# BLUE THUMB REPORT ON BARON FORK CREEK

DEGREDATION OF A PRISTINE OZARK STREAM

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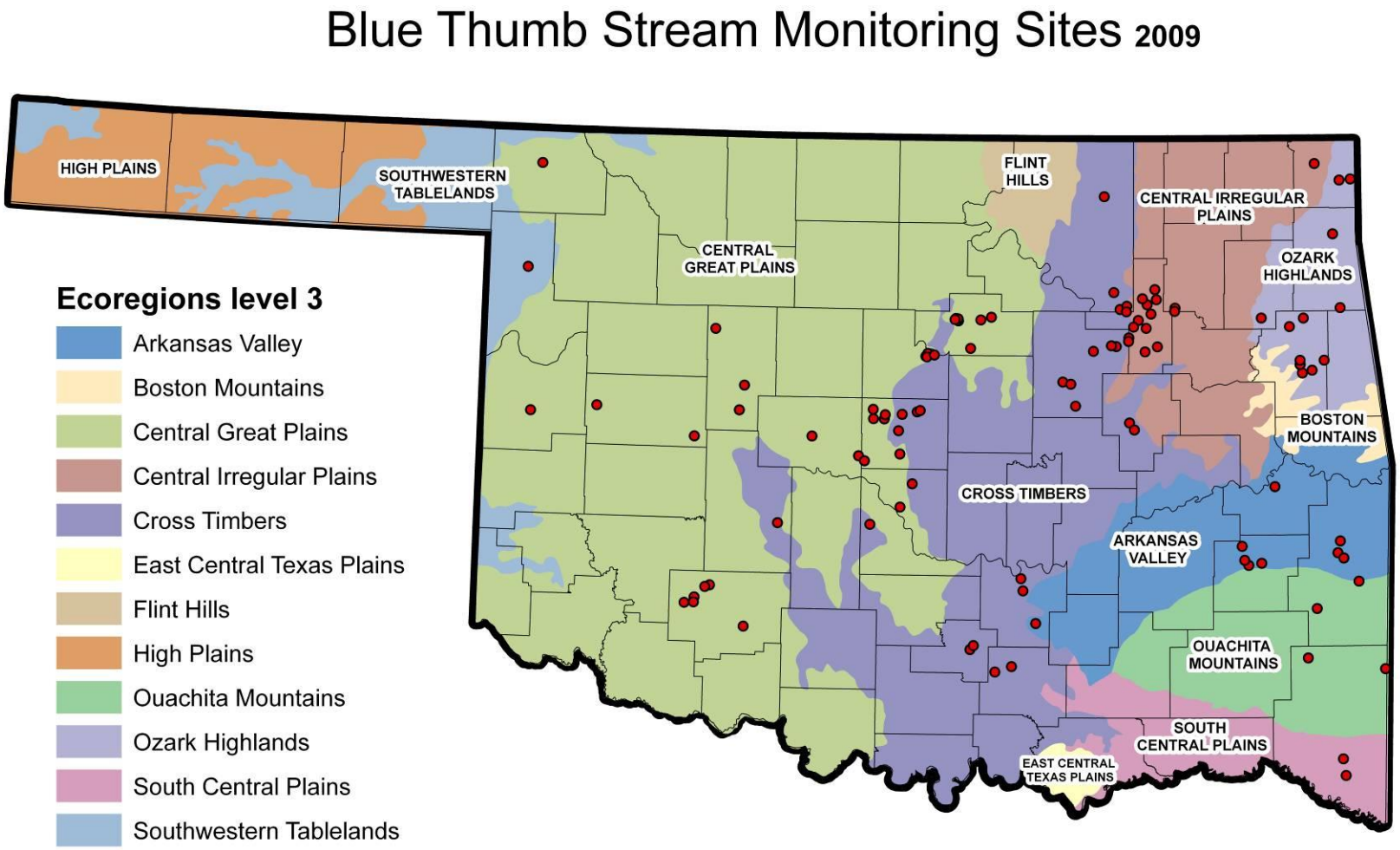
# Blue Thumb Water

# Pollution Education Program

# Each Volunteer monitors a stream

- Performs chemical assay each month
- Assists with Collection of macroinvertebrates twice a year
- Assists with fish collections about every 5 years.

