Smith River and Tributaries, South Mayo River and North Mayo River Water Quality Meeting

August 8, 2007

Henry County Administration Building

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Meeting Overview:

- Presentations
  - Mary Dail DEQ
  - Drew Miller DEQ
  - Raed El Farhan Louis Berger
- *General* Question & Answer session
- Posters and Questions!

Why Are We Here?

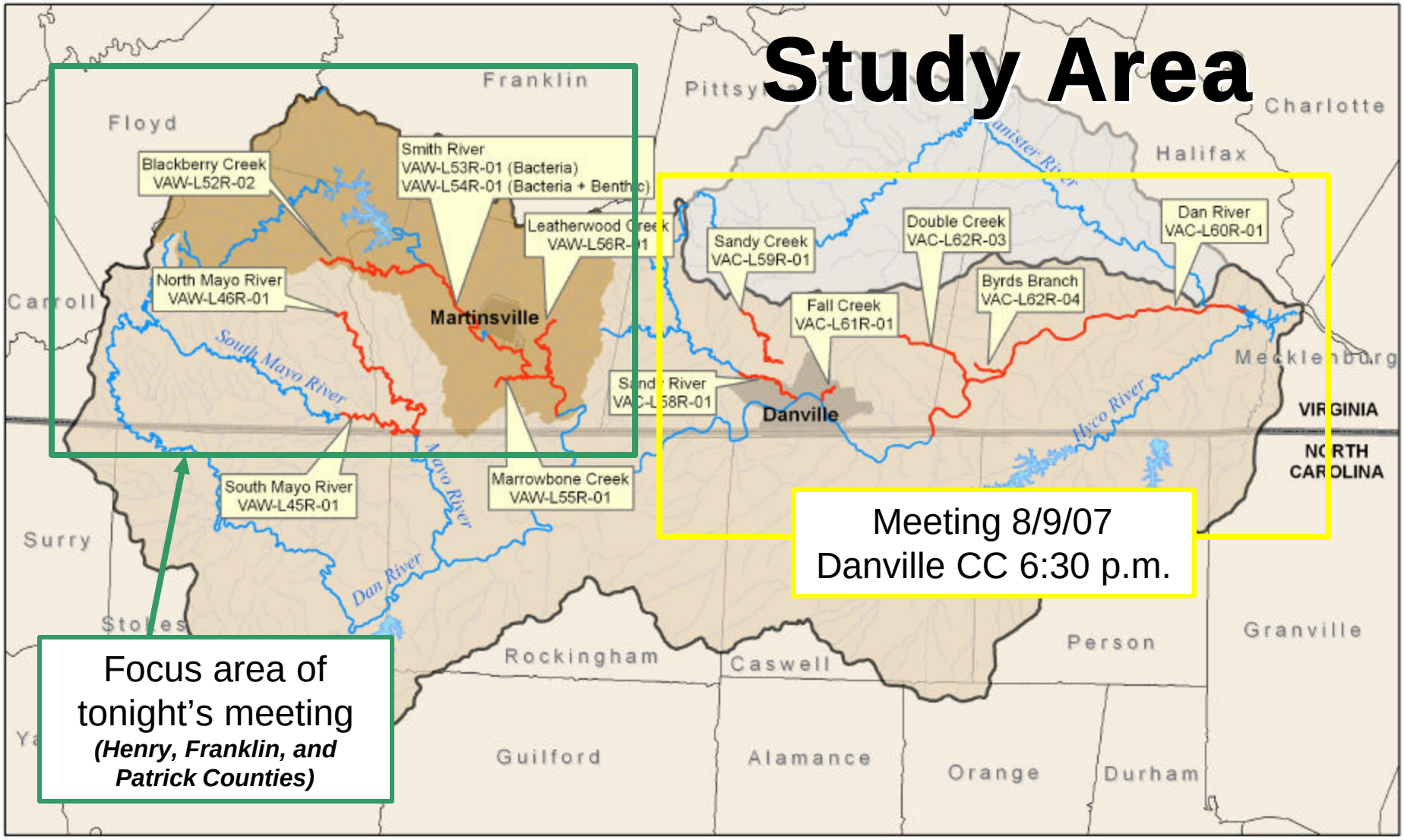
- Learn about water quality in the Smith River and a few tributaries, South Mayo River and North Mayo River

- Explain efforts that the State is undertaking to improve and protect water quality

Water Quality in the Smith River, tributaries, North and South Mayo Rivers

- Water Quality Problems exist on several streams and rivers in Henry, Patrick, and Franklin Counties
  - 2 Main problems:
    - Water Data found elevated levels of **Bacteria**: Smith River, Marrowbone Creek, Leatherwood Creek, Blackberry Creek, North and South Mayo Rivers
    - Biomonitoring data showed that water quality does not support a healthy Aquatic Insect community – Cause to be determined

Study Area


Franklin
Floyd
Pittsylvania
Charlotte
Halifax
Carroll
Surry
Stokes
Rockingham
Caswell
Person
Granville
Guilford
Alamance
Orange
Durham
Mecklenburg
VIRGINIA
NORTH CAROLINA
Blackberry Creek
VAW-L52R-02
Smith River
VAW-L53R-01 (Bacteria)
VAW-L54R-01 (Bacteria + Benthic)
Leatherwood Creek
VAW-L56R-01
North Mayo River
VAW-L46R-01
Martinsville
South Mayo River
South Mayo River
VAW-L45R-01
Mayo River
Marrowbone Creek
VAW-L55R-01
Sandy River
VAC-L58R-01
Dan River
Sandy Creek
VAC-L59R-01
Double Creek
VAC-L62R-03
Dan River
VAC-L60R-01
Byrds Branch
VAC-L62R-04
Fall Creek
VAC-L61R-01
Danville
Hyco River
Banister River
Meeting 8/9/07
Danville CC 6:30 p.m.
Focus area of tonight's meeting
(Henry, Franklin, and Patrick Counties)
Legend
Smith River Watershed
Banister River Watershed*
Dan River Watershed
Counties
State Boundary
Impaired Segments
Streams
Major Rivers
Major Waterbodies
*Outside study area
N
W
E
S
0 2.5 5 10 15 20
Miles
Sources: USGS, VADEQ, ESRI
Projection: NAD 1983 State Plane Virginia N+S
THE Louis Berger Group, INC.
MAP INDEX
MD
DE
WV
KY
VA
TN
NC
GA
SC
Dan River Watershed

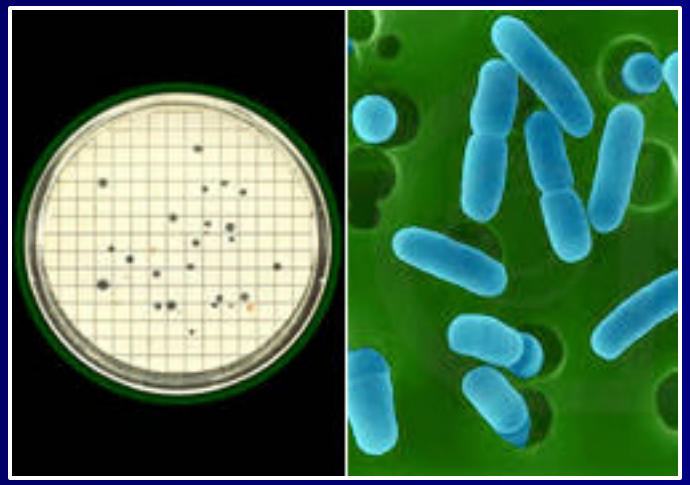
Bacteria Impairments

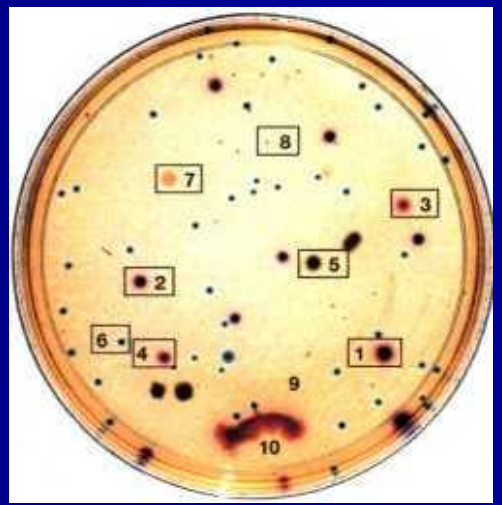
What does impaired mean?

