



{ 2013 Centerville Creek Stream Assessment



Beginning of Dam removal on Centerville Creek



Site of Removed Dam on Centerville Creek



Site of the Mid-Point sample site within the former Mill pond after restoration

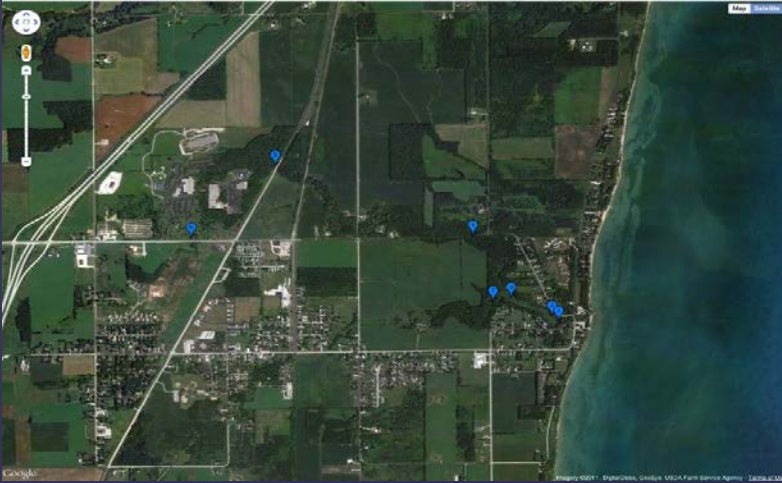
Centerville Creek, Summer 2013

- Student Intern: Ethan Poling
- Baseline Assessment
- Ten sampling points along stream
- Weekly measurements of physical, chemical, and biological characteristics
 - pH, temperature, stream flow, turbidity, conductivity, dissolved oxygen, ammonia, phosphorus, *E. coli* (*Escherichia coli*)



Sampling points along Centerville Creek:

Summer 2011



Summer 2012



Summer 2013



Preliminary analysis:

- ⌘ Comparison between averages of summers 2011 and 2012 suggests that:
 - The physical and nutrient levels decreased.
 - *E. coli* concentrations increased.

- ⌘ Trends reversed between summers 2012 and 2013.

- ⌘ However levels did not return to pre-restorations levels.

- ⌘ Stream flow was typically higher along the South Branch than the North Branch of Centerville Creek, and highest at the Dam barrier (Consistent throughout all three summers)

Centerville Creek, Summers 2011, 2012, and 2013

Averages for All Creek Sample Points,	Summer 2011	Summer 2012	Summer 2013	Increase/Decrease Between 2011 and 2012	Increase/Decrease Between 2012 and 2013
Water temperature (°C)	23.1	18.84	17.75154	4.26	1.09
pH	8.5	8.46	8.625923	0.04	0.17
Turbidity (NTU)	29.6	15.44	15.09808	14.16	0.34
Stream flow (M/sec)	30.5*	0.20	0.339231	*	0.14
Conductivity (µS)	836.1	867.42	843.4923	31.32	23.93
Dissolved oxygen (mg/L)	8.43	7.82	8.364077	0.61	0.54
Total Dissolved Phosphate (mg/L)	0.14	0.04	0.064817	0.10	0.025
Total Phosphate (mg/L)	*	0.08	0.15381	*	0.07
Ammonia nitrogen (NH3) (mg/L)	0.06	0.03	0.040075	0.03	0.01
Ammonia nitrogen (NH4) (mg/L)	0.65	0.34	0.371483	0.31	0.03
<i>E. coli</i> (MPN/100 ml)	595.7	1476.606	925.0962	880.906	551.5098

Red=Decrease
Green=Increase
* = Exclude

What have We seen?

Comparison of summer data

Summer 2011:

- ❖ North Branch of Centerville Creek appears to be a significant contributor to *E. coli*, turbidity, and ammonia nitrogen.
- ❖ Phosphates within the creek appear to spike significantly within the millpond area.
 - Possibly attributed to the amount of rain events in sampling season.
- ❖ Turbidity was generally high throughout the North Branch, was typically lower along the South Branch, and increased throughout the mill pond area

What have We seen?

