

WATER QUALITY STRATEGY FOR THE LOCKWOODS FOLLY RIVER: A PARTNERSHIP FOR AN AILING RIVER

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Background

As with a majority of the remaining undeveloped coastal areas in North Carolina, Brunswick County is not a hidden treasure any more. Since 1980 the county's population has more than tripled to over 95,000 and another 30,000 or so residents are expected to make this last bastion of undeveloped southeastern NC their home by 2020, even with the current economic downturn.

As the 29th fastest growing county in the nation this population explosion is resulting in rapid landscape scale land use changes within the watershed of the Lockwoods Folly River. Subdivisions, shopping centers, new highways and bridges, golf courses, and marinas are becoming significant land use activities. The surging development within this 150-square mile 88 thousand-acre watershed has had a severe effect on the health of the river. The portion of the river closed to shell fishing has more than tripled from 18 percent in 1980 to more than 55 percent today and 60% of the beds are considered impaired. For generations, locals have enjoyed the bounty of the Lockwoods Folly River and estuarine system famed for its rich and abundant shell fish beds and excellent coastal inshore fishing. This river system stretches from the Lockwoods Folly Inlet at the Atlantic Ocean inland where it makes the transformation from saltwater marshes to a winding blackwater river that snakes into hundreds of smaller tributaries and blackwater swamps.

Lockwood Folly Roundtable and EEP Initiatives

Brunswick County officials have recognized that existing federal, state and local land use management strategies for the watershed need to be improved if the river is to be adequately protected, and are taking steps to formulate improved and more effective watershed management strategies that will both protect and restore water quality in the river. The Brunswick County Board of Commissioners teamed up with the NC Coastal Federation, the EPA and the State Ecosystem Enhancement Program to establish the Lockwood Folly Watershed Roundtable in 2005. This eight member group, which included participation from a wide range of backgrounds and diverse interests, was tasked with the development of strategies to balance the exploding growth with the needs of the environment. That two year effort resulted in a set of nine strategies adopted by the County that range from educating the public about the importance of protecting water quality to changing land development policies to protection of vulnerable ecosystems and landscapes. These strategies offer a roadmap to a future where growth and development does not come at the expense of the environment that makes the Lockwood area such a special place to live, work and play

In response and in coordination with the roundtable work, the NC Ecosystem Enhancement Program initiated a local watershed plan for the Lockwoods Folly River which was designed to provide an assessment of watershed. Begun in 2005, this comprehensive watershed plan was designed to provide an assessment of watershed conditions and recommendations to help restore degraded streams by enhancing riparian buffers, wetlands, and forested uplands. The primary watershed functions of concern are water quality, habitat (both aquatic and terrestrial), and hydrology. The planning process includes four basic phases: (1) a preliminary characterization of watershed conditions and indicators of watershed function (completed); (2) detailed assessment encompassing additional water quality monitoring, screening-level watershed modeling (PLOAD), assessments of potential stream and wetland restoration and preservation opportunities, and an identification of potential stormwater BMP sites; (3) specific plan to target management activities that identifies highest priority areas for restoration and prioritizes projects within those areas; and (4) recommendations to address the predicted impacts of future land uses and identify sensitive areas in need of additional protection measures.

This planning process was heavily dependent on the work of the Lockwood Folly River Roundtable, and was merged with that effort. Staff for both projects worked together as one project team, and developed joint products and recommendations. The NCEEP uses funding to implement specific restoration, enhancement and preservation projects that may receive compensatory mitigation credit. NCEEP is also seeking to work with local governments

(and other agencies or non-profit groups) to fund projects that are not traditional mitigation projects such as stormwater BMPs, under purview of “flexible mitigation” guidelines that are currently under development.

Partnerships for Solutions

In 2007 the Coastal Federation teamed up with Brunswick County, the NC Division of Water Quality, the NC Division of Transportation, the NC Ecosystem Enhancement Program and the EPA to work towards some solutions to the problem. Funded by a \$309,000 EPA Section 319 grant, the three year study is focused on strategies to reduce the bacterial source pollution of the river and re-open closed shellfish waters. The project products include a TMDL and a watershed implementation plan to identify projects and policies to reduce the pollution and impairment identified by the TMDL project.

The TMDL Project

All of the waters in the river are impaired by fecal coliform pollution limiting the harvest of oysters and clams. In addition, the NC Division of Marine Fisheries reports that shrimp, crab and fish harvests have declined in recent year. Officials representing the NC DWQ have also informed county officials that water quality trends indicate that the river is becoming progressively more polluted each year. State officials identify stormwater runoff as the biggest contributor to water quality problems.

Stormwater runoff was not a problem before the landscape was altered. That’s because rainfall soaked into the ground or was consumed by vegetation. Most rainfall reached the river by moving as groundwater laterally, and not as surface runoff. Now, with the watershed being “hardened” by houses, yards, roads and other uses of the land, water rapidly runs over the surface of the watershed and conveys fecal coliform bacteria from wildlife, livestock, pets and humans to the river. The goal of this project is to develop a management plan for the river that can be implemented so as to protect and restore water quality for shellfishing.

This project will assist the county and the state in carrying out specific elements of watershed management strategies by providing the data and technical information necessary to make sure that actions taken are cost-effective. Local officials will have much better information to decide how best to focus their efforts so as to obtain measurable improvements to water quality. By guiding the use of retrofits and post development management strategies this effort will help to strategically advance land acquisition and wetland restoration projects as well as non-regulatory incentives for water quality enhancement being developed by the Lockwood Folly River Roundtable.

