

# Most Probable Stressor

## Lower MF Cunningham Creek

30

- **Most probable stressor currently:** sediment due to lack of riparian vegetation.

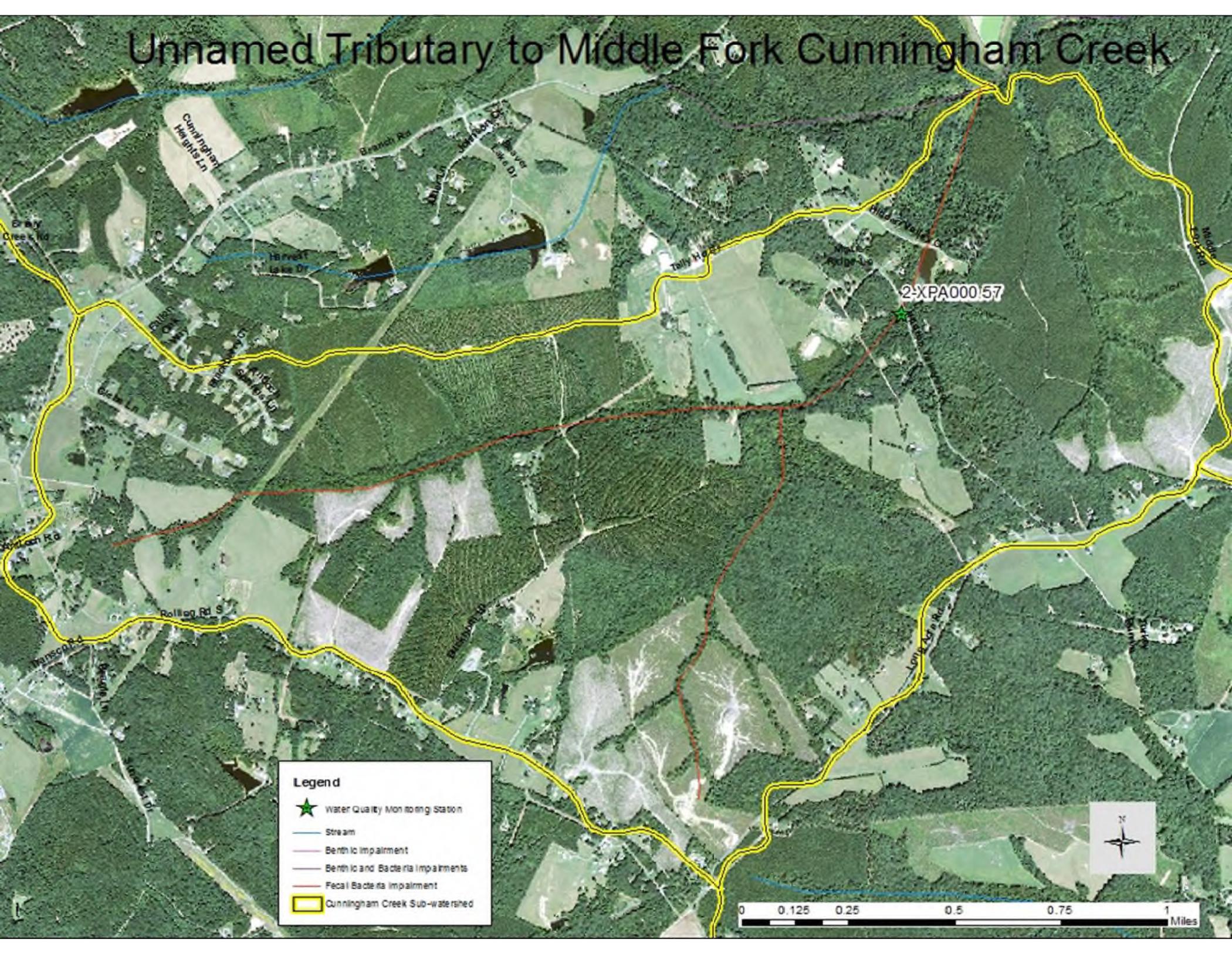
Downstream from 2-CNM001.75,  
March 2016



Upstream from 2-CNM002.25,  
March 2016



# Unnamed Tributary to Middle Fork Cunningham Creek

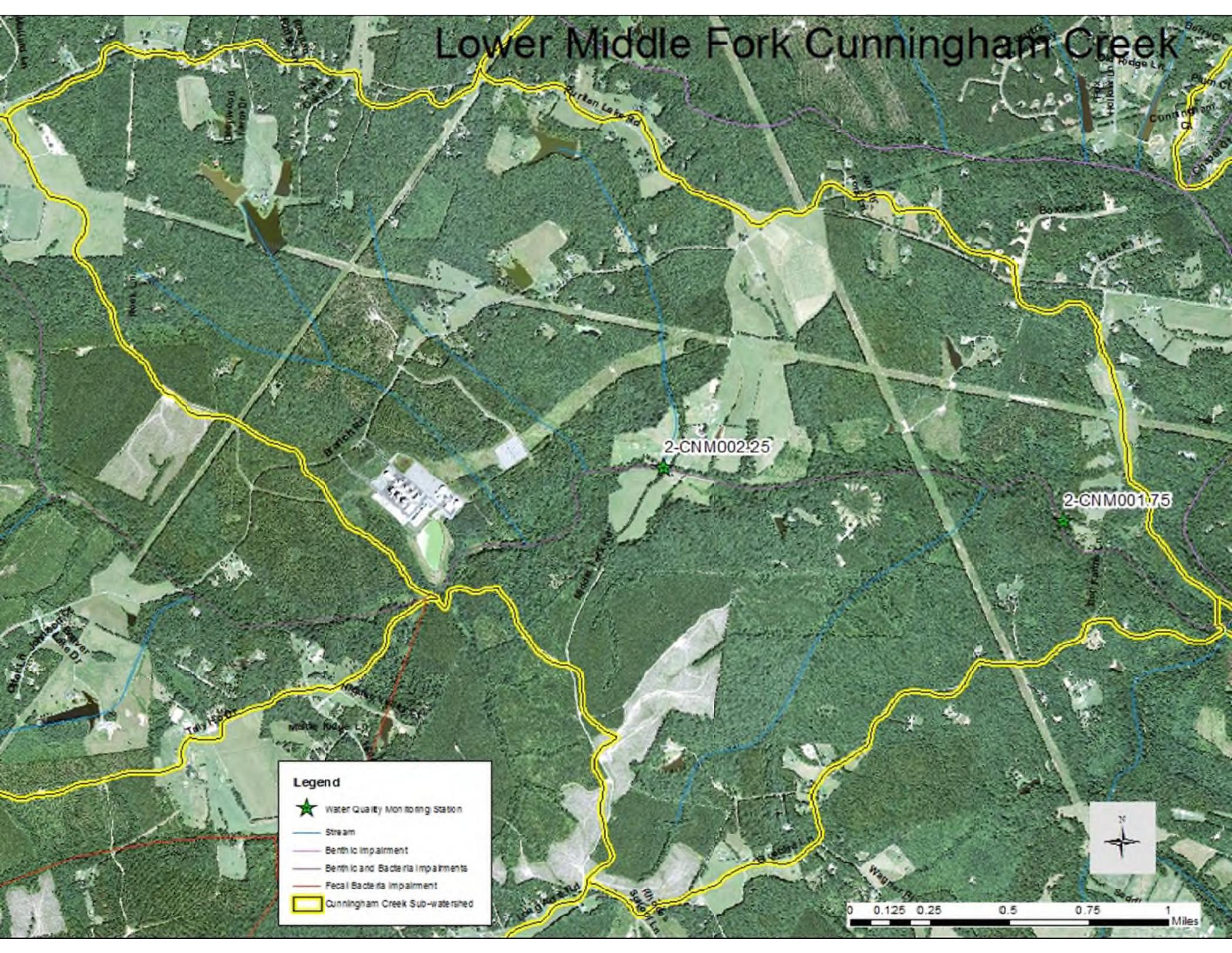


**Legend**

- ★ Water Quality Monitoring Station
- Stream
- Benthic Impairment
- Benthic and Bacteria Impairments
- Fecal Bacteria Impairment
- ▭ Cunningham Creek Sub-watershed

