Biological Assessment of the Streams and Waterbodies of Fairfax County, Virginia

Tags

WADEABLE STREAMS, Habitat, Watersheds, Streams, BENTHOS, WATER QUALITY, biota, environment, Biology, Ecology, Ecosystem, Environment, Indicator, Marine, Monitoring, Quality, Surface Water, Water, Benthos, Macro Invertebrates, Water Quality, Wateshed

Summary

The long-term stream monitoring program meets the requirements of state and federal regulations and supports the Board of Supervisors' environmental improvement program by providing an ongoing evaluation of the physical, chemical and biological conditions for Fairfax County's streams. Stream and watershed health is evaluated using a variety of indicators such as water quality parameters, bacteria levels, resident invertebrate and fish communities and habitat conditions. The study evaluates countywide stream health conditions annually through a randomized site selection process. The program is developing a substantial database, which over time will be used to determine the overall rate of change or trends in the conditions of our waterways. The original monitoring design, which used targeted sites, was updated in 2004 to a probabilistic monitoring approach. This methodology, which is now widely used by other monitoring agencies (including the commonwealth of Virginia), evaluates sites which are randomly selected within Fairfax County each year. Every year, 40 stream locations are monitored for several parameters including: bacteria, benthic macroinvertebrates, fish and physical habitat. Water quality parameters, such as water temperature, dissolved oxygen, specific conductance, pH and nutrients such as nitrogen and phosphorus are also collected. The results of the monitoring events are compiled into annual reports and are also used to support the county's Environmental Quality Advisory Council's Annual Report on the Environment.

Description

As part of a comprehensive program Fairfax County conducts the following monitoring activities: Bacteria- As recommended by the U.S. Environmental Protection Agency, the bacterium Escherichia coli (E. coli) is used by staff of Fairfax County as the water quality indicator for fecal contamination in surface water. E. coli is a species of bacteria present in the intestinal tracts and feces of warm-blooded animals. It is commonly used as an indicator of possible sewage contamination because it is found in human wastewater. Although most strains of E. coli are generally not harmful, its presence indicates the possible existence of pathogenic (disease-causing) bacteria and viruses. Grab samples of water are collected seasonally to determine the concentration of E. coli in our streams. At the time of collection, other water quality and chemical parameters are measured including: nitrates, phosphates, pH, water temperature, dissolved oxygen and specific conductance. E. coli levels, nitrates and phosphate samples are processed at the Fairfax County Health Department laboratory, while chemical parameters are recorded by county ecologists at the site of collection. The Fairfax County Health Department Water Quality Statement discourages the recreational use of county streams. Benthic Macroinvertebrates- Benthic macroinvertebrates are aquatic insects or the larval form of many common terrestrial insects that live on the bottom of the streambed (benthic); are visible without the use of a microscope (macro); and do not have a backbone (invertebrate). Benthic macroinvertebrates are diverse organisms with varying tolerances for pollution from toxins, nutrients and sediment, making them well suited as indicators for determining stream health and water quality. Samples are collected between mid-March and mid-April, using the USEPA Rapid Bioassessment Protocol for Use in Wadeable Streams and Rivers. This method involves taking 20 separate "jabs" or collections from different habitat types, such as undercut banks, aquatic vegetation, riffles and snags. Benthic macroinvertebrates are picked out of the vegetative debris and identified to the genus taxonomic level in a county laboratory. Fish Community- A healthy and diverse fish community is indicative of good stream health. Fish are very sensitive to both

natural and human-induced changes within a given stream system and surrounding watershed. The method for collection is based upon the Environmental Protection Agency's Rapid Bioassessment Protocols V. A backpack electrofisher unit is used to send electricity into the water, stunning the fish for a moment, allowing for easy collection with a net. Once collected, the fish are identified to the species taxonomic level and counted to track their respective populations within each 100-meter sample. Anything that appears strange or anomalous on the fish, such as fin or eye deformations is recorded. The fish are then released back into the water. Habitat Quality- Stream quality and the types of aquatic organisms that live there are controlled by habitat factors, such as how well the stream is shaded by leaves, whether there are plants protecting the stream banks from erosion and how the land is being developed throughout the watershed. A stream with good habitat quality will have a wide, healthy forest growing along both stream banks; small amounts of erosion on the stream banks; riffles and pools; and vegetative debris in the stream. Stream habitat is visually assessed and scored for ten features. Scores can range from zero at the very worst to 200 at the very best.

