



# Goose Creek Vulnerability Analysis Summary Paper January 2003



## Overview

The Goose Creek Watershed is a 385-square-mile area of Loudoun and Fauquier Counties in the Virginia Piedmont. Its waters provide the drinking water for one-half of eastern Loudoun County, a portion of western Fairfax County, and for the entire City of Fairfax. Goose Creek, a state-designated Scenic River, is also an ecologically significant waterway: a rare biological community and a new species of aquatic life have been discovered within its banks, and the creek harbors one of the highest-ever-reported levels of biodiversity of small stream invertebrates in the world.



The watershed, however, is facing increasing development pressure, particularly from Loudoun County, one of the fastest growing counties in the nation. Although water quality surveys in the early 1990s showed the creek to be one of the cleanest waterways on the Atlantic seaboard, the watershed continues to see an increase in uncontrolled roadway runoff, runoff from construction sites, and continued growth of impervious surfaces, which have a direct effect on stream quality. The watershed is also threatened by pollution problems, and the Virginia Department of Environmental Quality has classified 7 stream segments in the Goose Creek watershed as impaired waters.



In order to protect and enhance this valuable watershed, the Piedmont Environmental Council and the Goose Creek Association contracted with the Center for Watershed Protection to engage in a watershed planning process for Goose Creek. The goals are to: 1) **partner** with public and private stakeholders (to include environmental, historic, recreational, governmental, residential and economic interests) for broad-based protection of Goose Creek; 2) **identify** regional resources, threats and tools to address the threats; 3) produce an action/strategic **plan** for watershed protection; and 4) **implement** that plan through the partnership – divide tasks, secure funding, monitor progress and evaluate success. In order to achieve these goals, the group has delineated the following tasks in three phases:



**Phase 1** - Complete a Goose Creek Watershed Vulnerability Analysis;

**Phase 2** - Detailed analysis of three priority subwatersheds (Conservation Area and Rapid Stream Assessments); and

**Phase 3** - Develop and implement watershed plans for three subwatersheds.

To facilitate the process the group is convening community/stakeholder meetings and evaluating existing Loudoun and Fauquier County programs, regulations and ordinances that deal with watershed protection.

## **Phase 1: Goose Creek Watershed Vulnerability Analysis - COMPLETED**

The vulnerability analysis was comprised of 5 major tasks:

- 1) **DELINEATE SUBWATERSHEDS:** The Goose Creek Watershed was divided into 40 subwatersheds of relatively comparable size.
- 2) **ESTIMATE CURRENT IMPERVIOUS COVER:** The current impervious cover of the subwatersheds showed that 38 were in the sensitive category (less than 10% impervious cover) and only

two were in the impacted category (10%-25% impervious cover)—Tuscarora Upper Direct Drainage and Tuscarora Lower Direct Drainage.

3) **CONSIDER OTHER SUBWATERSHED QUALITY FACTORS:** A “Rural Watershed Quality Point Method” was devised to assign favorable and unfavorable points to each subwatershed.



Favorable points were awarded to subwatersheds with a high fraction of forest cover, high coverage of land with conservation easements and extensive streamside forest cover. Unfavorable points were assigned to subwatersheds with poor in-stream and subwatershed qualities such as designated impaired waters, water quality violations, poor to fair Index of Biotic Integrity scores, presence of fish barriers, unusual nonpoint source areas, high septic density and high animal density.

The combination of impervious cover, in-stream and high quality factors was then used to reclassify the 40 subwatersheds of Goose Creek into one of four possible categories: High Quality, Rural Impacted, Urban Impacted and Non-Supporting subwatersheds. The current conditions for the Goose Creek subwatersheds yielded 25 High Quality, 13 Rural Impacted, and 2 Urban Impacted subwatersheds. None are currently Non-Supporting.

4) **ESTIMATE FUTURE IMPERVIOUS COVER:** Based on future land use (assuming full build-out with unbuildable land subtracted) and the use of an impervious cover coefficient for each zoning category, future impervious cover was predicted. In Loudoun, the Revised Comprehensive Plan was used as the basis for determining build-out. The analysis shows that four subwatersheds will become Urban Impacted— North Fork Upper Direct Drainage, Sycolin Direct Drainage, Main Goose Direct Drainage 101, and Beaverdam Reservoir—and two will become Non-Supporting (where impervious cover is greater than 25%)—Tuscarora Upper Direct Drainage and Tuscarora Lower Direct Drainage.

5) **SELECT THREE SUBWATERSHEDS FOR MORE DETAILED ANALYSIS:** Using these data, twelve subwatersheds in 4 categories were identified as “Most Vulnerable”:

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|-------------------------|---|
| Future Non-supporting - | Two subwatersheds that are predicted to become non-supporting (due to impervious cover)   |
| Future Urban Impacted - | Four subwatersheds that are predicted to become impacted (due to impervious cover)        |
| Rural Impacted -        | Three Rural Impacted headwaters with most unfavorable points                              |
| High Quality -          | Three headwaters with most favorable watershed quality points & fewest unfavorable points |

Three subwatersheds from this “Most Vulnerable” list were then selected as the first set of subwatersheds for further planning and assessment in Phase 2 and Phase 3 of the planning process: one high quality (**Goose Headwater 105**), one rural impacted (**North Fork 102**) and one future urban impacted subwatershed (**North Fork Upper Direct Drainage**).

Note: Despite concern about projected impairments to the drinking water-supply subwatersheds, the Beaverdam Reservoir and Main Goose Direct Drainage 101 subwatersheds were not chosen for more detailed analysis in this study due to plans by the Loudoun County Sanitation Authority to study these subwatersheds.

A link to the full Goose Creek Vulnerability Analysis can be found at <http://www.pecva.org/conservation/funds/goosecreekfund.asp>