0 0.125 0.25 0.5 0.75 1 Miles

# Lower Middle Fork Cunningham Creek



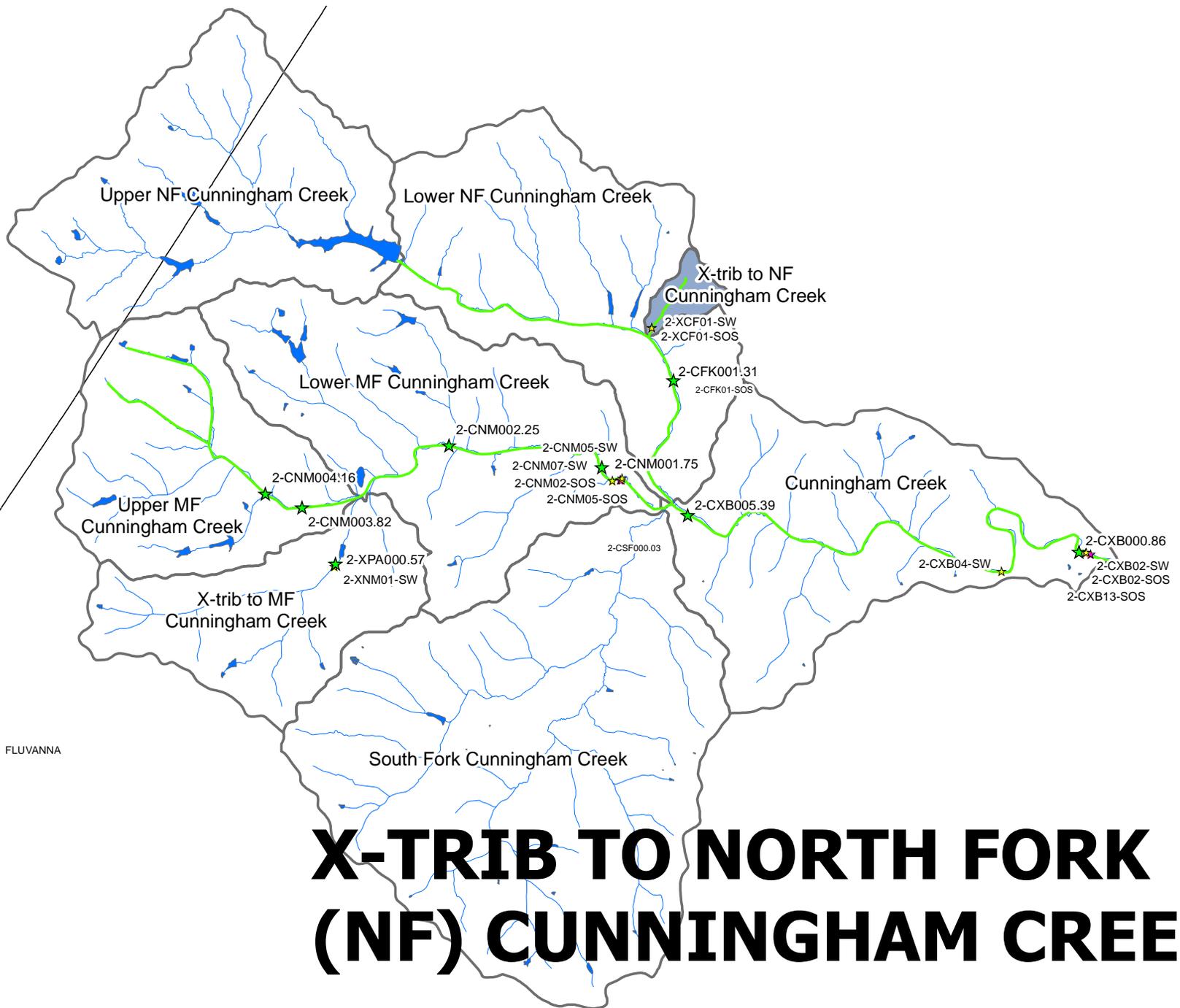
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ALBEMARLE

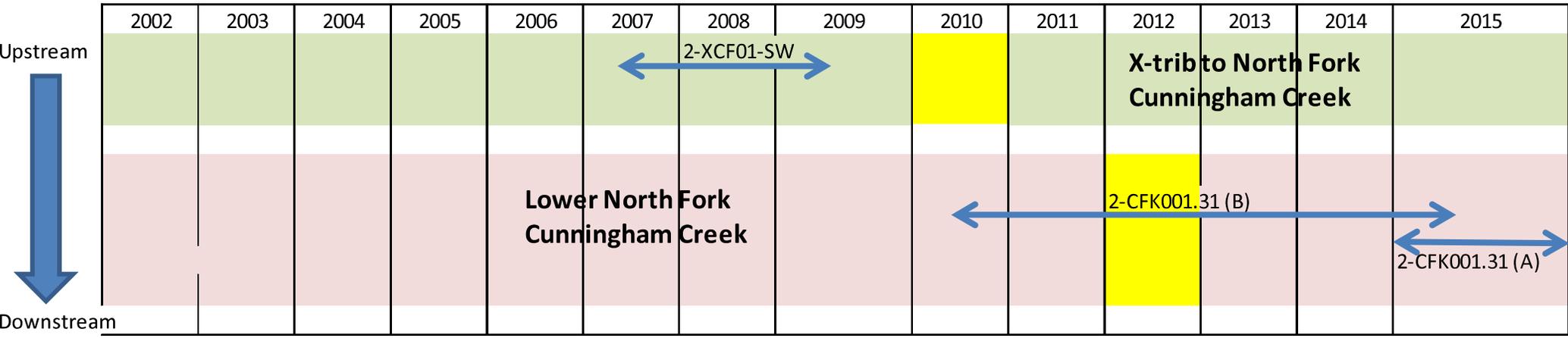
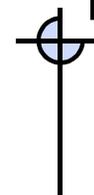
FLUVANNA



