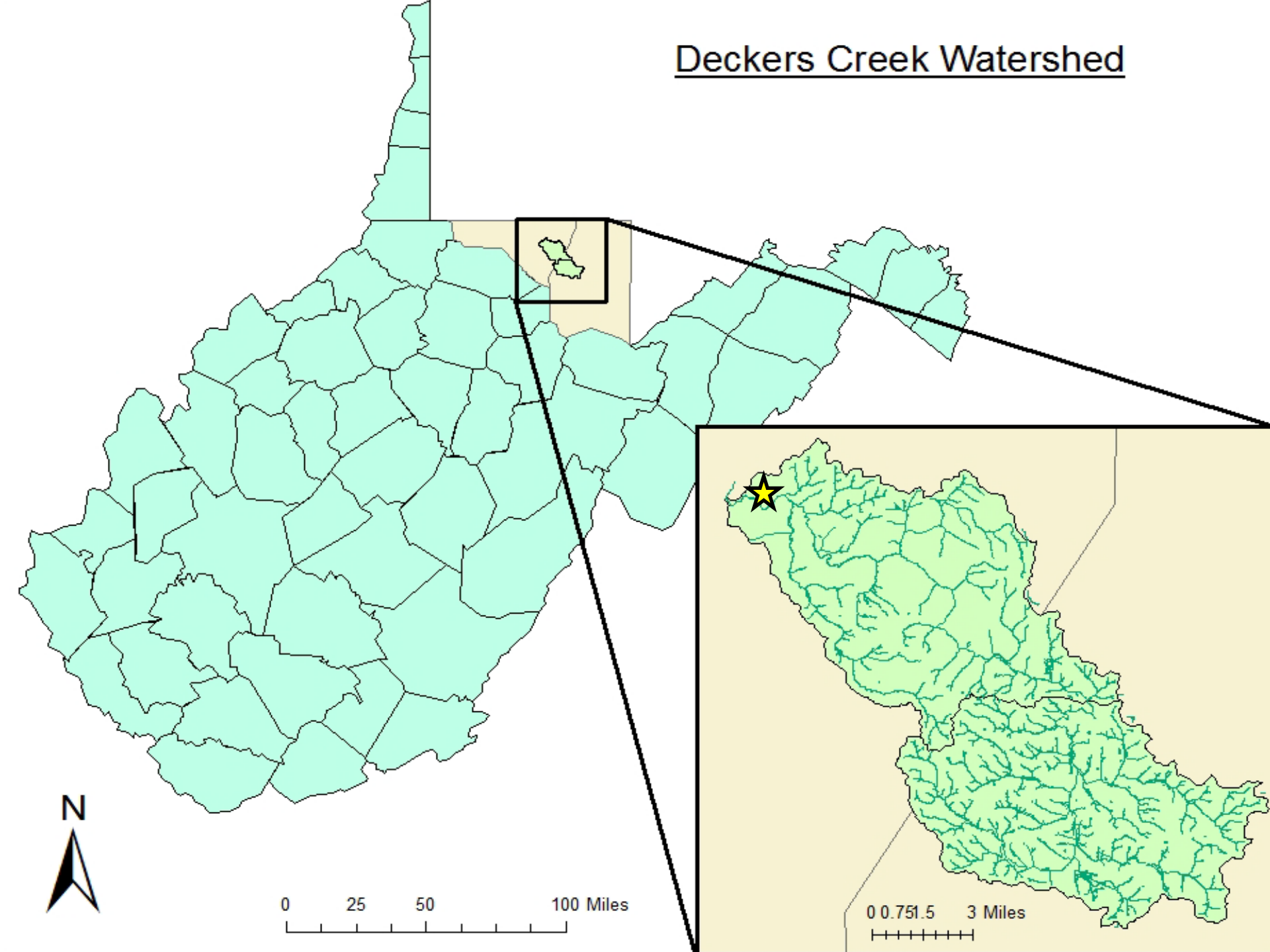
FRIENDS OF DECKERS CREEK

PO Box 877 * Dellslow, WV 26531 * www.deckerscreek.org

The Impacts of Acid Mine Drainage Remediation Projects on Water Quality, Aquatic Macroinvertebrates, and Fish Populations in the Deckers Creek Watershed

Nicholas Revetta

Project Manager

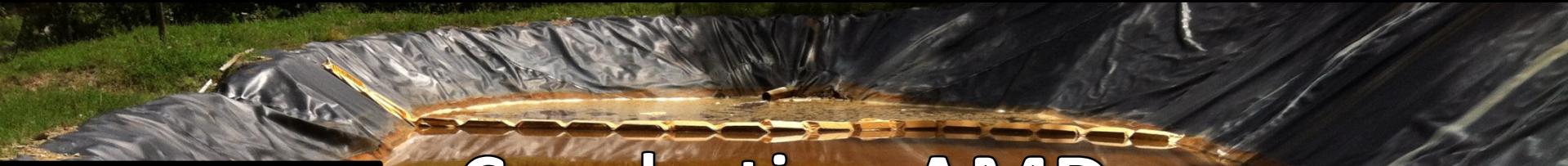

Deckers Creek Watershed
N
0 25 50 100 Miles
0 0.751.5 3 Miles

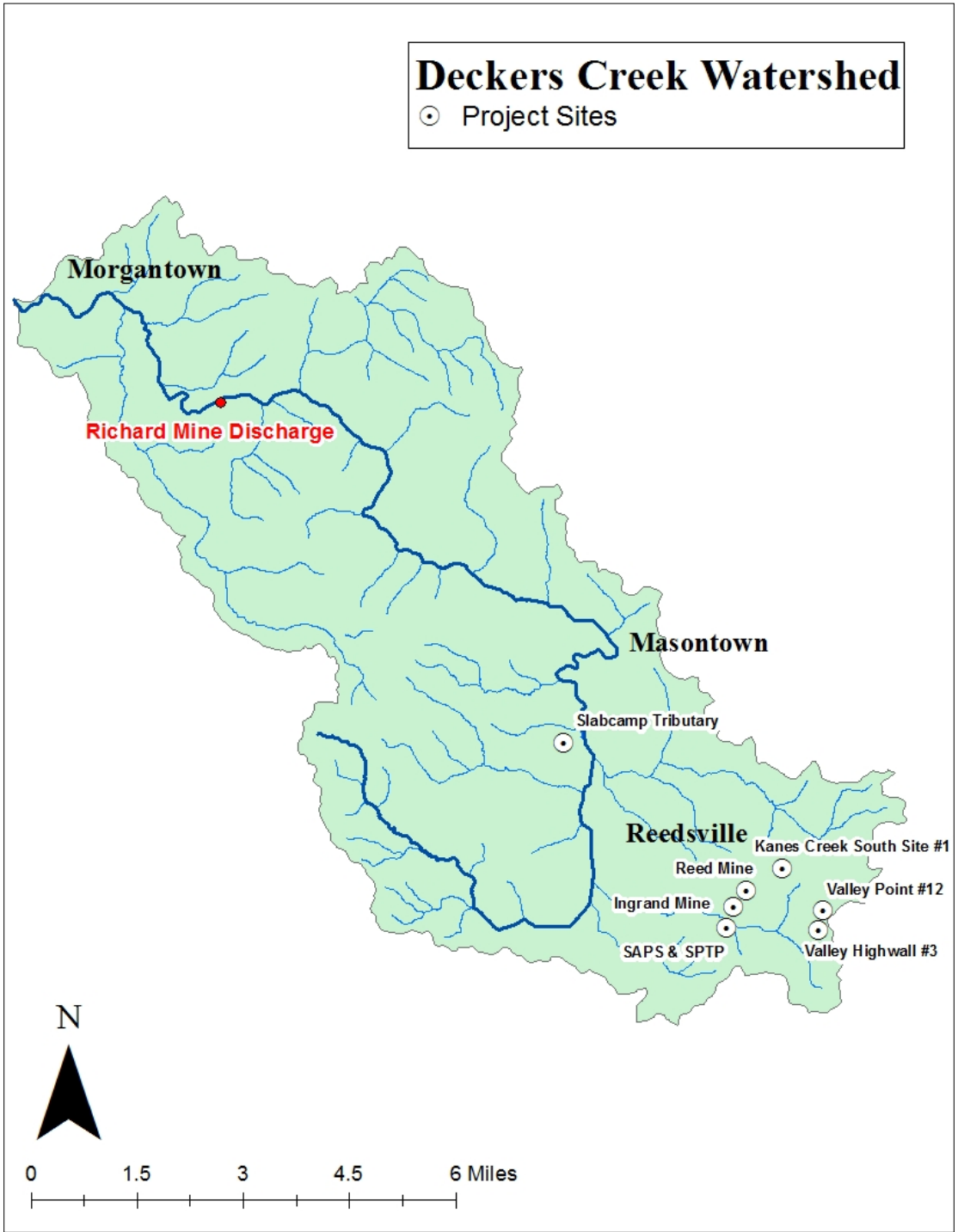
Major Issues in our Watershed

- E. coli & fecal coliform
  - CSOs
  - Unkempt farmland
- Streambank failure
- Sedimentation
- Lack of shade
- Stormwater runoff
- **Acid Mine Drainage**

