

# Results of a Water Quality Study on the Little Calfpasture River

November 19, 2009



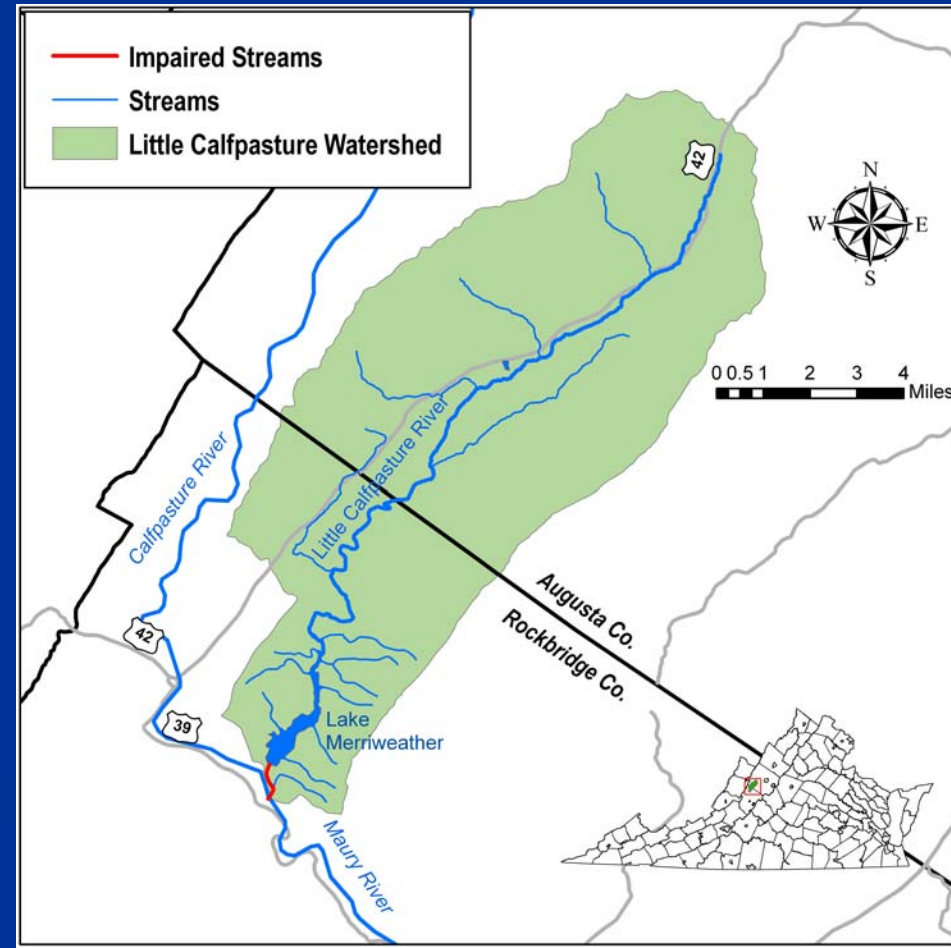
# What's the Purpose of Tonight's Meeting?

- Learn about existing water quality impairments in the Little Calfpasture River
- Explain where the problem is coming from and next steps needed to restore the River



# What's the Status of the Little Calfpasture River?

- DEQ routinely monitors the quality of waters across the state and reports those results every 2 years
- Since the first such report in 1996, a section of the Little Calfpasture River has been listed as “impaired” for aquatic life
- Impairment begins at the Goshen Dam and extends 0.82 miles downstream to the Maury River



# What is an Aquatic Life (Benthic) Impairment?

## What does it mean?

- Stream does not fully support a healthy and diverse aquatic life

## What is the standard?

- State waters shall be free from pollutants which are harmful to aquatic life

## How is it assessed?

- Biologist collects and identifies benthic macroinvertebrates
- The numbers and kinds of benthic macroinvertebrates collected are compared to a healthy reference condition
- The stream is given a Stream Condition Index (SCI) score (<60 = impaired)



# Why Do We Care About the “Bugs”?

- Important food source for fish
- Important in cycling nutrients
- Good indicators of pollutants and overall stream health



