

# Loudoun County Virginia-Water Resource Monitoring Program

## Metadata:

- [Identification Information](#)
  - [Data Quality Information](#)
  - [Spatial Data Organization Information](#)
  - [Spatial Reference Information](#)
  - [Entity and Attribute Information](#)
  - [Distribution Information](#)
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### *Identification\_Information:*

#### *Citation:*

##### *Citation\_Information:*

*Originator:* Loudoun County Department of Building and Development

*Originator:* David Ward

*Publication\_Date:* Unknown

#### *Title:*

Loudoun County Virginia-Water Resource Monitoring Program

*Geospatial\_Data\_Presentation\_Form:* map

*Online\_Linkage:* <http://www.loudounwatershedwatch.org/maps/index.htm>

### *Description:*

#### *Abstract:*

Probability-based survey, benthic and habitat assessments took place at 177 stream sites throughout Loudoun County watersheds, at locations selected by stratified random sampling. The probability-based sampling design supports overall assessment of the population of streams throughout the County and by watershed. Stream sampling sites were selected randomly using a probabilistic approach so that statistical inferences about the health of streams countywide can be made with known confidence. All streams designated as perennial in the National Hydrography Dataset (NHD) Medium Resolution stream network (USGS 2000) were included in the survey sample frame, with the exception of reservoirs and two unwadeable portions of the largest streams, which were excluded from the sample frame. To allocate sites for sampling, the stream network was stratified into 12 primary sampling units (PSUs), each a Loudoun County watershed or, in the case of small watersheds, combinations of two or more watersheds. PSUs were allocated a minimum of 10 sites per watershed. The PSUs with larger numbers of stream miles received more than 10 sites in proportion to their number of stream miles, for a total of 177 sites. It was anticipated that some of the sites selected from the probabilistic analysis would not be assessed owing to site access constraints, landowner denial of permission to enter a property, or field conditions. When a site was found to be unsampleable, a replacement site in the same watershed was substituted. In addition to the probability-based survey, benthic macroinvertebrate and habitat assessments were conducted at 23 known, targeted sites. These sites had been previously sampled by

Virginia DEQ, through its probability-based monitoring or targeted sampling programs. In addition, habitat assessments was conducted at an additional 300 sites, which provide extensive information on other streams throughout Loudoun County.

Benthic macroinvertebrate samples were collected in accordance with Virginia DEQ Laboratory processing of benthic samples followed Virginia DEQ (2008) Standard Operating Procedures (SOPs) for subsampling/sorting, taxonomic identification, and enumeration. The benthic macroinvertebrate samples were sorted into subsamples of 110 organisms procedures (DEQ 2008). At each sample site, benthic macroinvertebrates were sampled using a D-net to collect organisms, following the single habitat (cobble) or multihabitat protocol. Samples from individual net kicks or jabs were composited into a single macroinvertebrate sample per site, which were preserved in ethanol for subsequent laboratory subsampling and identification. Samples were collected in the field within the spring index period of March – May 2009. No periods of extreme rainfall (i.e., exceeding three inches within a 48-hour period) were countered. Laboratory processing of benthic samples followed Virginia DEQ (2008) Standard Operating Procedures (SOPs) for subsampling/sorting, taxonomic identification, and enumeration. The benthic macroinvertebrate samples were sorted into subsamples of 110 organisms sorting and identification of benthic samples was completed during March - July 2009.

Stream habitat assessments were conducted in accordance with DEQ's protocols, as detailed in Virginia DEQ (2008), which are based on EPA's Rapid Bioassessment Protocol (Barbour et al. 1999). The RBP Habitat Assessment procedure is a well-established method for evaluating the structure and function of the physical habitat in a stream and its surrounding riparian area. Since biological potential is limited by the quality of the stream's physical habitat, an assessment of physical habitat is an important component of any biological stream survey. The RBP protocol consists of ten parameters appropriate for the evaluation of stream habitat (Table 2-3). The habitat assessment process involves rating each of the parameters on a 0 - 20 scale within four categories: Poor: 0-5; Marginal: 6-10; Suboptimal: 11-15 and Optimal: 16-20. Scores increase as habitat quality increases. To ensure consistency in the evaluation procedure, descriptions of the physical parameters and relative criteria are included on the rating form. Two or more digital photographs of each site were taken to record observed conditions. A suite of basic water quality parameters (pH, conductivity, temperature, and dissolved oxygen) were measured at each site using a multiparameter sonde (YSI or equivalent). In addition, particular problems such as a lack of adequate riparian buffer were noted on data sheets adopted from the Stream Corridor Assessment (SCA) protocol (Yetman 2001). Habitat assessments took place during March - July 2009.