- More than 10.5% of samples collected exceeded State standards for bacteria

What is the standard?

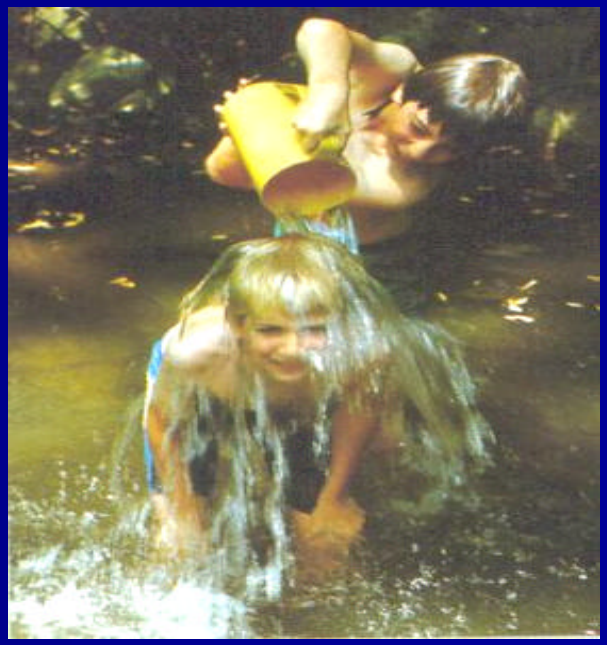
- No more than 235 E.Coli colonies per 100ml water (~1/2 cup)
- Bacteria (like E.Coli) are found in the intestines of warm-blooded animals





Why Are High Bacteria Levels Bad?

- Presence of E.Coli indicates that other disease causing bacteria may be present



Human Health Concern

- Chance of gastrointestinal illness or infection during primary contact (e.g., water in mouth, nose, eyes, open wounds)

Other Concerns

- Livestock health and weight gain

Water Quality Monitoring Program

- Capture ambient conditions in streams & lakes
- Samples are collected from bridges or other public access points

Bacteria Levels

Stream Name	Miles	Impairment	Exceedence Rate**
Blackberry Creek	**14.82**	**Bacteria**	**15%**
Smith River	**6.95**	**Bacteria**	**15%**
	13.77	**Bacteria**	**17% & 17%**
South Mayo River	**10.86**	**Bacteria**	**12.5%**
Leatherwood Creek	**8.34**	**Bacteria**	**13%**
Marrowbone Creek	**4.33**	**Bacteria**	**14%**
North Mayo River	**22.46**	**Bacteria**	**12% & 33%**

** * Ratio of Total # of Violations to Total # of Measurements*

How Do We Tackle These Water Quality Problems?

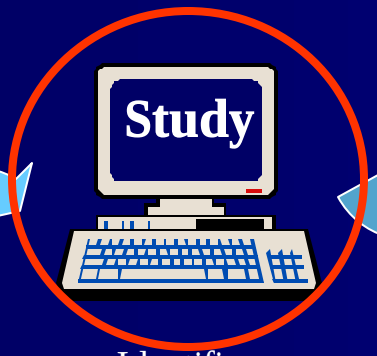
- DEQ works with a Consultant – Louis Berger Group
- Public Participation through Public Meetings
- DEQ's Lynchburg office is working concurrently to address bacteria problems in the Dan River
- 2 Reports
  - Bacteria TMDL Report for the entire Dan River watershed (including the Dan, the Smith & tributaries, South Mayo, and North Mayo)
  - Benthic TMDL Report for the Smith River watershed

What Happens When a Stream is Impaired?

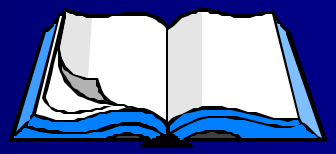
The State begins a formal study to clean up that water body (a TMDL)

Total
Maximum
Daily
Load

We are here



- Identifies sources of pollution
- Calculates amounts from each source
- Estimates necessary pollutant reductions



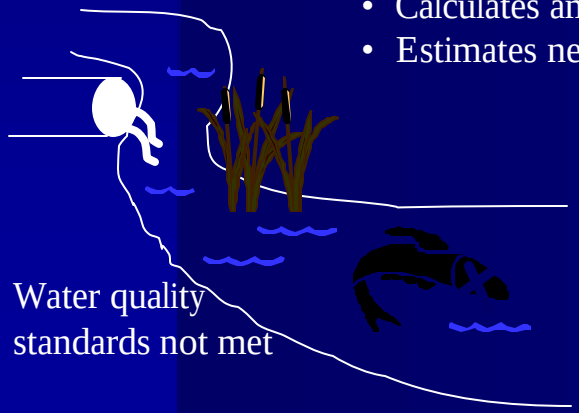
Implementation Plan

- Identifies permit controls or best management practices needed to make necessary pollutant reductions

Implementation

Monitoring

Polluted



Water quality standards not met

Clean

Water quality standards met

The Process

What are the Study Goals?

- Identify all sources of fecal bacteria
- Quantify amounts from each source
- Estimate reductions necessary to meet water quality standards

Virginia's Biological Monitoring Program

DEQ
Virginia Department of Environmental Quality

The DEQ has responsibility for Monitoring Water Quality in Virginia

- Chemistry - Toxics, Nutrients
- Physical - Temperature, Oxygen, pH
- **Biology - Fish, Benthic Macroinvertebrates**

Why?

The Objective of the Clean Water Act is to:

"restore and maintain the chemical, physical, and <u>biological</u> integrity of the Nation's waters."

Virginia's General Standard => *"all state waters shall be free from substances... which are harmful to aquatic life"*

Public Perceptions About Biological Monitoring and Ecosystem Protection

Aquatic invertebrates are good indicators of stream health

- Respond to environmental changes (stress) predictably and quickly
- Response to short-term pollution events is evident for long periods of time (think of them as the “memory” or Black Box of the stream)
- Widespread distributions
- Relatively easy to collect and identify