# X-TRIB TO NORTH FORK (NF) CUNNINGHAM CREEK

# Monitoring Matrix

## North Fork Cunningham Creek



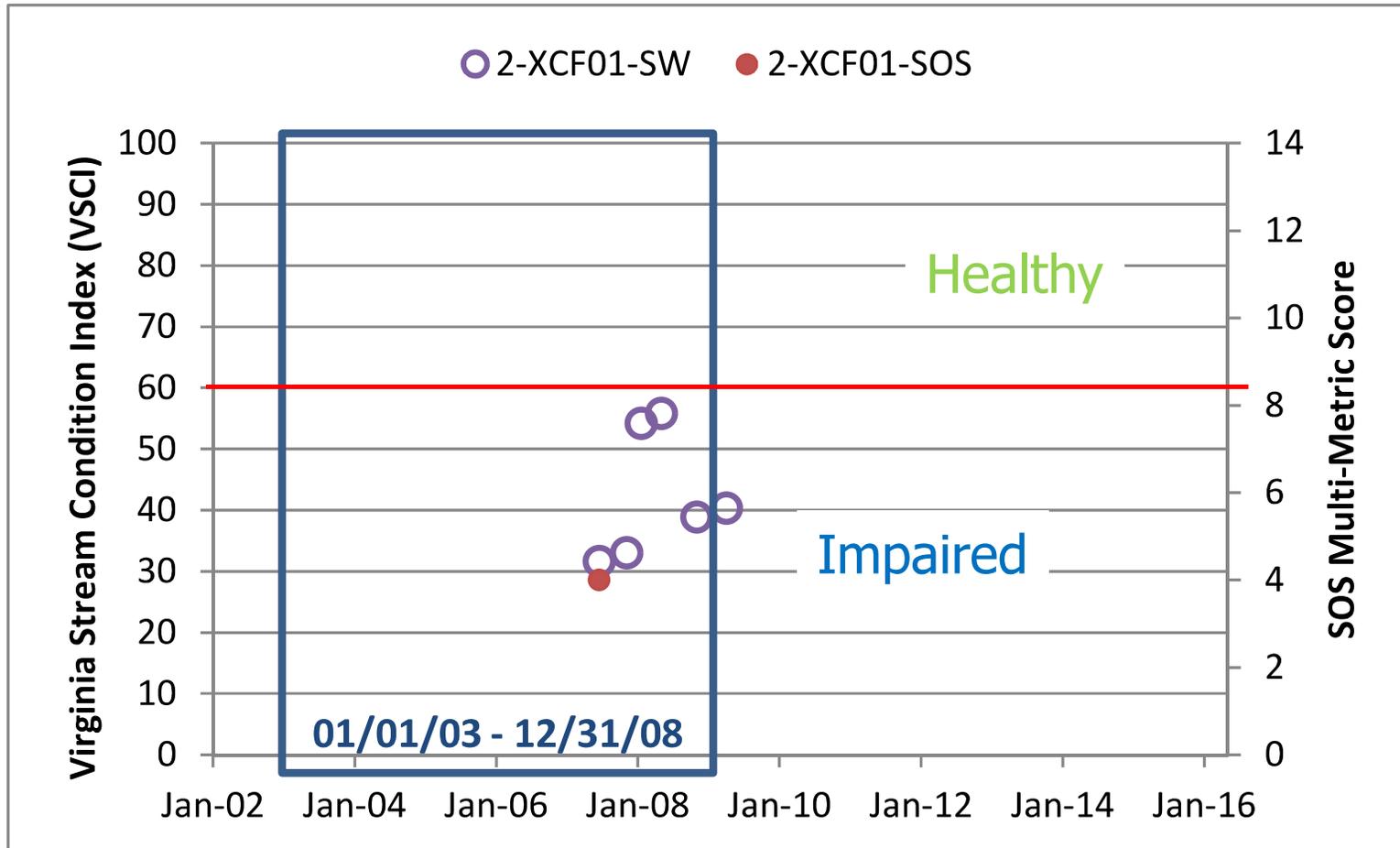
- Impairment listing Year

All StreamWatch (SW) and Save Our Streams (SOS) stations monitor benthic inventories only.

DEQ monitoring stations may be: A= ambient water column water quality; and/or B=benthic monitoring.

# Benthic Monitoring Summary

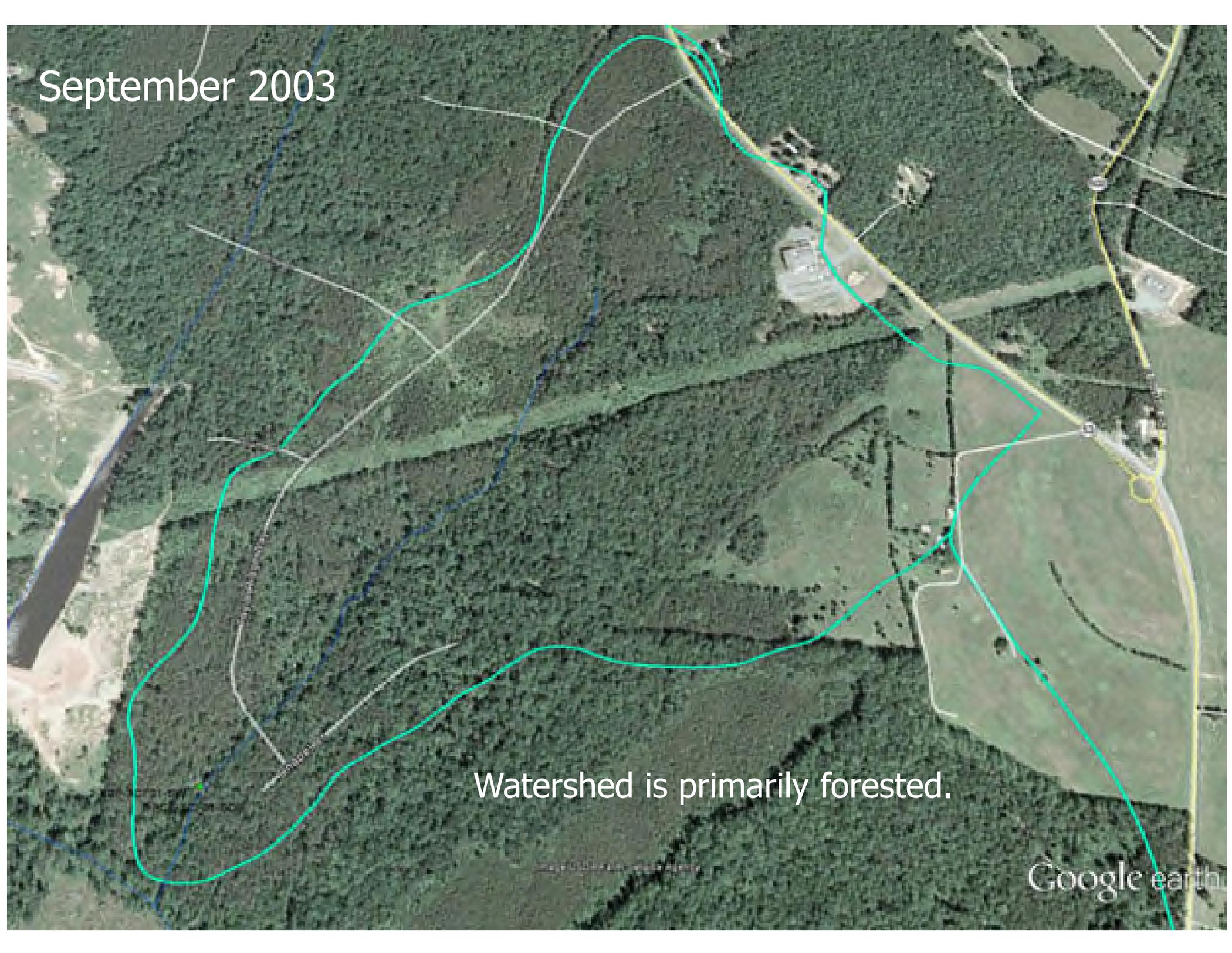
X-trib to NF Cunningham Creek



September 2003

Watershed is primarily forested.