Stantec Consulting was hired by the North Carolina Coastal Federation to develop a Total Maximum Daily Load (TMDL) for the Lockwoods Folly River to estimate allowable pollutant loads, and to allocate those loads to known sources such that actions may be taken to restore the river to its intended shellfishing use. The river is currently on the 303(d) list of impaired waters in North Carolina due to elevated fecal coliform levels which have led to the closure of shellfish harvesting areas in the river. The watershed is currently heavily forested, but lies within one of the fastest developing counties in the state.

Initial modeling strategies for TMDL calculation included using HSPF as a watershed model and Tidal Prisms as the receiving model. However, preliminary results from the fecal coliform TMDL developed for the White Oak River Basin indicated that there is a considerable amount of uncertainty in fecal coliform source contribution, particularly with regard to the contribution attributed to wildlife within the watershed. The application of a complex watershed model, HSPF, did little to reduce that over-arching uncertainty. Similar uncertainty is present in the Lockwoods Folly watershed, given that detailed bacterial source tracking data are unavailable.

A simplified modeling approach was selected in order to calculate the TMDL and meet EPA requirements. Calculation of the TMDL involved the development of a linked HEC-HMS watershed model and Tidal Prisms receiving model in order to investigate watershed hydrodynamics and pollutant source effects on water quality. This is the first time that such a modeling approach has been applied to a fecal coliform TMDL in a coastal watershed in North Carolina. The TMDL document also includes a source assessment which brings together information from previous studies including the Lockwoods Folly River Watershed Plan Detailed Assessment and the Shellfish Shoreline Survey.

Taking a simpler modeling approach allowed focus to shift to the TMDL Implementation Plan. This plan will provide a suite of strategies/management measures to reduce fecal coliform loads to the Lockwoods Folly River. The plan will include the nine elements identified by EPA as critical for developing and implementing effective watershed-based plans to improve water quality. This includes descriptions of management measures, where they should occur, and the reduction associated with each. In addition to new measures, the plan will incorporate strategies that have already been identified in previous reports including the Lockwoods Folly Watershed Roundtable and the EEP Restoration Opportunities Atlas.

The Lockwood Army

In the summer of 2008 the Federations Cape Fear Coastkeeper, the project coordinator, put the call out for volunteers to assist the field work that would be required for the TMDL study. Over 25 citizens responded and over that two year period they have been engaged in the project their enthusiasm and efforts dubbed them the "Lockwood Army". For a two year period over 300 water samples were collected from 12 sites throughout the watershed. Sites were selected from previous sample sites from the Division of Shellfish Sanitation and Division of Water Quality projects that were either ongoing or had concluded. Sample were collected after sufficient rainfall and had to be coordinated throughout the entire watershed for proper tidal flows and runoff sequence. The volunteers also collected stage height data and flow measurements from the upper watershed to assist Stantec in the flow modeling. The sampling and flow measurement field work was completed in the fall of 2009 and the effort now is the TMDL model development and watershed implementation strategy development. Due to the size of the watershed and the influence of beavers on the flow in the upper watershed the flow modeling calibration was very difficult and time consuming. Volunteers and staff had to keep a close eye on any changes, both natural and human induced to ensure the flow was representative of the entire watershed.

All the partners and stakeholders are now engaged in the work review and comment. The TMDL and watershed plan is on schedule to be finalized in the summer of 2010 and submitted for public review and approval by the Division of Water Quality and the EPA in the fall.

Status and Conclusions so Far

The TMDL-based management strategy that results from this project is likely to serve as a model approach for addressing impairment in other shellfish waters, and should provide valuable science-based guidance on how to address these widespread impairments without spending extremely limited time and financial resources developing detailed receiving water quality models for every water body. Specifically, the project goals included: (1) documenting sources and pathways that are currently delivering fecal coliform to impaired waters; (2) developing a workable TMDL for the river that supports and helps calibrate watershed management actions; (3) enabling watershed management strategy to cost-effectively target known and potential pollution sources and pathways; (4) engaging local decision makers and the public as partners in carrying out management actions by keeping them informed through on-going progress reports and press releases on project findings; (5) providing necessary data to help quantify how much emphasis must be placed on various elements of management strategies such as public education, stormwater discharge retrofits, post-development guidelines, land acquisition for preservation and restoration projects; and financial incentives for improved land use practices; and (6) promoting partnerships for implementing various elements of the watershed management strategy both through the direct participation of project partners as well as new partners such as the Clean Water Management Trust Fund and other program funding that is available to government agencies, non-profits and regular citizens.

Since the project is not yet complete we cannot state with any certainty the outcomes and deliverables of the project will achieve the goal of restoring closed shellfish waters to a degree that the river impairment will be decreased. We think the project will support the concerns in the strategies state and federal officials use to control stormwater, now the largest source of water pollution along the N.C. coast. Those strategies focus almost entirely on reducing the sources of pollution. This project, as well as others, demonstrates that source of the contamination is less important than the pathway it travels to the water. Interrupt, decrease and treat the flow and that final input into the watershed should reduce the contamination and the problem.

While the TMDL process is important, the watershed and the manner in which contamination reaches the water is the most important factor in impairment of shellfishing waters, as well as designated uses as swimming and fishing.

This project, because of the extensive work completed before the TMDL, provides a glimpse into the importance of watershed plans and strategies that meet general goals that reduce the pollution load and thereby the impairment of coastal waters. We suggest that a general TMDL be devised along with a similar 9-step watershed strategic plan that could be applied to similar watersheds that are affected by similar problems.

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