# What's a TMDL?

**T**<sub>total</sub>  
**M**<sub>aximum</sub>  
**D**<sub>aily</sub>  
**L**<sub>oad</sub>

**WE ARE HERE**



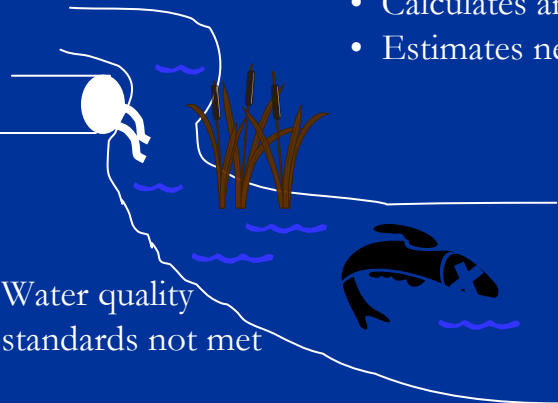
## Implementation Plan



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

## Polluted

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



**The Process**

## Implementation

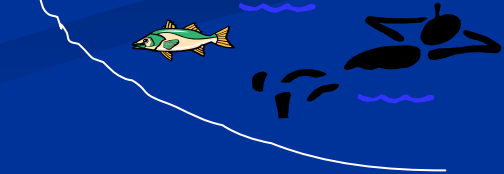


## Monitoring



## Clean

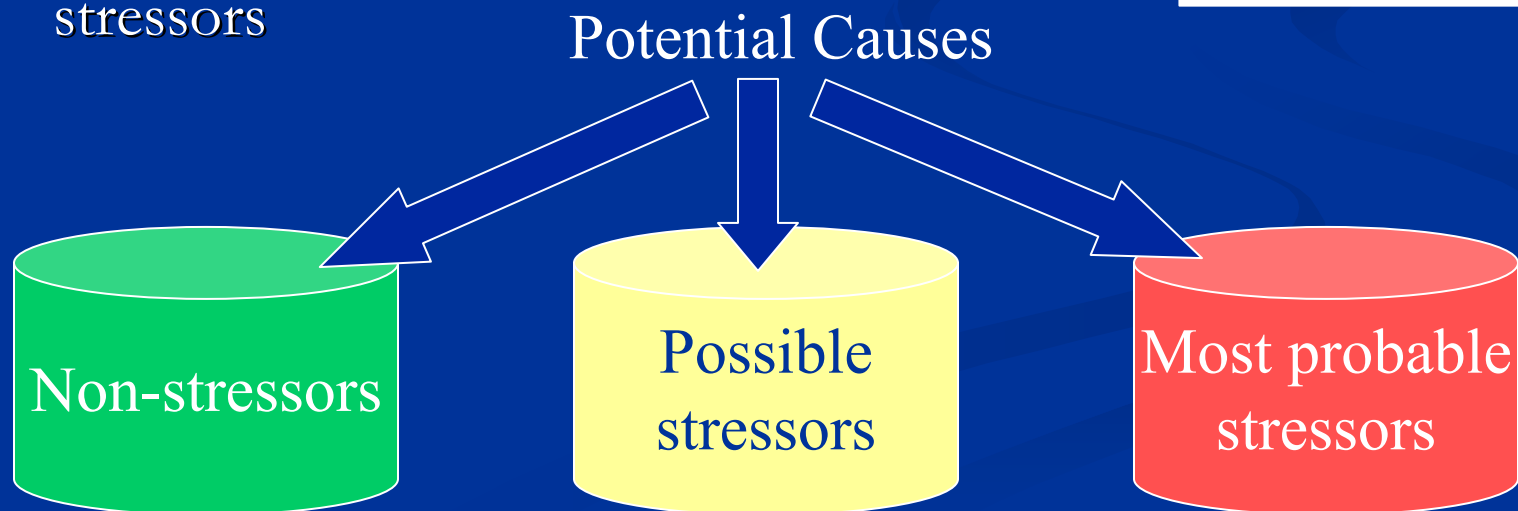
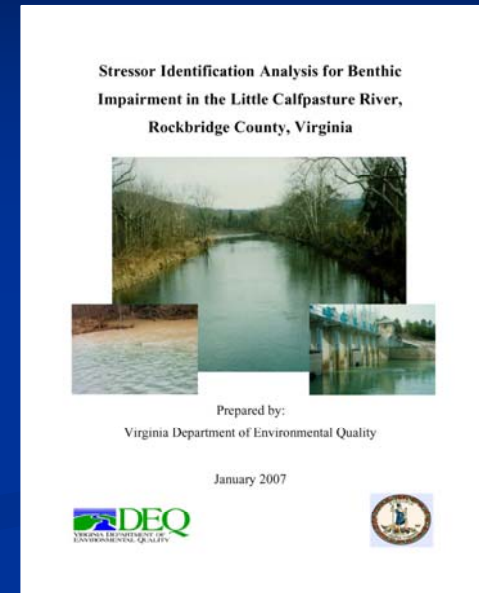
Water quality standards met



