

The pages in this document were taken from the "Corsica River Watershed Restoration Action Strategy: Final Report" published in September 2004. The entire document can be found at http://dnrweb.dnr.state.md.us/download/bays/cr_strategy.pdf.

Corsica River Watershed Restoration Action Strategy: Final Report

**Excerpt Showing an Example of an
Implementation Program**

September 2004

IV. Implementation Strategies and Recommendations

Summary of prioritized findings from all the Methods employed in the WRAS data collection (to ground truth or monitor the Corsica River Watershed condition and move forward with implementation projects) are as follows:

1. **Nutrient Uptake** in the nonpoint source (NPS) contributors is deemed our highest overall priority as agricultural practices contributed 86% of the NPS Nitrogen and 84% of the NPS Phosphorous according to the Watershed Characterization and the MDE TMDL. Many of the farmers in The Corsica River Watershed voluntarily implement management systems that address nutrient run-off and infiltration, erosion and sediment control, and animal waste utilization. All farms in the Maryland Agricultural Land Preservation Fund (MALPF) program have been assessed by USDA-NRCS using the *Resource Inventory for Conservation Planning Field Evaluation* protocol. This assessment and the required nutrient management plans in process throughout the watershed are certainly a start. Best Management Practices (BMPs) identified in the Soil Conservation and Water Quality Plans for implementation on individual farms within the watershed include grassed waterways, riparian herbaceous and riparian forested buffers, conservation cover, cover crops, shallow water wildlife areas and grade stabilization structures. Of the above, while all are important, the WRAS Steering Committee has identified the Cover Crop opportunity as a primary means to improve the nutrient reductions from Agricultural land uses. The funding for the Maryland Cover Crop Program has gone quickly statewide and the WRAS seeks to target additional funding to this program. To that end, the WRAS Committee supports the following initiative:

CORSICA RIVER COVER CROP – DEMONSTRATION PROGRAM

Project Area:

Corsica River Watershed

Sponsors: Queen Anne's SCD Office
505 Railroad Avenue, Suite 3
Centreville, Maryland 21617

Preamble

The Queen Anne's Soil Conservation District established a voluntary Winter Cover Crop program in the Corsica River watershed. Targeting in this area is necessary because of WRAS priorities and the Corsica River TMDL focus on nutrient reduction. Maryland's current cover crop program is funding limited and will not meet the goals of the nutrient reduction needed to meet the TMDL.

The Corsica River Cover Crop Program will contain requirements already familiar to local agricultural producers including: provisions for a limited sign-up period, requirements for a nutrient management plan, no commercial fertilization, program guidelines that establish crop species and planting dates, spot checks by the local SCD staff and a required spring kill down or suppression.

Because cover crop planting dates continue to be an issue, this demonstration will pro-rate cost-share in accordance with nutrient uptake potential, i.e., producers will receive \$30/acre for cover crops planted by October 1, 2004 and \$15/acre for cover crops planted by November 1, 2004. The Corsica River Cover Crop program will be run by the local Soil Conservation District with administrative assistance provided by the Maryland Department of Agriculture through staffing and will be subject to all of its regulations and procedures.

The Queen Anne's County Cooperative Extension endorses this program as both cost effective and beneficial to the water quality in the Chesapeake Bay. Proposed nitrogen and phosphorus reductions from this practice with 3,000 acres under management are estimated at 21,000 lbs. and 570 lbs. respectively.

This project addresses the goals outlined by the WRAS which call for the restoration of the Corsica River watershed based on a watershed plan and having a direct relationship to a TMDL.

Funding: \$90,000

Source of funding: As yet unidentified grants

Project History/Background

The Corsica River, a tributary of the Chester River, is located in Queen Anne's County, Maryland. The Corsica River is approximately 6.5 miles in length. The watershed of the Corsica River has an area of approximately 25,000 acres or 40 square miles. The predominant land use, based on 1994 Maryland Office of Planning information, is agricultural (15,600 acres or 62%). Watersheds, and the implementation of agricultural best management practices (BMPs) makes a significant contribution to nutrient reductions in these watersheds. Implementation of nutrient management plans, new animal waste management systems, conservation tillage, Soil Conservation and Water Quality Plans (SCWQPs) and treatment of lands with high erosion potential all contribute to nutrient reduction. However, further actions are necessary in order to address conditions in watersheds as identified under the Watershed Restoration Plan and the TMDL goals.

Annual cover crops are highly effective in managing nutrients and sediments when planted in the early fall following the harvest of corn, soybeans, vegetables or tobacco. Cover crops reduce the leaching of excess crop nutrients from the root zone and valuable erosion protection.

Cover crops have long been recognized as one of the most effective practices to reduce nitrate leaching losses. As noted in the November 1997 *Blue Ribbon Report, the Citizens Pfiesteria Action Commission* headed by The Honorable Harry Hughes:

The Commission heard testimony from Dr. Russell B. Brinsfield. He pointed out that nitrate leaching losses occur even when all crop yield goals are met and all best management practices and a nutrient management plan are implemented. Dr. Brinsfield estimates that the utilization of cereal grain cover crops can reduce nitrate leaching losses by 60% following a corn or soybean crop. The Commission strongly encourages the regular use of cover crops as a best management practice.

The Commission strongly recommends that the State implement a continuing cover crop program designed specifically to limit nitrate leaching and to prevent nutrients from entering the Bay and its tributaries. The Commission anticipates a meaningful level of support of a program designed to meet the specific goal of nutrient reduction. Participants in the program should not be permitted to assist crop growth by adding nutrients from organic or commercial fertilizer.