Credits
There are no credits for this item.

Use limitations
Use at your own risk

ArcGIS Metadata ►

Citation ►

TITLE Biological Assessment of the Streams and Waterbodies of Fairfax County, Virginia

Hide Citation ▲

Resource Details ►

CREDITS

Hide Resource Details ▲

Resource Constraints ►

CONSTRAINTS
LIMITATIONS OF USE
Use at your own risk

Hide Resource Constraints ▲

Metadata Details ►

* LAST UPDATE 2010-04-21

ARCGIS METADATA PROPERTIES
METADATA FORMAT ESRI-ISO

CREATED IN ARCGIS 2010-03-30T13:19:05
LAST MODIFIED IN ARCGIS 2010-04-21T13:37:28

AUTOMATIC UPDATES
HAVE BEEN PERFORMED No

Hide Metadata Details ▲

FGDC Metadata (read-only) ►

Identification ►

CITATION
CITATION INFORMATION
ORIGINATOR Fairfax County- Watershed Planning and Assessment Branch
ORIGINATOR Chad Grupe
PUBLICATION DATE 2013-04-24
TITLE
Biological Assessment of the Streams and Waterbodies of Fairfax County, Virginia
PUBLICATION INFORMATION
PUBLICATION PLACE Annapolis, MD
PUBLISHER Chesapeake Bay Program (CBP)
ONLINE LINKAGE http://data.chesapeakebay.net/?DB=CBP_NTBENDB
ONLINE LINKAGE
http://www.chesapeakebay.net/data/downloads/watershed_wide_benthic_invertebrate_database
ONLINE LINKAGE http://www.chesapeakebay.net
ONLINE LINKAGE http://www.fairfaxcounty.gov/dpwes/stormwater/

DESCRIPTION
ABSTRACT
As part of a comprehensive program Fairfax County conducts the following monitoring activities:

Bacteria- As recommended by the U.S. Environmental Protection Agency, the bacterium Escherichia coli (E. coli) is used by staff of Fairfax County as the water quality indicator for fecal contamination in surface water. E. coli is a species of bacteria present in the intestinal tracts and feces of warm-blooded animals. It is commonly used as an indicator of possible sewage contamination because it is found in human wastewater. Although most strains of E. coli are generally not harmful, its presence indicates the possible existence of pathogenic (disease-causing) bacteria and viruses. Grab samples of water are collected seasonally to determine the concentration of E. coli in our streams. At the time of collection, other water quality and chemical parameters are measured including: nitrates, phosphates, pH, water temperature, dissolved oxygen and specific conductance. E. coli levels, nitrates and phosphate samples are processed at the Fairfax County Health Department laboratory, while chemical parameters are recorded by county ecologists at the site of collection. The Fairfax County Health Department Water Quality Statement discourages the recreational use of county streams.

Benthic Macroinvertebrates- Benthic macroinvertebrates are aquatic insects or the larval form of many common terrestrial insects that live on the bottom of the streambed (benthic); are visible without the use of a microscope (macro); and do not have a backbone (invertebrate). Benthic macroinvertebrates are diverse organisms with varying tolerances for pollution from toxins, nutrients and sediment, making them well suited as indicators for determining stream health and water quality. Samples are collected between mid-March and mid-April, using the USEPA Rapid Bioassessment Protocol for Use in Wadeable Streams and Rivers. This method involves taking 20 separate "jabs" or collections from different habitat types, such as undercut banks, aquatic vegetation, riffles and snags. Benthic macroinvertebrates are picked out of the vegetative debris and identified to the genus taxonomic level in a county laboratory.

Fish Community- A healthy and diverse fish community is indicative of good stream health. Fish are very sensitive to both natural and human-induced changes within a given stream system and surrounding watershed. The method for collection is based upon the Environmental Protection Agency's Rapid Bioassessment Protocols V. A backpack

electrofisher unit is used to send electricity into the water, stunning the fish for a moment, allowing for easy collection with a net. Once collected, the fish are identified to the species taxonomic level and counted to track their respective populations within each 100-meter sample. Anything that appears strange or anomalous on the fish, such as fin or eye deformations is recorded. The fish are then released back into the water.