Google earth



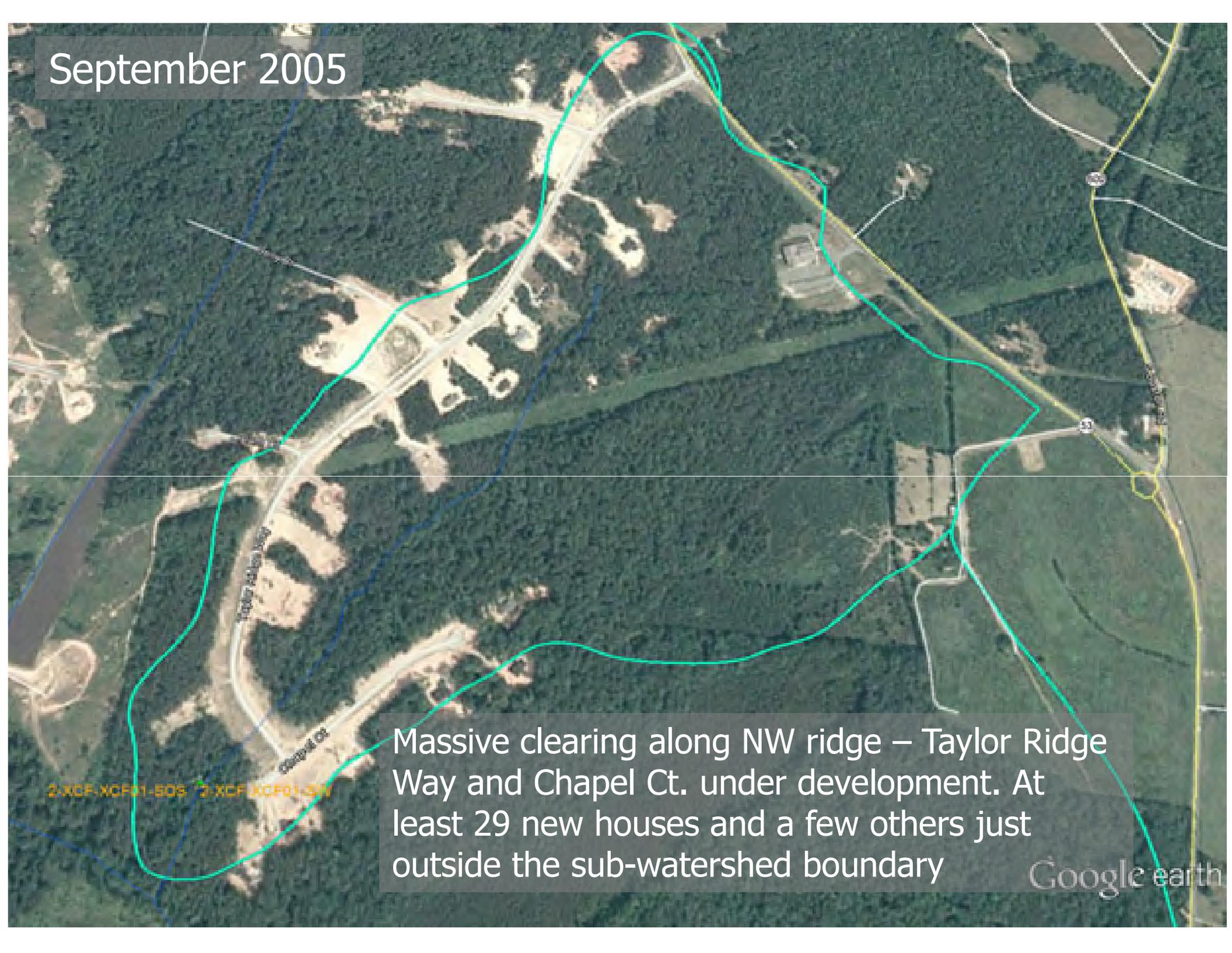
September 2005

Massive clearing along NW ridge – Taylor Ridge Way and Chapel Ct. under development. At least 29 new houses and a few others just outside the sub-watershed boundary

Google earth

2.XCF.XCF01-S05 3.XCF.XCF01-S04

Taylor Ridge Way  
Chapel Ct.



April 2013

New construction near the sub-watershed outlet.

Google earth



September 2015

Continued lack of adequate re-vegetation  
in latest residential development.

2.XCF.XCF01.SOS 2.XCF.XCF01.SW

Google earth

March 2016



Recently denuded outslope of road just above listing station 2-XCF01-SW.



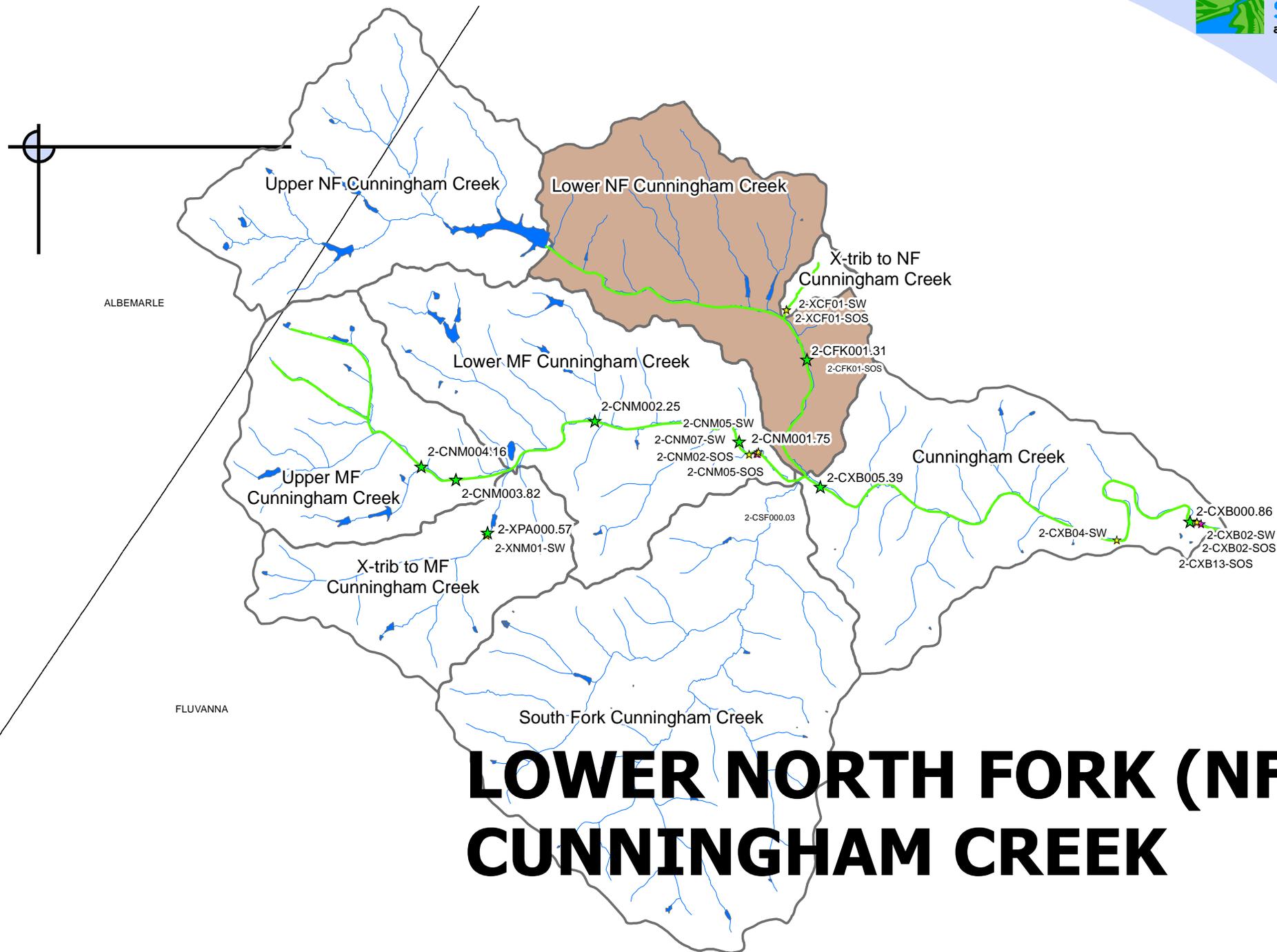
# Most Probable Stressor

X-trib to NF Cunningham Creek

41

- **Most probable stressor in 2010:** sediment from new home construction.
- **Most probable stressor today:** sediment from new construction near outlet. Other potential sources: Lawn fertilization, unbuffered riparian livestock activity.

