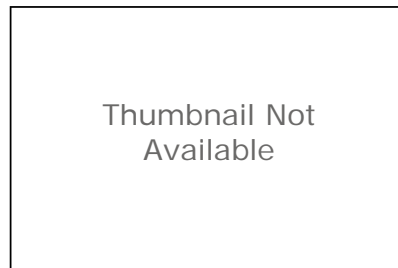


## Interactive Stream Assessment Resource Biological Monitoring Program



### Tags

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

### Summary

The INSTAR program began in 2003 as a collaboration between the Center for Environmental Studies at VCU and several agencies, including the Virginia Department of Conservation and Recreation and the Virginia Coastal Zone Management Program. The program goal is to develop and promote statistically sound analytical and decision-support tools for blue infrastructure assessment statewide. Specifically, INSTAR supports detailed geospatial analyses of aquatic living resources, in-stream and riparian habitat, and measures of the ecological integrity of streams and watersheds (i.e., Virtual Stream Assessment, VSA; Modified Index of Biotic Integrity, mIBI). INSTAR, and the extensive aquatic resources database on which it runs, were developed to support a variety of stream assessment, management, and planning activities aimed at restoring and protecting water quality and aquatic living resources throughout the Commonwealth. Currently, over 2,000 stream locations across Virginia are represented within the INSTAR database and most of these sites are accessible through the INSTAR online interface. The database that VCU will develop is expected to complement and enhance the limited available information on stream ecological health in many parts of the state, including the Coastal Plain Macroinvertebrate Index (CPMT; USEPA 1997, Maxted et al. 2000) for low-gradient streams and rivers of the Coastal Plain physiographic province, and other indices based on the EPA's Rapid Bioassessment Protocols for streams and rivers (Barbour et al. 1999). In addition, the fish community data are expected to be particularly useful for the assessment of larger, nonwadeable streams and rivers, which are not amenable to macroinvertebrate sampling. Because of the complementary nature of the purpose and research design, much of the project management, assessment and oversight follows the protocols of VADEQ Biological Monitoring of Virginia Quality Assurance Project Plan for Wadeable Streams and Rivers (2006). The current project through Virginia Department of Conservation and Recreation will expand significantly the geographic scope of the existing INSTAR database. The goal of this project is to expand INSTAR (Integrated Stream Assessment Resource) coverage in the Shenandoah River basin of Virginia. Specifically, this project will support field collections and database and model development for 36 sub-watersheds (HUCs) within the basin and will focus primarily on low-gradient catchments associated with the valley floor. Currently, the INSTAR program includes most of the Chesapeake Bay basin within Virginia. One exception is the Shenandoah watershed, which is currently represented by a very limited number of archival collections. For the past several years, this region has experienced major fish-kill and fish morbidity events due to unknown causes and the lack of aquatic living resources data, especially for tributaries, has impeded the progress of a multi-agency fish kill taskforce. Following the completion of this proposed study, the entire Potomac River basin in Virginia, including the Shenandoah River and many of its tributaries, will be accessible through INSTAR .

### Description

The project will create an expanded version of INSTAR that includes stream health data for 36 targeted HUCs in the Shenandoah River basin, Chesapeake Bay drainage. Probabilistic study reaches for INSTAR sampling are selected through a statistically powerful stratified (by stream order) random design. Within each geo-referenced reach (150-200 m), fishes are sampled quantitatively using electrofishing equipment (backpacks, tote barge units, boats) and standard methods. Backpack and tote barge sampling is performed throughout the entire reach in a single pass. Boat electrofishing may include additional sampling effort depending on stream width and habitat variability. All fishes are identified to