This voluntary project will build upon the State's current cover crop initiative that is inadequate to address the needs based upon C2K funding analysis. Maryland provides 1.5 to 2.5 million annually for state wide cover crops. Evaluation of the need to meet the commitments in the current round of Tributary Strategies suggest that up to 19.5 million will be needed annually to meet the cover crop goals. Through this 319 initiative the agricultural agencies of Queen Anne's County will implement a voluntary enrollment cover crop program targeted for maximum water quality benefits in the Corsica River. The implementation and benefits are proportionate to and dependent upon adequate grant funding levels.

Previous work has focused on the Monocacy Basin in Western Maryland. However, new FY2003 grant program guidance requires a focus on only those watersheds with a watershed restoration plan and a draft or final TMDL.

The Corsica River Cover Crop Program will include aerial seeding of cover crops in order to address implementation barriers caused by limited fall planting dates. Cooperators will be provided the opportunity to sign up and apply cover crops under this program. For those not interested in aerial seeding but interested in applying cover crops, a more traditional crop application program will also be available. This program will contain many requirements already familiar to local agricultural producers including: provisions for a limited sign up period, requirements for a nutrient management plan, no commercial fertilizer application, program guidelines that establish crop species and planting dates, spot checks by the local SCD staff and a required spring kill down or suppression. Because cover crop planting dates continue to be an issue, this demonstration will pro-rate cost-share in accordance with nutrient uptake potential, i.e., producers could receive \$30/acre for cover crops planted by October 1, 2004 and \$15/acre for cover crop planted by November 1, 2004. The Corsica River Cover Crop program will administratively follow the Maryland Agricultural Cost Share Program (MACS) cover crop program offered on the Eastern Shore and will be subject to all of its regulations and procedures.

Local Soil Conservation Districts' personnel will be responsible for delivery, sign up, administration, and certification.

We expect program sign up to exceed the funds available. The program would continue to sign up acreage beyond the available funds as "stand by contracts" if they agree to follow program guidelines.

Goals and Objectives

Goal

The project will promote a voluntary best management practice to improve the water quality in the Corsica River.

Objectives

1. Promote a watershed based cover crop program within the region by way of publications and outreach through the Cooperative Extension, Soil Conservation District and local print and broadcast media.
2. Install cover crops on over 3,000 acres of cropland.

Measurable Environmental Results

The proposed cover crop program will target 3,000 acres under management. Based upon Chesapeake Bay Program and Maryland's Tributary Strategies, the reduction efficiency of this practice is estimated at 21,000 lbs. for nitrogen and 570 lbs. for phosphorus. In addition, cover crops provide valuable erosion protection on the moderately sloped lands.

2. **AG Nutrient and Sediment Reducing Buffers** are important permanent measures for water quality and habitat enhancement in the Watershed. To best actualize the benefits of these buffers, they should be at least 100 feet wide - 50 feet on either side of an intermittent stream and a full 100 feet wide on each side of a perennial or *blueline stream* and the same for Critical Area's standard shore buffer. The WRAS Committee further recommends that through outreach efforts and a pilot program, Wildlife Habitat Incentive Program (WHIP) grants through Natural Resource Conservation Service (NRCS) be sought along the tidal frontage of the Corsica River. This is a gap closer between the agricultural buffer practices and currently required buffers for new developments. (See figure 9).

In Maryland, the Conservation Reserve Enhancement Program (CREP) offers additional incentives to encourage landowners to implement practices that will help reduce sediment and nutrients in the Chesapeake Bay and will improve wildlife habitat. CREP is seeking to enroll 16,000 acres of highly erodible cropland into grass and/or tree plantings, establish 77,000 acres of riparian buffer habitat, provide 5,000 acres of water and wetland habitat, and restore 2,000 acres of habitat for declining species.

Like the original conservation reserve program (CRP), land must be owned or leased for at least one year before it can be enrolled in CREP. Land must also meet cropping history and/or other eligibility requirements. Enrollment is on a continuous basis, allowing landowners to join the program at any time rather than waiting for specific sign-up periods.

The USDA Farm Service Agency (FSA) provides an annual land rental payment, including a CREP special incentive payment, plus cost-share of up to 50 percent of the eligible costs to plant grasses or trees on highly erodible cropland, establish vegetated buffers along streams, restore wetlands, provide shallow water areas for wildlife, and restore habitat for rare and declining species. The Maryland Department of Agriculture, through the Maryland Agricultural Water Quality Cost Share (MACS) program, offers additional cost-share (up to 37.5 percent of eligible costs) for practices that will provide significant benefits for water quality.

The U.S. Environmental Protection Agency's Chesapeake Bay Program has established ambitious goals to reduce nutrients entering the Chesapeake Bay and its tributaries by 2010 while increasing habitat and restoring wetlands. When fully implemented, CREP will help to achieve Maryland's water quality goals by:

- Reducing an estimated 5,750 tons of nitrogen and 550 tons of phosphorus from entering Maryland waterways each year.
- Reducing the amount of sediment entering the Bay and its tributaries by approximately 200,000 tons annually.

- Establishing and enhancing 93,000 acres of riparian buffers, 5000 acres of wetland habitat and 2000 acres of habitat for declining, threatened or endangered species including the bald eagle, Eastern bog turtle, dwarf wedge mussel, glassy darter and harparella, a nearly extinct aquatic plant that grows only where suitable water quality conditions are present.