# 1<sup>st</sup> Step in TMDL Development

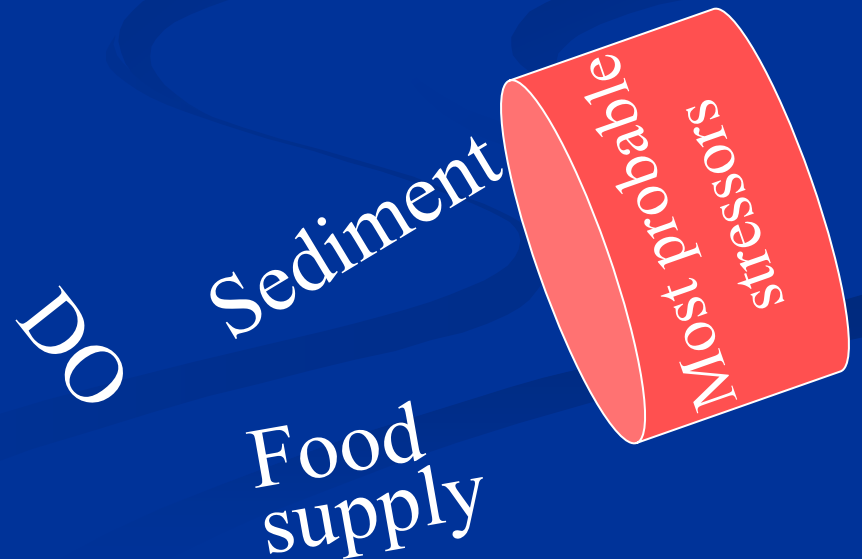
## ■ Stressor Analysis

- Answers the question: what is causing the impairment?
- All available water quality and biological data is analyzed
- DEQ has conducted the stressor analysis and has determined the most probable stressors



# Most Probable Stressors

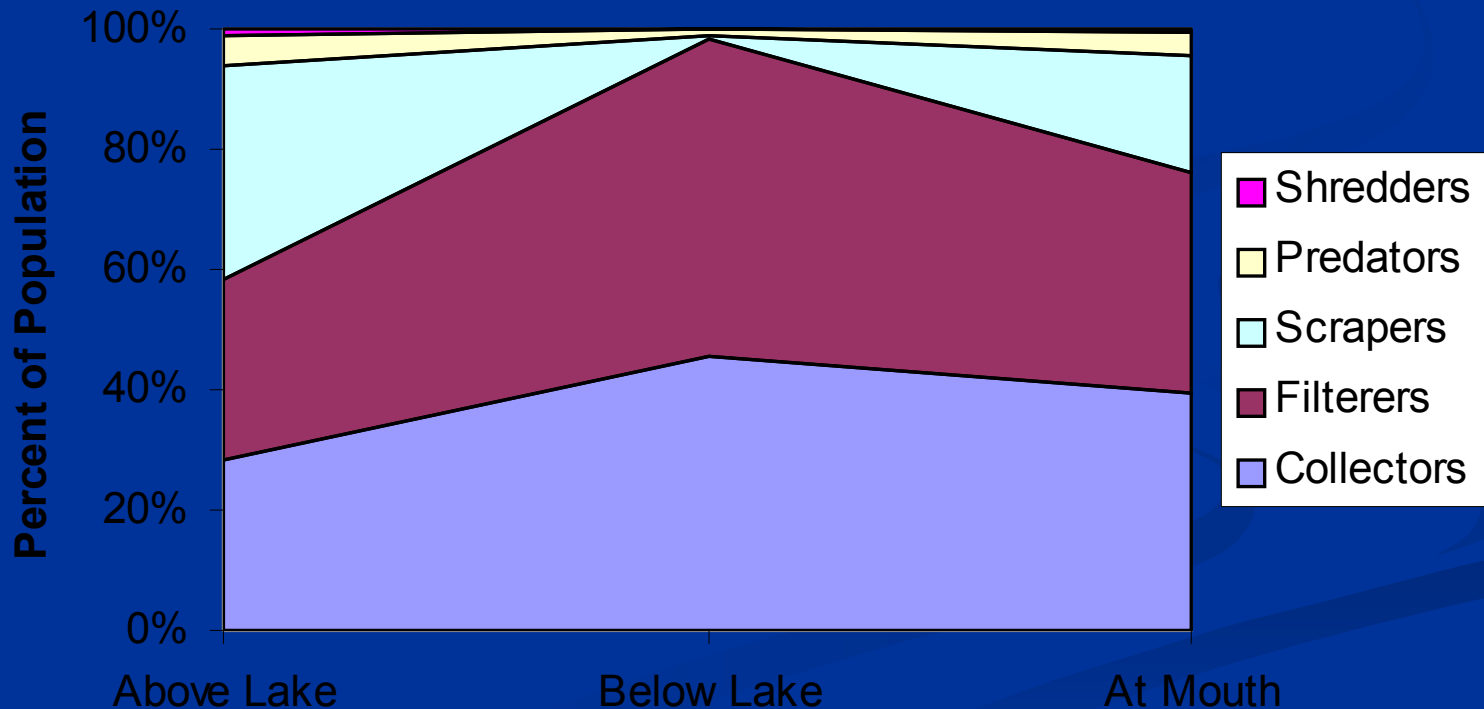
- Change in available food supply – ecological change in energy dynamics and food supply when a flowing river is impounded
- Dissolved Oxygen – DO below water quality standard at times
- Sediment – physical stress caused by too much sediment smothering available habitat