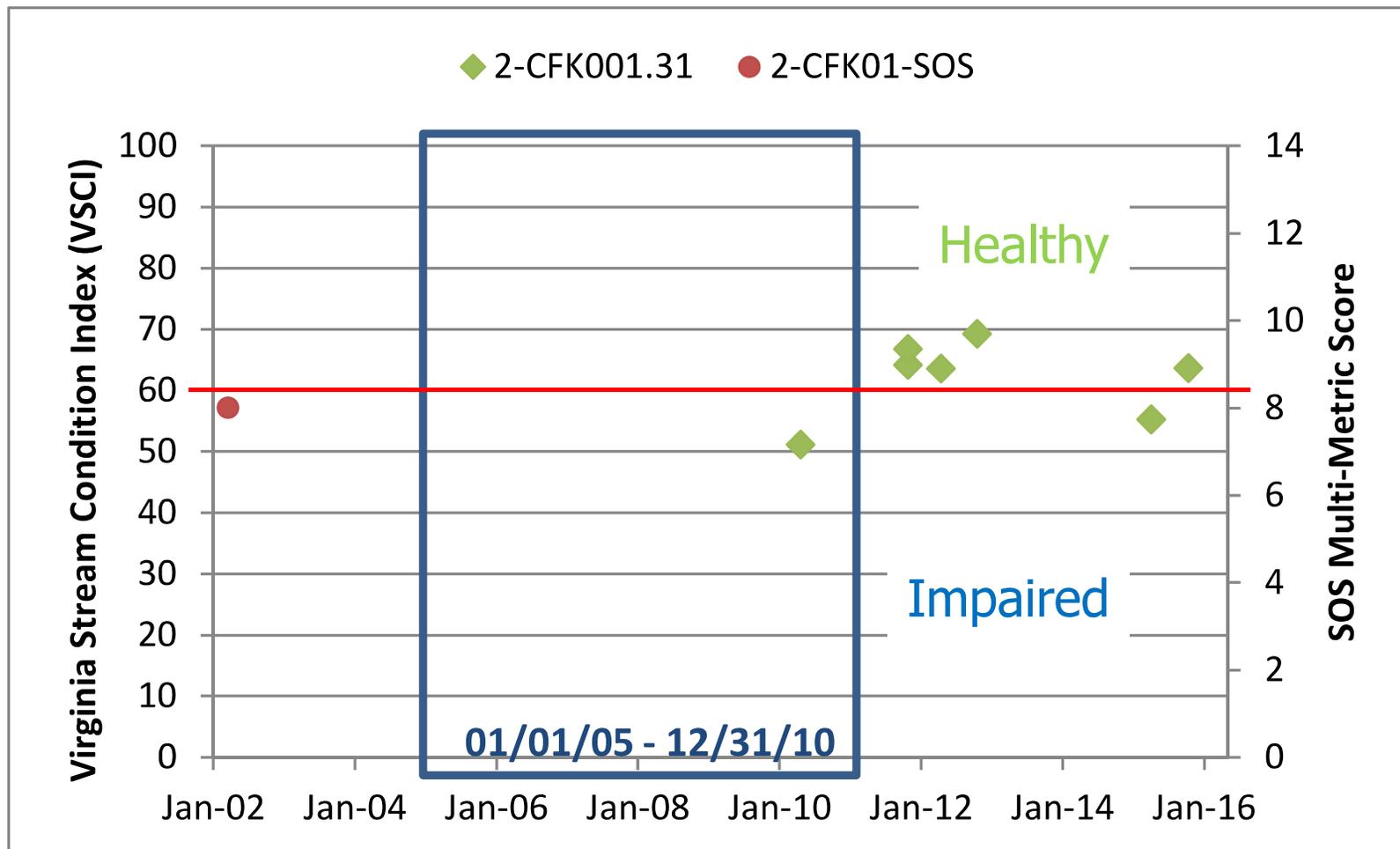




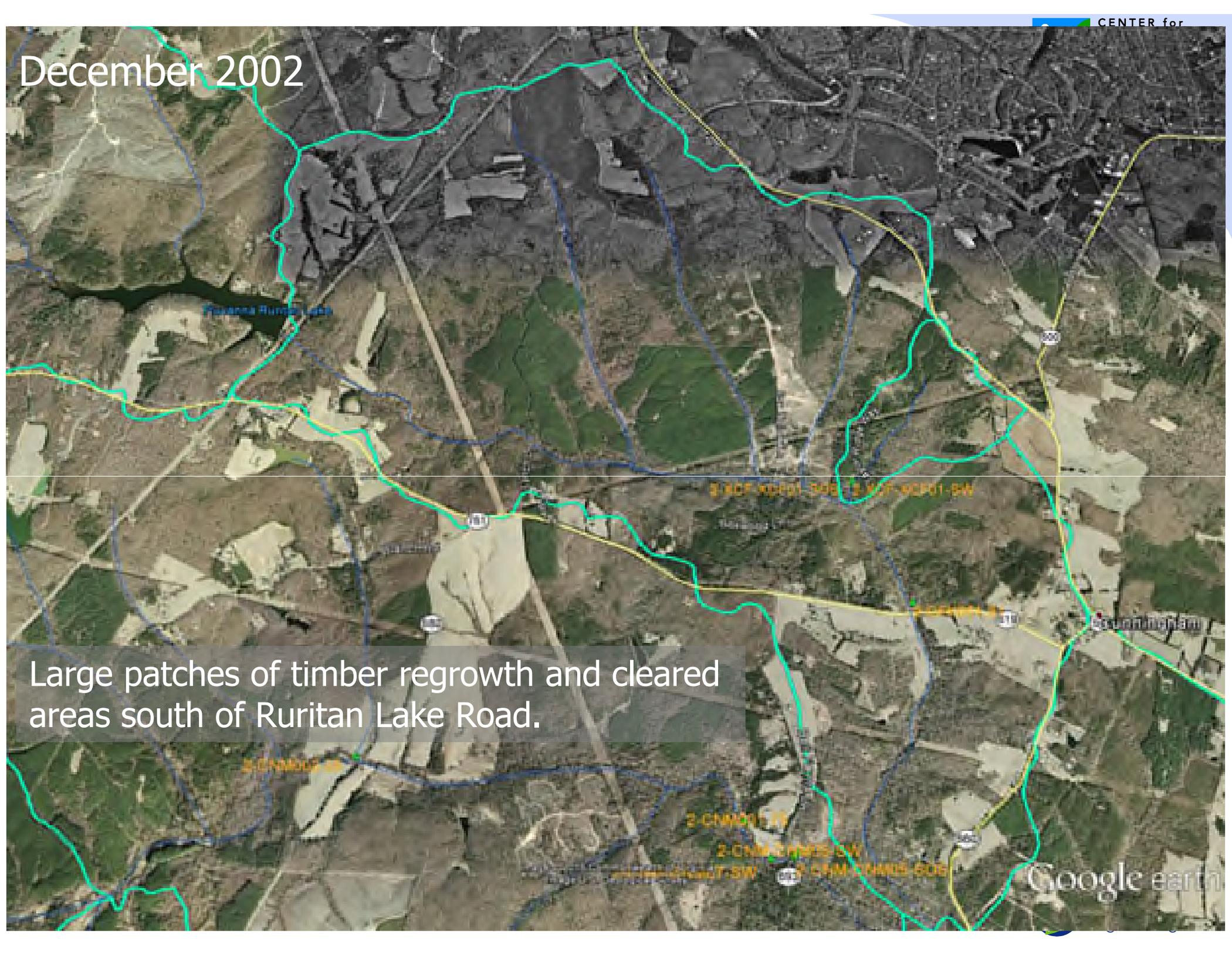
# LOWER NORTH FORK (NF) CUNNINGHAM CREEK

# Benthic Monitoring Summary

## Lower NF Cunningham Creek



December 2002



Large patches of timber regrowth and cleared areas south of Ruritan Lake Road.