Habitat Quality- Stream quality and the types of aquatic organisms that live there are controlled by habitat factors, such as how well the stream is shaded by leaves, whether there are plants protecting the stream banks from erosion and how the land is being developed throughout the watershed. A stream with good habitat quality will have a wide, healthy forest growing along both stream banks; small amounts of erosion on the stream banks; riffles and pools; and vegetative debris in the stream. Stream habitat is visually assessed and scored for ten features. Scores can range from zero at the very worst to 200 at the very best.

PURPOSE

The long-term stream monitoring program meets the requirements of state and federal regulations and supports the Board of Supervisors' environmental improvement program by providing an ongoing evaluation of the physical, chemical and biological conditions for Fairfax County's streams. Stream and watershed health is evaluated using a variety of indicators such as water quality parameters, bacteria levels, resident invertebrate and fish communities and habitat conditions. The study evaluates countywide stream health conditions annually through a randomized site selection process. The program is developing a substantial database, which over time will be used to determine the overall rate of change or trends in the conditions of our waterways. The original monitoring design, which used targeted sites, was updated in 2004 to a probabilistic monitoring approach. This methodology, which is now widely used by other monitoring agencies (including the commonwealth of Virginia), evaluates sites which are randomly selected within Fairfax County each year. Every year, 40 stream locations are monitored for several parameters including: bacteria, benthic macroinvertebrates, fish and physical habitat. Water quality parameters, such as water temperature, dissolved oxygen, specific conductance, pH and nutrients such as nitrogen and phosphorus are also collected. The results of the monitoring events are compiled into annual reports and are also used to support the county's Environmental Quality Advisory Council's Annual Report on the Environment.

TIME PERIOD OF CONTENT

TIME PERIOD INFORMATION

SINGLE DATE/TIME

CALENDAR DATE 19990418-Present

CURRENTNESS REFERENCE

Ground condition

STATUS

PROGRESS In work

MAINTENANCE AND UPDATE FREQUENCY Annually

SPATIAL DOMAIN

BOUNDING COORDINATES

WEST BOUNDING COORDINATE -77.51743

EAST BOUNDING COORDINATE -77.0586

NORTH BOUNDING COORDINATE 39.04950

SOUTH BOUNDING COORDINATE 38.19319

KEYWORDS

THEME

THEME KEYWORD THESAURUS None

THEME KEYWORD WADEABLE STREAMS

THEME KEYWORD Habitat

THEME KEYWORD Watersheds

THEME KEYWORD Streams
THEME KEYWORD BENTHOS
THEME KEYWORD WATER QUALITY

THEME
THEME KEYWORD THESAURUS ISO 19115 Topic Category
THEME KEYWORD biota
THEME KEYWORD environment

THEME
THEME KEYWORD THESAURUS EPA GIS Keyword Thesaurus
THEME KEYWORD Biology
THEME KEYWORD Ecology
THEME KEYWORD Ecosystem
THEME KEYWORD Environment
THEME KEYWORD Indicator
THEME KEYWORD Marine
THEME KEYWORD Monitoring
THEME KEYWORD Quality
THEME KEYWORD Surface Water
THEME KEYWORD Water

THEME
THEME KEYWORD THESAURUS User
THEME KEYWORD Benthos
THEME KEYWORD Macro Invertebrates
THEME KEYWORD Water Quality
THEME KEYWORD Wateshed

PLACE
PLACE KEYWORD THESAURUS None
PLACE KEYWORD Virginia
PLACE KEYWORD Fairfax County

ACCESS CONSTRAINTS
None

USE CONSTRAINTS
Use at your own risk

POINT OF CONTACT
CONTACT INFORMATION
CONTACT PERSON PRIMARY
CONTACT PERSON Chad Grupe
CONTACT ORGANIZATION Fairfax County Watershed Planning and Assessment Branch
CONTACT POSITION Ecologist
CONTACT ADDRESS
ADDRESS TYPE mailing and physical address
ADDRESS Stormwater Planning Division, Department of Public Works and Environmental Services
ADDRESS GOVERNMENT CENTER
CITY Fairfax
STATE OR PROVINCE Virginia

POSTAL CODE 22035

CONTACT VOICE TELEPHONE (703)324-5500
CONTACT ELECTRONIC MAIL ADDRESS chad.grupe@fairfaxcounty.gov
CONTACT INSTRUCTIONS
Not Available