# Change in Available Food Supply

## Supply

- This stressor will continue to exist regardless of dam design or operation

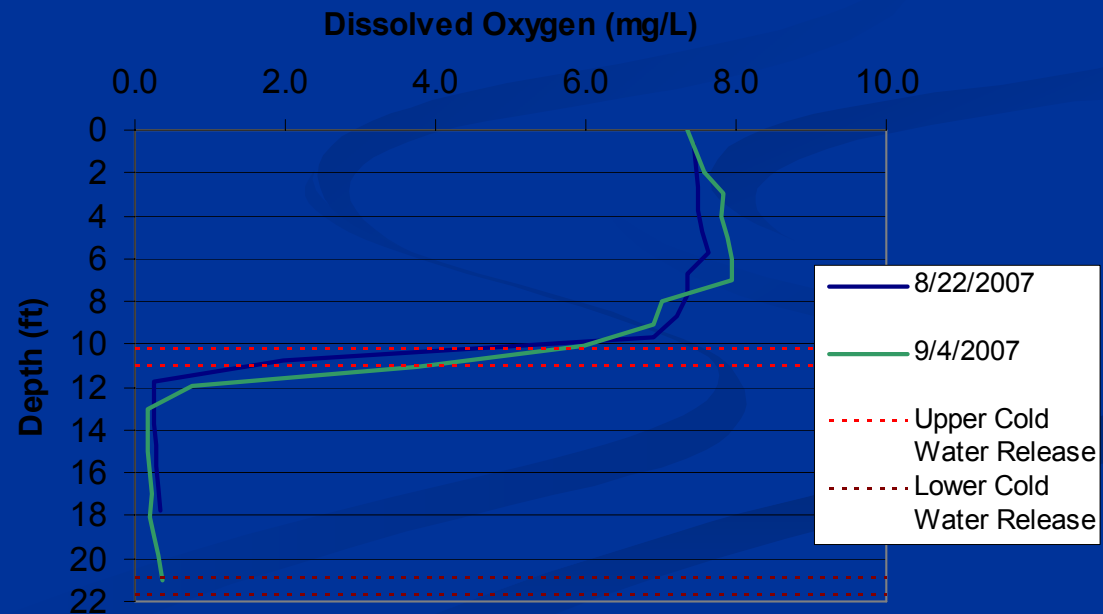
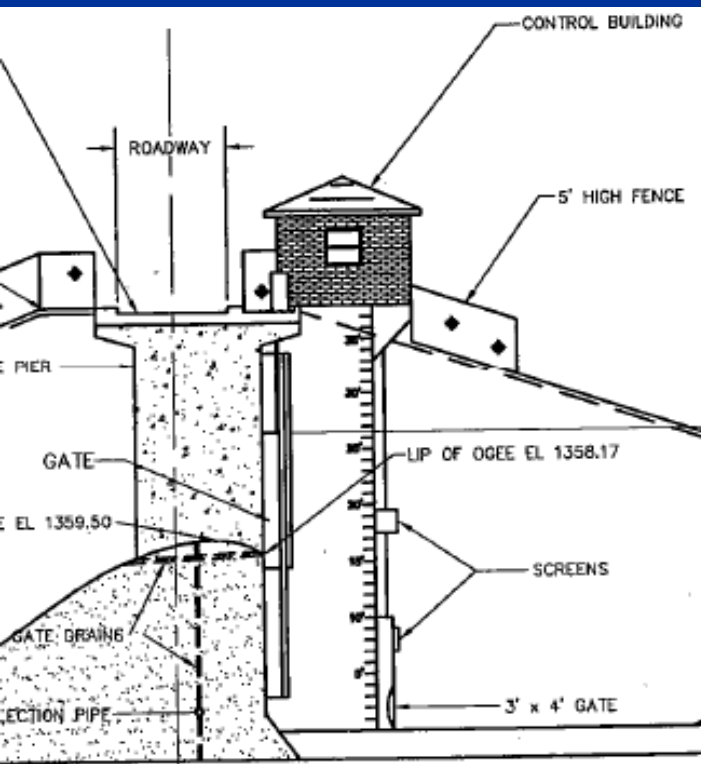