Queen Anne's County as a whole currently has in inventory:

- 8000 acres of grass buffer
- 440 acres of forested buffer
- 655 acres of wetland restoration
- 121 acres of shallow water areas designed for waterfowl

The goal of this initiative is to add 100 acres in the Corsica River Watershed @ \$170/acre for 15 years (sign-up). Above that, we include in the costs one review person for 2 years at \$50,000/year and supplies of \$5,000. As yet unidentified grants are to fund this initiative. In addition, supplemental budget requests to the State legislature are recommended. The Nutrient Reduction Efficiency of CREP in the Upper Eastern Shore is 43% for nitrogen and 53% for phosphorous. Therefore, assuming low till for a more conservative agricultural practice on the average, conversion from arable to buffered lands should yield a reduction of 1000 ac. X 21.3685lbs/ac x 0.43 = 9,188.46 lbs/acre of nitrogen; and 1000 ac. X 1.4951lbs/ac. X 0.53 = 792.40 lbs

3. **Whole Farm Nutrient Management and Horse Pasture Management** are areas the WRAS Committee recommends in the form of demonstration projects designed for farmettes of ten acres or less. This is an area which can fall through the regulatory cracks but could result in both ecological and farm owner benefits. Unlike larger animal waste management systems, some of the nutrient reduction is acknowledged to be found on waste in pasture land as well as animal confinement runoff control. This demonstration site employs techniques for manure storage and treatment as well as entrapment and treatment of surface run-off. There are fifty (50) voluntary demonstration acres in the Corsica River Watershed set aside for a maximum of five such farmette conversion projects proposed for \$ 25,000 each with an anticipated nutrient reduction of 14%. An example of the reduction calculation is as follows: 10 acres x 2282.4784 lbs/ac. x 0.14 = 3,195.47 x 5 (conversions) = 15,977 lbs of nitrogen and 10 acres x 277.7539 lbs/ac. x 0.14 = 388.85 lbs/ac. x 5 (conversions) = 1,944.28 lbs. Funding source is from grants and existing USDA NRCS programs.

4. **Household Pollution Reduction** strategy involves the Town of Centreville sponsorship of an outreach program to promulgate Urban Nutrient Management pieces on lawn fertilization and pet waste control. Specific Code implementation is hereinafter discussed. It is important to remember that this WRAS is intended to leave no sector of the watershed citizenry uninvolved in the overall effort to improve the watershed. There are approximately 3,700 people in the watershed whose ecological behaviors must be affected.

Brochures describing how to reduce nutrient loads coming from lawns and residences will be prepared for each property owner in the watershed. The estimated cost to develop, print and mail approximately 4,000 brochures is \$3,000.00. Funding for this project is through the Upper Eastern Shore Tributary Team and Strategies program. The brochures will be developed through the Queen Anne's County Master Gardner program of the University of Maryland Extension Service. The target date for having the brochures distributed is March 2005 (development by 11/15, review and printing by 2/1, distribution by 3/15). The metric will be an average of 1/3 acre of lawn per residence x 1201 households (in the Town of Centreville) = 400 acres in lawn at \$1.74/ac/yr or \$696. The total loading reduction goals for each element are as follows: N-17%, P-22%. The estimated cost for implementation of this BMP includes soil testing and tracking by house to house survey. The estimated nutrient reduction is as follows: 400 acres x 9.3315 lbs/ac x 0.17 = 634.54 lbs. for nitrogen and 400 acres x 1.3399 lbs/ac. x 0.22 = 117.91 lbs. We will assume that 50% of brochure recipients will achieve these goals by June 2005; 75% by June 2006 and 90% by June 2007. Progress will be monitored by phone surveys of a sample of brochure recipients. Survey Sampling will be conducted in December 2006, and December 2007 by QAC Extension Service/MG program.

In addition, steps will be taken to reduce nutrient applications by commercial lawn services. Ordinances will be proposed for the Town which will expressly prohibit fertilizer application by contractors more than twice per year and with an application rate determined in total lbs per acre established by U of MD Cooperative Extension Service specifically for the Town. Letters will be prepared and sent to each nursery and vendor of lawn maintenance products in the watershed and boundary areas requesting that they review their inventories of fertilizer and lawn care products to make sure that products labeled primarily for correcting lawn problems like crabgrass, weeds, fungus etc have minimal amounts of fertilizer included and that products that are mainly comprised of fertilizer are labeled as such. No specific metric will be applied to these actions as they are meant to supplement the principle action directed to residents as outlined in the previous paragraph.

- 5. Main Stem of the Corsica River: Water Quality Monitoring** is crucial to our understanding of both existing conditions and the highly anticipated improvements in water quality as WRAS implementation strategies mature. It is imperative that monitoring be permanent, that the findings be scientifically unassailable, and that such progress in water quality improvements be heralded. Acquisition and deployment of buoys and data collection are the keys to this strategy. Sufficient funding is crucial to the success of this strategy.

Main stem of the Corsica River: Water quality monitoring. CRA is eager to work in partnership with MD DNR and University of Maryland to develop a water quality monitoring program that will integrate continuous monitoring technology (supplied by DNR) with citizen monitoring using bioindicators (isotopic analysis of which will be provided by University of Maryland and can be used to track pollution sources). Cost estimate = \$345,434. Project entirely dependent on grant funding; no grant sources currently identified.

Milestones: 1 month after funds received – recruit participants, 3 months after funds received, train participants, citizen monitoring ongoing for months 3 – 24. Educational component: citizens hopefully will see improvements in water quality over time and be able to relate this to WRAS implementation.

- 6. Submerged Aquatic Vegetation (SAV) Reestablishment** is deemed important by the WRAS Partners as it constitutes an ongoing measure of water clarity, and chemical quality. While SAVs may be the canary in the coal mine, its survival will give a very visible and measurable means to gauge watershed improvement. This is also an area which engages a growing corps of volunteers and students in the restoration process.