Comparison of summer data continued..

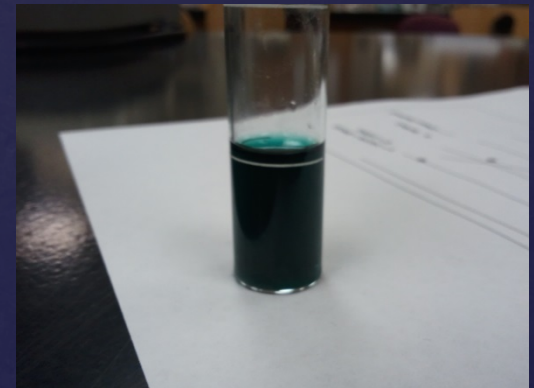
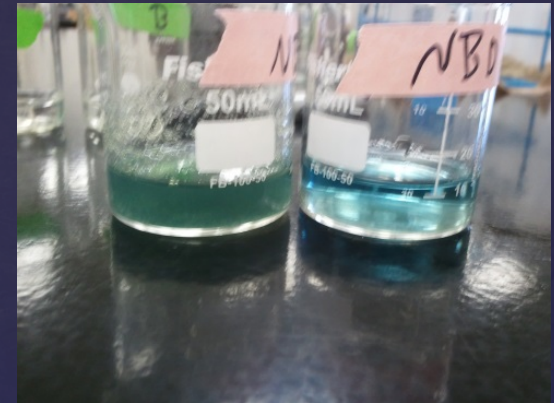
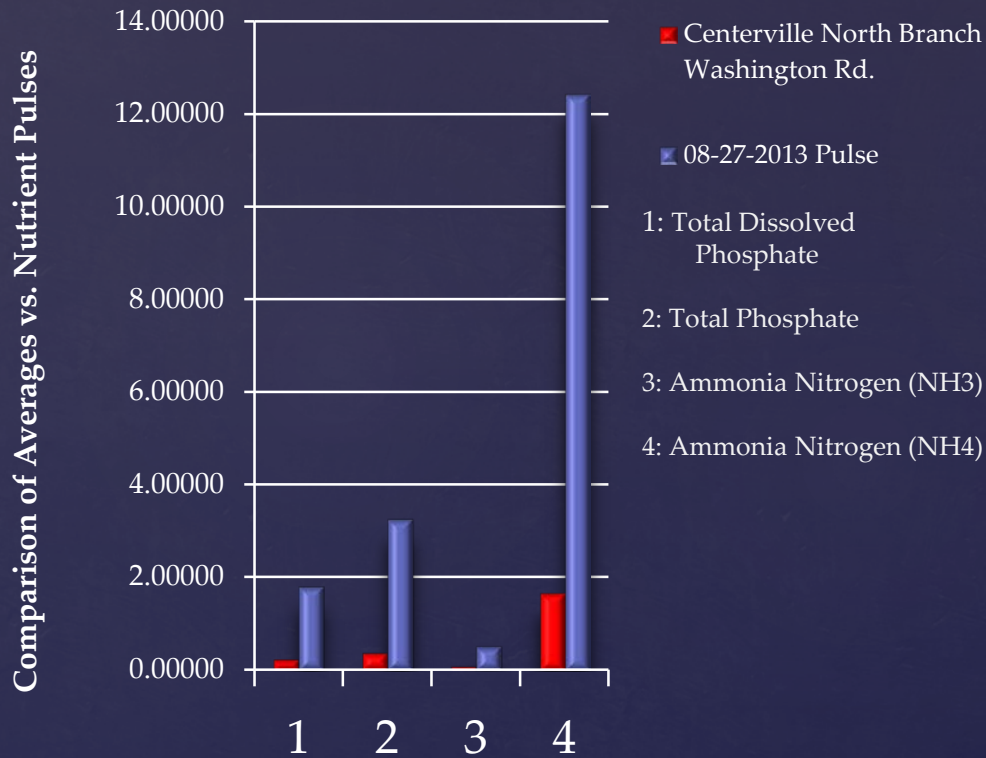
Summer 2012:

- ❖ North Branch Centerville Creek consistently appears to be a significant contributor to *E. coli*, turbidity, and ammonia nitrogen.