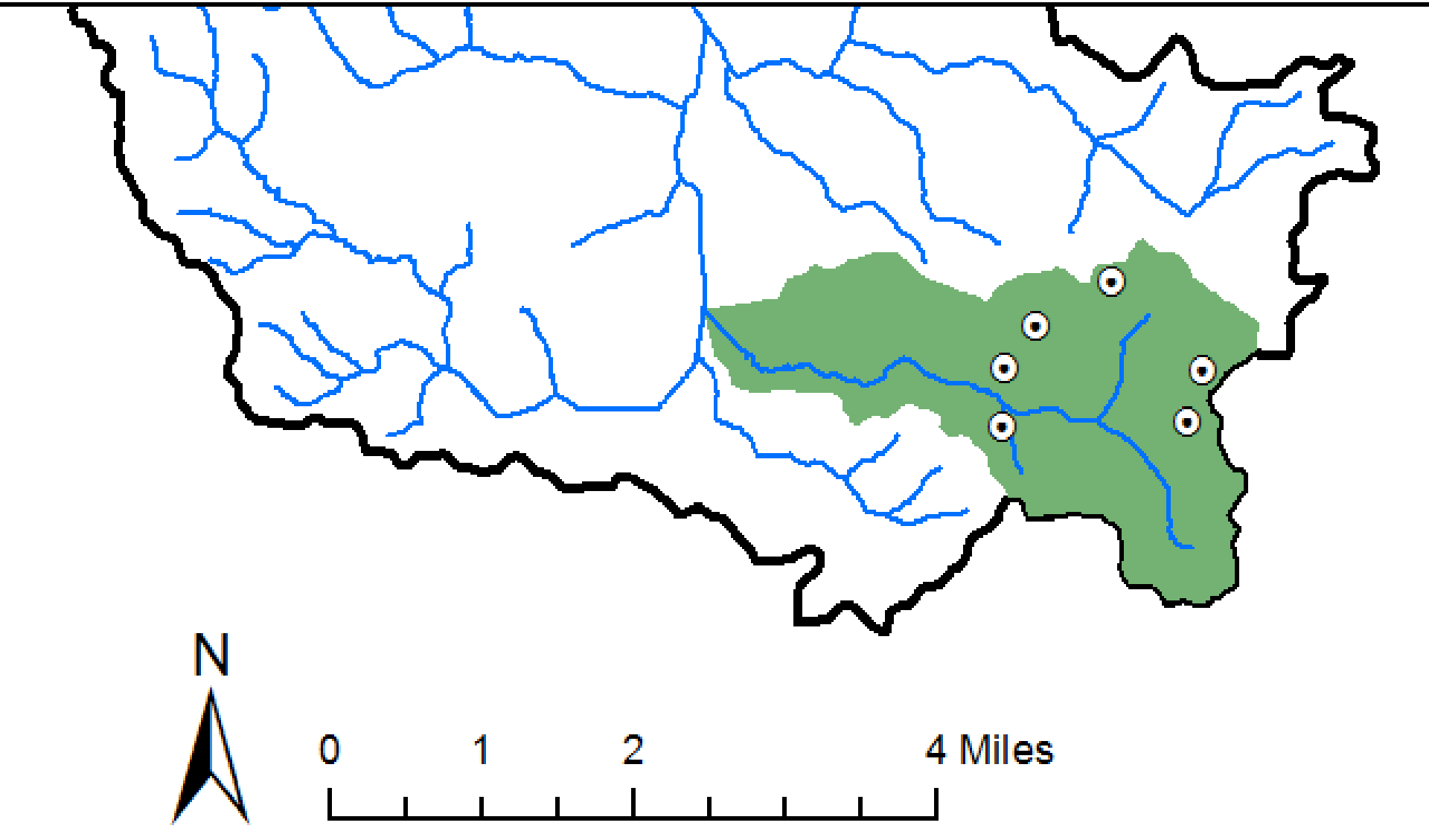
Kanes Creek

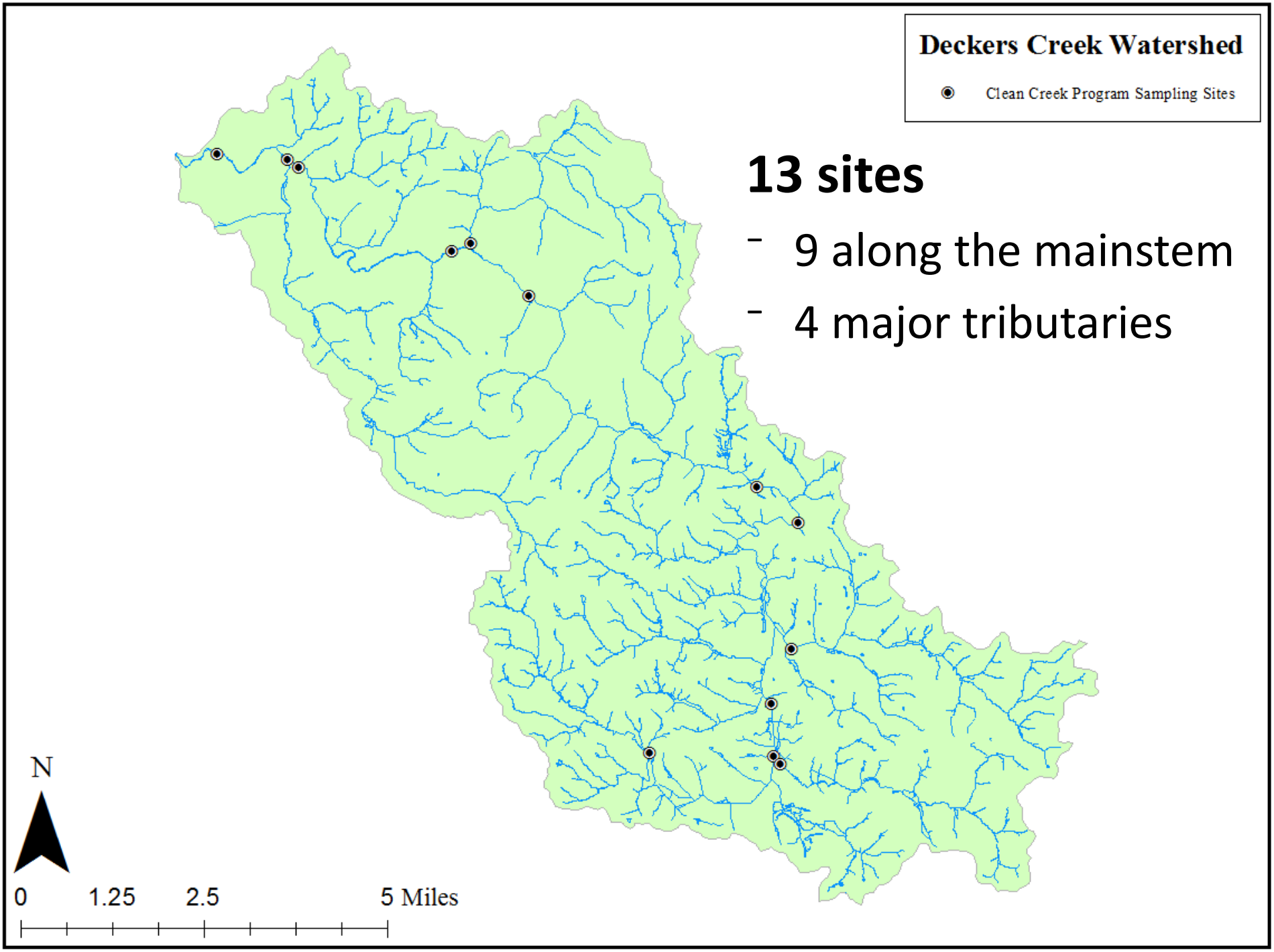
Combating AMD




Deckers Creek Watershed
Project Sites
Morgantown
Richard Mine Discharge
Masontown
Slabcamp Tributary
Reedsville
Kanes Creek South Site #1
Reed Mine
Valley Point #12
Ingrand Mine
SAPS & SPTP
Valley Highwall #3
N
0
1.5
3
4.5
6 Miles

Kanes Creek Subwatershed




Deckers Creek Watershed
Clean Creek Program Sampling Sites
13 sites
- 9 along the mainstem
- 4 major tributaries
N
0
1.25
2.5
5 Miles

Water Quality Sampling Methods

- Sampled quarterly
- Three samples collected in the thalweg:
  - **Sample 1**: collected without filtration or preservation
    - Analyzed for acidity, alkalinity, pH, conductance, and sulfate
  - **Sample 2**: collected through a 0.45 µm filter and preserved with 1:1 nitric acid/H_2O
    - Analyzed for dissolved metal analysis
  - **Sample 3**: collected without filtration and preserved with 1:1 nitric acid/H_2O
    - Analyzed for total metal analysis
- Temp., cond., DO, pH, and flow recorded on site

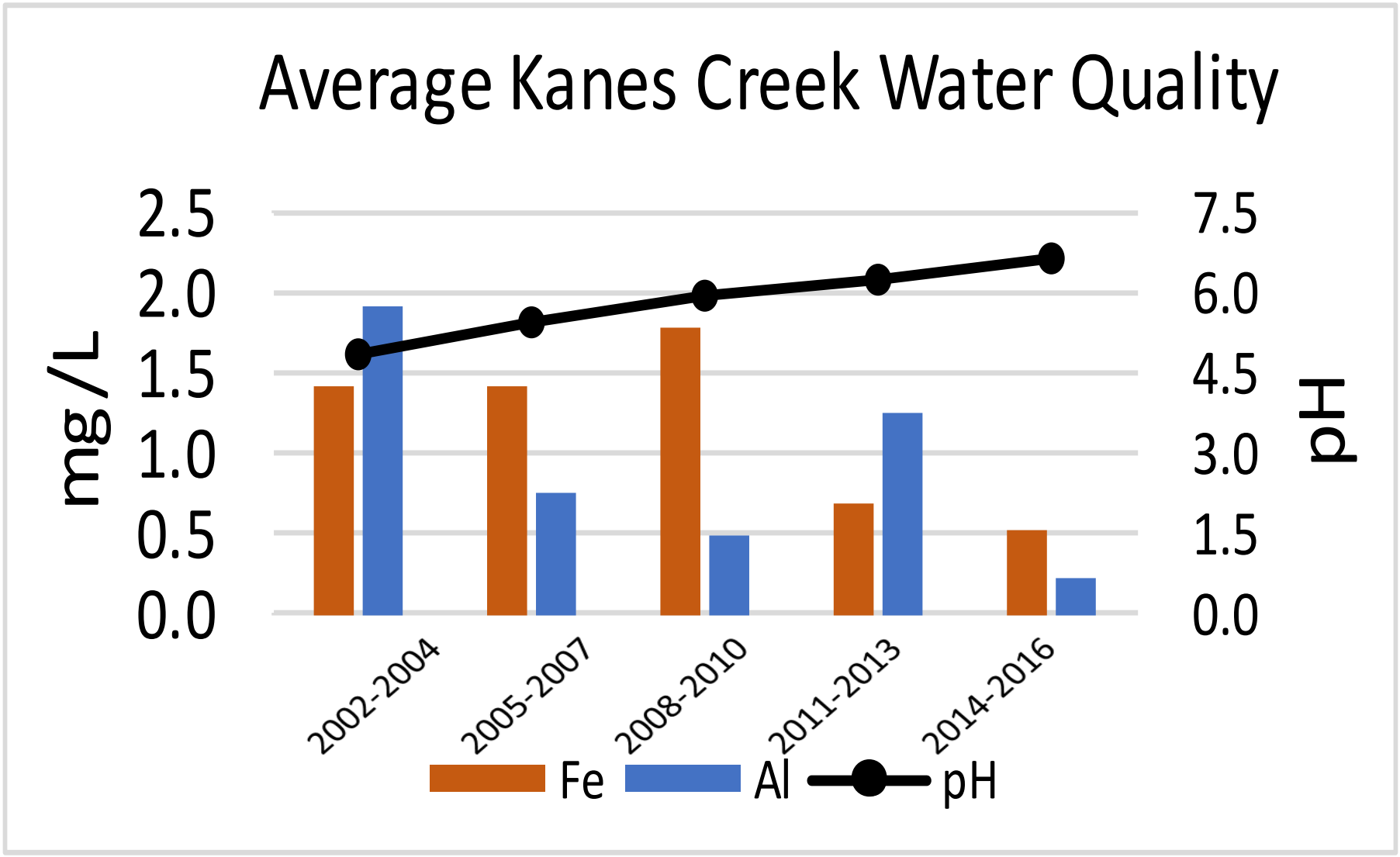
Aquatic Macroinvertebrate Sampling Methods