With the new Centreville WWTP having come on line, a concerted effort will be made starting in 2005 to dramatically increase the planting and seeding of underwater grasses in the Corsica. An on-the-water survey of historic and prospective grass planting sites in the River was completed in the first quarter of 2004, in concert with Underwater Grass experts from UMD Horn Point Center. Some plants were grown and planted by Chester River Association in early June 2004 and are currently being monitored for survival and growth. Growth during the summer of 2004 has been sustained, significant, and very promising. Funds and sources for massive plantings and seedings of underwater grasses at surveyed sites throughout the mainstem of the Corsica will be sought through grants and continued cooperation with CRA, University of MD Center for Environmental and Estuarine Studies at Horn Point, and the Chesapeake Bay Trust (CBT). The goal is to begin this large-scale program in the summer of 2005 and to sustain it until grasses show a persistent ability to regenerate at all historic and prospective sites in the River.

A total of \$48,000 will be sought to implement this program over two years. CBT grants and other as yet unidentified grants will be pursued for this strategy. The metric will be square feet of SAV planted in early summer and measured against square feet of SAV surviving in late summer/early fall. There will be no direct nutrient load reduction associated with this strategy. However, water clarity and reduced turbidity will be associated indicators of success, along with overall habitat improvement as identified by DNR and through citizen monitoring. Funding proposal will be developed and submitted by CRA by 11/15/04 for funds to begin large-scale plantings in June 2005 with a similar cycle for 2006. CRA will work closely with Horn Point and DNR technical assistance and to identify funding sources. CRA will continue to work closely with the CBF and VIMS in surveying and reporting SAV in the Corsica and surrounding areas. As the lead for SAV restoration in the watershed, CRA will also continue the educational outreach component of this program through citizen participation in growing grasses for plantings.

7. **Low Impact Development Technique in Ordinance Form**
Water Quality Protection Regulation

The Town of Centreville will produce and adopt the **Centreville Water Quality Protection Regulation** and associated **Centreville Water Quality Design Manual**. This ordinance and manual is to supercede the existing Queen Anne's County Stormwater Management Ordinance currently regulating such activities within the Town. This new regulation and design manual is being modeled after the Huntersville, NC low impact development ordinance which may be found in complete detail at <http://www.charmeck.nc.us/Departments/LUESA/Water+and+Land+Resources/Programs/Water+Quality/Huntersville+Ordinance/Home.htm>

The Prince George's County Maryland Low Impact Development Design Strategies and the MDE Model Stormwater Management Ordinance (2000) must be used to ensure that volumetric or quantity management objectives of the State of Maryland are integrated into the final Town code. The WRAS Committee is aware that this ordinance can only have effect within the incorporated Town and that efforts should be made to establish a similar ethic in the County portions of the watershed to the degree possible. Because the vast majority of the impervious area in the watershed is found within the Town and its growth area, LIDs will make a significant contribution to development and urban-driven nutrient and sediment reductions.

The first step in the implementation process after the adoption of the above anticipated code will be the design and construction of regional urban stormwater management facilities on publicly owned lands along the Millstream and along Gravel Run. These facilities are in addition to the marsh creation opportunities that exist at each of these sites. At the very least, mechanical trash removal and water quality improvements will be implemented. Partial funding is in place through the fee-in-lieu escrow account for stormwater management previously established by the Town. The cost to develop the required code and have it published and promulgated is \$37,000. The Town will provide funding for this ordinance from its general fund. This cost includes pilot demonstration sites that clearly show the design and application of LID techniques and practices. The goal reduction is 33% for nitrogen and 46% for phosphorous improvement over existing untreated lands. A calculation for Centreville is as follows: 996 acres (urban impervious) x 8.1184lbs/ac. x 0.33 = 2668.36lbs of nitrogen and 996 acres x 0.5145 lbs/ac. x 0.46 = 235.72 lbs. of phosphorous.

8. **A Native Conservation Landscaping Demonstration Project** was deemed of value as it is coupled with an outreach effort to engage a minimum of 200 citizen participants. Potential sites for this project are to be selected using the full capability of the GIS system developed by the WRAS. This item evolved in the context of an extreme makeover which would take a highly impaired site into an environmental limelight.

Native Conservation Landscaping Project. Project relies on volunteers to participate in high-profile "makeover" of a public site to demonstrate the value of Bay-friendly landscaping. This includes an education and outreach component (media coverage and on-site educational materials). Success measured by # of citizen participants and CRA-sponsored tracking of subsequent referrals to landscape consultants. Estimated cost = \$78,410. The Town of Centreville will work with its stakeholders to designate public

lands for this project at the Millstream and Gravel Run Public Parks. Project entirely dependent on grant funding; no grant sources currently identified. Anticipated pollution reduction: phosphorus and suspended sediments reduction per acre of Bayscape of approximately 70%, anticipated acreage of “makeover” site and subsequent homeowner efforts = 2 acres. Milestones: 2 months after funds received, site identified; 3 months after grant received, participants recruited media alerted and site design begun; 4 months after grant received (and/or during appropriate planting period) plants ordered and planted; 6 months after grant received follow-up with participants to encourage home projects. Educational component: citizens will learn how to reduce pollution by using native plants which require fewer chemicals, and will understand the role of raingardens in retaining and filtering stormwater runoff.