# Change in Available Food Supply

- As part of the triennial review of Virginia's water quality standards, DEQ proposed to adopt a special standard that recognizes the presence of the dam
- The standard allows a zone of recovery (about  $\frac{3}{4}$  of a mile) for the river to recover and achieve water quality standards:
  - Aquatic life scores directly below the dam would have to meet a SCI score of 20.5
  - Aquatic life conditions would have to improve and recover from the dam to the mouth of the Little Calfpasture
  - At the mouth of the Little Calfpasture, aquatic life scores would have to meet the traditional SCI score of 60

# Why is Dissolved Oxygen Low?

- During very dry conditions, the majority of water released downstream is from deep in the lake
- The lake naturally has very little oxygen below 10-12 feet



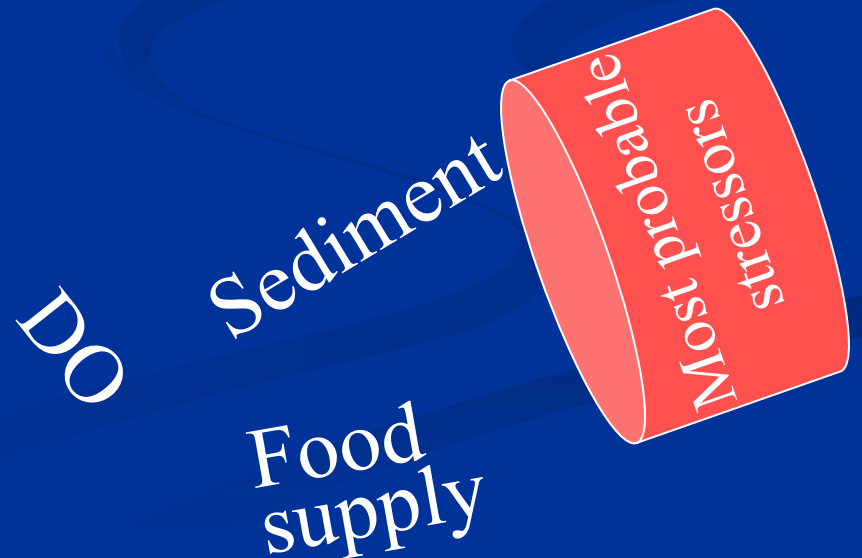
# Dissolved Oxygen

- Boy Scouts modified the outlet structure in July 2009 to pull water from higher in the lake where there is more oxygen
- Initial DEQ monitoring indicates improvement, but monitoring will continue to ensure success



# Most Probable Stressors

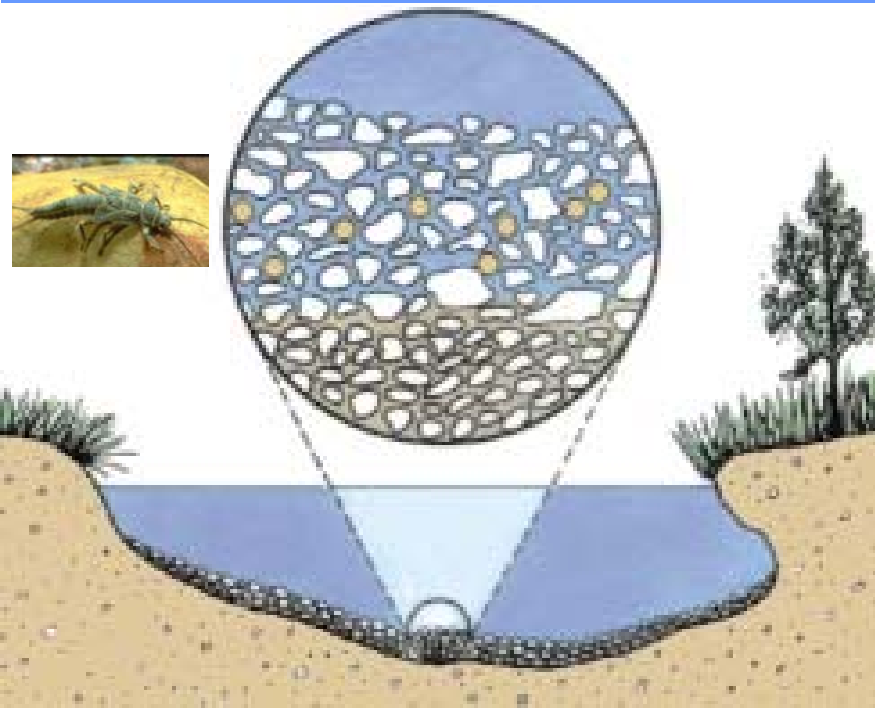
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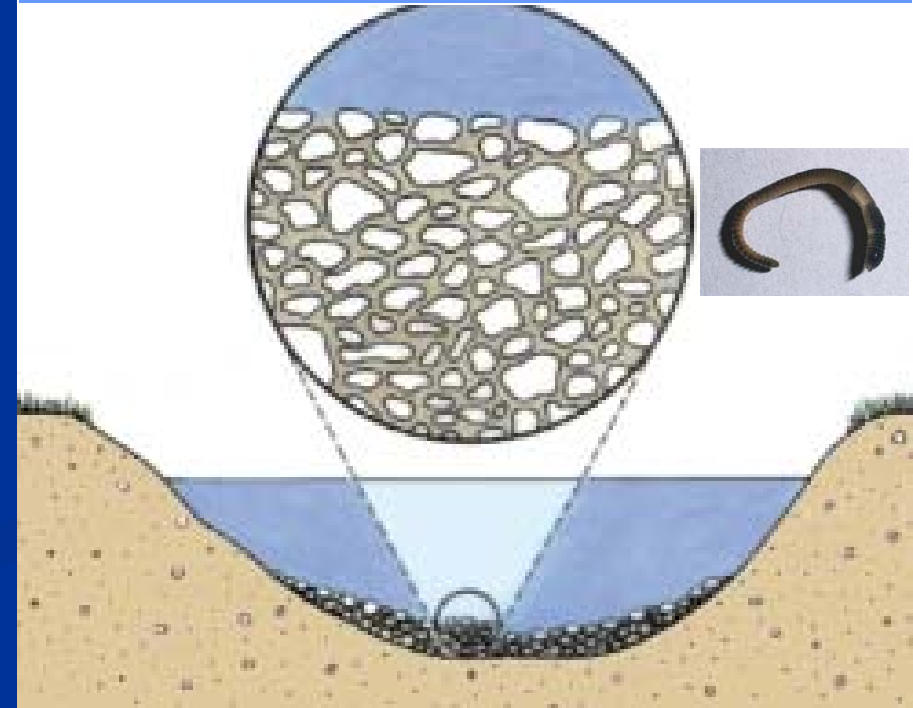
# Why do we care about Sediment?

