding for the planner position.	Nutrient reduction for cost shared BMPs was indicated at the time the BMP was implemented. Nutrient reduction for farmer funded BMPs will be based on a functional equivalent to be determined.
6. Wetland Creation	50 acres	88.3 acres	20 acres	Variable	N/A

Table 1 (Continued): Corsica Watershed Implementation Strategies/Goal Status and Future Plans

Best Management Practice (BMP)	Previous 2005 - 2011		New 2012 - 2016	Cost \$/Unit or \$/Acre	Nutrient (N & P) Reductions
	Original Goal	Status End of 2011	NEW Goal		
7. Retrofit Septic systems	30 N Retrofit Systems	16	14	\$13,000	185 lbs/year of Nitrogen
8. WWTP Upgrade	Enhance Nutrient Removal (ENR)	Biological Nutrient Removal (BNR): Operating @ ENR levels with BNR treatment, based on annual average	None	\$4,500,000	The WWTP was upgraded to BNR at a cost of \$9.6 million, of which \$4.5 million was funded by the state. Annual Removal: N = 50,770 lbs/yr P = 4,260 lbs/yr Measured from pre-BNR
9. LID Projects (Rain barrels/Rain gardens)	200	308 RG 170 RB	100 RG 40 RB	\$2,000 rain garden \$60 rain barrels	Rain Gardens per acre: N=4.14 lbs P=0.33 lbs
10. Easements and Land Acquisition	1,710 acres	5,800	200	N/A	TBD
11. Oyster Reef Replenishment	20 acres=100 million spat	10 acres= 50 million spat	100 million spat	\$1 million	N/A
12. New Code and Ordinance		<i>Town:</i> Tree and pet waste ordinances <i>County:</i> Septic pump out and lawn fertilizer maintenance	Revisions to parking code requirements		
13. Establish 300 acre stormwater retrofits	300	112.54	187.46	\$15,000/acre	Varies per BMP since 2006: N = 138lbs/yr P = 19lbs/yr Sediment = 1.5 tons/yr
14. Establish SAV	10 acres	0	10 acres	\$100,000 for 10 acres seeded only, w/ 3 species	N/A
15. Stream Restoration	2 miles	0	0.5 miles	Approx \$150/linear ft, may be less for rural streams	Per LF/lbs/ft, (new interim rates) N= 0.20, P = 0.068 TSS = 310
New Practices: Dam removal/ Fish Blockage	NA	NA	Feasibility 2012 Final Eng 2013 Construction 2014	N/A	N/A
Street Sweeping	NA	NA	50 tons/yr sediment and debris	\$25,000/year	Varies per season

LESSONS LEARNED

This watershed restoration effort was designed to address the major impacts and stressors which affected water quality in the main-stem (tidal portion) of the Corsica River. High nutrient loading was specifically identified as the most important stressor to the overall health of the river. As with all dynamic living systems, there must be built-in adaptive management, and some goals identified in the original WRAS could not be addressed due to various reasons; including costs and cost effectiveness, the current ability of the river to support resources like oysters and submerged aquatic vegetation (SAV), and impacts to the river that involve sensitive species.

The items below include both on-going objectives that have been successful and some that need to be further implemented; all are essential to a highly functioning initiative.

- Effectively communicating conservation goals in the watershed;
- Engaging local communities in protection and restoration;
- Developing clear, measurable, science-based restoration and conservation strategies;
- Forming and maintaining a project implementation team that includes state, county, municipal, agricultural and local citizen representatives;
- Narrowing focus to the sub-watershed level to assess non-tidal impacts and impairments;
- Focusing protection and restoration efforts that accomplish cost-effective and long-term sustainable gains;
- Accounting for lag time that can be associated with water quality improvements;
- Having a central tracking repository for data and implementation activities, as well as analyzing data results annually.

THINGS YOU CAN DO TO IMPROVE YOUR LOCAL RIVERS & STREAMS

Opportunities for the public to engage in this, or any, watershed effort are many and critically important. Planting trees, growing oysters, participating in monitoring efforts, installing rain gardens/barrels are just some of the opportunities for public involvement and should be utilized to the greatest degree possible. More and more groups and agencies are relying on and fostering community level engagement and education in order to protect and restore water and other valuable resources around the country and the world.

PLANT TREES/BUFFERS

Planting riparian buffers along waterways is essential in limiting nutrient runoff, both in urban, suburban, and agriculture areas. The Department of Natural Resources has a several funding sources that can pay for tree buffers and similar projects on private and public land. Contact MD DNR's Chesapeake and Coastal Program for more information. You can also work with the Corsica Conservancy for specific projects.