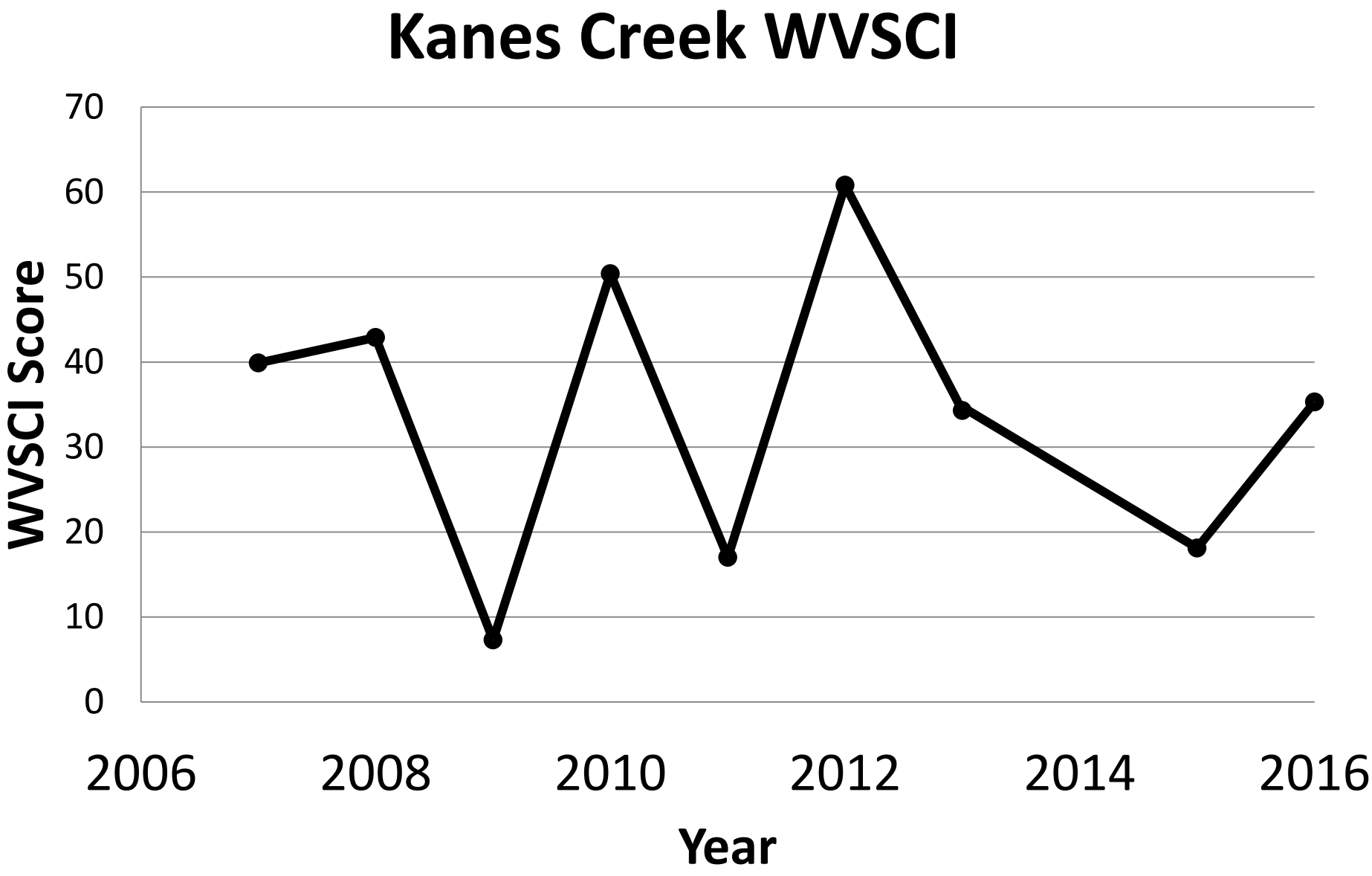
- Sampled annually

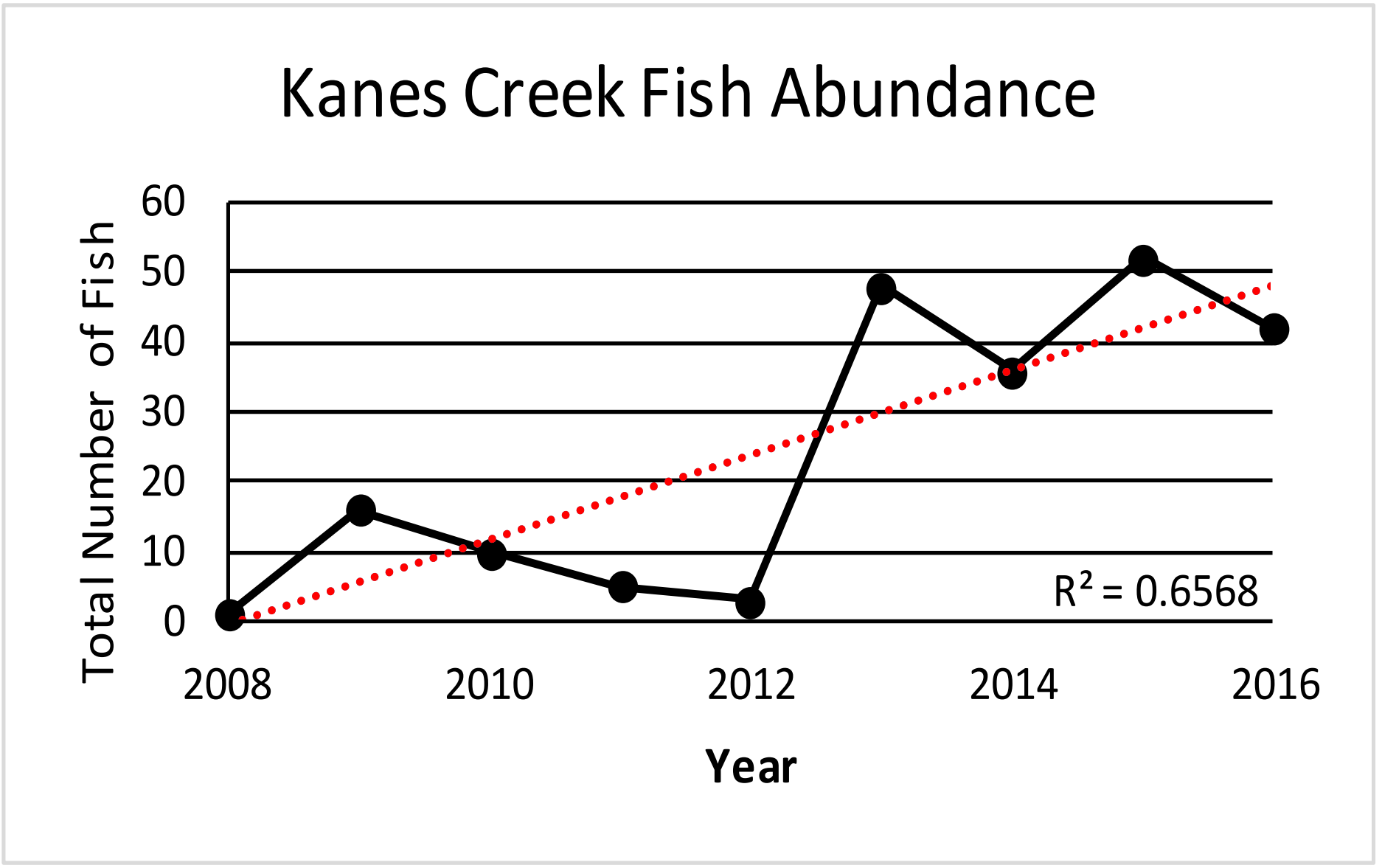
- Followed West Virginia Stream Condition Index (WVSCI) protocol
  - 100 m representative reach
  - Composite of 4 equally spaced riffle samples
  - Rectangular dipnet
  - Preserved in ethanol and brought back to the lab for identification
  - Complete sort instead of capping at 200 individuals

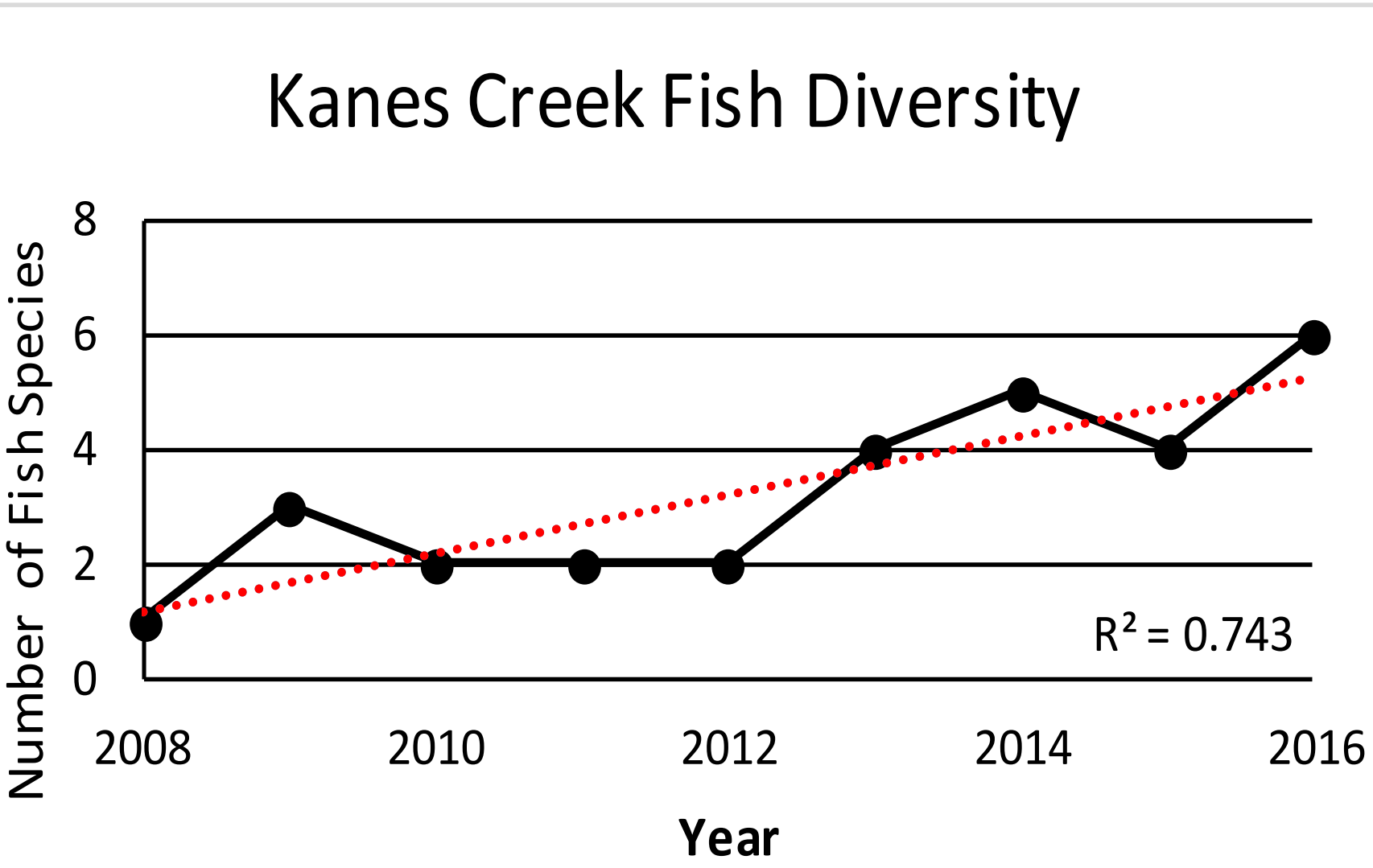
Fish Sampling Methods

- Sampled annually
- Reach = 40 x average wetted width
- 2 Backpack electroshockers utilized
- Fish were identified, weighed, and measured on site and then re-released into the stream


Average Kanes Creek Water Quality
mg/L
2.5
2.0
1.5
1.0
0.5
0.0
7.5
6.0
4.5
3.0
1.5
0.0
pH
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016
Fe
Al
pH


Kanes Creek WVSCI
70
60
50
40
30
20
10
0
WVSCI Score
2006
2008
2010
2012
2014
2016
Year


Kanes Creek Fish Abundance
Total Number of Fish
60
50
40
30
20
10
0
2008
2010
2012
2014
2016
Year
R² = 0.6568


Kanes Creek Fish Diversity
Number of Fish Species
0
2
4
6
8
2008
2010
2012
2014
2016
Year
R² = 0.743

Ingrand Mine Remediation

Input 2 Avg (lbs/yr)

pH – 3.5

Acidity – 20,652.55

Fe – 1,300.65

Al – 1,869.92

Input 1 Avg (lbs/yr)

pH – 3.1

Acidity – 19,889.70

Fe – 2,238.90

Al – 1,869.92

Output (lbs/yr)

pH – 8.4

Acidity – 1.63

Fe – 26.12

Al – 13.06

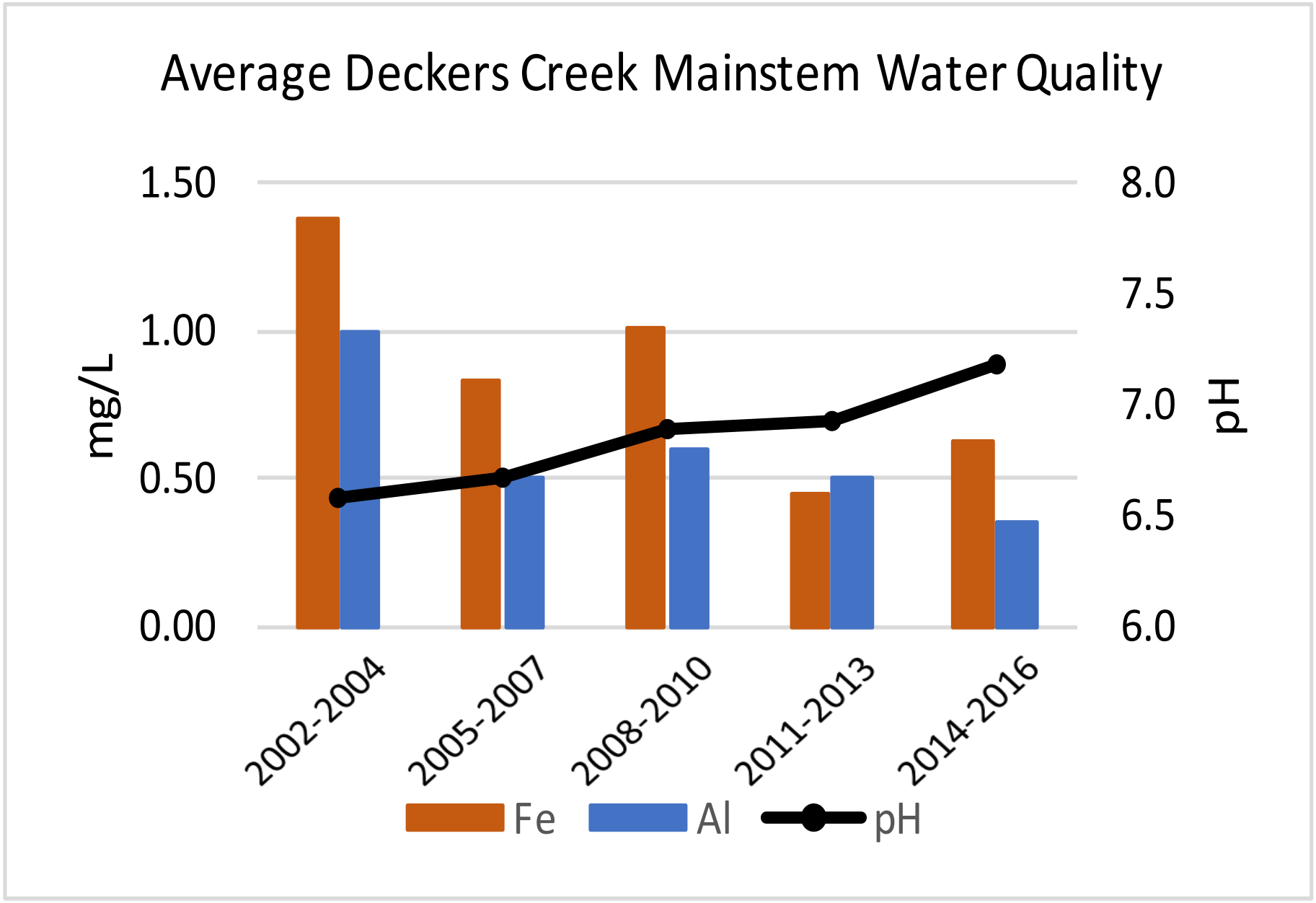
Sum of inputs (lbs/yr)