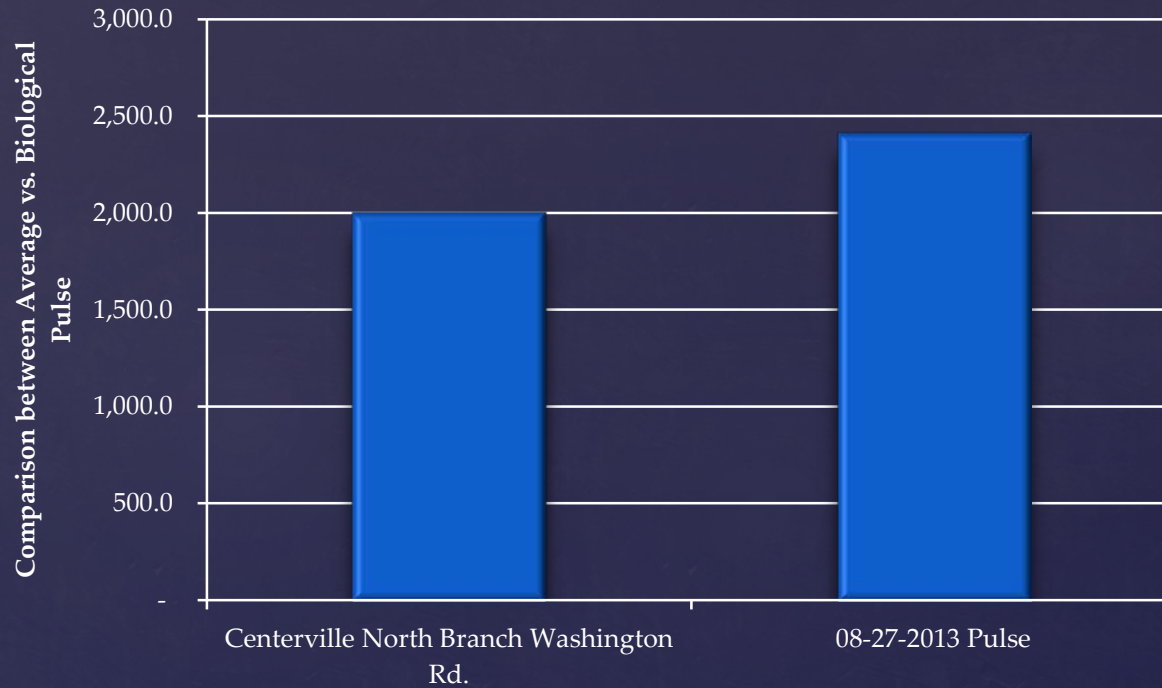
- ❖ Phosphates did not seem to increase at Mid-point within the mill pond in the sampling season of 2012.
 - This may be attributed to the lack of rainfall throughout summer 2012

- ❖ Turbidity was generally high throughout the North Branch, was typically lower along the South Branch, and increased throughout the mill pond area

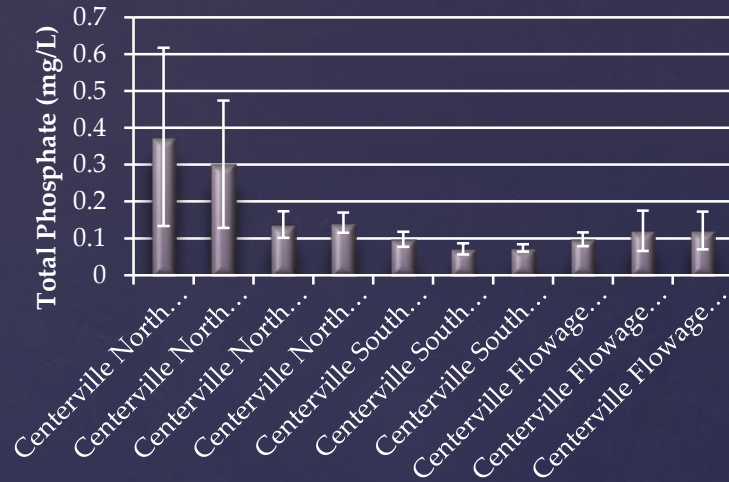
Comparison between Averages vs. Nutrient/ Biological pulses