species in the field, checked for anomalies, and released. Macroinvertebrates are collected using modified EPA Rapid Bioassessment Protocols (RBP III) for single habitat collections using D-frame dipnets. Each major stream habitat type is sampled separately and collections are returned to the VCU lab for identification to the lowest practical taxon and enumeration. Data are compiled into SQL databases and application macros within INSTAR calculate over 50 separate metrics and ecological variables, including those typically generated with the Index of Biotic Integrity (IBI) and Rapid Bioassessment Protocol (RBP). INSTAR assesses the ecological health of streams within watersheds based on percent comparability to the appropriate (e.g. basin, stream order) reference condition (i.e., virtual stream). Stream Ichthyofauna Sampling Virginia Commonwealth University, Center for Environmental Studies (CES), uses various quantitative sampling gears and procedures for freshwater fish assemblages depending on the size and geomorphology of the stream, water quality characteristics, and flow conditions. The large majority of wadeable streams (typically 1st through 3rd order) are sampled using a single backpack electrofishing unit (Smith-Root LR-20). Larger streams may warrant the concurrent use of two backpack units and crews in order to effectively sample a wider or more complex channel. Larger streams and rivers (4th or 5th order) that are wadeable but have sufficient width and depth to decrease substantially the efficiency of backpack units are sampled with a tote boat unit (Smith-Root SR-6). Non-wadeable streams and rivers (5th order or greater) are sampled using electrofishing boats (Smith-Root SR-16H) units. Selection of appropriate gears and protocols is based on the best professional judgment of an experienced regional fish biologist. Sampling will be conducted during the period 15 March - 15 June, 2007 and at water temperatures above 5°C and water conductivities above 30  $\mu$ mhos. Fishes at each location will be sampled quantitatively using well-maintained electrofishing equipment (pulsed direct current; Smith-Root backpack units, tote barge units, and boats) and standard methods (Garman and Smock 2004, McCormick and Hughes 1998). Electrofisher settings (e.g. output voltage, waveform, etc.) for each sampling event will optimize sampling efficiency and minimize fish mortality, based on ambient conditions and operator experience. Sites that can be sampled effectively by wading will be sampled by backpack electrofisher; comparatively high-order streams and rivers will be sampled by electrofishing boat. Transitional sites (e.g. deep pools and wide, but wadeable, channel) will be sampled by tote barge. Sampling will be performed throughout the entire stream channel in a single pass and in a manner that incorporates all major aquatic habitat types. Blocking nets will be deployed where deemed both necessary and feasible. Boat electrofishing may include multiple sampling passes (e.g. channel versus margin), depending on stream conditions, channel width, and habitat variability. Electrofishing settings and total effort (seconds of generator output) will be recorded for each sampling event, along with any other relevant information. Proper precautions (e.g. use of insulated gloves, etc.) will be taken to ensure the safety of field personnel at all times. Stream Macroinvertebrate Sampling Macroinvertebrates are collected using modified EPA Rapid Bioassessment Protocols (RBP III) for multiple habitat collections (Barbour et al. 1997). D-frame dip nets are used to sample macroinvertebrates from major habitat types found within each 150-meter study site. Examples of habitat types include undercut banks, hard substrate (gravel, etc.) riffles, leaf litter, and woody debris. Each habitat type is sampled separately and then composited into one sample. Dip nets are swept, jabbed, and/or kicked in and through habitats in order to secure a representative sample of the macroinvertebrate assemblage. Samples are processed in the laboratory where the first 200 organisms encountered are identified to the lowest practical taxonomic level (typically genus) and enumerated.

### Credits

There are no credits for this item.

### Use limitations

None. Please check sources, scale, accuracy, currentness and other available information. Please confirm that you are using the most recent copy of both data and metadata. Acknowledgement of the EPA would be appreciated.

## ArcGIS Metadata ►

### Citation ►

TITLE I nTeractive SStream Assessment Resource Biological Monitoring Program

[Hide Citation ▲](#)

## Resource Details ▶

CREDITS

[Hide Resource Details ▲](#)

## Resource Constraints ▶

CONSTRAINTS

LIMITATIONS OF USE

None. Please check sources, scale, accuracy, currentness and other available information. Please confirm that you are using the most recent copy of both data and metadata. Acknowledgement of the EPA would be appreciated.

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## Metadata Details ▶

\* LAST UPDATE 2010-04-26

ARCGIS METADATA PROPERTIES

METADATA FORMAT ESRI-ISO

CREATED IN ARCGIS 2010-03-30T13:19:05

LAST MODIFIED IN ARCGIS 2010-04-26T11:11:00

AUTOMATIC UPDATES

HAVE BEEN PERFORMED No

[Hide Metadata Details ▲](#)

## FGDC Metadata (read-only) ▶

### Identification ▶

CITATION

CITATION INFORMATION

ORIGINATOR Center for Environmental Studies

ORIGINATOR Virginia Commonwealth University

ORIGINATOR Greg C. Garman

PUBLICATION DATE 2013-04-24

TITLE

INteractive SStream Assessment Resource Biological Monitoring Program

GEOSPATIAL DATA PRESENTATION FORM multimedia presentation

PUBLICATION INFORMATION

PUBLICATION PLACE Annapolis, MD

PUBLISHER Chesapeake Bay Program (CBP)

ONLINE LINKAGE [http://data.chesapeakebay.net/?DB=CBP\\_NTBEADB](http://data.chesapeakebay.net/?DB=CBP_NTBEADB)

ONLINE LINKAGE

[http://www.chesapeakebay.net/data/downloads/watershed\\_wide\\_benthic\\_invertebrate\\_database](http://www.chesapeakebay.net/data/downloads/watershed_wide_benthic_invertebrate_database)

ONLINE LINKAGE <http://instar.vcu.edu/>

DESCRIPTION

ABSTRACT

The project will create an expanded version of INSTAR that includes stream health data for 36 targeted HUCs in the Shenandoah River basin, Chesapeake Bay drainage.

Probabilistic study reaches for INSTAR sampling are selected through a statistically powerful stratified (by stream order) random design. Within each geo-referenced reach (150-200 m), fishes are sampled quantitatively using electrofishing equipment (backpacks, tote barge units, boats) and standard methods. Backpack and tote barge sampling is performed throughout the entire reach in a single pass. Boat electrofishing may include additional sampling effort depending on stream width and habitat variability. All fishes are identified to species in the field, checked for anomalies, and released. Macroinvertebrates are collected using modified EPA Rapid Bioassessment Protocols (RBP III) for single habitat collections using D-frame dipnets. Each major stream habitat type is sampled separately and collections are returned to the VCU lab for identification to the lowest practical taxon and enumeration. Data are compiled into SQL databases and application macros within INSTAR calculate over 50 separate metrics and ecological variables, including those typically generated with the Index of Biotic Integrity (IBI) and Rapid Bioassessment Protocol (RBP). INSTAR assesses the ecological health of streams within watersheds based on percent comparability to the appropriate (e.g. basin, stream order) reference condition (i.e., virtual stream).