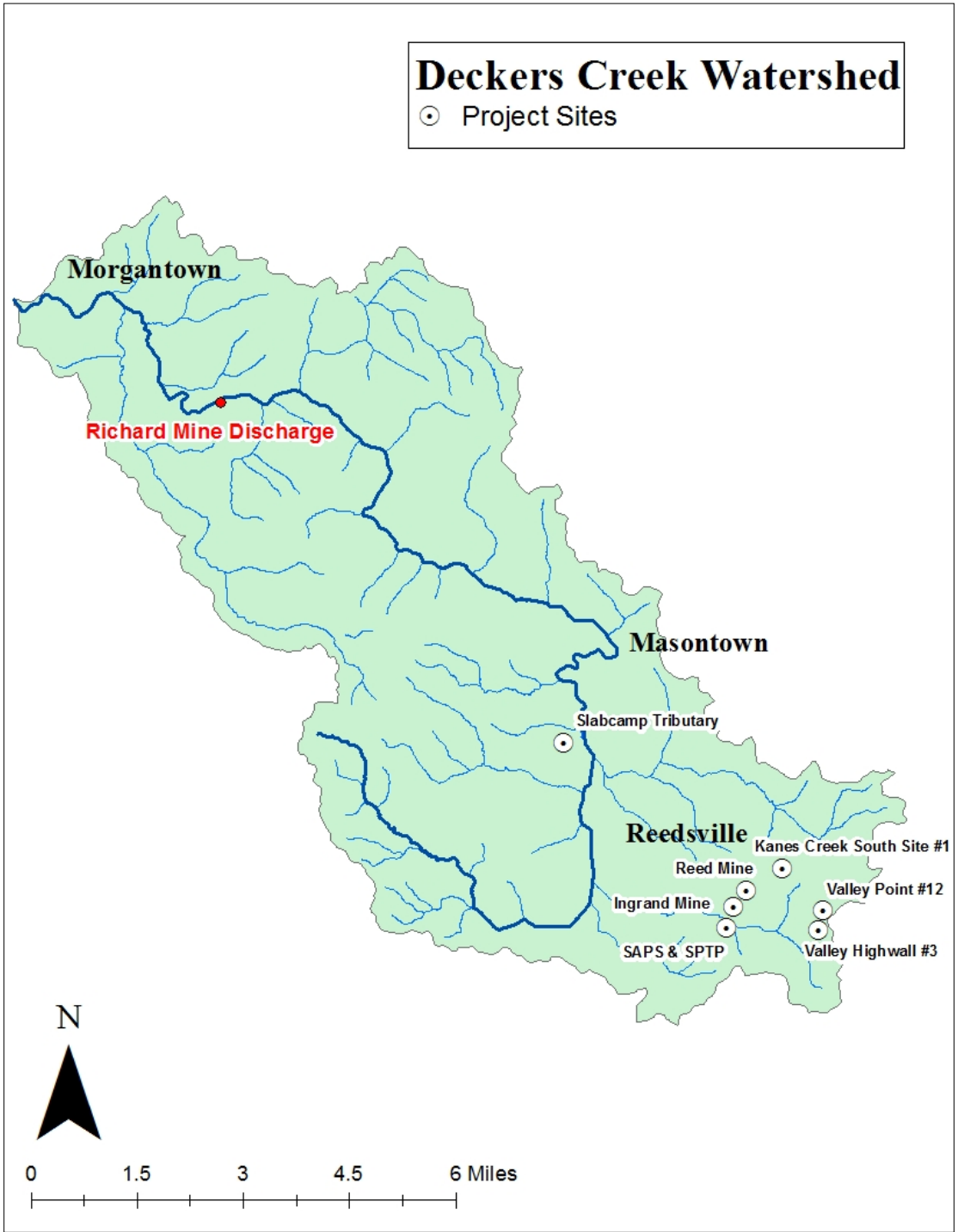
pH – 3.3

Acidity – 40,542.24

Fe – 3,359.54

Al – 3,710.08


Average Deckers Creek Mainstem Water Quality
1.50
1.00
0.50
0.00
mg/L
8.0
7.5
7.0
6.5
6.0
pH
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016
Fe
Al
pH


Deckers Creek Watershed
Project Sites
Morgantown
Richard Mine Discharge
Masontown
Slabcamp Tributary
Reedsville
Kanes Creek South Site #1
Reed Mine
Valley Point #12
Ingrand Mine
SAPS & SPTP
Valley Highwall #3
N
0
1.5
3
4.5
6 Miles