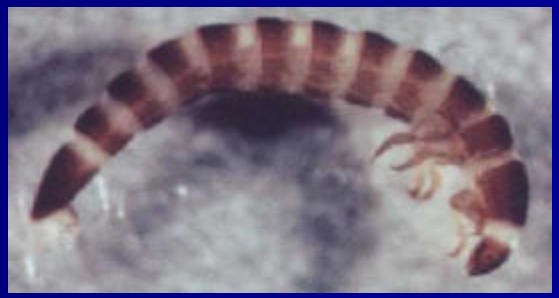
Pollution Intolerant Invertebrates

Mayfly

Stonefly

Caddisfly

Water Penny



Riffle Beetle

Moderately Pollution Tolerant Invertebrates

Crayfish

Dragonfly

Netspinning Caddisfly

Aquatic Sowbug

Cranefly

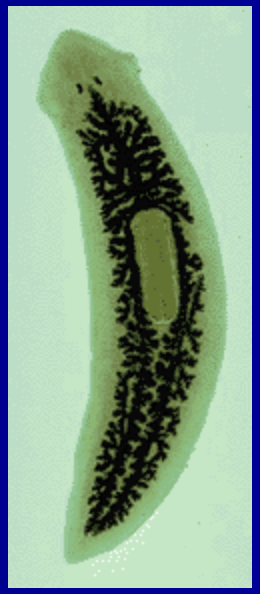
Highly Pollution Tolerant Invertebrates

Midge Larvae

Segmented Worm

Pouch Snail

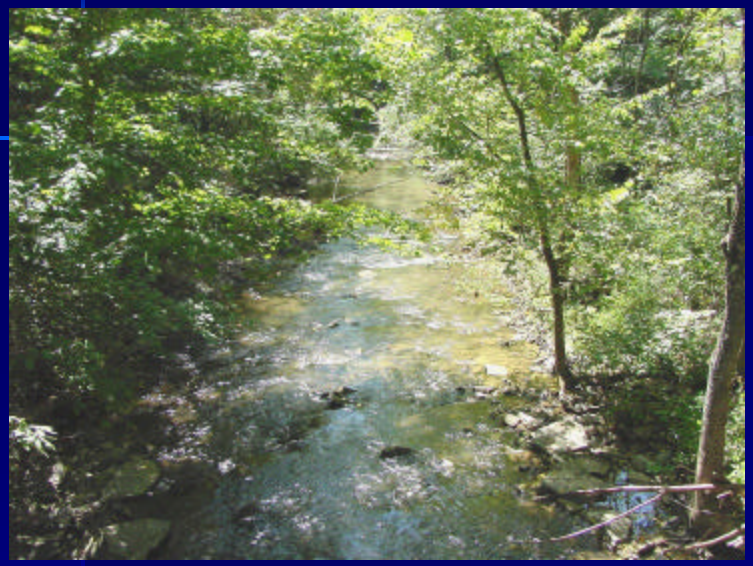
Leech

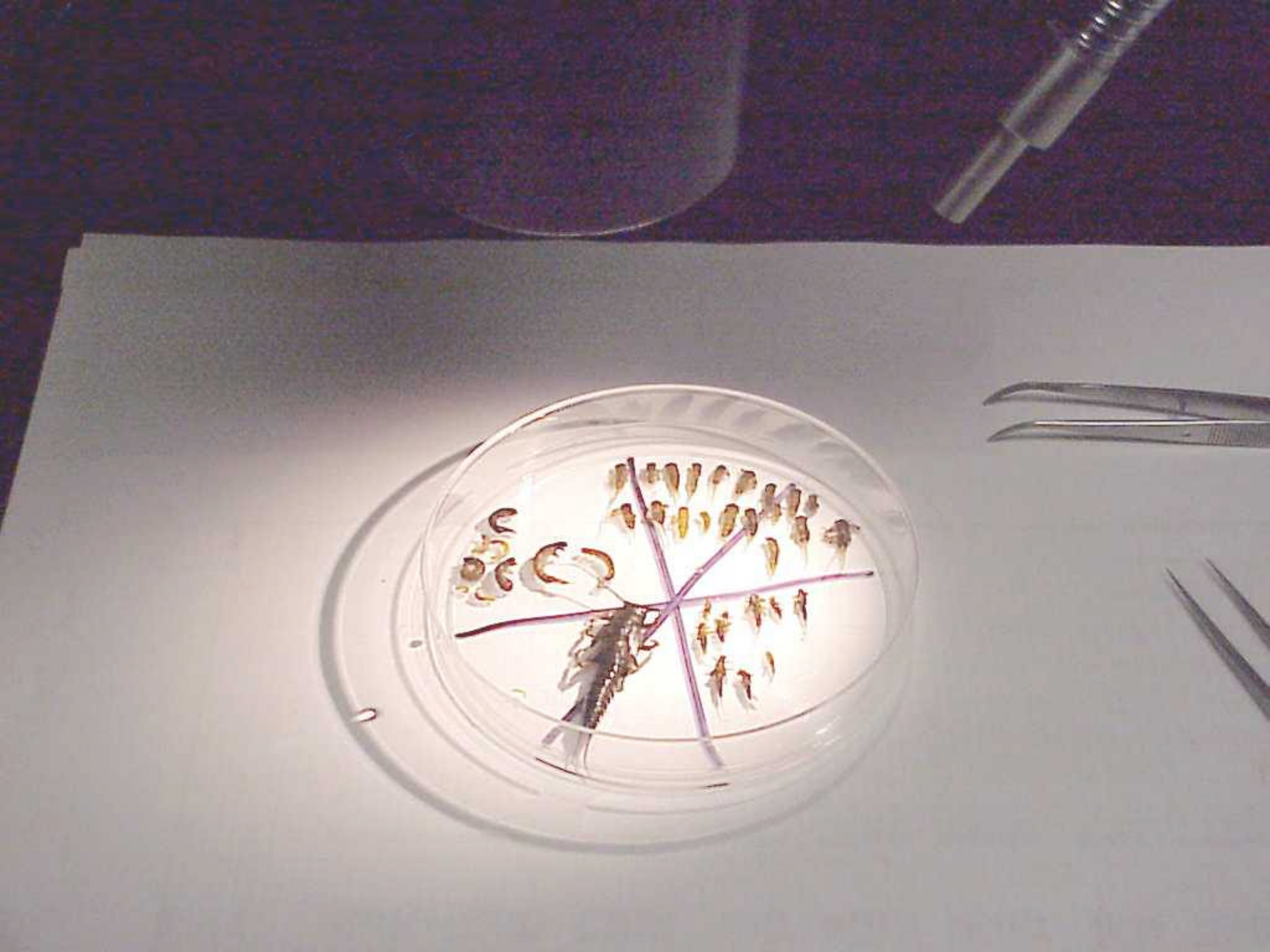


Flatworm

NOV 26 2001

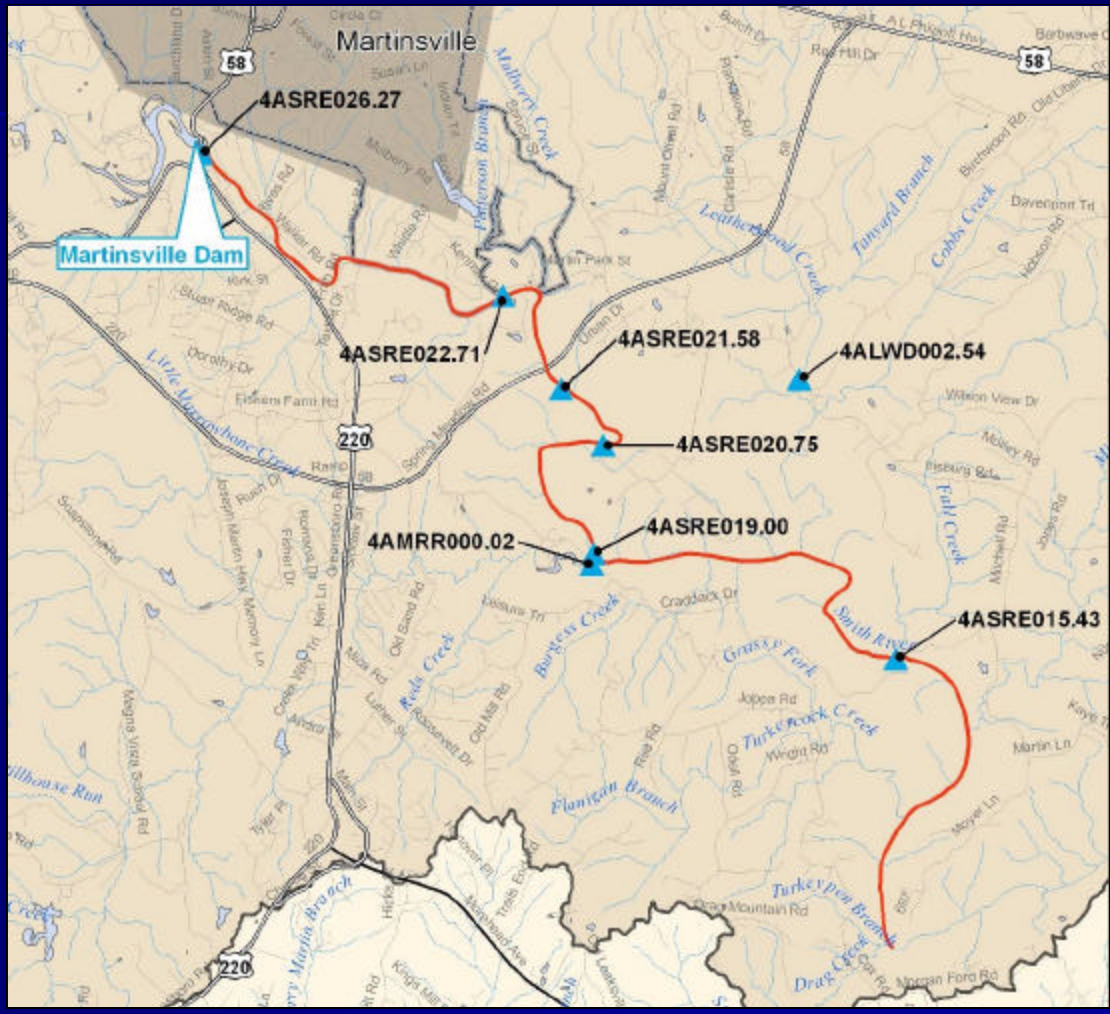
Habitat assessments detect potential stressors to the benthic community