Residential Buffer Planting and Conservation Landscaping. The Buffer Gap analysis from the WRAS SCA will be used to identify and prioritize residential areas in need of increased buffer plantings and conservation landscaping. The total linear frontage of residential buffer gaps in the Corsica watershed is estimated at 23,898 linear ft. The goal is to cover 90% of these gaps with conservation landscaping to a depth of at least 100 ft from mean high tide within two years of the completion of the WRAS (by Fall 2006 with interim goal of 45% by Fall 2005) Vegetation appropriate for this purpose will consist of a variety of tidal water grasses and proceed upland to various native shrubs and trees. Sources for plants have been established through joint CRA/DNR Watershed efforts (e.g., grow out stations) but will need reinforcement and enlargement to meet the supply needs to close the identified Corsica buffer gaps.

Workshops will be held for target communities throughout the watershed, working through CRA, DNR Watershed Services, QAC SCD, Queen Anne’s County local agents for the U of MD Cooperative Extension Service and Master Gardeners (QAC ES/MG), the QA Soil Conservation District, and UES TribTeam. Property owner volunteers will be enlisted through these workshops and other more focused targeting efforts to participate in buffer plantings on their property. Incentives will include the supply of plants, landscape design assistance, spraying of invasives, and volunteer assistance with plantings. The total cost of grasses, trees, shrubs and replacement grow-out stock and supplies for the two-year program is \$75,000. Grants will be sought through the Chesapeake Bay Trust and the alliance for the Chesapeake Bay as well as other sources with continuing funding and existing delivery systems in place.

Records will be kept by SCD of linear feet of shoreline buffers treated through this program.

- 9. An Easements Incentive Program** for acquisition of development rights within the watershed is contemplated which would boost the rate of conservancy in the Corsica River Watershed. Methods to finance these acquisitions will be discussed in Chapter V part 3 of this report.

The WRAS Committee has a strong partner in the Eastern Shore Land Conservancy. The WRAS Steering Committee suggested that information be gathered during the opening process of purchasing easements in the Watershed which would give the Conservators a field survey of the environmental condition of the acquisition. Similar to the USDA-NRCS farm plan (see Appendix II), this request for information supplement, will alert interested parties of opportunities to remedy impairments identified through the WRAS and to implement agricultural BMPs that will go with the land into the future.

This program will be coupled with a Town of Centreville Comprehensive Land Use Plan that establishes an Urban Growth Boundary around the Town and a platted Greenbelt within the Town limits into which priority funding would be funneled by the Town for easement acquisition.

- 10. Creation of Non-Agricultural Wetlands** is deemed a valuable means of effecting human behavior changes resulting in stronger watershed stewardship. The Corsica River Watershed has an identified need for conversion (or more accurately, reversion) of hydric soils to their original pre-historic wetland condition. If a demonstration project can be accomplished which results in a suburban wetland landscape that is attractive, easily accessed by the public and affordable, the WRAS believes great downstream benefit will be found. Wetlands and wetland marshes are very effective at removing nitrogen.

The WRAS has demonstrated opportunities to restore nontidal wetlands on landowner properties. The Chester River Association in partnership with DNR and The Alliance for Chesapeake Bay will seek to identify 2 wetland restoration sites and engage up to 100 citizens in marsh planting and restoration. The Town will assist in locating these sites on public lands within the Town boundary and make safe and easy access to them for educational purposes. Estimated cost = \$22,000. Project entirely dependent on grant funding; no grant sources currently identified. Anticipated pollution reduction: nitrogen reduction per acre of emergent marsh = 42%, and phosphorus reduction per acre of nontidal wetlands = 55%, anticipated acreage of wetlands restored = 1 acre. Milestones: 2 months after grant received, sites identified; 4 months after grant received, participants recruited and plants ordered; 6 months after grant received (or appropriate planting season) marsh plantings occur; 12 months after grant received wetland condition assessed.

The restoration of wetland habitat in the Corsica watershed is recognized as an important attribute in restoring water quality. The Corsica watershed is estimated to have a historic wetland loss of 4,192 acres (Unified Watershed Assessment 1998). Most of this historic loss occurred in the upper headwater tributaries of the Three Bridges and Mill Stream sub-basins. Conversion of wetlands was a common agricultural practice in the region until 1985. Today those converted wetlands are valuable high production cropland. A network of lateral collectors (farm ditches) and grass swales has altered the pre-colonial landscape and watershed hydrology.

As part of the action strategy to restore water quality to the Corsica Watershed it is recognized that restoration of upper headwater prior converted wetlands can play an important role in sequestering nutrients and sediments. Most of the opportunities for wetland restoration are on agricultural lands and farmland converted to low density

development. Furthermore, the cost of conversion of agricultural land to wetland is a loss to the farmer in terms of the economic value of the land. Agricultural programs that promote best management practices (BMPs) can offset the cost of converting drained hydric soils back to wetland through rental agreements. It is recognized that the restoration of wetlands should be done on a voluntary basis and that there are other conservation practices that may achieve similar results.

There may be additional opportunities to restore wetlands in the urban environment. These wetland restoration opportunities are down stream in the watershed and at or near the tidal interface with the Corsica River. These areas include both tidal and nontidal systems where public land inside the Centreville municipal limits is adjacent to the fresh water tributaries and the main stem of the Corsica River. The Town of Centreville holds seventy (70) acres encompassing the acreage of the original normal pool of the mill pond located east of Maryland Route 213. This area may be considered for a wetland restoration project. The Town also holds six (6) acreages of public land immediately upstream of Maryland Route 213 encompassing the existing pond in Gravel Run. Both these areas are potential restoration sites that tie into the Town's regional urban stormwater management construction goal cited in item seven (7) above. Additionally, landowners along the tidal waters of the Corsica who are concerned with erosion and habitat loss may adopt a Living Shoreline approaches to restore tidal fringe marsh.