- A healthy “bug” community requires a clean stream bottom with lots of space between rocks and gravels

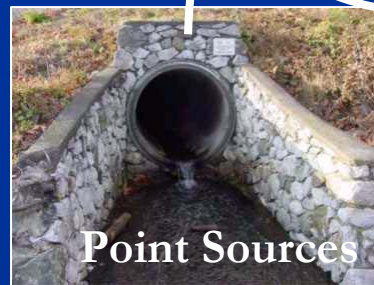
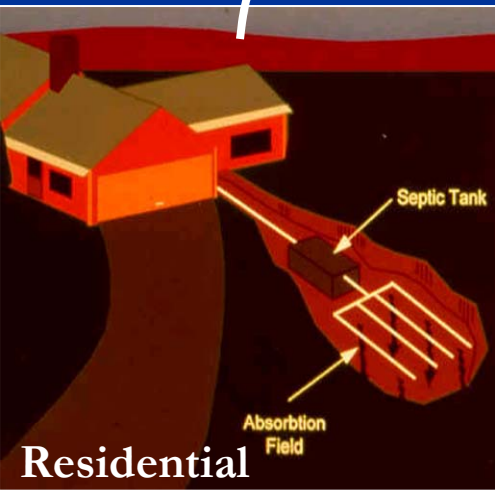
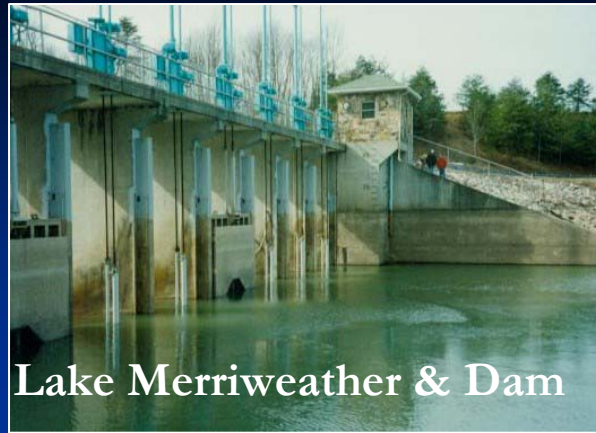
## Healthy Stream Bottom