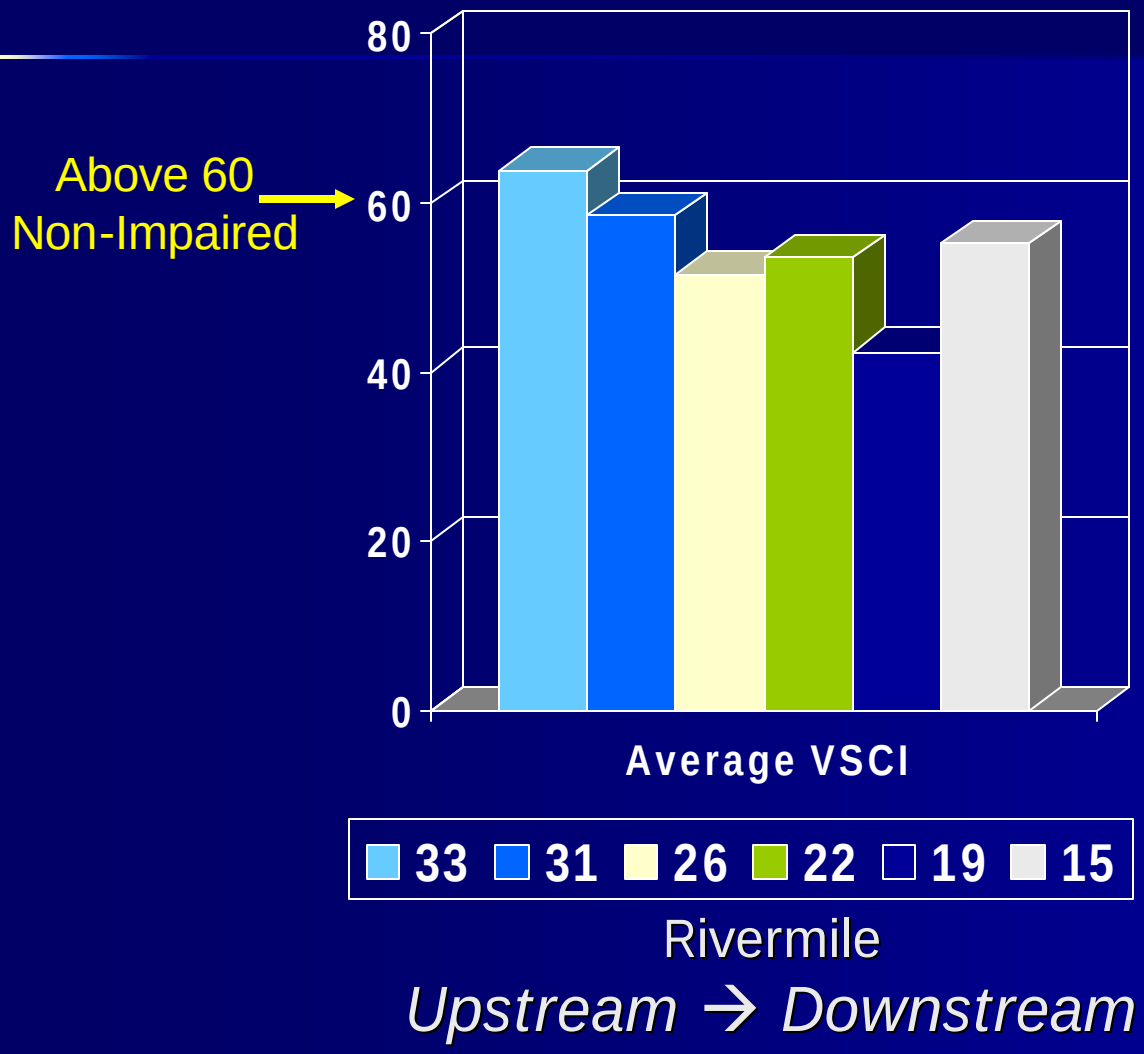


Smith River Listed Segment

- Upstream Limit:
  Martinsville Dam
- Downstream Limit: Confluence of the Smith River and Turkey Pen Branch
- Total Length
  Approx. 14 Miles



Biological Community Assessment (2000-2006)



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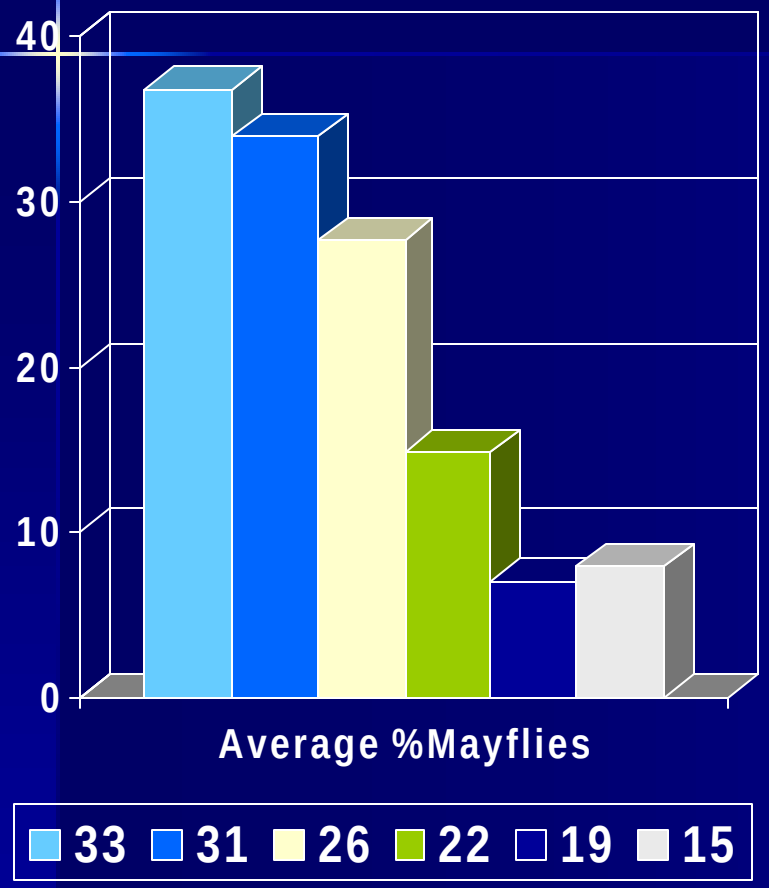
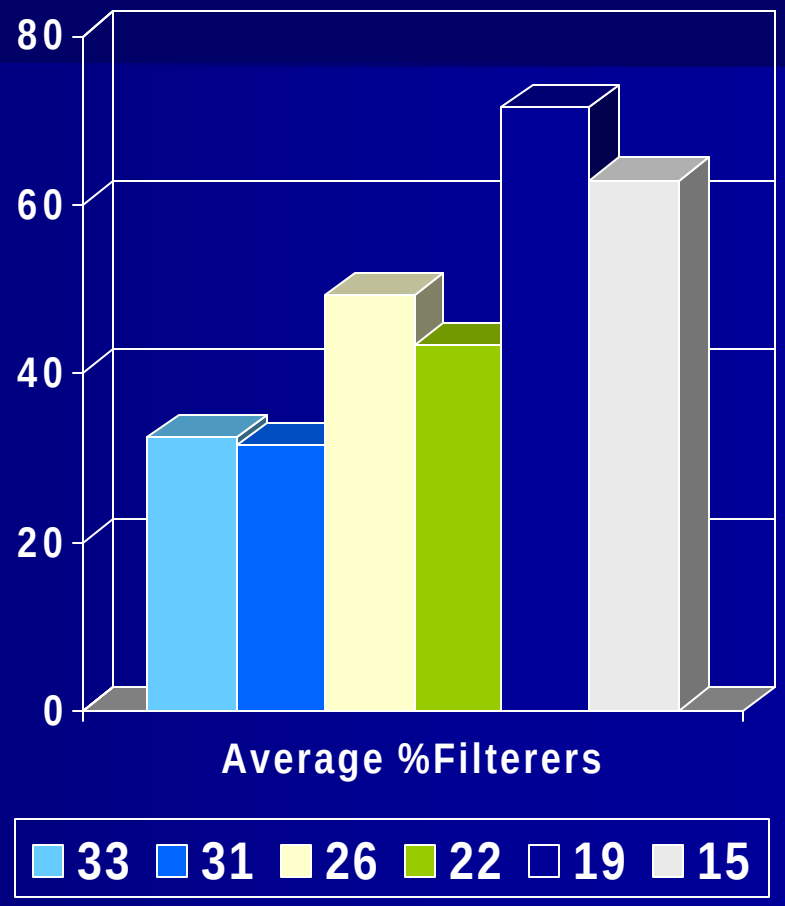