11. **Septic System Retrofits** are believed to be a critical priority in the Corsica River Watershed strategy as this comprises a large part of the non-agricultural nonpoint source nutrient contribution to the Corsica. There are existing systems that are installed in marginal soils, some are very poorly (if ever) maintained, some lie within 300 feet of a tributary stream or the edge of tidal water, and employ ancient technology not capable of any significant nutrient reduction. Many innovative systems are now commercially available some of which are currently pre-qualified for installation in Queen Anne's County by the Queen Anne's County Environmental Health Department.

The overall goal of this strategy is reduce nutrients from septic throughout the watershed, particularly those within the 300 foot critical area. Conventional systems that are permitted in the County emit 40 - 60 mg/l of nitrogen (estimated N content in what flows from the whole septic system into the groundwater). The goal is to reduce this to about 20-25 mg/l. [For the purposes of this initiative, 80-100 gallons per day per capita is used to determine total annual flow and 705 existing systems are included in the strategy. Using data from MdPropertyView®, total parcels in the watershed = 2142 minus 1201 in the Town of Centreville (on public sewer and water) – 236 unimproved parcels = 705.] Therefore, clearly it will be a long time before this can be done for the majority of systems in the watershed, maybe never. However, the WRAS program will begin efforts towards this goal in a voluntary program led by the Upper Eastern Shore Tributary Team (UESTT).

The program is one of education of existing and new septic system owners and getting them to voluntarily adopt improvements to their current systems. These improvements include regular pumping of solids (1-3 years depending on size and usage), adding "risers" for better access and identification, adding plastic baffles to existing tanks, adding filters to prevent the entry of solids to drainfields. In addition to the cost of

educational pamphlets, some financial assistance to make improvements to systems might also be pursued if the need can be demonstrated through citizen response. The cost for this portion is, 705 systems x \$125 = \$88,125 for a three year coverage span. Funding will be pursued through MDE grants.

We also plan to work closely with QAC Health Department to work cooperatively with owners with failing septic systems that are clearly discharging into the waterways of the Corsica to immediately remedy those problems.

Measures will include number of new BNR systems installed, percentage of new systems that are BNR vs Conventional, number of conventional systems with improved features and maintenance, number of offending failed systems corrected or eliminated. The QAC Health Department will have records reflecting this data which the UES Tributary Team will periodically review to monitor progress. The total cost for this is $705 \times \$5500 = \$3,877,500 + \$141,000/\text{yr.}$ in maintenance (\$200 per connection per year spaced over time). Anticipated nutrient reduction is $365 \times 2.8 \text{ppm} \times 80 \text{gpd} \times 8.34 \text{lbs/gal} \times 60 \text{mmg/l} \div 1 \text{m} + 40.91 \text{ say } 41 \text{ lbs per unit or } 28,905 \text{ pounds of nitrogen per watershed year.}$ Funding through the Maryland Department of the Environment will be sought.

Working with the Queen Anne's County Health Department, the WRAS Committee will forge a plan to retrofit and test selected septic systems through a voluntary agreement with the homeowners in an effort to document in an unequivocal manner the benefits of system maintenance and replacement of technologies. This plan will call for both installation and long term water quality testing. The WRAS stakeholders believe there may be a significant benefit derived through extended drain field life expectancy. In the rural landscape of the Corsica River Watershed, individual systems will prevail well into the future. A WRAS Committee recommendation is that voluntary installation of innovative denitrification systems should be encouraged in new development or replacements with particular attention to those systems located within 300 feet of a perennial stream or tide water.

12. **EcoTeams** offer an opportunity within the watershed, and beyond, to coalesce a growing environmentally concerned citizenry into function teams to plan and implement workshops, school education programs and to measure and track homeowner behavioral change over time. The Chester River Association will be the leader of this initiative which is intended to build volunteer capacity and voice for future implementation of WRAS projects.

Urban and suburban homeowners will be recruited to participate in local teams which "adopt" their local waterway through monitoring and stream cleanup projects. In addition, participants will learn homeowner BMPs for river protection and restoration and will use journals and workbooks to track their progress in implementing these BMPs. Teams will provide peer support groups and volunteer coaches to encourage individual participants and provide learning resources. A pre- and post- project survey will track the program's effectiveness in inducing behavior change. Estimated cost = \$93,500. A grant has been submitted to fund the initial stages of this work. Anticipated pollution reduction: phosphorus reduction per household = 10 lbs., anticipated number of households participating = 50. Milestones: 1 month after grant received educational materials, log books etc. developed; 2 months after grant received design

and send out homeowner survey; 4 months after grant received participants recruited; 5 months after grant received begin series of homeowner education workshops and hold first EcoTeam meetings, distribute workbooks etc; 6 months after grant received and monthly through month 18, host EcoTeam meetings; month 18 send out post-survey to measure behavior change. The CRA will champion this initiative and grant funding through DNR and EPA- Watershed Initiatives grant will be sought as a capacity builder.

13. **Turbidity Reduction** in the Corsica River can occur through the reintroduction of oyster reef ecosystems. The WRAS suggests that the historic shellfish areas, shown on Figure 14, should be formally set aside in Sanctuary, seeded, and monitored as to viability. To defend the scope of this project the WRAS Committee suggests that clam dredging be suspended in and near these historic locations. Turbidity in the Corsica and the Chester River mainstem will be measured and indexed along with the chemistry suggested in #5 above. The estimated cost is \$14,500/acre and the WRAS estimates a total 80 acre opportunity for \$1,160,000 or increments thereof as water quality over survivability is assessed over time. For The WRAS phase one, assume a first phase of 10 acres at 14,500 = \$145,000. Chester River Association will champion this project and funding will be sought through Maryland Fisheries and other research funding sources. This project will proceed when water quality data suggests survivability may be sustainable.