Comparison between Averages vs. Nutrient/ Biological pulses

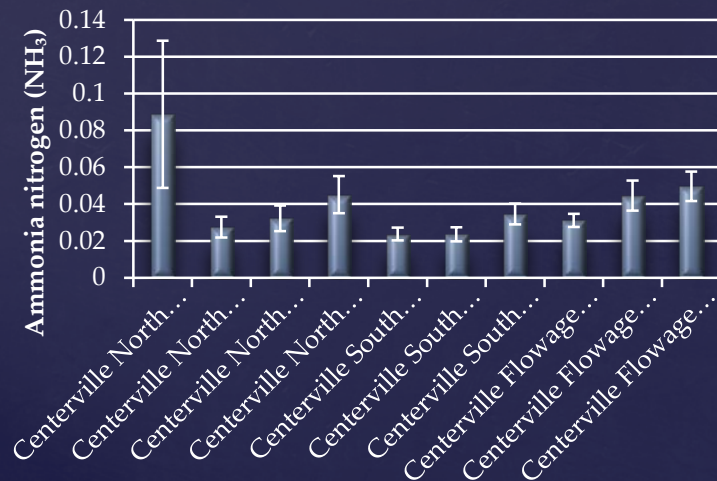


Comparison among sampling points:



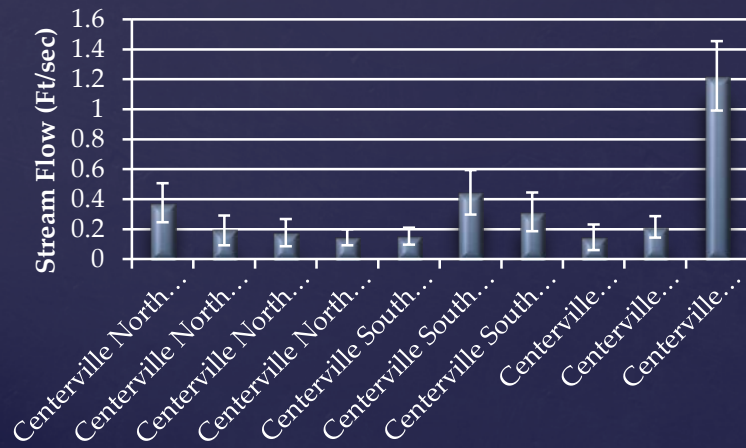
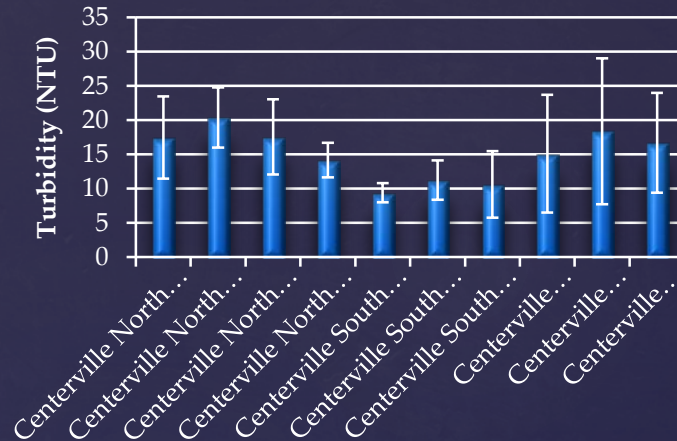
❖ As seen in summer, 2012. Phosphates did not seem to increase at Mid-point within the mill pond in the sampling season of 2013.