Rivermile

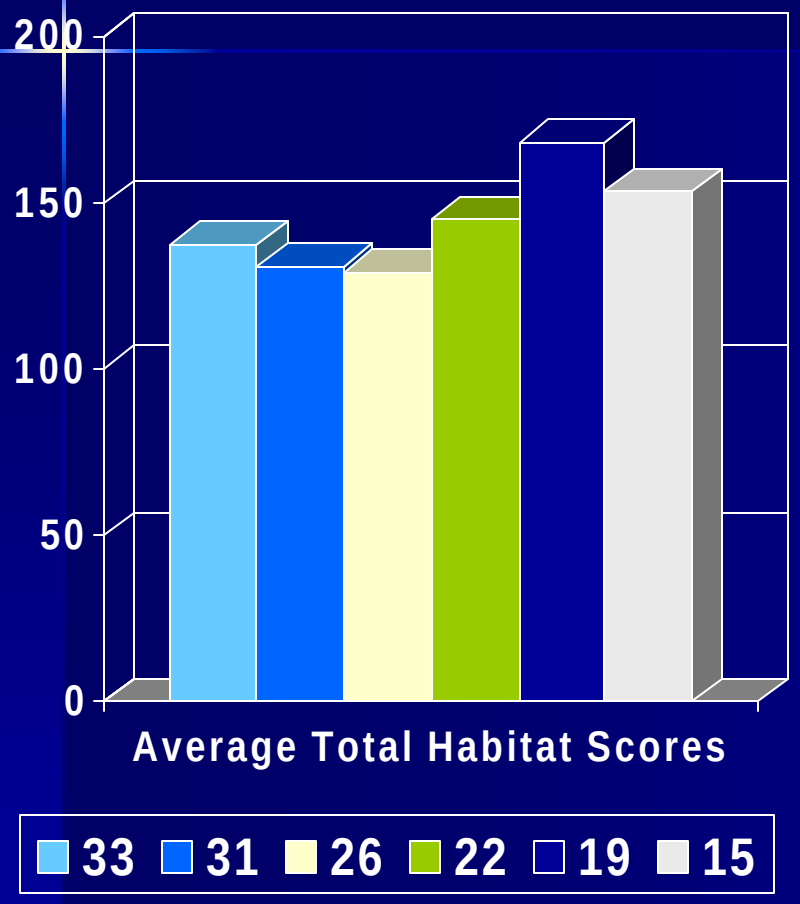
Upstream → Downstream

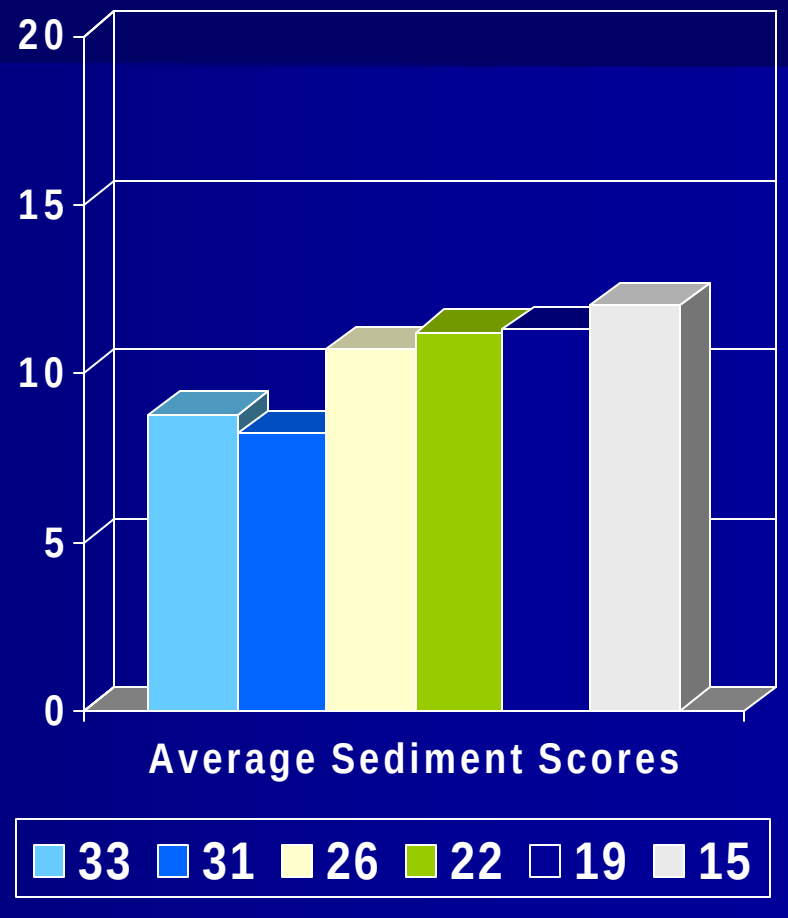


Rivermile

Upstream → Downstream

Habitat Assessment (2000-2006)





Summary

- **A tool for detecting environmental impacts that are not typically detected by standard chemical monitoring networks**
- **Benthic community and habitat surveys detect impacts in the Smith River**
- **Purpose of the study is find the cause (stressor) of the impacts**
- **Potentially impacted by urban runoff, sediment, riparian zone loss, nutrients, and organic inputs**