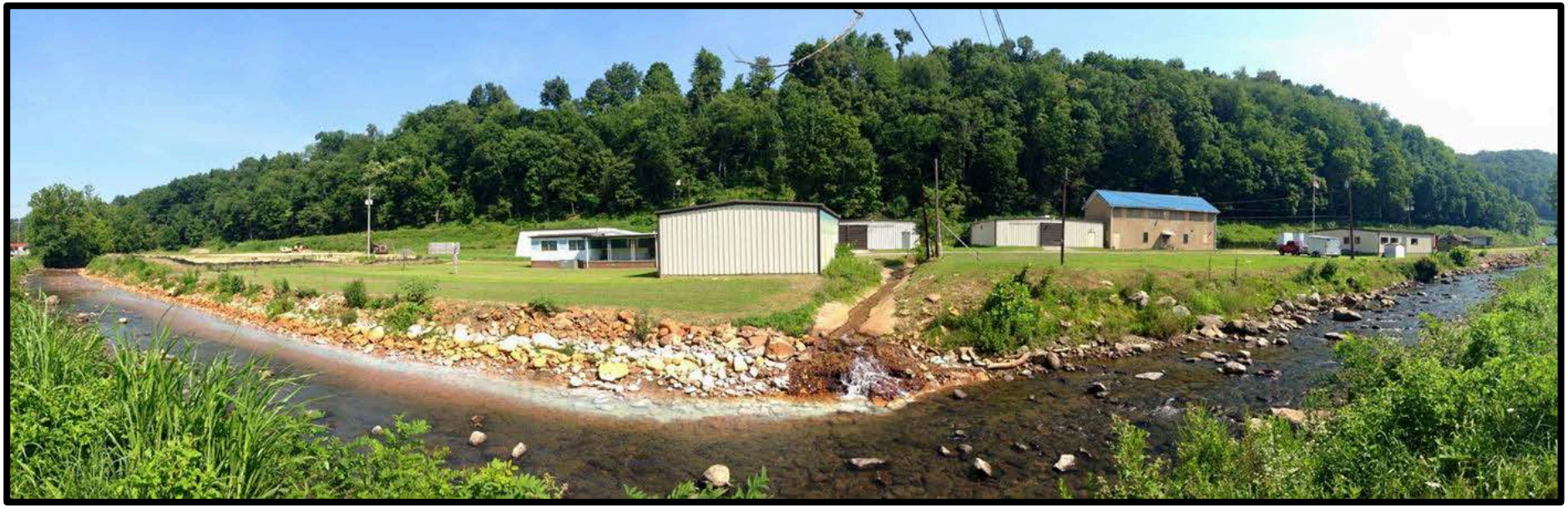
Richard Mine Pollution

Acidity – 730,500 lbs/yr

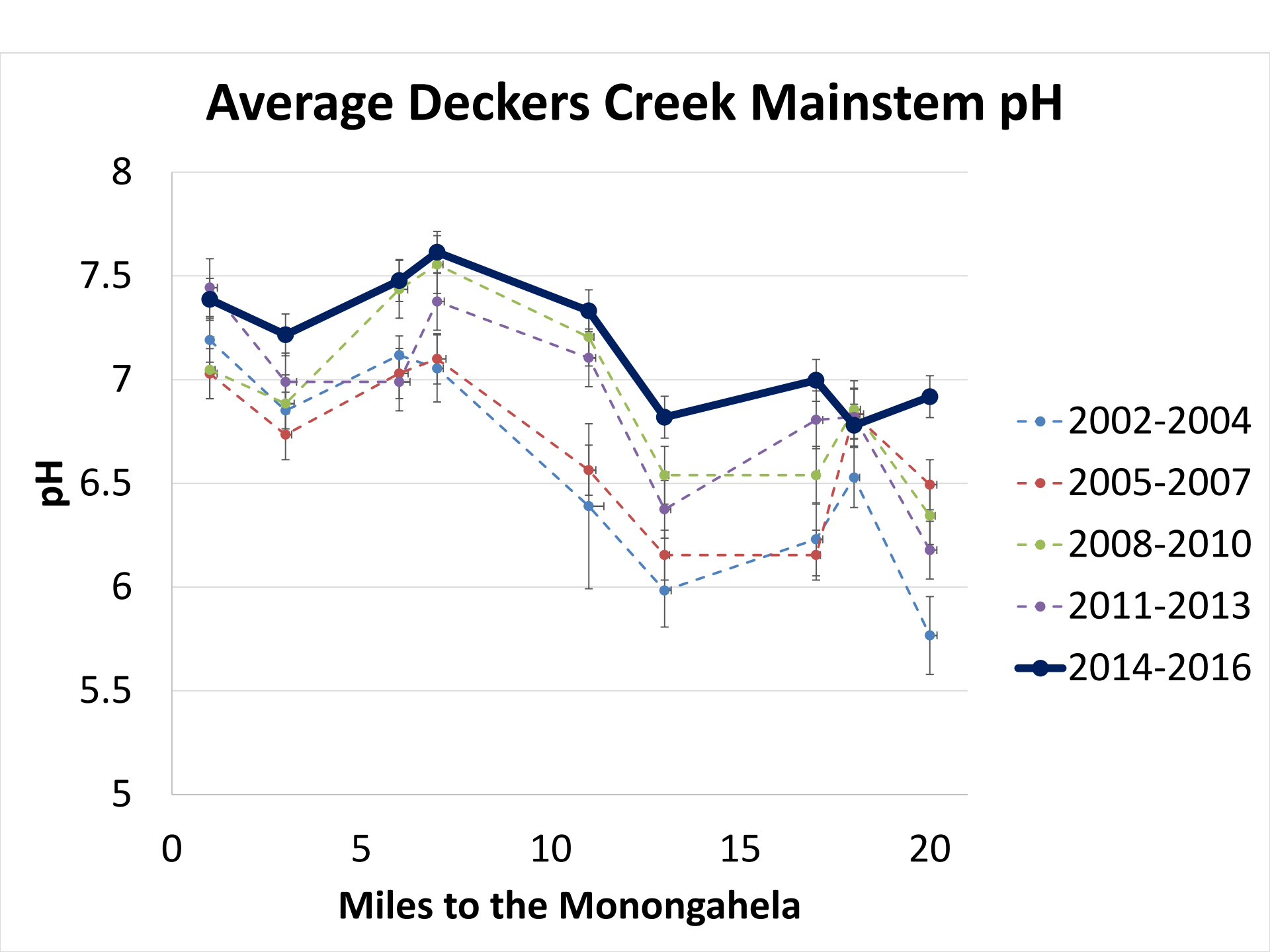
Fe – 143,000 lbs/yr

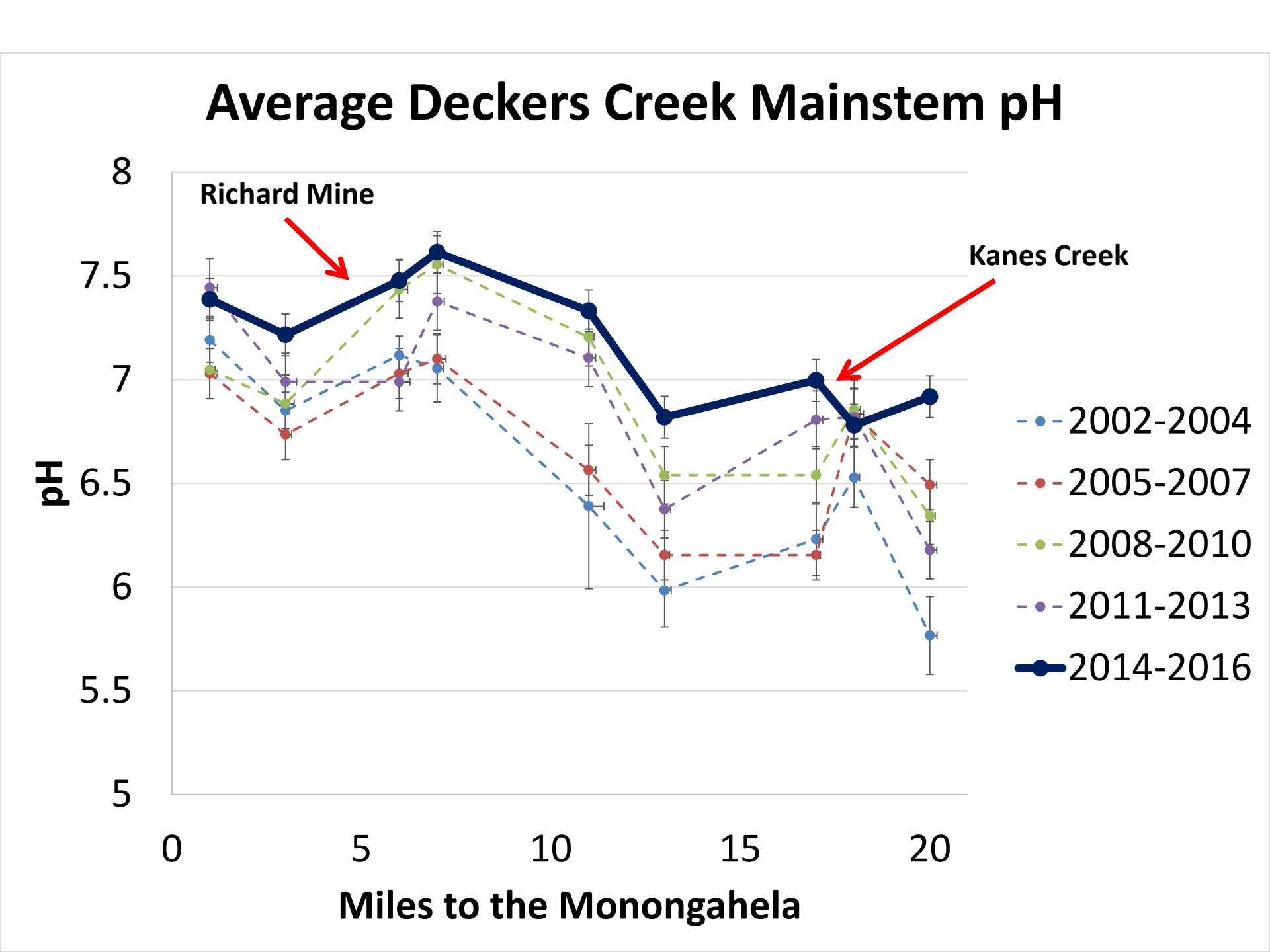
Al – 59,000 lbs/yr

Mn – 3,200 lbs/yr

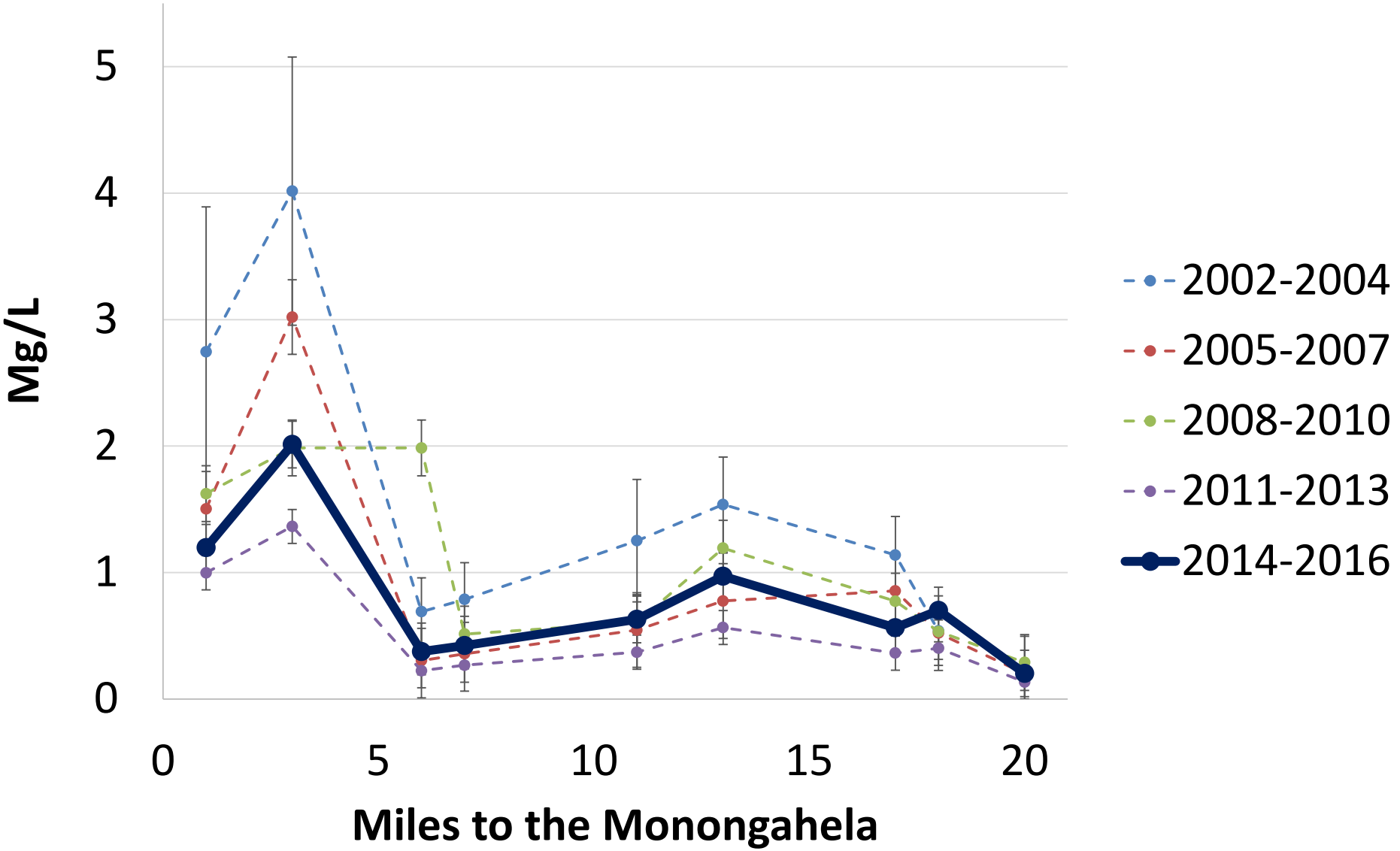


Richard – 5 miles outside of town

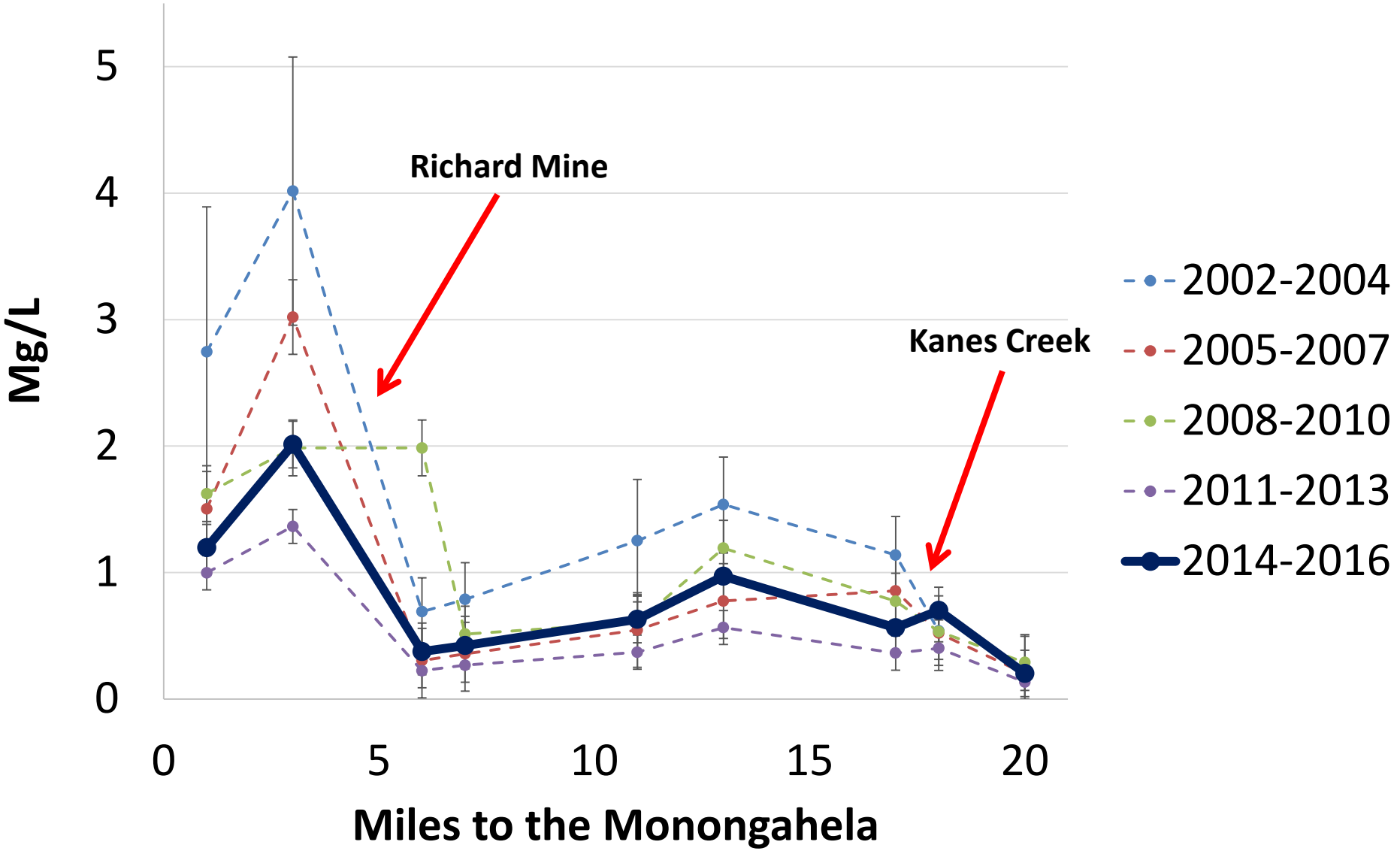

Average Deckers Creek Mainstem pH
8
7.5
7
6.5
6
5.5
5
pH
0
5
10
15
20
Miles to the Monongahela
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016

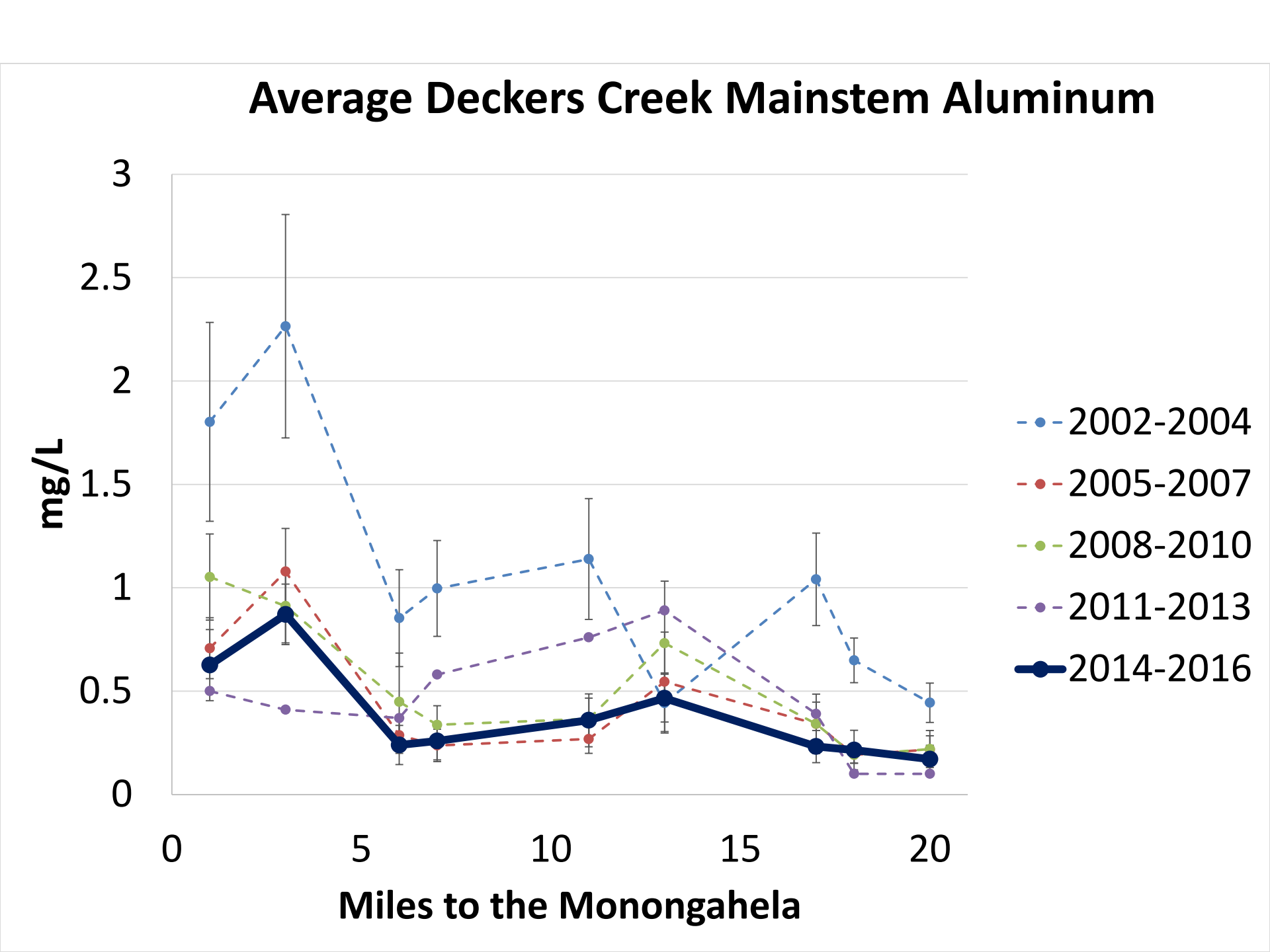

Average Deckers Creek Mainstem pH
Richard Mine
Kanes Creek
pH
8
7.5
7
6.5
6
5.5
5
0
5
10
15
20
Miles to the Monongahela
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016