## Excess Sediment

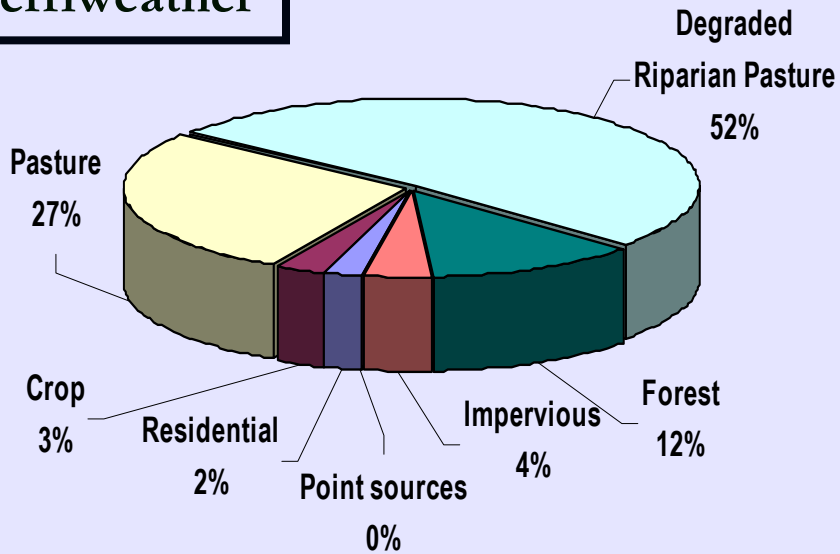


# Where does Sediment come from?

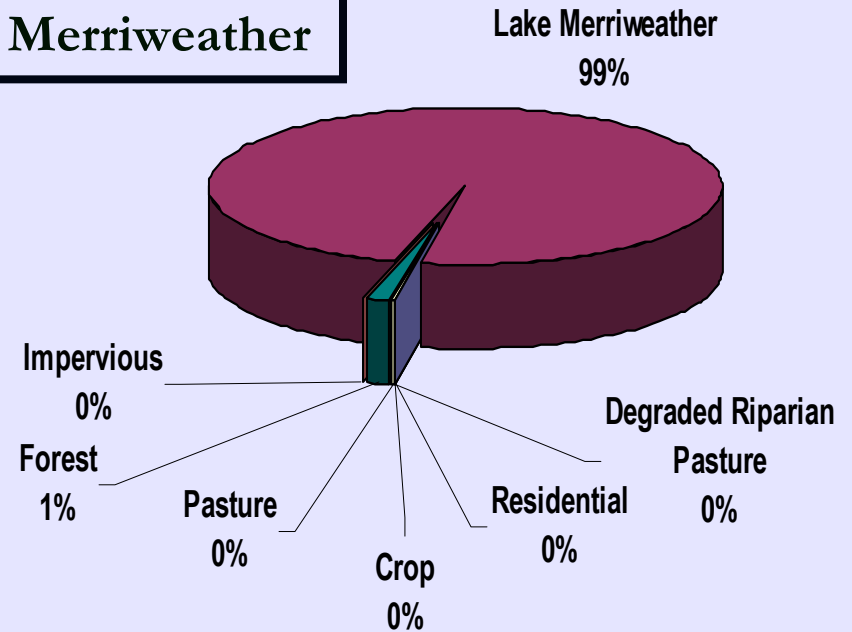


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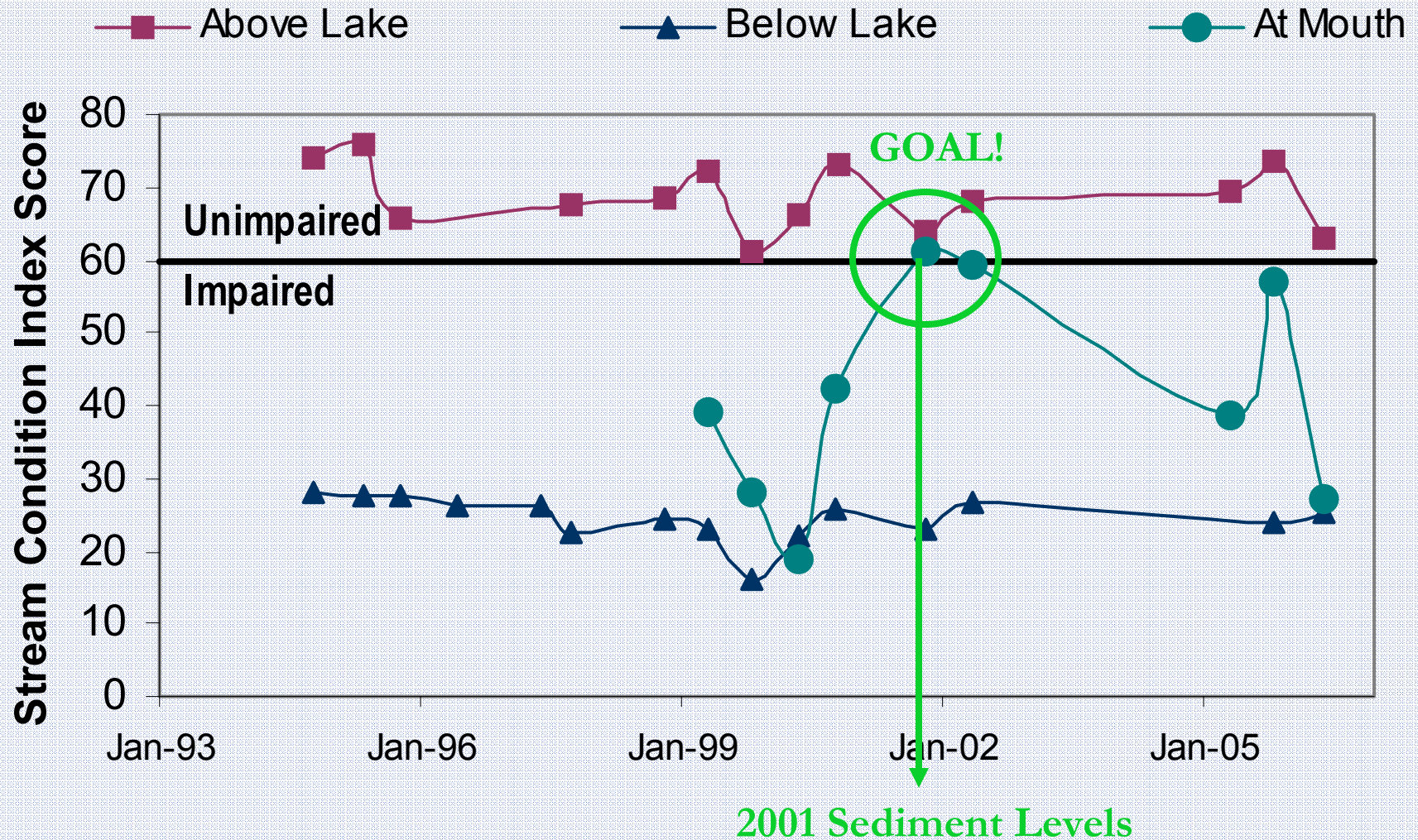
**Above Lake Merriweather**