# What Ecoregion are we In?




# Fish Collections

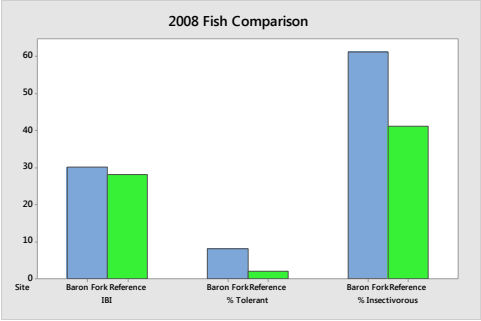
# Analysis of fish collections

- Collections from 2008 and 2013 compared to reference Ozark streams
- Index of Biotic Integrity (IBI) based on:
  - Number of species
  - Number of intolerant vs tolerant species
  - Number of Sunfish species
  - Number of gravel spawners
  - Proportion that are insectivorous
- Grade of “A” for IBI >87% of reference

# Fish

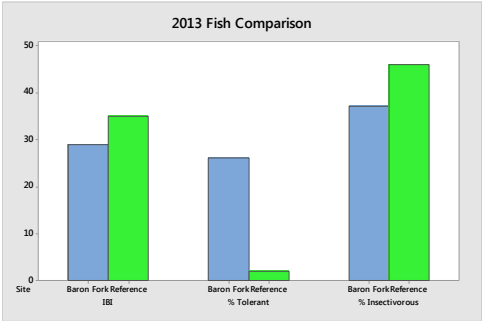
## 2008 collection

- A was overall score
- IBI 30 (vs 28 for ref)
- 8% tolerant individuals vs 2% for reference
- 61% insectivorous vs 41%




## 2013 collection

- B was overall score
- IBI 29 (vs 35 for ref)
- 26% tolerant individuals vs 2% for reference
- 37% insectivorous vs 46%



# FISH COMPARISON IS BASED ON ONLY ONE COLLECTION FROM EACH TIME PERIOD

Sampling error cannot be estimated

# MACROINVERTEBRATE COLLECTIONS

26 collections: 13 from winter, 13 from summer

# Macroinvertebrates

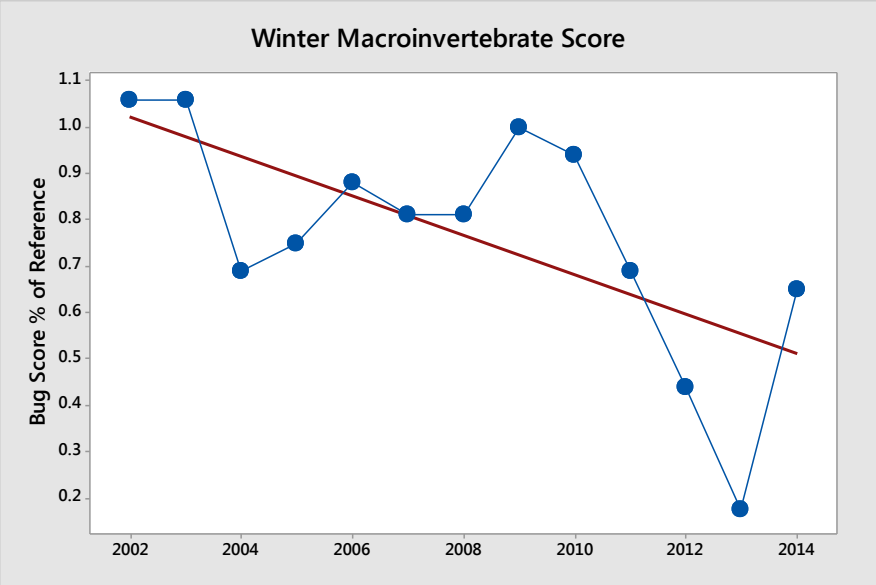
- Six indices of habitat quality based on macroinvertebrates
- Those indices rely on:
  - Number of species - community diversity
  - Abundance of intolerant taxa

# A single score calculated and compared to reference

- “A” for score >83% of reference
- “B” for score 54 to 82% of reference
- “C” for score 53 to 21% of reference
- “D” for score <20% of reference

# Macroinvertebrate results – 26 collections

- All summer collections received “A”, within 83% of reference streams
- Of the first 7 winters: 5 “A”s; 2 “B”s
  - GPA of 3.7
- Of the last 6 winters: 2 “A”s, 2 “B”s, 1 “C”, 1 “D”
  - GPA of 2.8