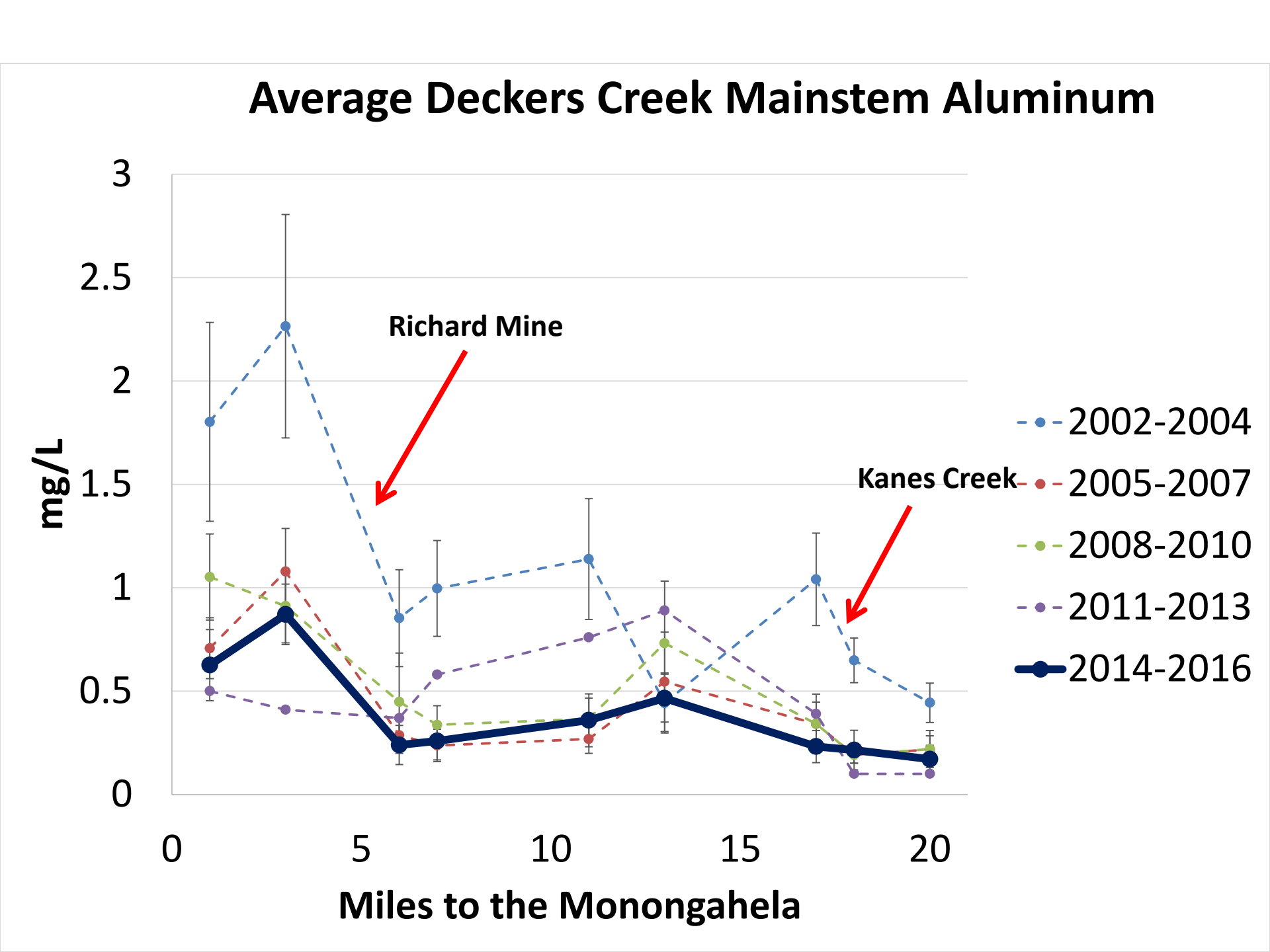
Average Deckers Creek Mainstem Iron

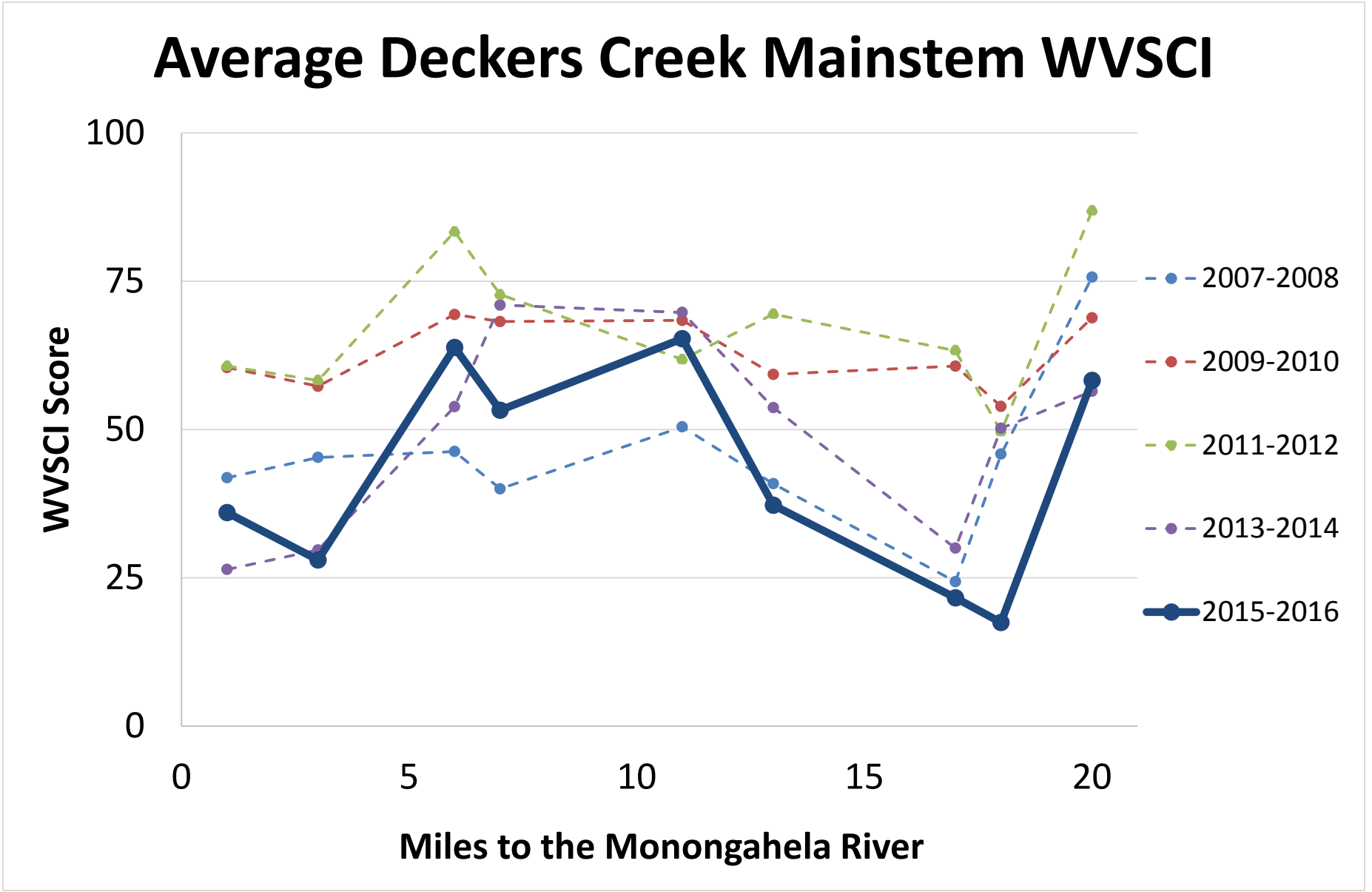


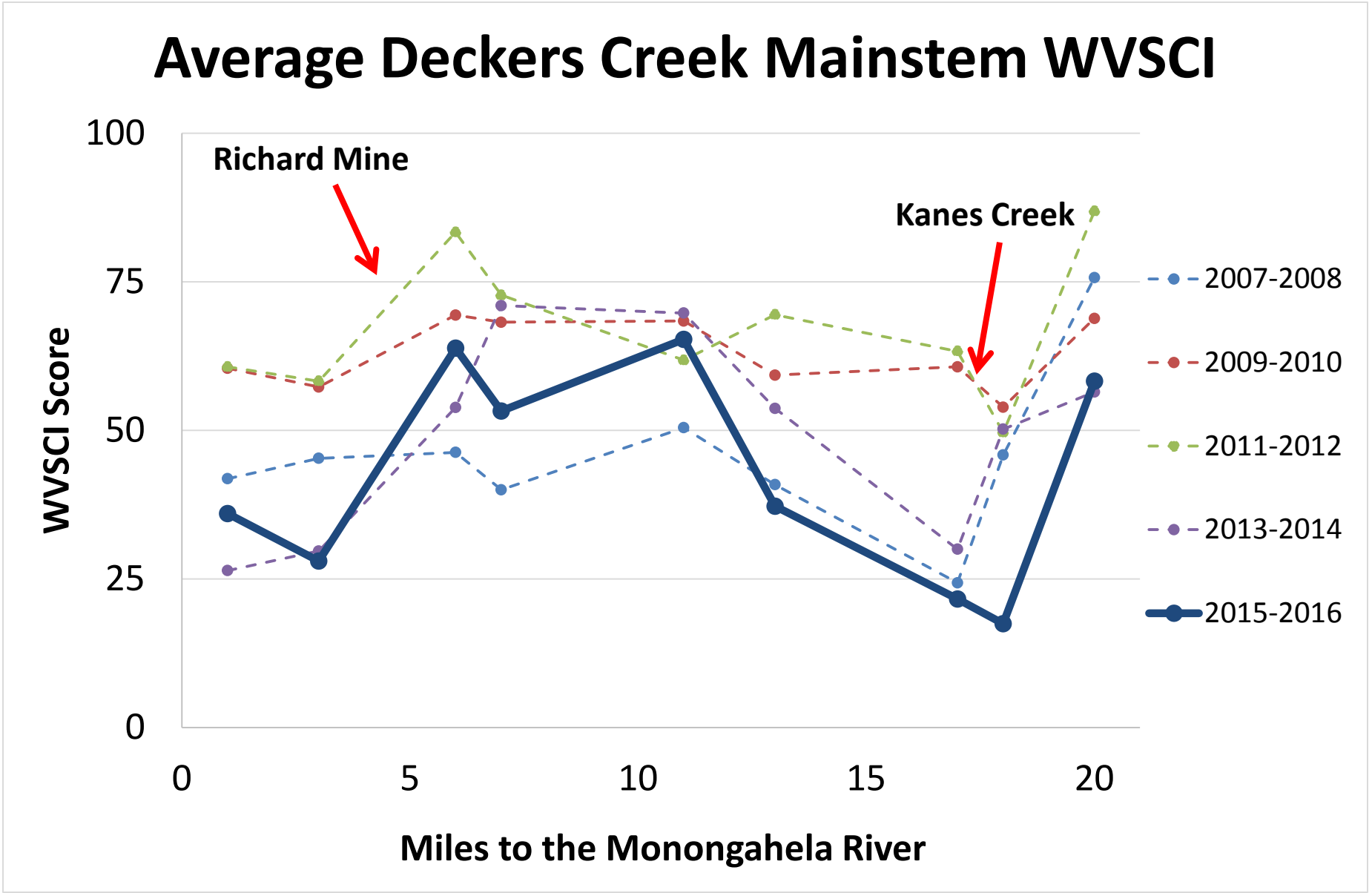
Average Deckers Creek Mainstem Iron

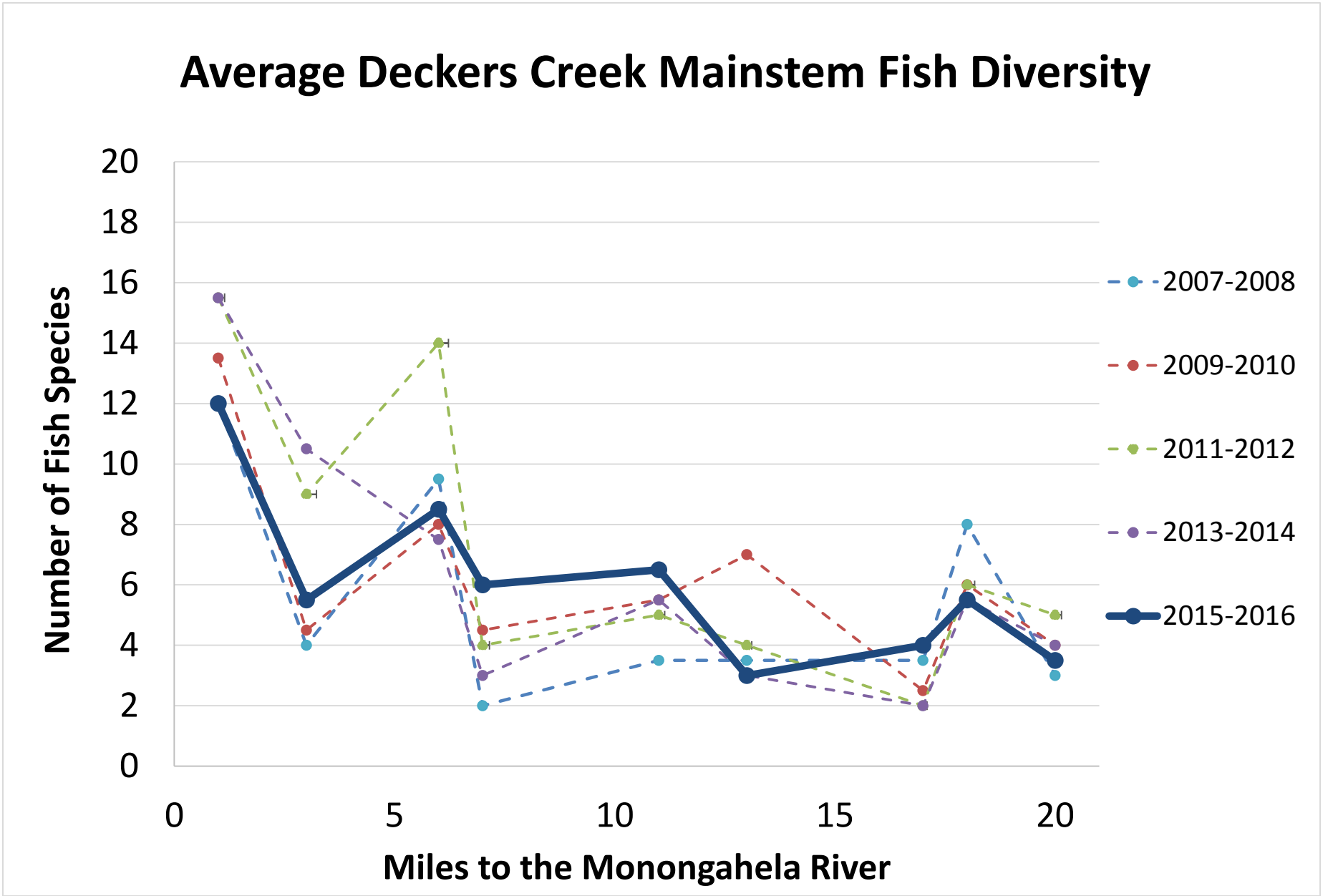


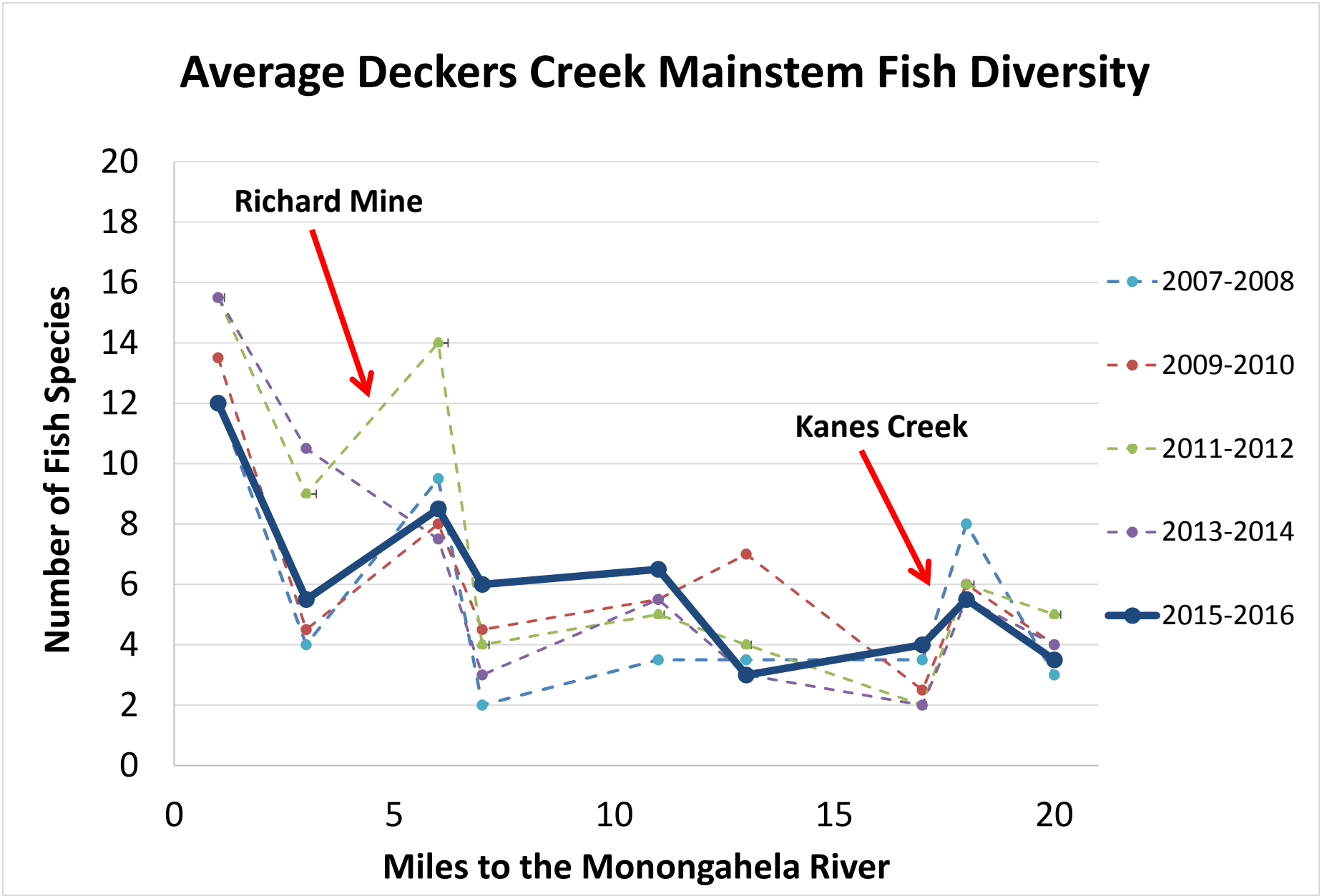

Average Deckers Creek Mainstem Aluminum
mg/L
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
Miles to the Monongahela
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016

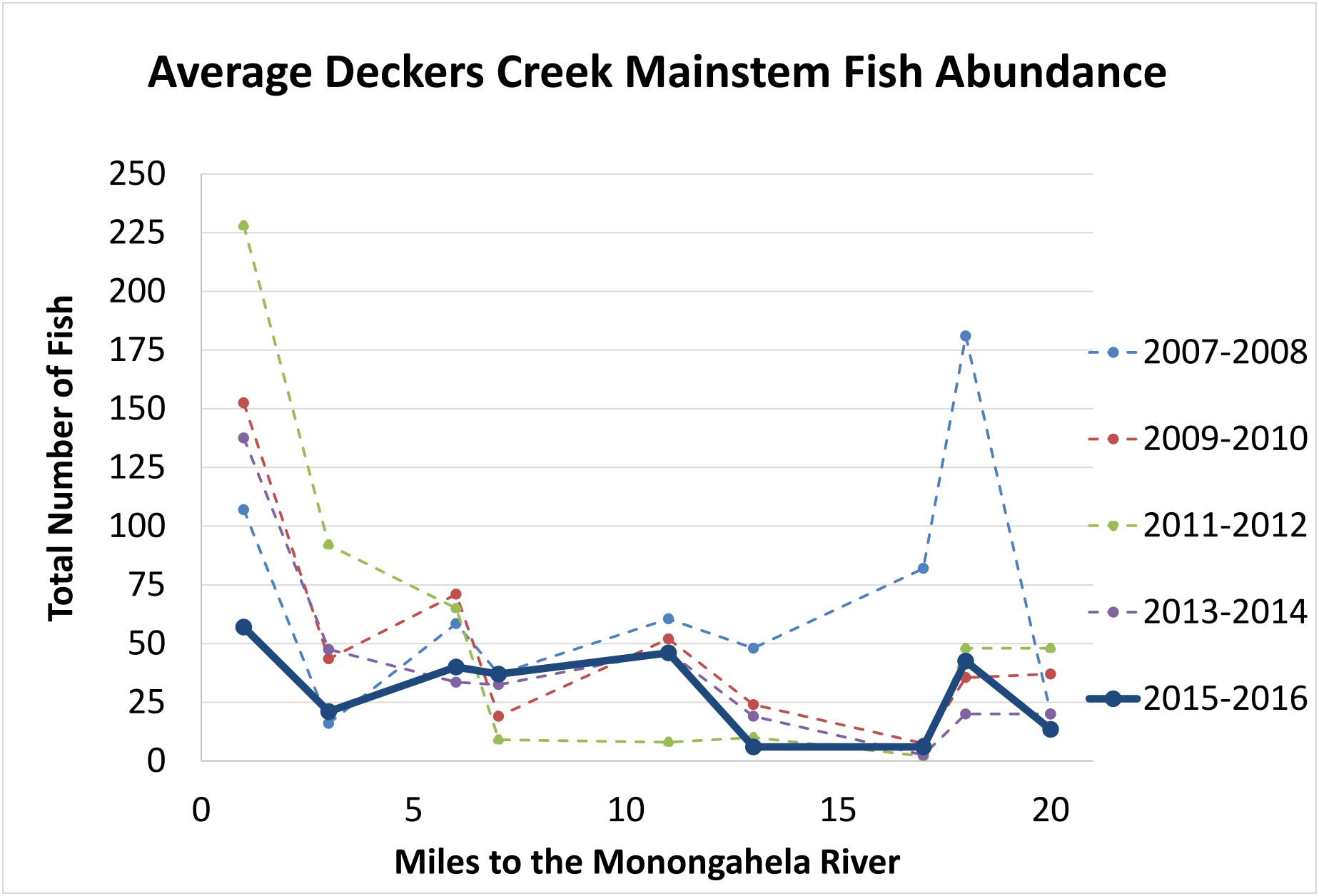

Average Deckers Creek Mainstem Aluminum
mg/L
3
2.5
2
1.5
1
0.5
0
0
5
10
15
20
Miles to the Monongahela
Richard Mine
Kanes Creek
2002-2004
2005-2007
2008-2010