Bacteria TMDL Study Development

Louis Berger Group

Bacteria Levels

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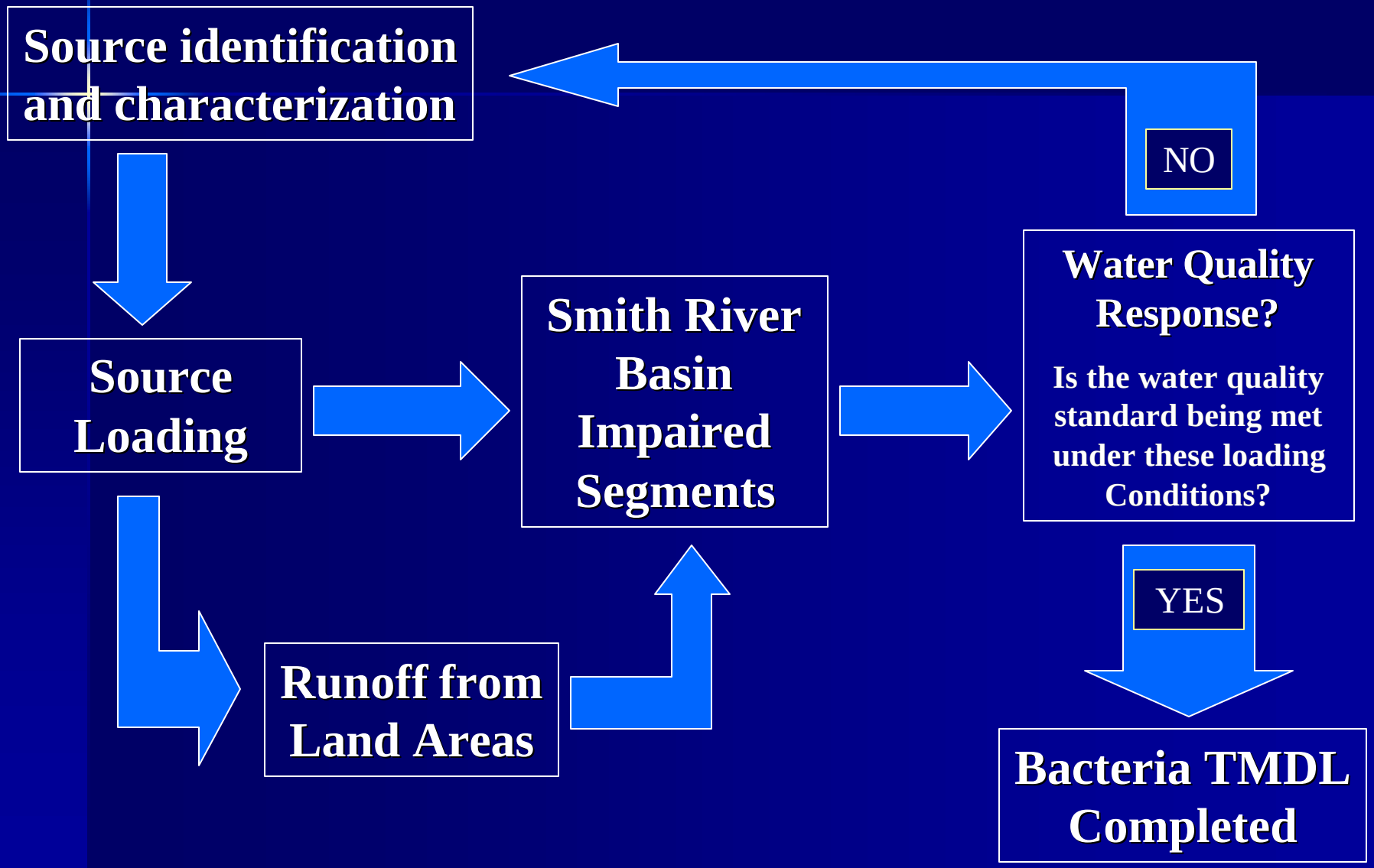
Bacteria TMDL Development



Bacteria Sources Assessment

Addresses the following issues related to bacteria production:

- Bacteria loading from Human Sources
  - Straight pipes
  - Septic systems
  - Biosolids
- Bacteria loading from Livestock
  - Livestock inventory
  - Livestock grazing and stream access
  - Confined animal facilities
  - Manure management
- Bacteria loading from Wildlife
  - Wildlife Inventories
- Bacteria loading from Pets
  - Pet Inventories

Humans

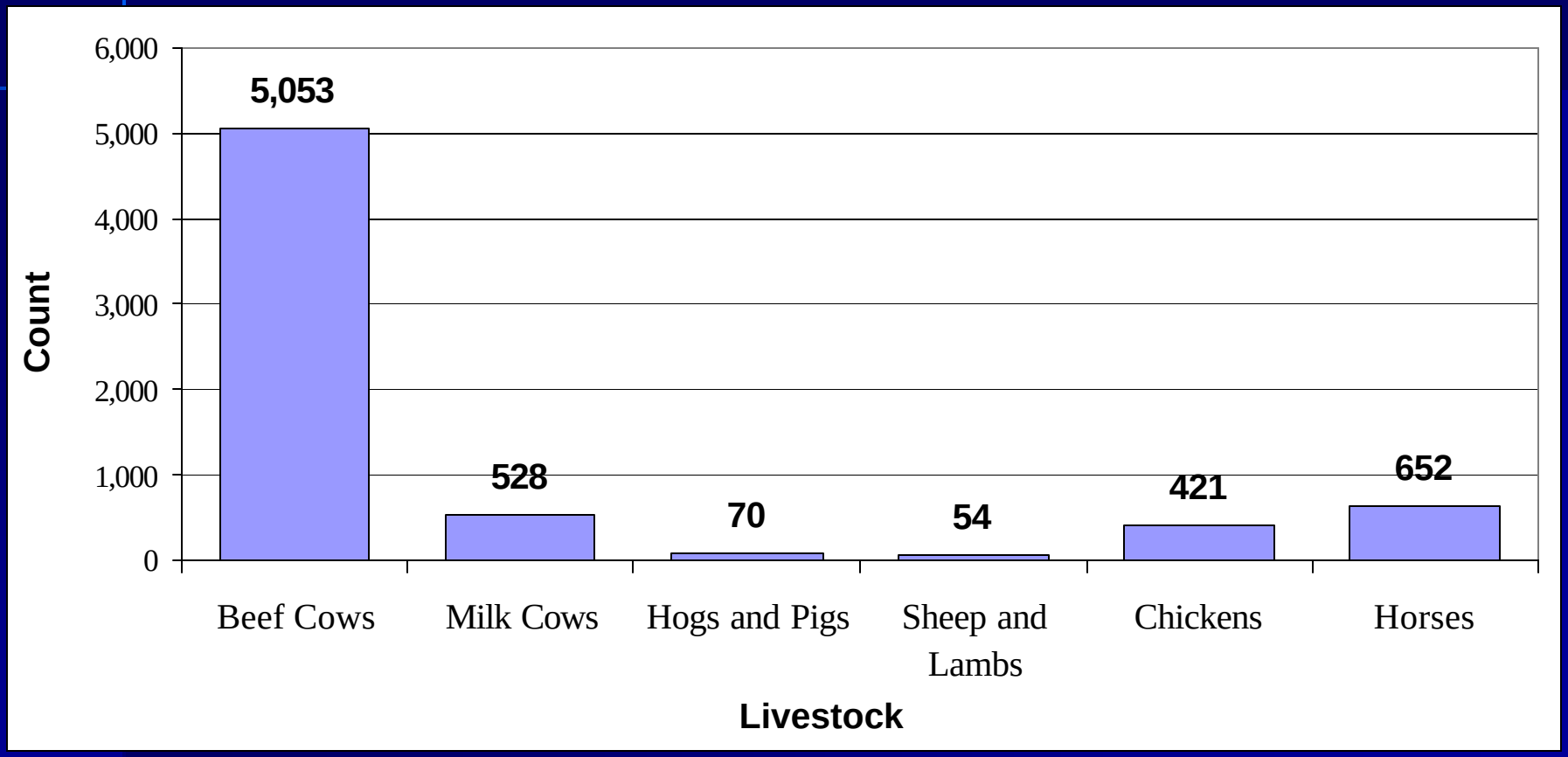
2004 Census Data Summary for the Smith River Watershed	
Smith River Watershed Human Population	**69,170**

Estimates of the Number of Septic Systems and Straight Pipes					
Category	**# Failing Systems**	**# People per Household**	**People Served**	**Flow (gal/day)**	**Daily Load (#cfu/day)**
Septic Systems	**31**	**2.38**	**74**	**5,534**	**55,335,000**
Straight Pipe	**58**	**2.38**	**138**	**10,353**	**1.0767E+10**