# In what ways did winter collections deteriorate?

- Taxa Richness was lower – less community diversity
- Fewer intolerant species – EPT richness dropped
  - Mayflies, Stoneflies, Caddisflies

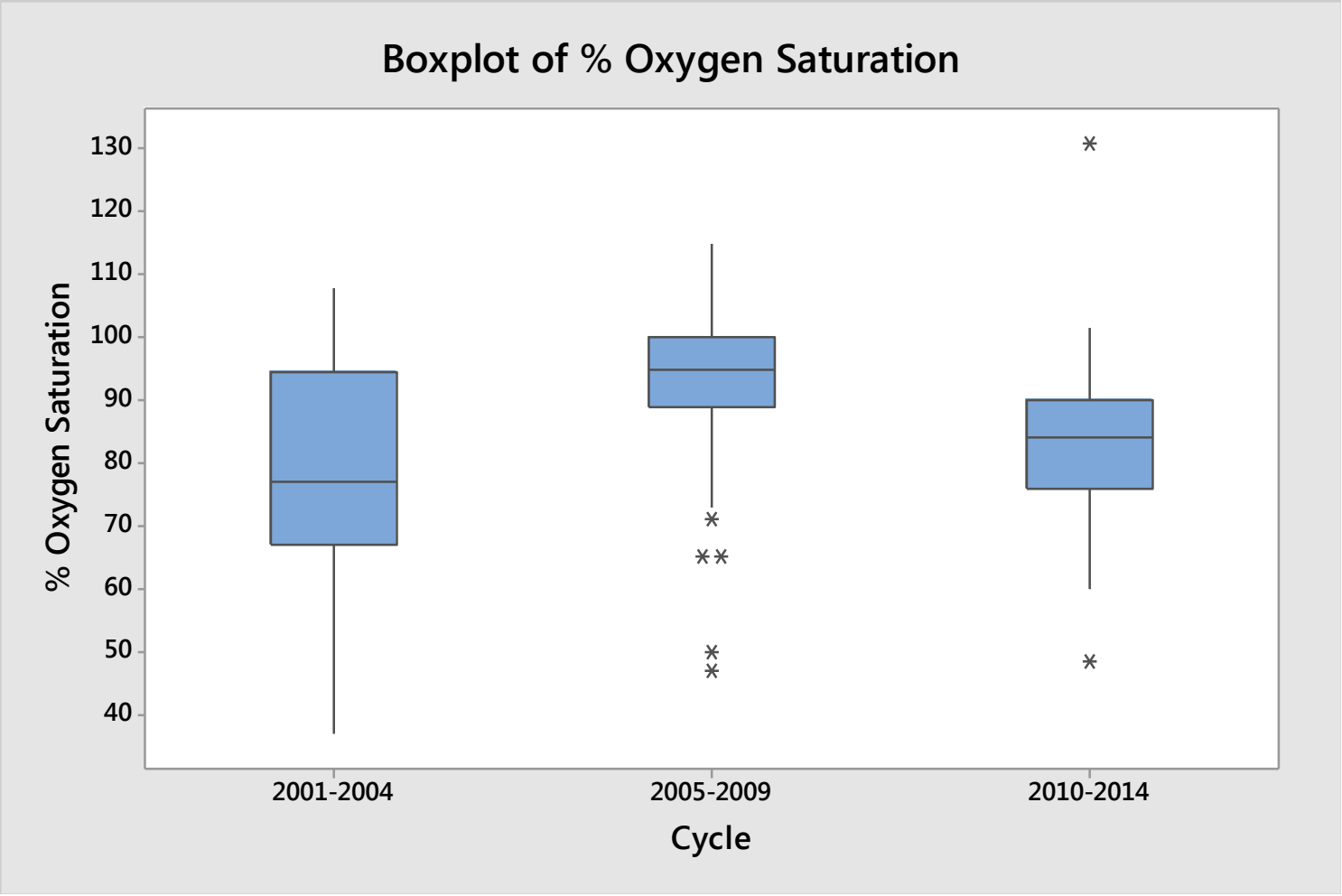
# WATER CHEMISTRY RESULTS

Total of 142 visits,  seven tests per visit

# Oxygen as % of saturation

- 130 to 80% good
- 79 to 50% caution
- Below 50% poor

# Most oxygen levels were good



# During the last two years Oxygen levels dropped

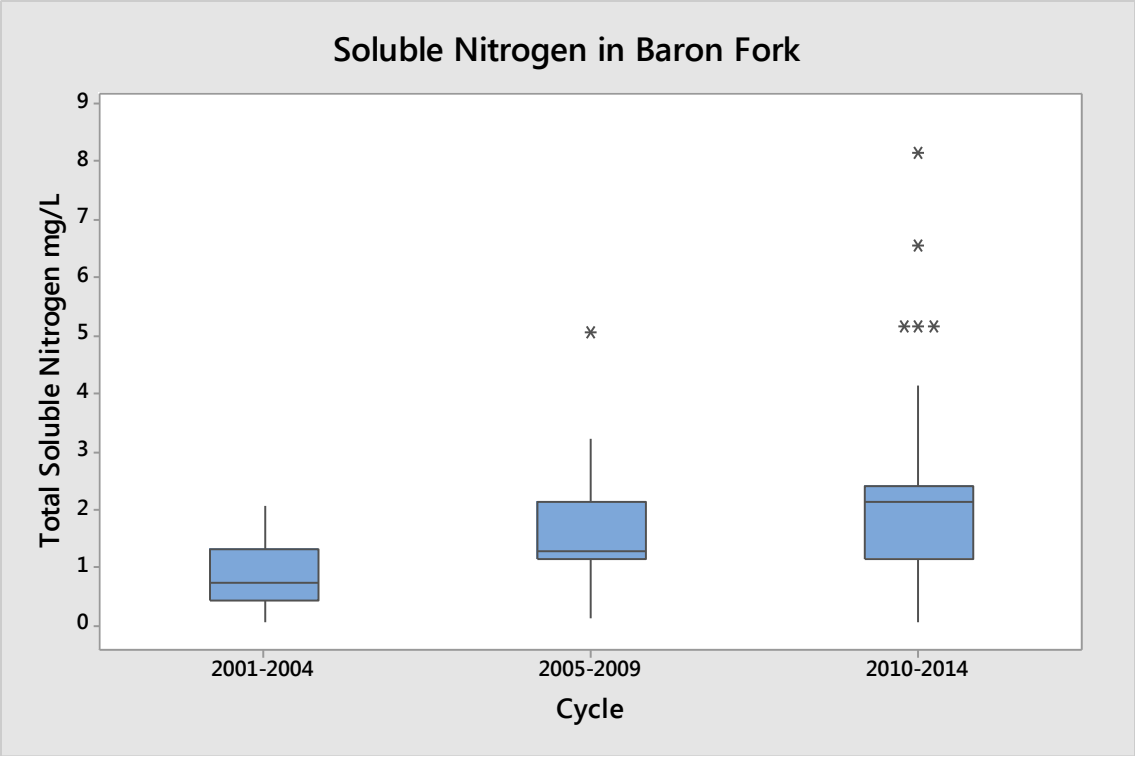
- In first 12 yrs:  28% of 123 readings were “Poor”  (<50%)
- In the last 2 yrs: 65% of 17 readings were “Poor”
- That change coincided with a period of drought.

# Soluble Nitrogen (nitrates)

- In Baron Fork soluble nitrogen is nearly all nitrates as ammonia and nitrites are near zero

# 131 Nitrate readings

- In First 44 readings: 2 were “poor” (>1.4 mg/L)
- In second 44 readings: 15 were “poor”
- In last 43 readings: 27 were “poor”