<http://dnr.maryland.gov/ccp/index.asp>

<http://www.corsicariverconservancy.org/>

Forest Stewardship Plan: Any homeowner with 5 acres or more can become certified on their private property. Contact the DNR Forestry Department or your County Forester.

MARYLAND DNR'S OYSTER CAGE PROGRAM

The CRC has been growing oysters under the state Maryland Grows Oysters (MGO) program since 2009. **In 2011, 40 properties owners on the Corsica hosted 221 oyster cages filled with shells that had been seeded with oyster spat.** The CRC plans to continue and expand their oyster recovery program. If you have a pier or dock along the river and want to participate in the program, please contact CRC.

For other areas in Maryland, contact Chris Judy at MD DNR:

<http://www.oysters.maryland.gov/>

RAIN GARDENS & RAIN BARRELS

The Corsica River Conservancy developed a rain garden program in 2006, and has **installed of over 300 residential rain gardens in the Corsica River watershed as of 2011.** Rain gardens are an important component to local restoration efforts, by providing a hands-on learning opportunity to homeowners, and by capturing excess nutrient runoff.

CORSICA TARGETED WATERSHED INITIATIVE PROGRESS REPORT: 2005–2011

Through several grant programs, homeowners in the Corsica watershed have had rain gardens available to them free of charge. CRC will be looking for funding to continue this highly successful program. Please check our website at www.corsicariverconservancy.org for updates on the status of our rain garden program.

Rain barrels are available for purchase online through multiple vendors. <http://www.rainbarrelsource.com>



MINIMIZE LAWN FERTILIZATION & RECYCLE YOUR LAWN CLIPPINGS

Lawns are Maryland's biggest "crop" and a large source of nutrient runoff. You can have a nice lawn and still be mindful of your streams and river with just a little thought and care – and less work and expense! There are several things you can do to accomplish this:

- Established lawns generally do not require spring fertilization. If you do buy weed killer for spring/summer application, check the label of ingredients since many such products contain mostly unneeded fertilizer.
- The University of Maryland recommends fertilizer with no phosphorus and 0.9 pounds of nitrogen per 1,000 square feet of lawn per year, preferably in the fall only.
- Cut your lawn so that clippings are recycled back into it. This helps add nitrogen back into the soil which helps to improve the soil quality and decrease the amount of fertilizer you need.
- Have a soil test done to determine what your lawn actually needs and follow the recommendations from the results.
- If you water your lawn, do so only early in the morning, or late afternoon/evening, and be careful not to overwater since this is also a source of pollutant runoff.

PET WASTE PROGRAM

Pet waste not disposed of properly is responsible *for substantial nutrient and bacteria* deposits in local streams and rivers. The Town of Centreville has a pet waste ordinance that requires owners to properly dispose of all waste from pets.

CORSICA RIVER VOLUNTEER MONITORING

The CRC has been monitoring water quality at five sites in the Corsica River since 2005. Monitoring is conducted from May through October. The following parameters are measured at one foot and at depth: Dissolved Oxygen (mg/l), Water Temperature (°C), Temperature compensated Conductivity (mS/cm), Salinity (ppt), pH, Secchi Disk Water Clarity (m) and Enterococci (CFU).

To join the monitoring effort, go to:

<http://www.corsicariverconservancy.org/water-quality-monitoring>

ACKNOWLEDGEMENTS

Thank you to the following writers, editors, and contributors of this document:

Teri Batchelor, Maryland Department of Natural Resources

Carrie Decker, Maryland Department of Natural Resources

Frank Digilianardo, Corsica River Conservancy

Jen Dindinger, University of Maryland Extension Program

Quentin Forrest, Maryland Department of the Environment

David Foster, Chester River Keeper

Rob Gunter, Queen Anne County Planning

Isabella Junkin, Chester River Association

Eva Kerchner, Town of Centreville

Michael Kashiwagi, Maryland Department of Natural Resources

Jim Malaro, Corsica River Conservancy

Margaret McGinty, Maryland Department of Natural Resources

Dave Mister, Maryland Department of Agriculture

Debbie Pusey, Corsica River Conservancy

Eric Ruby, Maryland Department of the Environment

Erin Ryan, (Intern) Maryland Department of the Environment

John Scarborough, Queen Anne County Public Works

Kevin Smith, Maryland Department of Natural Resources

Katie Starr, Queen Anne's Soil Conservation District

Mark Trice, Maryland Department of Natural Resources