*Purpose:*

During 2009, Loudoun County has conducted a stream assessment to characterize the condition of aquatic resources throughout the County's watersheds. Field investigations and analysis focused on benthic macroinvertebrate monitoring and stream habitat assessment. The County will use results of the stream assessment in support of future watershed management decisions, particularly for the planning of restoration and environmental protection measures, and to plan future monitoring efforts. This document presents results of the stream assessment, including benthic and habitat assessments. Results of stream perenniality investigations, also conducted in 2009, are being provided separately and are summarized here. Loudoun County identified a need for stream assessment data to support its watershed management

efforts. Although there have been a number of previous sampling efforts in the County, there has not previously been any consistent, countywide picture of stream conditions. A review of previous stream biological and habitat data (Roth et al. 2009a) collected in Loudoun County confirmed the need for consistent countywide data to better characterize stream conditions. Two recent efforts, the Strategy for Watershed Management Solutions (Loudoun County 2006) and the Comprehensive Watershed Management Plan (CH2MHill 2008), recommended biological monitoring, particularly the use of probability-based sampling, to provide a statistically valid characterization of watershed conditions, as well as targeted monitoring to evaluate trends.

The purpose of the Loudoun County Stream Assessment conducted in 2009 was to: assess stream conditions, using benthic and habitat rapid assessment methods, and • develop field-based information on stream perenniality, to refine existing information on extent and location of perennial streams. Specific objectives of the Stream Assessment included: 1) employ a probability-based benthic survey to provide an assessment of stream conditions throughout the County's watersheds (at 177 sites), 2) target additional benthic sampling to provide additional information at sites already established by Virginia Department of Environmental Quality (DEQ, 23 sites), 3) assess stream habitat in conjunction with all benthic sampling (same 200 sites), 4) assess habitat conditions at additional sites to develop a more comprehensive picture of stream conditions throughout the County (300 sites), and 5) develop field-based information on stream perenniality to support further planning/management needs.

*Time\_Period\_of\_Content:*

*Time\_Period\_Information:*

*Range\_of\_Dates/Times:*

*Beginning\_Date:* 20090101

*Ending\_Date:* Present

*Currentness\_Reference:*

ground condition

*Status:*

*Progress:* In work

*Maintenance\_and\_Update\_Frequency:* Annually

*Spatial\_Domain:*

*Bounding\_Coordinates:*

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*North\_Bounding\_Coordinate:* 39.31605

*South\_Bounding\_Coordinate:* 38.8491

*Keywords:*

*Theme:*

*Theme\_Keyword\_Thesaurus:* None

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*Theme\_Keyword:* Habitat

*Theme\_Keyword:* Watersheds

*Theme\_Keyword:* Streams

*Theme\_Keyword:* BENTHOS

*Theme\_Keyword:* WATER QUALITY

*Place:*

*Place\_Keyword\_Thesaurus:* None

*Place\_Keyword:* Virginia

*Place\_Keyword:* Loudoun County

*Access\_Constraints:* None

*Use\_Constraints:*

Use at your own risk

*Point\_of\_Contact:*

*Contact\_Information:*

*Contact\_Person\_Primary:*

*Contact\_Person:* David Ward

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Not Available

*Security\_Information:*

*Security\_Classification\_System:* None

*Security\_Classification:* Unclassified

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*Source\_Used\_Citation\_Abbreviation:*

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*Process\_Date:* 20100330

*Process\_Time:* 13190500

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*Spatial\_Data\_Organization\_Information:*

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*Distribution\_Information:*

*Distributor:*

*Contact\_Information:*

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unavailavle

*Distribution\_Liability:*

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*Metadata\_Reference\_Information:*

*Metadata\_Date:* 20100330

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*Metadata\_Standard\_Name:* NBII Content Standard for National Biological Information  
Infrastructure Metadata

*Metadata\_Standard\_Version:* FGDC-STD-001-1998

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None

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