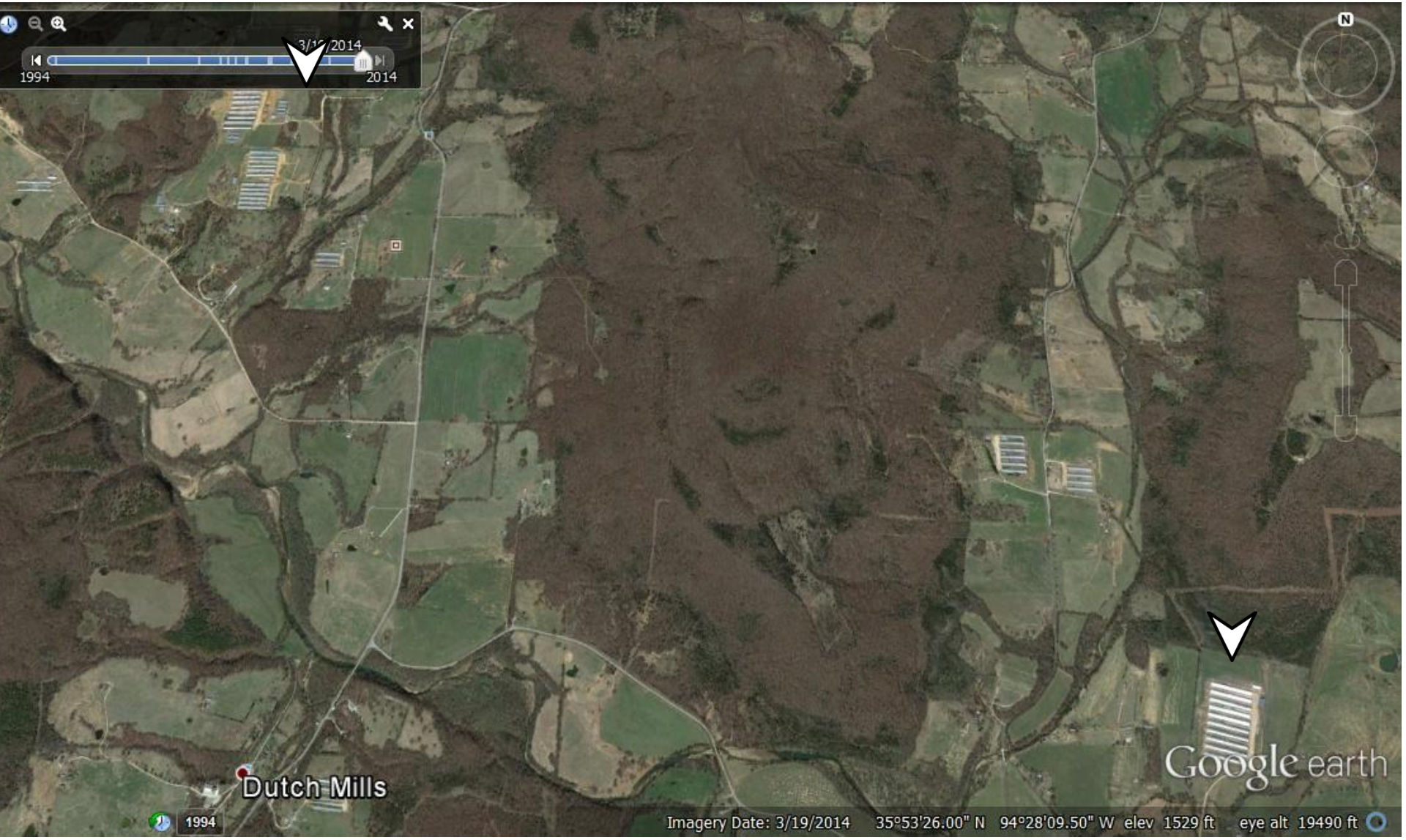
# Our data suggest a deterioration in quality of this stream

- Evidence is from
  - Fish collections
  - Macroinvertebrate collections
  - Water chemistry
- Changes escape casual observation but are evident with long-term assessment.

# We can only speculate on causes

- Google Earth images from 2003 and 2014 compared
  - Four places along the river show loss of all trees in the riparian zone
  - 25 new poultry houses near the river


4/3/2000
N
Image U.S. Geological Survey
Google earth
Dutch Mills
1994
Imagery Date: 4/3/2000 35°53'26.00" N 94°28'09.50" W elev 1529 ft eye alt 19490 ft


1994
2014
N
Dutch Mills
Google earth
1994
Imagery Date: 3/19/2014 35°53'26.00" N 94°28'09.50" W elev 1529 ft eye alt 19490 ft


8/22/2003
Image USDA Farm Service Agency
Google earth
1995
Imagery Date: 5/31/2003 35°57'24.54" N 94°42'59.73" W elev 795 ft eye alt 4914 ft


6/10/2013
1995
2013
Google earth
1995
Imagery Date: 6/10/2013 35°57'24.54" N 94°42'59.73" W elev 795 ft eye alt 4914 ft

# Global Climate Change

- Increase in droughts
- Increase in flooding
- Makes protection of the riparian zone even more important

# Baron Fork River has deteriorated

- Changes were small, not visible to casual observation
- Long-term study shows these changes quite convincingly