SECURITY INFORMATION
SECURITY CLASSIFICATION SYSTEM FIPS Pub 199
SECURITY CLASSIFICATION No Confidentiality
SECURITY HANDLING DESCRIPTION Standard Technical Controls

Hide Identification ▲

Data Quality ►

LOGICAL CONSISTENCY REPORT
Not Applicable

COMPLETENESS REPORT
Unknown

POSITIONAL ACCURACY
HORIZONTAL POSITIONAL ACCURACY
HORIZONTAL POSITIONAL ACCURACY REPORT
Data were collected using methods that are accurate to within 6-25 meters (EPA National Geospatial Data Policy [NGDP] Accuracy Tier 3). For more information, please see EPA's NGDP at http://epa.gov/geospatial/policies.html

LINEAGE
PROCESS STEP
PROCESS DESCRIPTION
Metadata imported.

PROCESS DATE 2010-03-30

PROCESS STEP
PROCESS DESCRIPTION
Data was loaded into the CBPO Non-Tidal Benthic Data base.

PROCESS DATE 2010-03-30

Hide Data Quality ▲

Spatial Reference ►

HORIZONTAL COORDINATE SYSTEM DEFINITION
GEOGRAPHIC
LATITUDE RESOLUTION 0.000001
LONGITUDE RESOLUTION 0.000001
GEOGRAPHIC COORDINATE UNITS Decimal degrees

GEODETIC MODEL
HORIZONTAL DATUM NAME North American Datum of 1983
ELLIPSOID NAME Geodetic Reference System 1980
SEMI-MAJOR AXIS 6378137.000000

DENOMINATOR OF FLATTENING RATIO 298.257222

Hide Spatial Reference ▲

Distribution Information ►

DISTRIBUTOR
CONTACT INFORMATION
CONTACT PERSON PRIMARY
CONTACT PERSON Chad Grupe
CONTACT ORGANIZATION Fairfax County Watershed Planning and Assessment Branch
CONTACT POSITION Ecologist
CONTACT ADDRESS
ADDRESS TYPE mailing and physical address
ADDRESS 12000 Government Center Pkwy
CITY Fairfax
STATE OR PROVINCE Virginia
POSTAL CODE 22035

CONTACT VOICE TELEPHONE (703)324-5500
CONTACT ELECTRONIC MAIL ADDRESS chad.grupe@fairfaxcounty.gov
CONTACT INSTRUCTIONS
unavailavle

RESOURCE DESCRIPTION Downloadable Data
DISTRIBUTION LIABILITY
I, the data requestor, agree to acknowledge the Chesapeake Bay Program and any other agencies and institutions as specified by the Chesapeake Bay Program Office as data providers. I agree to credit the data originators in any publications, reports or presentations generated from this data. I also accept that, although these data have been processed successfully on a computer system at the Chesapeake Bay Program, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that careful attention be paid to the contents of the data documentation file associated with these data. The Chesapeake Bay Program shall not be held liable for improper or incorrect use of the data described and/or contained herein.

Hide Distribution Information ▲

Metadata Reference ►

METADATA DATE 2013-04-24
METADATA FUTURE REVIEW DATE 2017-04-24
METADATA CONTACT
CONTACT INFORMATION
CONTACT ORGANIZATION PRIMARY
CONTACT ORGANIZATION U.S. Environmental Protection Agency, Chesapeake Bay Program
CONTACT PERSON Peter Tango
CONTACT POSITION Monitoring Coordinator
CONTACT ADDRESS
ADDRESS TYPE mailing and physical address
ADDRESS 410 Severn Ave, Suite 109
CITY Annapolis

STATE OR PROVINCE MD
POSTAL CODE 21403

CONTACT VOICE TELEPHONE 410-267-9875
CONTACT FACSIMILE TELEPHONE 410-267-5777
CONTACT ELECTRONIC MAIL ADDRESS Ptango@chesapeakebay.net
CONTACT INSTRUCTIONS
http://www.chesapeakebay.net

METADATA STANDARD NAME NBII Content Standard for National Biological Information Infrastructure Metadata
METADATA STANDARD VERSION FGDC-STD-001-1998

METADATA SECURITY INFORMATION
METADATA SECURITY CLASSIFICATION SYSTEM None
METADATA SECURITY CLASSIFICATION Unclassified
METADATA SECURITY HANDLING DESCRIPTION
None

Hide Metadata Reference ▲