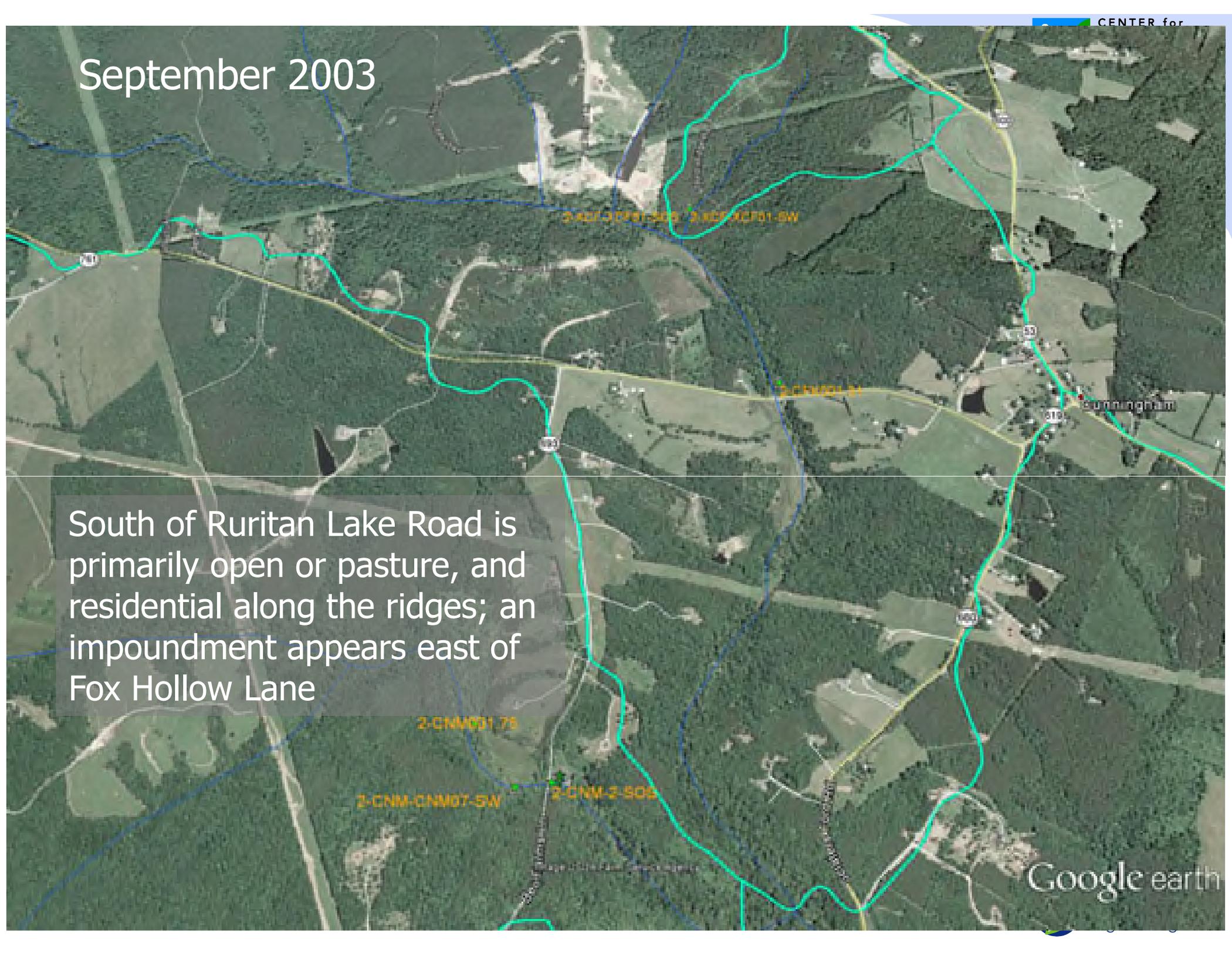
September 2003

South of Ruritan Lake Road is primarily open or pasture, and residential along the ridges; an impoundment appears east of Fox Hollow Lane

2-CNM001.75  
2-CNM-CNMDT-SW  
2-CNM-3-SOS

2-407-30781-SOS 2-407-30781-SW

2-CNM01.21



September 2005

A second parallel impoundment built W of Fox Hollow Ln.; large residential developments – Fox Hollow Lane, Cross Creek Way, Country Creek Way and Boxwood Lane under construction.

Plymouth Forested Lake

2-XCF-XCF01-SOS 2-XCF-XCF01-SW

2-CFH001-31

Sunningham

2-CNM001-75

2-CNM-CNM05-SW

2-CNM-CNM07-SW

2-CNM-CNM05-SOS

2-CXB005-39

March 2016



Between 2007 and 2011, DGIF dam inspectors noted severely eroded gully in Fluvanna Ruritan Lake outlet channel.

April 2013

2-CFK001.31

Birmingham

Livestock activity in pasture areas bordering Ruritan Lake Rd., below DEQ Station 2-CFK001.31.

2-CNM-6NM05-SW  
2-CNM-2-S05

September 2015

2010-2014: 376 acres  
harvested for timber (VDOF)