**Below Lake Merriweather**



# How much Sediment is ok?



# What were the 2001 Sediment Levels?

- Annual Sediment Load = **1138 tonnes**

(2001 load – estimated from computer model)

- Total Suspended Solids (TSS) concentrations above 3 mg/L  
= **Only 22% of the time**

(frequency simulated above Lake w/healthy aquatic life)

## GOALS:

Annual Sediment Load	TSS Concentrations above 3 mg/L
<b>1138 Tonnes/Year</b>	<b>22% of the time</b>

# How do we get to those levels?

- Various scenarios to meet the goals were presented to the Technical Advisory Committee (TAC), made up of local stakeholders
- After much discussion, the TAC selected the scenario which requires reductions from all land uses, focusing on those which contribute the most sediment



# Necessary Reductions to Restore Water Quality

Source	Sediment Reductions Needed
Forest	0%
Cropland	40%
Pasture	40%
Residential Land	40%
Impervious Surfaces	40%
Degraded Riparian Pasture	66%
Point Sources	0%
Lake Management	34%

# What is the Status of the Study?

- Study has been ongoing since April
- We have had the help of a number of local stakeholders that have served on a technical advisory committee
- Draft study report is available for public review and comment from now until December 18, 2009

<http://www.deq.virginia.gov/tmdl/drftmdls/>

Send  
comments

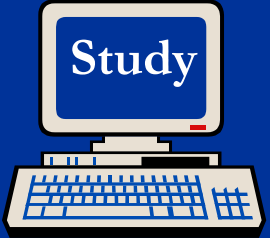
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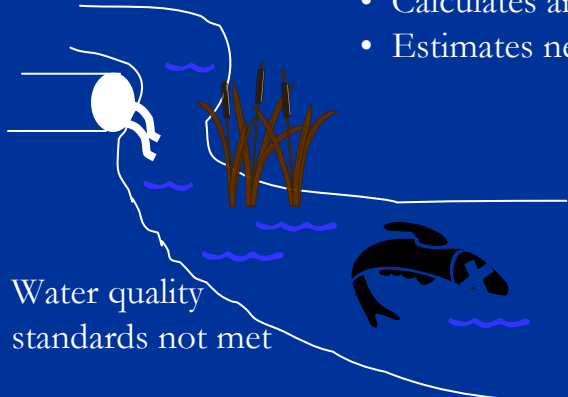
# What's the Next Step?

**T**otal  
**M**aximum  
**D**aily  
**L**oad



## Polluted

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**The Process**

## Implementation

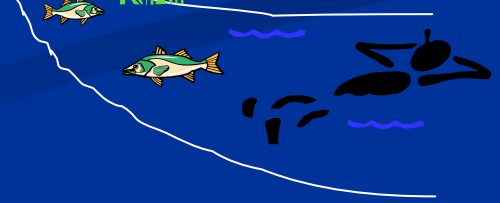


## Monitoring



## Clean

Water quality standards met



Questions?

# Contact Information

*(and comments on the Plan!)*

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