In addition, Chester River Association will continue its long-term monitoring program, Chester Testers, which maintains a site on the Corsica River, and its newly-initiated testing of the effluent from the Town of Centreville wastewater treatment plant.

The strategies discussed above are not intended to limit the power of the WRAS to espouse and support any project deemed of value to the health of the Corsica River. As a starting place, these initiatives touch the core of impairments that can, if remedied, have significant and early impact on the health of the river. Many other initiatives are difficult to quantify in terms of specific nutrient reduction but have great value to the long term and sustainable water quality. Outreach is one such example. These future initiatives will be pursued within the comprehensive context of the WRAS and result in ongoing updates to the WRAS databases.

TABLE 4 Implementation Strategies

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/ performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
<p>1. Market and early planting incentive, commodity, small grain, cover crop.</p> <p>Goal: 3000 demonstration acres.</p>	Queen Anne’s County Soil Conservation District (QA SCD).	<p>Outreach: Fall 2004.</p> <p>Implementation: 2005 to 2007.</p> <p>Monitoring: 2005 to 2007.</p>	<p>Pounds of nutrients reduced.</p> <p>Number of farmers and number of acres enrolled.</p> <p>Quarterly reports and tracking of acreages enrolled.</p>	<p>Paired watershed study: Maryland Department of Natural Resources.</p> <p>Ground water test wells: University of Maryland Cooperative Extension.</p>	<p>QA SCD aggressive enrollment initiative.</p> <p>Presentation of data results to public, other watersheds, and MD DNR WRAS web site.</p>	<p>Pro-rated early planting incentive: \$17/acre early planting, \$12/per acre later planting. Provides financial incentive to farmers to plant cover crops earlier to achieve greater nutrient uptake.</p>
<p>3. Demonstration, whole farm nutrient and horse pasture management for farmettes of less than 10 acres each.</p> <p>Goal: 50 demonstration acres.</p>	QA County SCD, the Chester River Association, and the Alliance for the Chesapeake Bay.	<p>Outreach: Fall 2004.</p> <p>Implementation: 2005 to 2007.</p> <p>Tier I BMP’s in 2005, Tier II BMP’s in 2006.</p> <p>Monitoring: 2005 to 2007.</p>	<p>Reduction in concentration of sediment, nutrients, bacteria in surface and ground water.</p> <p>Number of demonstration BMP’s.</p> <p>Quarterly reports and tracking of farmette acreage enrolled.</p>	<p>Paired watershed study. Pre and post sampling: Maryland Department of Natural Resources.</p> <p>Ground water test wells: University of Maryland Cooperative Extension.</p>	<p>QA SCD enrollment initiative.</p> <p>Presentation of results to public, other Maryland/Bay watersheds, and MD DNR WRAS web site.</p>	<p>A “gap” closer.</p> <p>Demonstrates small farmette management techniques.</p> <p>Currently, these farmettes fall outside of traditional nutrient management programs.</p>
<p>2. Agriculture nutrient and sediment reducing stream buffers.</p> <p>Goal: 30 demonstration acres.</p>	Queen Anne’s County Soil Conservation District.	<p>Outreach: Fall 2004.</p> <p>Implementation: 2005 to 2007.</p> <p>15 acres by 2005.</p> <p>15 acres by 2006.</p> <p>Monitoring: 2005 to 2007.</p>	<p>Number of acres buffered.</p> <p>Change in concentration of nutrient and sediment levels in surface waters.</p> <p>Quarterly reports tracking numbers of acres enrolled.</p>	<p>Tracking of buffered acres: Queen Anne’s County Soil Conservation District: Paired watershed study.</p> <p>Pre and post sampling for nutrients and sediment: Maryland Department of Natural Resources.</p>	<p>QA SCD aggressive enrollment initiative.</p> <p>Presentation of results to public, other MD/Bay watersheds, and MD DNR WRAS web site.</p>	<p>A “gap” closer.</p> <p>Demonstrates buffer development and management techniques.</p> <p>Currently, these unbuffered areas fall outside of traditional buffer program criteria.</p>