2011-2013
2014-2016

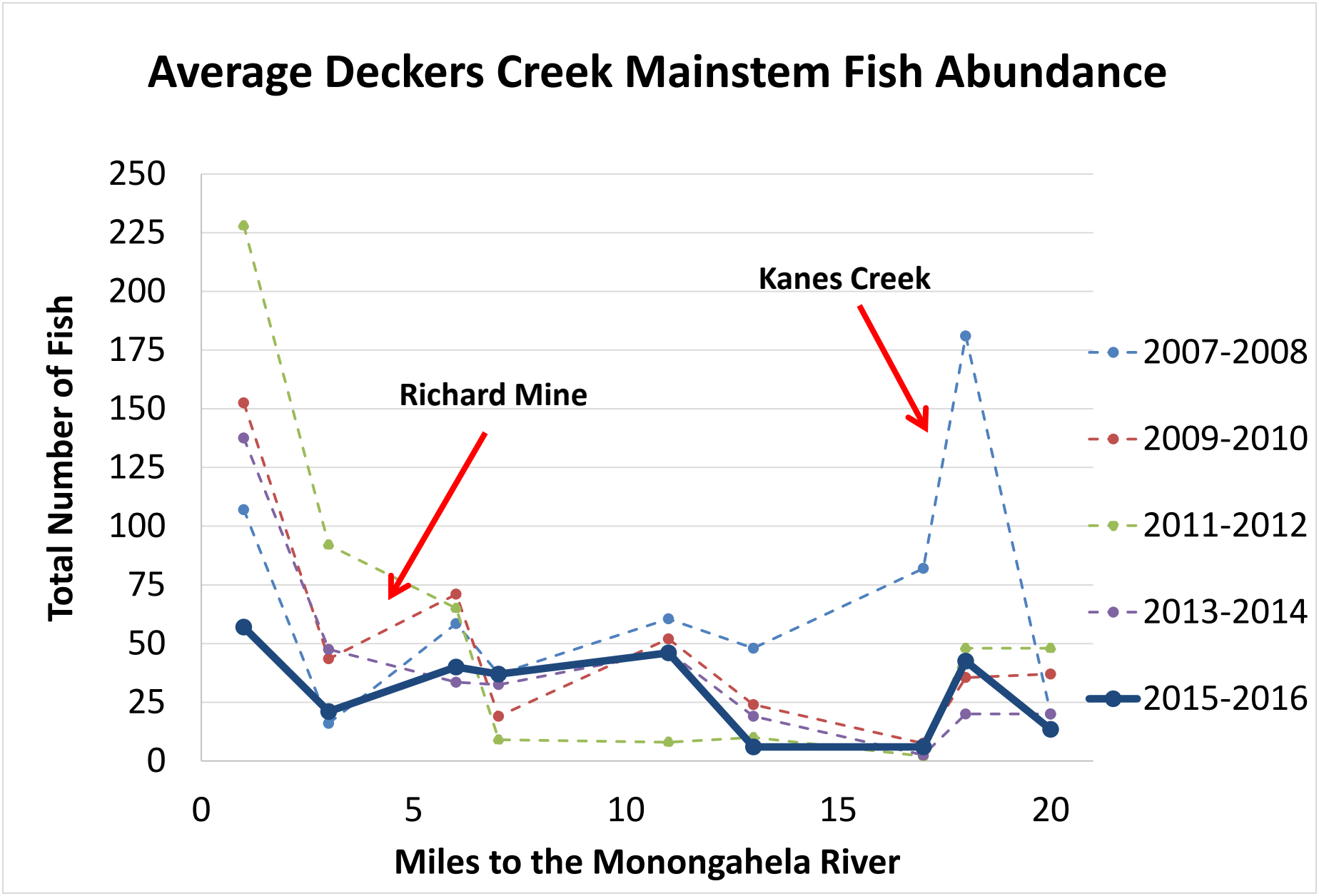

Average Deckers Creek Mainstem WVSCI
WVSCI Score
100
75
50
25
0
0
5
10
15
20
Miles to the Monongahela River
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016


Average Deckers Creek Mainstem WVSCI
Richard Mine
Kanes Creek
WVSCI Score
100
75
50
25
0
0
5
10
15
20
Miles to the Monongahela River
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016

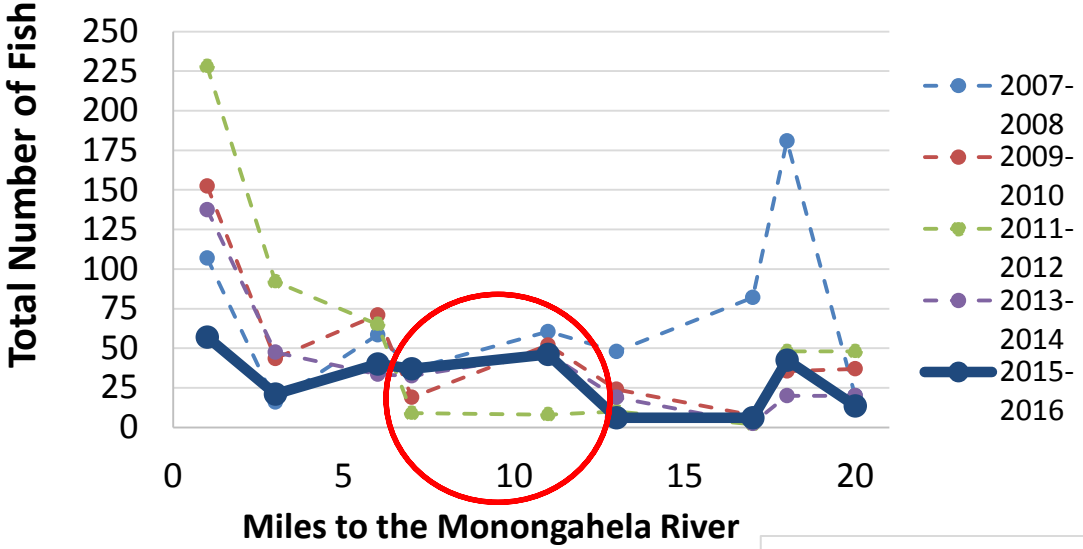

Average Deckers Creek Mainstem Fish Diversity
Number of Fish Species
20
18
16
14
12
10
8
6
4
2
0
0
5
10
15
20
Miles to the Monongahela River
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016