2-XCF-XCF01-SOS 2-XCF-XCF01-SW

2-GFK001-S1

2-CNM002-25

2-CNM001-75

2-CNM-CNM05-SW

2-CNM-CNM07-SW

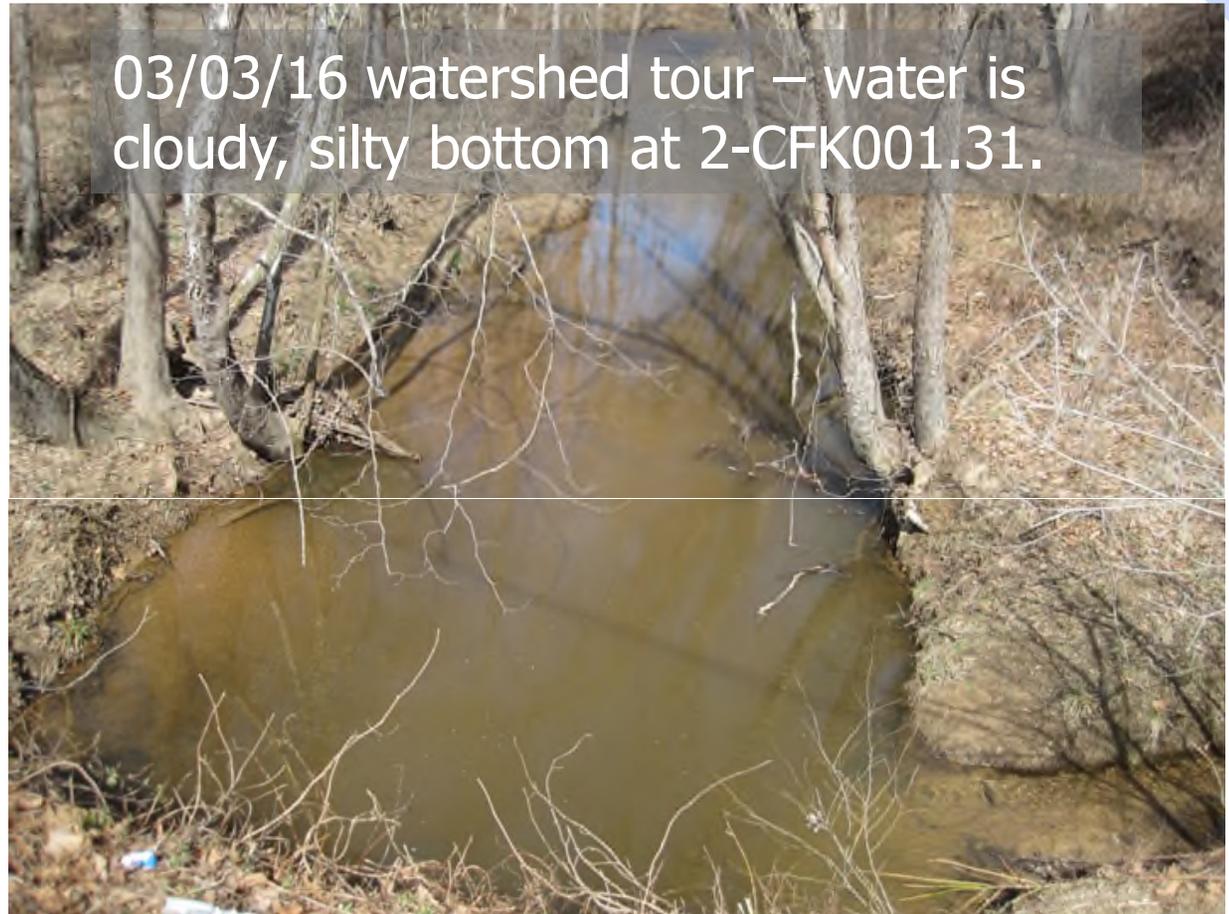
2-CNM-CNM05-SOS

# Most Probable Stressor

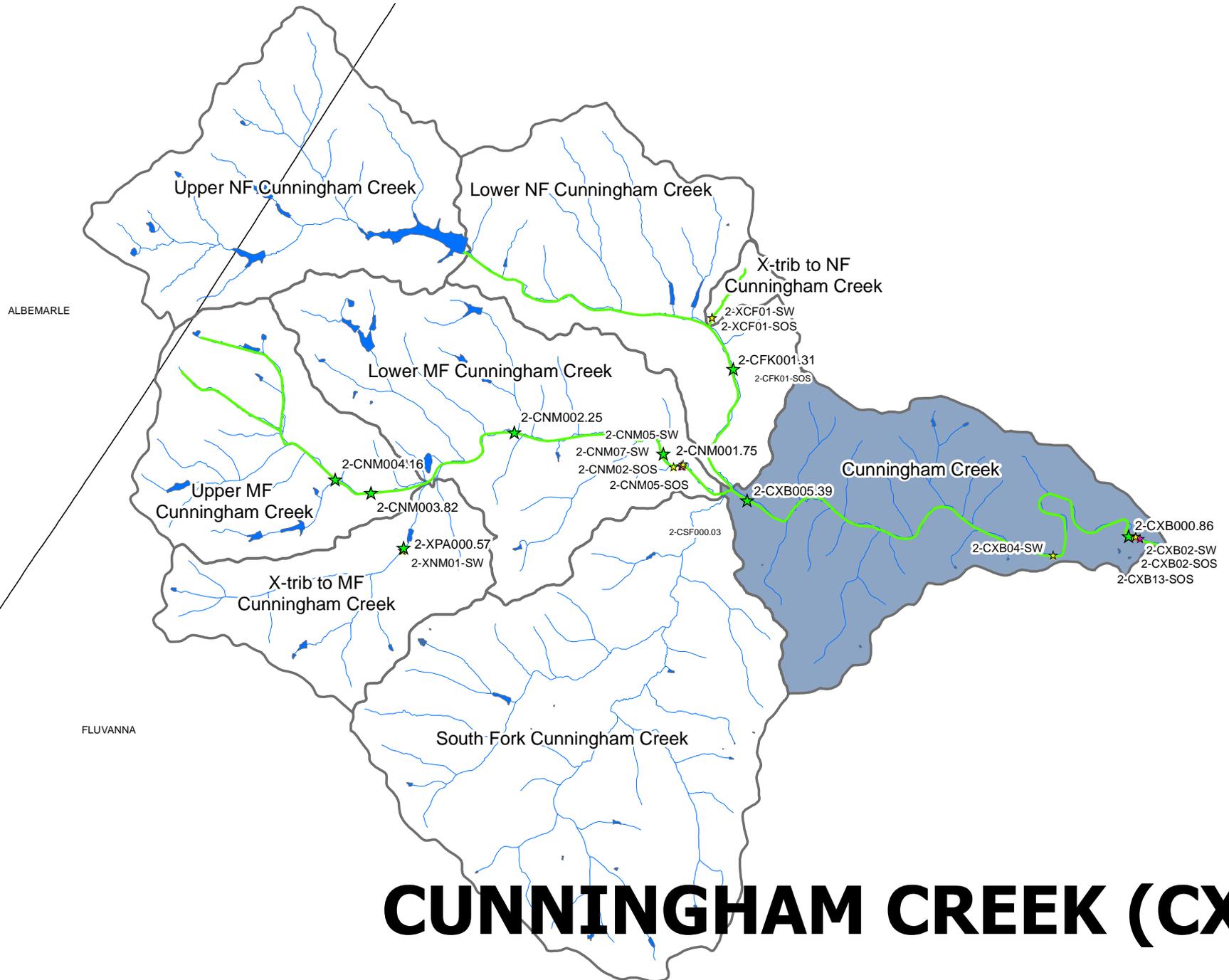
Lower NF Cunningham Creek

50

03/03/16 watershed tour – water is cloudy, silty bottom at 2-CFK001.31.



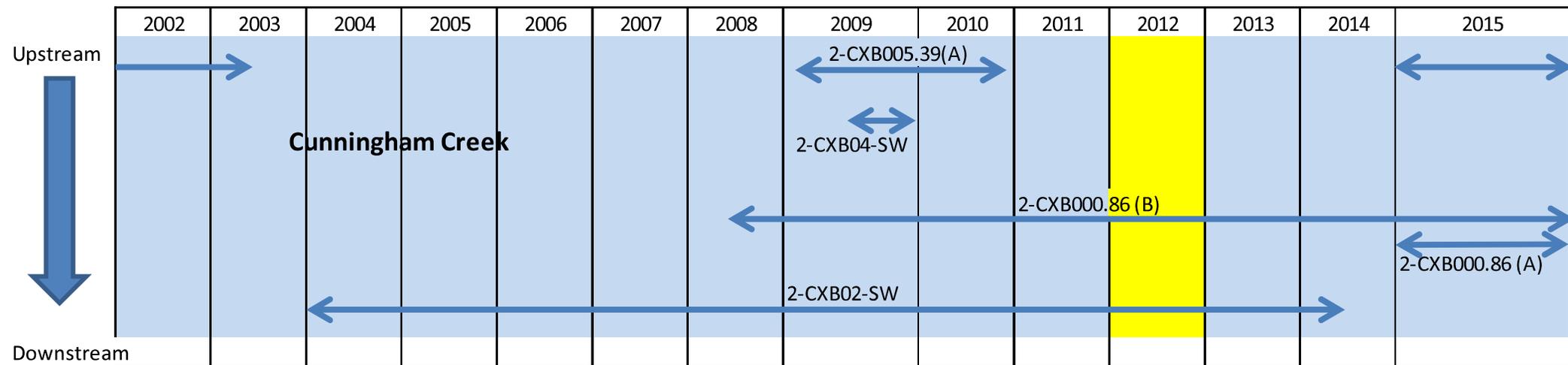
**Most probable stressor in 2012 and currently:**  
sediment from gully erosion near lake outlet, residential development, possibly some timber harvesting.



# CUNNINGHAM CREEK (CXB)

# Monitoring Matrix

## Cunningham Creek



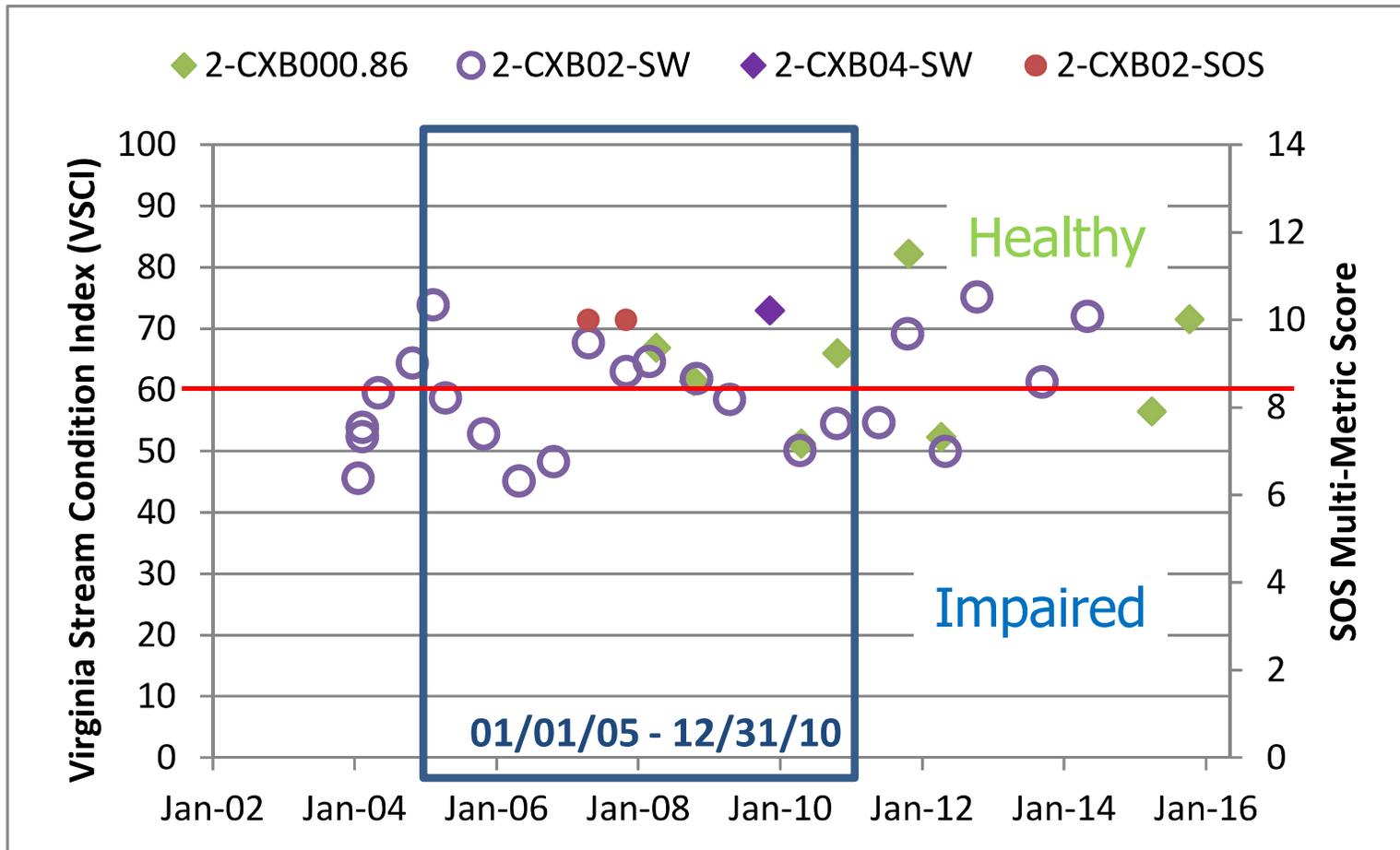
- Impairment listing Year

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# Benthic Monitoring Summary