➤ This may be attributed to the lack of rainfall throughout summers 2012, and 2013



Comparison among sampling points:

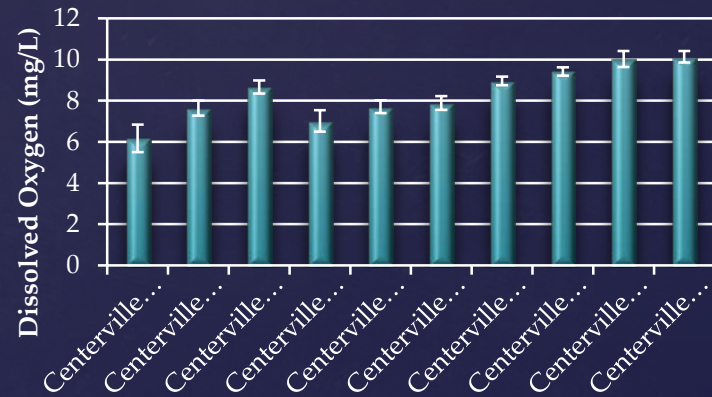
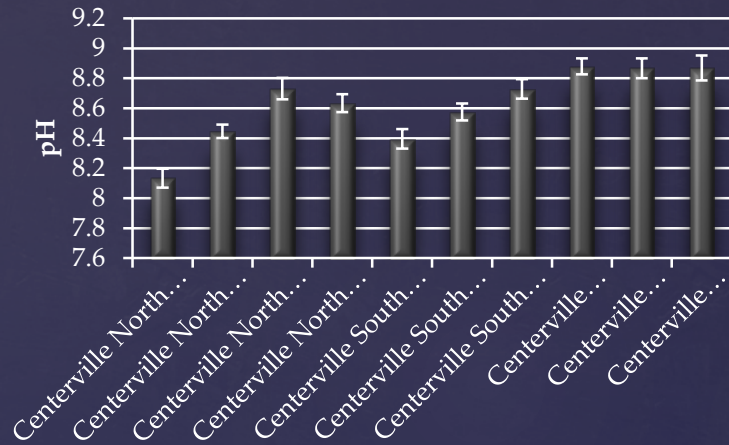
Turbidity was generally high throughout the North Branch, was typically lower along the South Branch, and increased throughout the mill pond area



Stream flow was typically higher along the South Branch than the North Branch of Centerville Creek, and highest at the Dam barrier (Consistent throughout all three summers)

Physical parameters- Significant differences along stream sites

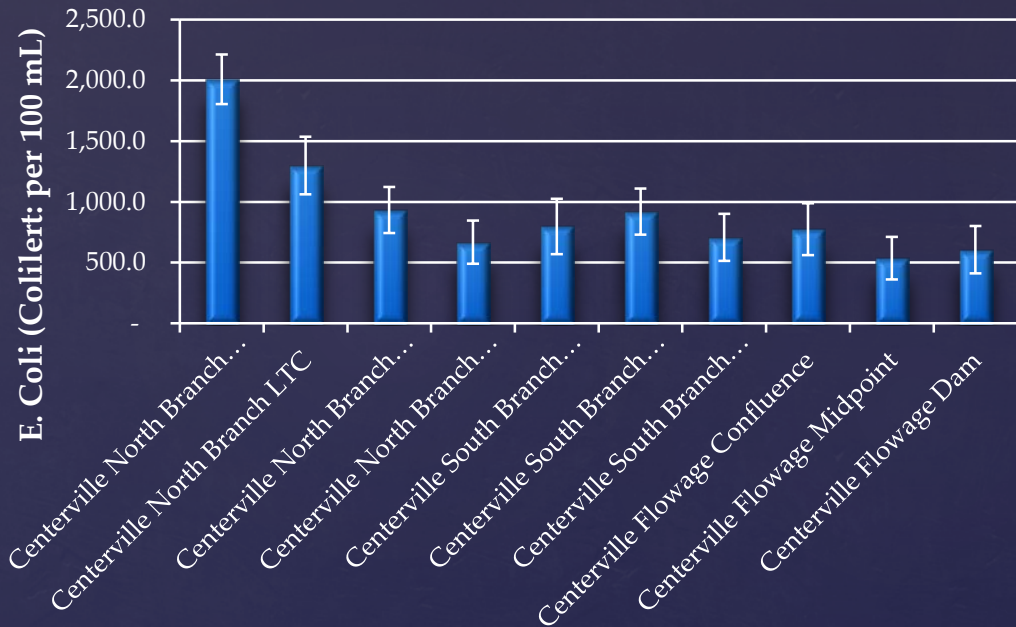
Comparison among sampling points:



Physical parameters- Significant differences along stream sites

Comparison among sampling points:

E. Coli Summer 2013



North Branch
Centerville Creek
appears to be a
significant contributor
to *E. coli* (Consistent
with both previous
summer's data)

What are we seeing?

Comparison of summer data continued..

Summer 2013:

- ❖ North Branch Centerville Creek consistently appears to be a significant contributor to *E. coli*, turbidity, and ammonia nitrogen. (Agreeing with both previous summers data)
- ❖ During summer 2013, nutrient and biological contamination pulses were observed.
- ❖ *E. coli* pollution not directly correlated with phosphate or ammonia levels
- ❖ A difference from the data of 2011.
 - Phosphates did not seem to increase at Mid-point within the mill pond.
 - This may be attributed to the lack of rainfall throughout both summers 2012, and 2013

Issue 1: North Branch contribution to pollution

- ⌘ Agreeing with the data of 2011 and 2012, *E. coli* levels were above threshold set by BEACH act at all sampling points along the creek during summer, 2013
 - ⌘ *HYPOTHESIS*: Centerville Creek may be a significant source of beach contamination near Hika Bay
- ⌘ Following the trend seen in 2011 and 2012, North branch consistently had highest levels of *E. coli* (Specifically North Branch Washington [CE10])
 - ⌘ *HYPOTHESIS*: *E. coli* sources are located along the north branch
 - ⌘ *E. coli* levels are not strongly correlated to nutrient pollution such as ammonia nitrogen, and phosphates.

Issue 1: North Branch Contribution to pollution

⌘ Suggestions for future work:

- ⌘ Continue monitoring creek for *E. coli*, possibly adding more sample site along each branch of the creek in order to obtain a better understanding of the point source contamination.
- ⌘ Take soil samples along the banks of all access points
- ⌘ Continue to take environmental data with *E. coli* data (nutrients, turbidity, etc)
- ⌘ Investigate the possible causes of high nutrient and *E. coli* levels along North Branch access points furthest from the lake.

Mill pond reclamation management

- ⌘ The restoration process on Centerville Creek began the week of July 24th, 2012. the restoration was complete as of
- ⌘ Decades of backed up sediment, that had been left behind from the former mill pond, have now been Removed and been used to create a ridge and swell ecosystem near the Hika Bay park
- ⌘ Continued research on Centerville Creek is important in understanding how these decisions will affect the quality of the creek in the future.

Thank You For Your Time And Attention!



Dam Barrier



Mid-Point



Confluence



South Branch Birch St



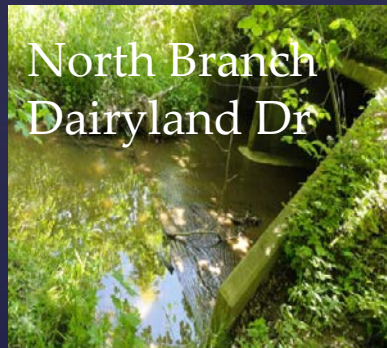
South Branch-Center Rd



South Branch
Veterans Park



North
Branch LTC



North Branch
Dairyland Dr



North Branch
Franklin



North Branch
Washington