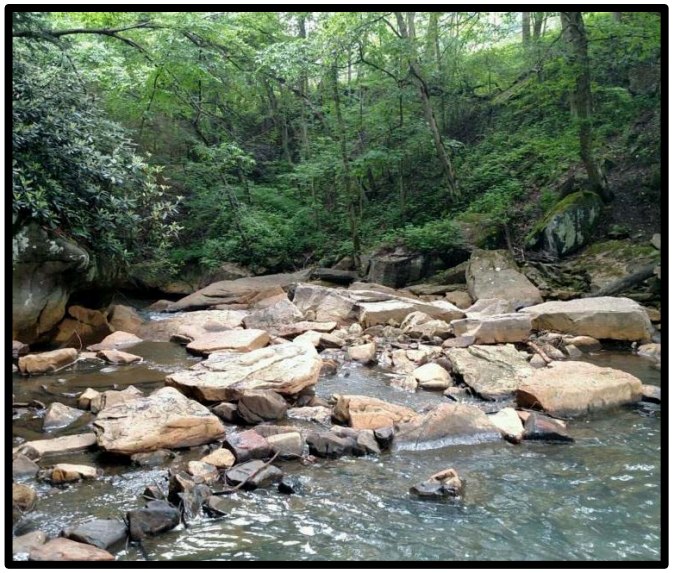

Average Deckers Creek Mainstem Fish Diversity
Richard Mine
Kanes Creek
Number of Fish Species
Miles to the Monongahela River
0
2
4
6
8
10
12
14
16
18
20
0
5
10
15
20
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016

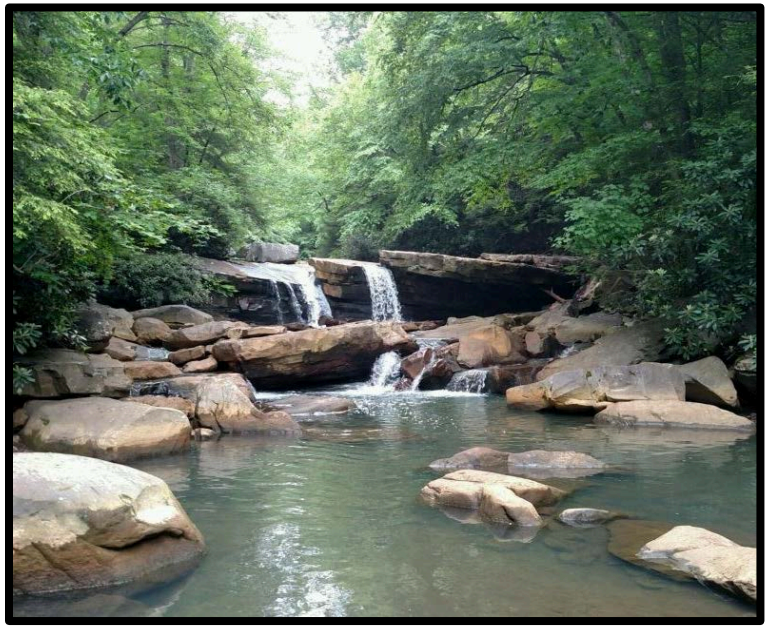

Average Deckers Creek Mainstem Fish Abundance
Total Number of Fish
250
225
200
175
150
125
100
75
50
25
0
0
5
10
15
20
Miles to the Monongahela River
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016


Average Deckers Creek Mainstem Fish Abundance
Total Number of Fish
250
225
200
175
150
125
100
75
50
25
0
0
5
10
15
20
Miles to the Monongahela River
Richard Mine
Kanes Creek
2007-2008
2009-2010
2011-2012
2013-2014
2015-2016

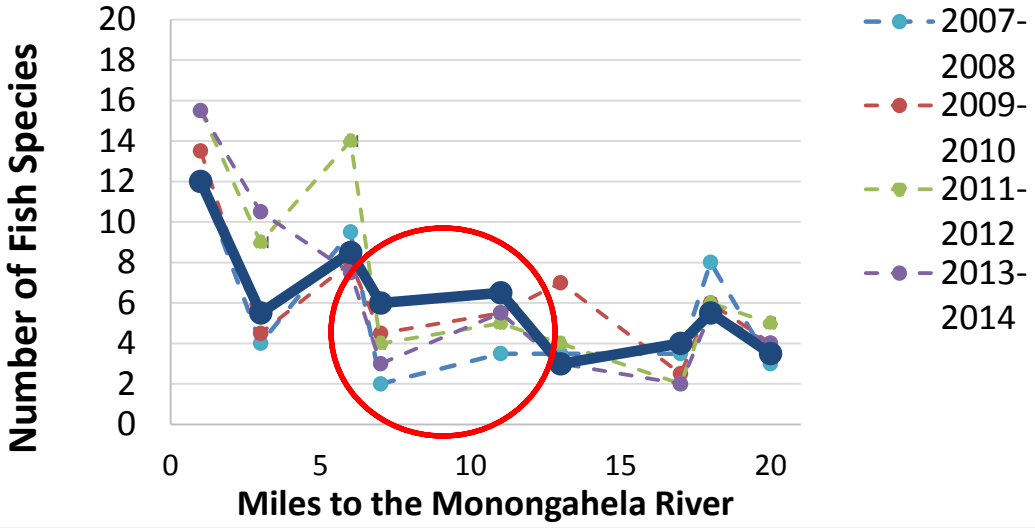
Average Deckers Creek Mainstem Fish Abundance

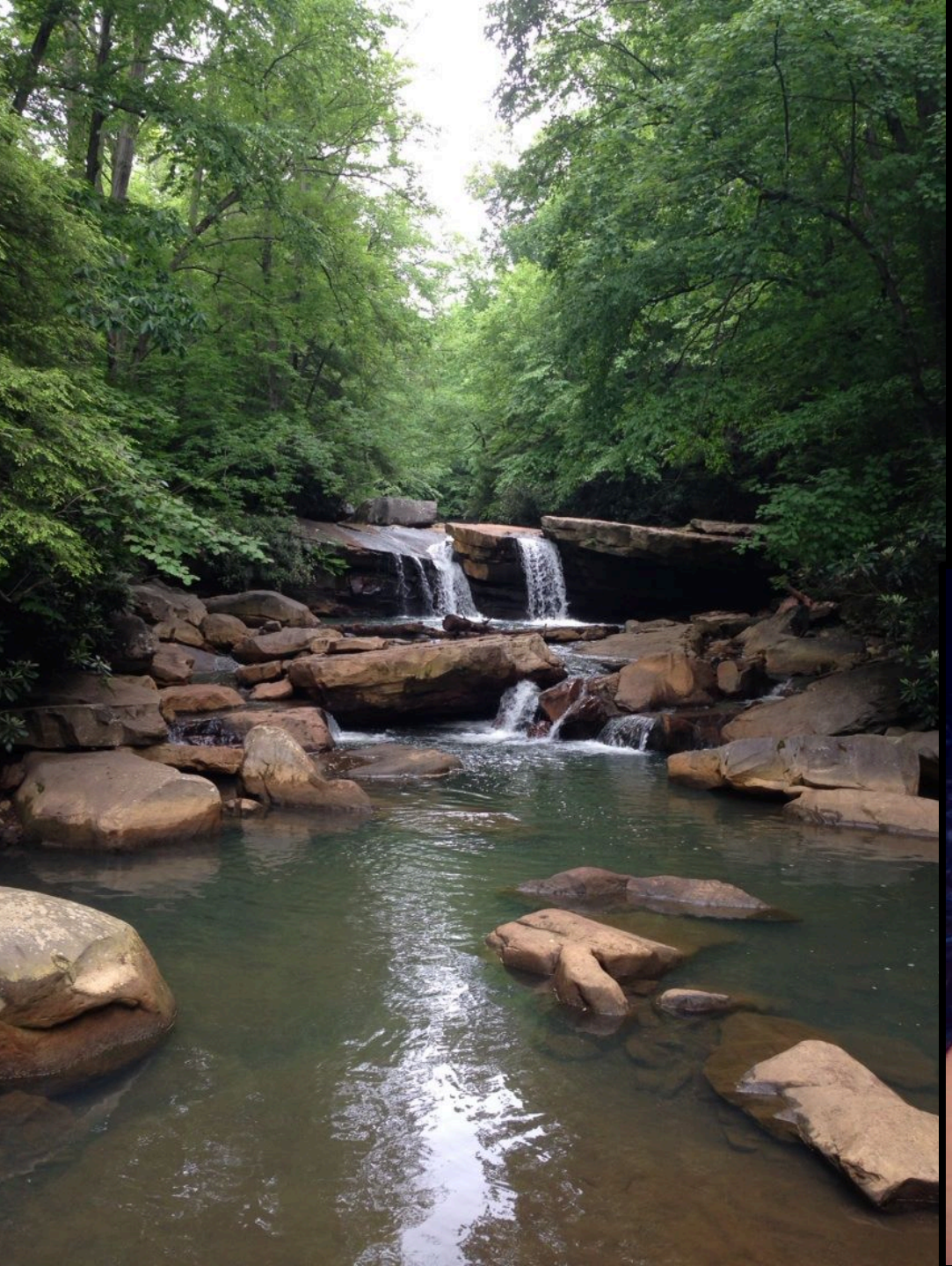






Average Deckers Creek Mainstem Fish Diversity

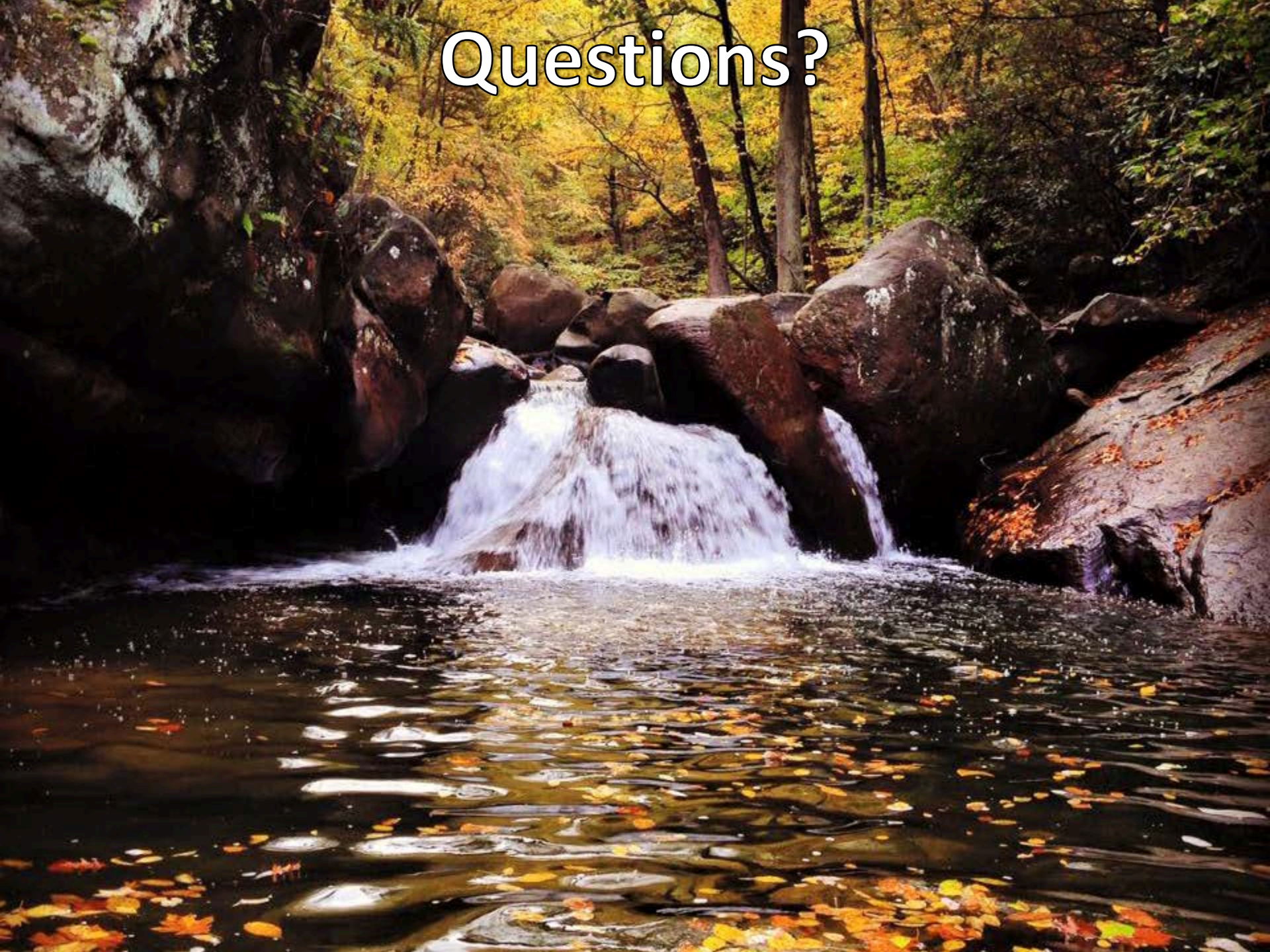





STAINLESS STEEL

Discussion

- Strongest improvements are on Kanes Creek near our project sites
- Headwater chemistry improvements appear to also be reflected downstream in the mainstem, although to a lesser degree
- WVSCI and fish abundance/diversity variability may be due to other environmental conditions or the chance of sampling during spawning events
- While the entire mainstem is seeing water quality improvements, certain areas are seeing more biological improvement than others. This may require additional physical habitat or other studies to determine why.


Questions?