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
<p>12. EcoTeams: Public awareness, education, involvement, and capacity building:</p> <p>10. Suburban marsh (2 sites) and stream (2 sites) buffer projects (200 citizens).</p> <p>8. Native conservation landscaping demonstration project (200 citizen participants).</p> <p>4. Household pollution reduction, citizen survey, and behavior change projects (watershed – 3700 people).</p>	<p>Chester River Association, Alliance for the Chesapeake Bay, the Chesapeake Bay Conservation</p> <p>Landscaping Council, and the Queen Anne’s County Soil Conservation District.</p>	<p>Outreach planning: Fall 2004.</p> <p>EcoTeam recruitment: 2004 to 2005.</p> <p>Capacity building and educational initiatives: 2004 to 2006.</p> <p>Site selection, and project planning: Fall 2004.</p> <p>Implementation of Demonstration projects: Summer 2005.</p> <p>Monitoring: Fall 2005 to 2007.</p>	<p>Measuring/tracking homeowner behavior change as education process unfolds.</p> <p>Number of Eco-teams, number of active participants on EcoTeams, number of workshops, and meetings.</p> <p>Number of demonstration projects (marsh and stream acres buffered, homes landscaped).</p> <p>Pounds of fertilizers and pesticides reduced, gallons of water conserved in homes.</p> <p>Number of referrals to restoration consultants.</p> <p>Implementation of “Extreme” conservation landscape makeovers.</p> <p>EcoTeams workbook.</p> <p>Production of documentary.</p>	<p>Number of acres buffered, estimate of load reductions: Queen Anne’s County Soil Conservation District.</p> <p>Behavior change measurements, participant involvement, household pollution reduced: Chester River Association and the Alliance for the Chesapeake Bay.</p>	<p>Public will be involved in:</p> <ul style="list-style-type: none"> - neighborhood based EcoTeams. - education workshops - demonstration projects. <p>Volunteer citizens participate to demonstrate “Extreme” conservation makeover for environmentally friendly landscaping.</p> <p>Citizen involvement in television documentary and homeowner behavior change program.</p>	<p>A “gap” closer. This project has the potential of reaching EVERY person in the watershed thus having a significant potential to affect water quality.</p> <p>Currently, these non-buffered areas fall outside of traditional buffer program criteria.</p> <p>Builds capacity to develop and manage buffers, reduce pollutants, affect behavior change in others.</p> <p>Demonstrates stream and marsh buffer development and management techniques in tidal areas.</p>
<p>7. Low Impact Development (LID), ordinance and code change research, development, and adoption. Will directly improve</p>	<p>Town of Centreville</p>	<p>Number of Public Roundtables.</p> <p>Code and Ordinance development: Fall 2004 to 2005.</p>	<p>Acres reduction of impervious surfaces within the town limits.</p> <p>Projected percent increase in vegetative buffer within town limits.</p>	<p>Projection of nutrients and sediments reduced as a result of code changes: Town of Centreville.</p> <p>Projection of percent change in watershed</p>	<p>Public inclusion in Roundtables to gather input and feedback.</p>	<p>Town of Centreville is at the headwaters of the Corsica. Innovative LID application (greenroofs, reduction of impervious surfaces, elimination of curb and gutter, swales, street narrowing, bio-</p>

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
Corsica River's water quality and provide collateral flood control.		Adoption and implementation of code changes: 2005.	Projected utilization of LID techniques. Projected pounds of nutrients reduced from LID technique application.	imperviousness: Town of Centreville.		retention areas, rain gardens, etc.), will prevent water quality degradation as infill begins to occur in this designated growth area.
13. Chester River turbidity reduction and reintroduction of Oyster reef ecosystems. Note** This is contingent on survey. No funding is requested for this effort.	Shellfish Program, Fisheries Service, Maryland Department of Natural Resources.	Survey historic oyster beds for oyster suitability: Spring 2004. Convene and collaborate with County Oyster Committee to close an area as a sanctuary: Spring 2005. ** Plant oyster habitat and or seed, 2005. **	Survey of historic site. Measurement of site suitability. Pending suitability: oyster viability. Measurement of turbidity after oyster reef is established.	Survey, collaboration activities, habitat and seed planting: Shellfish Program, Fisheries Service, Maryland Department of Natural Resources.	Oyster gardening with citizen groups.	Historically oysters filtered the Chesapeake Bay water column in three days. Oysters can greatly affect turbidity, thus light, and thus the growth of beneficial submerged aquatic vegetation. The establishment of oysters in the Corsica River could play an innovative role in water quality (turbidity) improvement.
6. Submerged aquatic vegetation (SAV) reestablishment in Corsica River for water quality and ecosystem function improvement. Goal: One acre of historical SAV grounds.	Tidewater Ecosystem Assessment Service, Maryland Department of Natural Resources.	Test plots, public training, and ongoing monitoring: 2005. Utilize spatial water quality data to further delineate sites: 2005 to 2006. Plantings: 2005/2006.	Number of acres of submerged aquatic vegetation.	Test plot establishment, public training, public involvement, and monitoring: Tidewater Ecosystem Assessment Service, Maryland Department of Natural Resources and the Chester River Association.	Grasses in Classes Program in Corsica River watershed schools. Public assistance in monitoring. Eyes on the Bay Web Site, the Maryland DNR WRAS Web site, and other sites.	The use of spatial water quality data for restoration site selection will increase the likelihood of project success. The establishment of one acre of submerged aquatic vegetation (SAV) in the Corsica River will re-establish the historical component of ecosystem function and form and further improve water quality (clarity).
5. Main stem of	Tidewater	Buoy acquisition	Every 15 minutes: salinity,	Continuous monitoring	All data interactively	Measure success of

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/ performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
the Corsica River: Water quality monitoring.	Ecosystem Assessment Service, Maryland Department of Natural Resources.	and deployment: 2004. Viable data stream and link to Eyes on the Bay Web Site: 2004/2005.	dissolved oxygen, turbidity, pH, chlorophyll, temperature. Nutrient data will be collected every week.	every 15 minutes: salinity, d.o., turbidity, pH, chl, temperature. Weekly monitoring: nutrients. Tidewater Ecosystem Assessment Service, MD DNR.	displayed on the Eyes on the Bay Web Site.	cumulative land and water based management actions via temporally and spatially intensive monitoring station in Corsica River main stem.
9. Easements incentive program.\$924/acre.Incentive bonus\$1,848/ac.	Town of Centreville in partnership with conservation partners	Outreach and implementation: Fall 2004 to 2007.	Projected pounds nutrients reduced through change in land use and acreage conserved	Enrollment outreach and monitoring: Conservation easement holders.	Meetings with individual landowners.	Market incentive based plans.
11. Septic System Retrofits	Queen Anne's County Health Department & Upper Eastern Shore Trib. Team	Fall 2004 program discussions. Implementation 2005	Water quality samplings from completed systems	Queen Anne's County Health Department	Septic brochure and public workshops by Trib. Team & information promulgated by QAC P&Z	Establishes a tracking method for septic effluent, incentivizes system maintenance and broad public outreach.

*Cost estimates used above are taken from The Technical reference for Maryland's Tributary Strategies October 2002 and from local engineering estimating practices.