## Mainstem Cunningham Creek



A satellite map of a rural landscape, likely in the Southeastern United States, showing a mix of agricultural fields, forests, and residential areas. The map is overlaid with several colored lines: a cyan line that follows a winding path through the landscape, a blue line that follows a similar but slightly different path, and a yellow line that runs more directly. Road markers for State Highway 53 and Route 15 are visible. A semi-transparent grey box in the top right corner contains the text "December 2002".

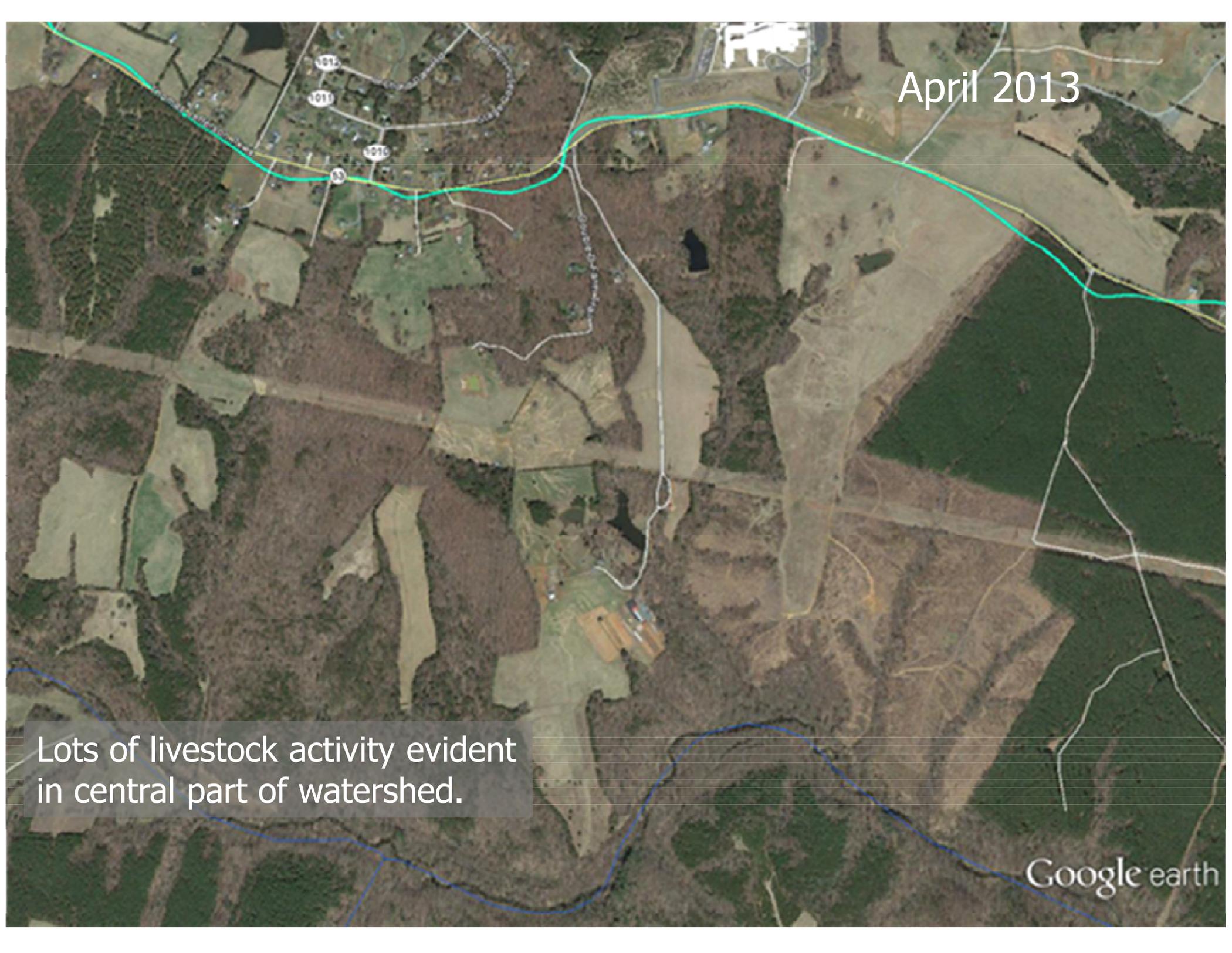
December 2002

Many current areas planted to pine were already in place. Residential areas primarily along northern boundary on State Hwy 53 and near outlet on Rt. 15.

April 2013

Lots of livestock activity evident in central part of watershed.

Google earth



# Initial Stressors

- 08/91 – 06/03: 2-CXB005.39 average ambient concentrations (n=55):
  - TN = 0.480 mg/L; TP = 0.073 mg/L
  - 13/31 samples (pre-2000) had COD values > 10 mg/L
- 2002-2010: Dominance of organic-loving chironomids in 7/10 samples; high numbers of filterer-collector organisms in 8/10 samples; many poor scores for riparian vegetation and sediment deposition.
- 10/09: Total habitat = 153; 22 fish species present (VCU).
- 2012: Initial benthic impairment listing.
- **Most probable stressor in 2012:** TP and sediment from upstream watersheds are elevated in concentrations at station 2-CXB005.39 relative to station 2-CXB000.86, near the outlet. Minor impacts may have been related to several elevated ammonia (1) and specific conductivity (3) measurements in 2001 and 2002 from an unknown source(s) that pre-date construction of the Tenaska plant upstream, and livestock access to streams.

September 2015

Recent timber harvesting in NW corner of watershed; large amount of land in pine plantations.

# Changes and Current Stressors

## Mainstem Cunningham Creek

58

- 2009: 1,392 linear feet livestock exclusion fencing installed.
- 2014-15: 258 acres timber harvested (VDOT).
- average ambient concentrations
- 2-CXB005.39 (01/09 to present; n=20):
  - TN = 0.442 mg/L; TP = 0.048 mg/L (34% reduction)
- 2-CXB000.86 (01/15 to present; n=9):
  - TN = 0.379 mg/L; TP = 0.029 mg/L (40% reduction)
- Dominance of organic-loving chironomids in 4/10 samples; high numbers of filterer-collector organisms in 5/8 samples; many poor scores for riparian vegetation and sediment deposition.
- The presence of **older residential homes** may have some septic issues; the abundance of **residential lawns** may contribute excess nutrients. Several **fields permitted for biosolids application**, but actual dates and rates of application are unknown.

# Most Probable Stressor

## Mainstem Cunningham Creek

59

**Most probable stressor currently:** Probable sediment sources include upstream sources, as evidenced by cloudy stream conditions at 2-CXB005.39, and pasture runoff, periodic timber harvesting, and bank instability contributing to sediment deposits at 2-CXB000.86.



# Stressor Analysis Recommendations

- Pro-Active Implementation is recommended
  - Upper MF: monitor benthics; check septics
  - Lower MF: install riparian vegetation; check for isolated bank stability issues
  - Lower NF: fix dam outlet erosion
  - X-trib to NF: stabilize areas near outlet; add a buffer to unknown livestock activity

# Contact Information

61

A group of five people, three men and two women, are standing in a wooded area with many bare trees and fallen leaves on the ground. They are dressed in outdoor or winter clothing. One man in the center is wearing a hat and holding a bag. A woman on the right is holding a green bag. The background shows a dense forest of thin trees.

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