Pets: Cats & Dogs

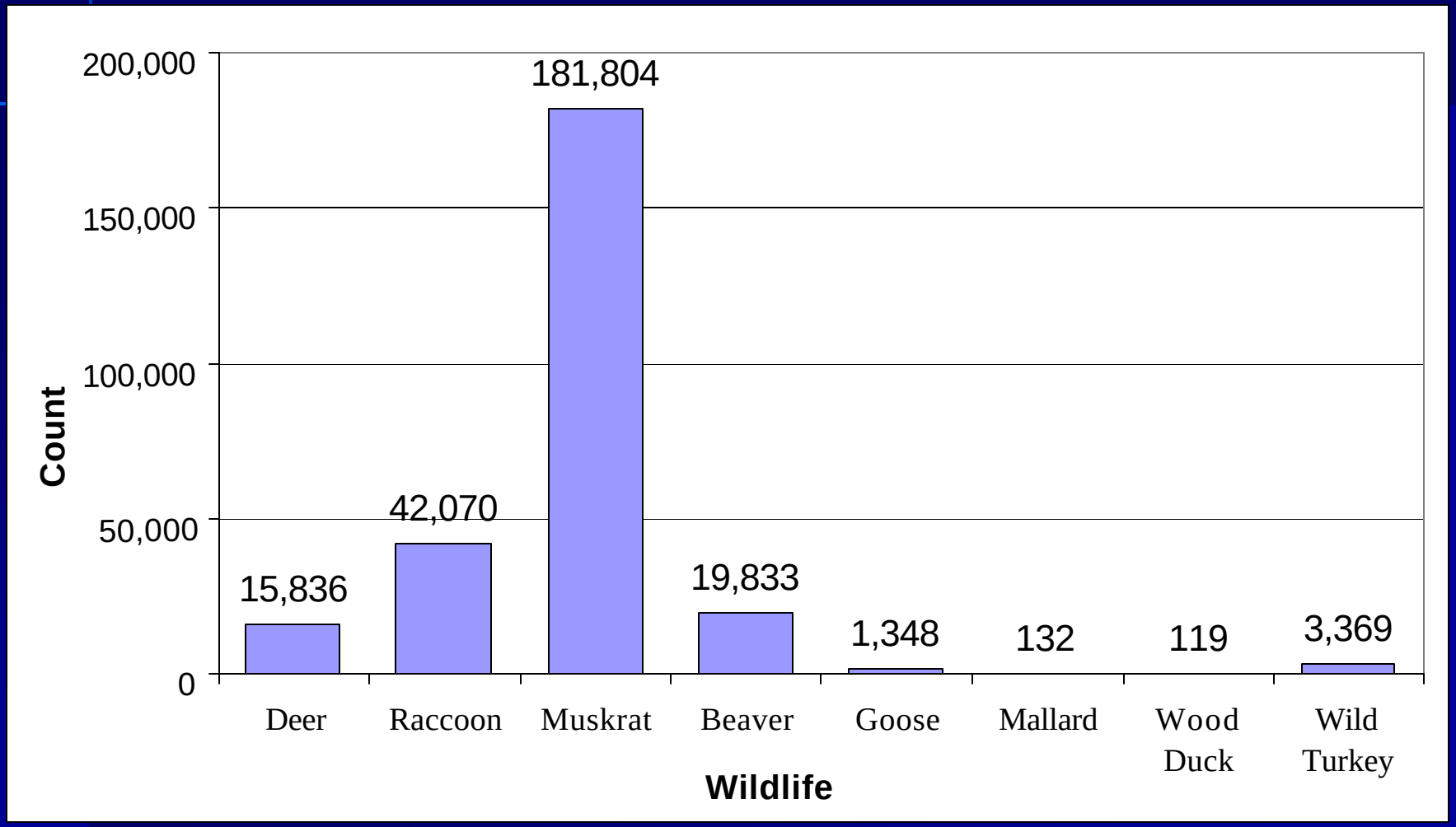
Pet Estimates within Smith River Watershed	
Dogs	Cats
15,737	*17,331*

Livestock Estimates



Livestock numbers are based on the 2002 US Agricultural Census data, the chicken numbers are based on permit information provided by VADEQ, and the horse numbers were based on the 2001 VA Agricultural Statistics Equine report.

Wildlife Estimates

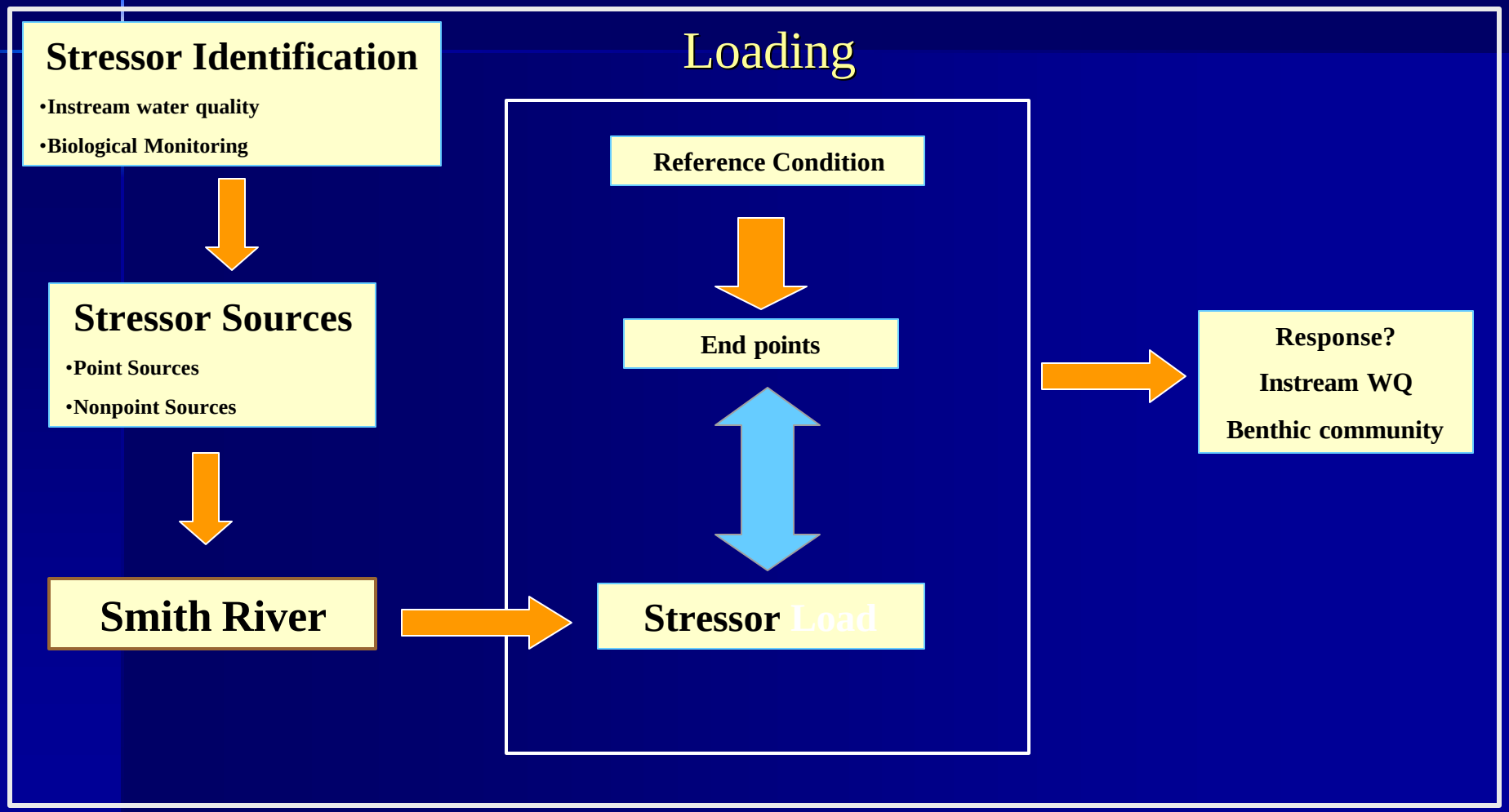


Estimates are based on NLCD 2001 land use data and distribution estimates from DGIF

Benthic TMDL Development

Louis Berger Group

TMDL Process for Benthic Impairment



Benthic Stressor Identification

- What pollutant(s) is causing the impairment of the benthic community?
- Common stressors include:
  - Dissolved Oxygen
  - Nutrients
  - pH
  - Temperature
  - Sediment
  - Toxics
- Stressors specific to the Smith River include:
  - Urban Runoff
  - Flow Modification (Dam Release)