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#### PURPOSE

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The database that VCU will develop is expected to complement and enhance the limited available information on stream ecological health in many parts of the state, including the Coastal Plain Macroinvertebrate Index (CPMT; USEPA 1997, Maxted et al. 2000) for low-gradient streams and rivers of the Coastal Plain physiographic province, and other indices based on the EPA's Rapid Bioassessment Protocols for streams and rivers (Barbour et al. 1999). In addition, the fish community data are expected to be particularly useful for the assessment of larger, nonwadeable streams and rivers, which are not amenable to macroinvertebrate sampling. Because of the complementary nature of the purpose and research design, much of the project management, assessment and oversight follows the protocols of VADEQ Biological Monitoring of Virginia Quality Assurance Project Plan for Wadeable Streams and Rivers (2006). The current project through Virginia Department of Conservation and Recreation will expand significantly the geographic scope of the existing INSTAR database.

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#### TIME PERIOD OF CONTENT

##### TIME PERIOD INFORMATION

##### SINGLE DATE/TIME

CALENDAR DATE 19990101-Present

##### CURRENTNESS REFERENCE

Ground condition

#### STATUS

PROGRESS In work

MAINTENANCE AND UPDATE FREQUENCY Annually

#### SPATIAL DOMAIN

## BOUNDING COORDINATES

WEST BOUNDING COORDINATE -79.13022  
EAST BOUNDING COORDINATE -78.565069  
NORTH BOUNDING COORDINATE 38.967753  
SOUTH BOUNDING COORDINATE 38.43139

## KEYWORDS

## THEME

THEME KEYWORD THESAURUS None  
THEME KEYWORD WADEABLE STREAMS  
THEME KEYWORD Habitat  
THEME KEYWORD Watersheds  
THEME KEYWORD Streams  
THEME KEYWORD BENTHOS  
THEME KEYWORD Fish

## 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 Fish  
THEME KEYWORD Macro Invertebrates  
THEME KEYWORD Water Quality

## PLACE

PLACE KEYWORD THESAURUS None  
PLACE KEYWORD Virginia

## ACCESS CONSTRAINTS

None.

## USE CONSTRAINTS

None. Please check sources, scale, accuracy, currentness and other available information.  
Please confirm that you are using the most recent copy of both data and metadata.  
Acknowledgement of the EPA would be appreciated.

## POINT OF CONTACT

## CONTACT INFORMATION

## CONTACT PERSON PRIMARY

CONTACT PERSON Greg Garman

CONTACT ORGANIZATION Virginia Commonwealth University

CONTACT POSITION Director, Center for Environmental Studies

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STATE OR PROVINCE Virginia

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CONTACT VOICE TELEPHONE 804.828.1574

CONTACT ELECTRONIC MAIL ADDRESS ggarman@vcu.edu

## 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-Data voluntarily reported

## COMPLETENESS REPORT

Unknown

## POSITIONAL ACCURACY

## HORIZONTAL POSITIONAL ACCURACY

## HORIZONTAL POSITIONAL ACCURACY REPORT

Data were collected using methods that are accurate to within 26-100 meters (EPA National Geospatial Data Policy [NGDP] Accuracy Tier 4). 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 for Chesapeake Bay Region was extracted from National Dataset and loaded into the CBPO Non-Tidal Benthic Data base.

PROCESS DATE 2010-03-30

## PROCESS STEP

## PROCESS DESCRIPTION

2008-2010 Data for Chesapeake Bay Region was extracted from provided and loaded into the CBPO Non-Tidal Benthic Data base.

PROCESS DATE 2011-12-30

*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 Greg C. Garman  
 CONTACT ORGANIZATION Virginia Commonwealth University  
 CONTACT POSITION Director, Center for Environmental Studies

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 STATE OR PROVINCE Virginia  
 POSTAL CODE 23284-3050

CONTACT VOICE TELEPHONE 804.828.1574

CONTACT ELECTRONIC MAIL ADDRESS ggarman@vcu.edu

##### CONTACT INSTRUCTIONS

unavailable

### 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.

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## Metadata Reference ►

METADATA DATE 2013-04-24

METADATA FUTURE REVIEW DATE 2017-04-24

METADATA CONTACT

CONTACT INFORMATION

CONTACT PERSON PRIMARY

CONTACT PERSON Peter Tango

CONTACT ORGANIZATION U.S. Environmental Protection Agency, Chesapeake Bay Program

CONTACT POSITION Monitoring Coordinator

CONTACT ADDRESS

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CITY Annapolis

STATE OR PROVINCE MD

POSTAL CODE 21403

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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* ▲