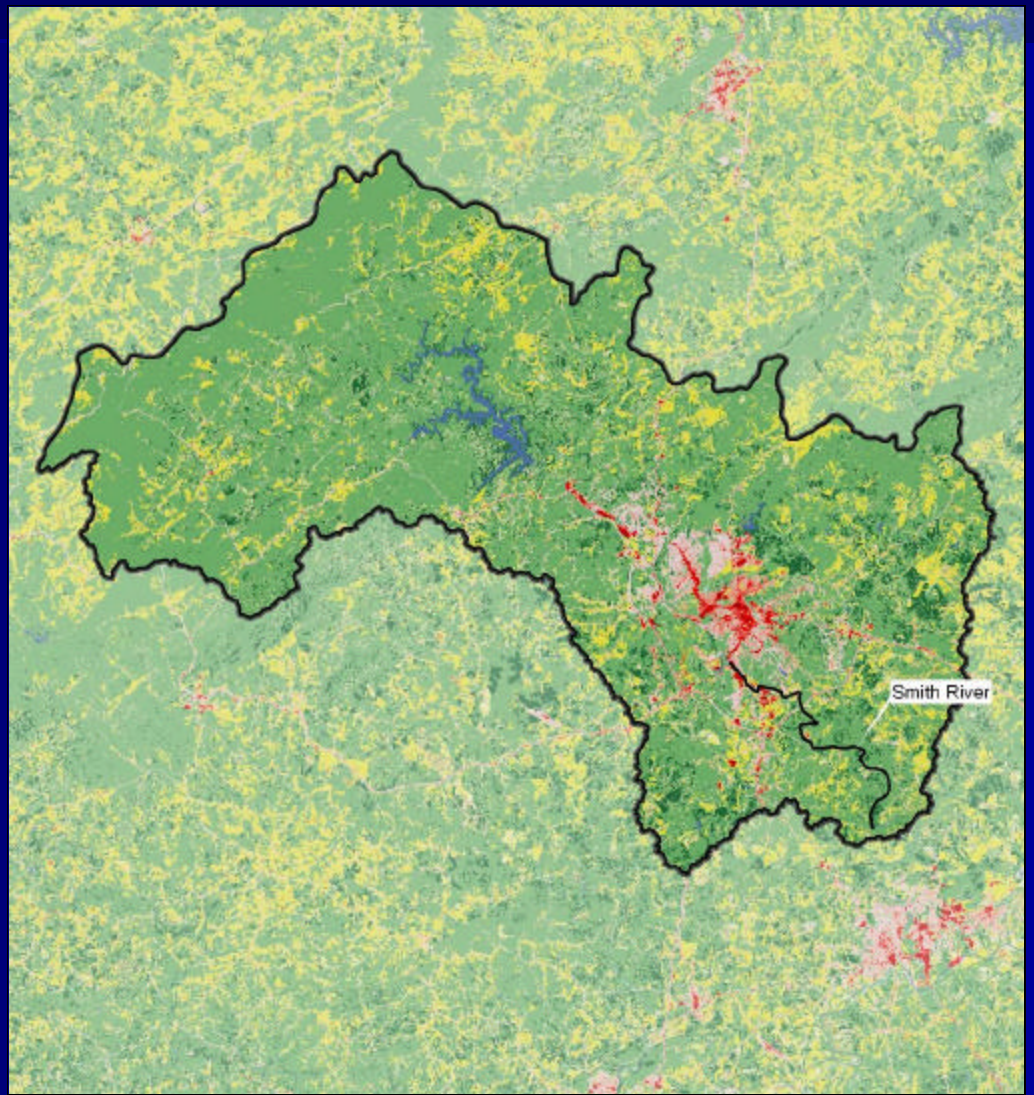
Data Used in Stressor Identification

Environmental Data:

1. Instream Water Quality Data
2. Biological and Habitat Assessment Data
3. Acute and Chronic Toxicity Testing
4. Field notes and observations
5. Discharge Monitoring Reports (DMR), Nutrient Monitoring Reports (NMR), WET toxicity testing
6. Stream flow

Land Use in the Smith River Watershed

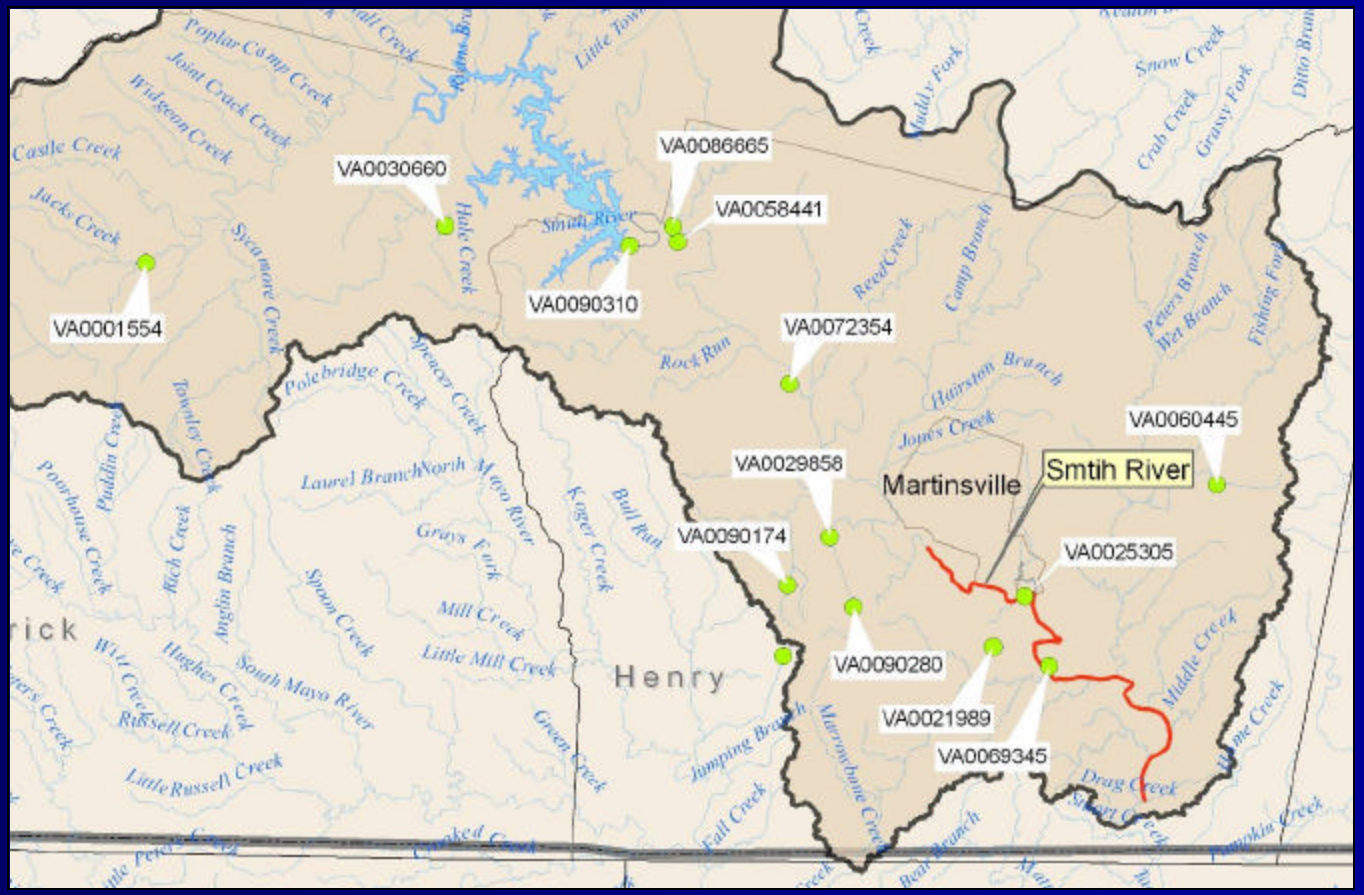
- Watershed Area
  - **336,929 acres**
- Dominant land uses
  - **76% Forested**
  - **11% Agriculture**
  - **8% Developed**
  - **3% Grassland/ Shrub**
  - **1% Water/Wetlands**



Data is from VA DEQ

Permitted Facilities in the Watershed

- 13 Active Permits:
  - **7 permits issued to industrial facilities**
  - **6 permits issued to municipal facilities**



Future Goals

- Finalize estimates of human, pet, livestock and wildlife sources
- Identify stressor(s) to Benthic Community
- Meet with Steering Committee
- Solicit input from public on the information presented tonight
  - Comment period ends September 10th!

What is the Study Timeline?

1st Public Meeting

Develop computer model to simulate stream flow and bacteria

Use model to estimate necessary load reductions

Final Public Meeting

August **September** **November** **December** **January**

Gather data (climate, land use, soils, population, animal numbers, flow, etc.)

Test computer model

Draft Study Report available for public comment

Final Report submitted to EPA

Study Contacts

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www.deq.virginia.gov/tmdl/mtgppt.html

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