SRBC's Emerging Lesser Quality Waters Policy and Mine Drainage Treatment Project Updates

Jim Richenderfer, Ph.D., P.G.
Director, Technical Programs
Susquehanna River Basin Commission

Tom Clark
Mine Drainage Program Coordinator
Susquehanna River Basin Commission

Susquehanna River Basin

The Basin:

- 27,510-square-mile watershed
- Comprises 43 percent of the Chesapeake Bay watershed
- 4.2 million population
- 60 percent forested
- 32,000+ miles of waterways

The Susquehanna River:

- 444 miles, largest tributary to the Chesapeake Bay
- On average; river supplies 18 million gpm (26 billion gpd) to the Bay

What Does SRBC Regulate?

- Surface Water Withdrawals; Threshold (100,000 gpd)
- Groundwater Withdrawals; Threshold (100,000 gpd)
- Consumptive Use; Threshold (20,000 gpd)
- For Unconventional Natural Gas Industry, all Regulatory Thresholds are Set at Gallon One!

Policies on Lesser Quality Waters

SRBC Resolution 2009-01: Application Fee Policy for Mine Drainage Withdrawals:

"The Commission has always encouraged the use (or reuse) of the lowest quality waters that will satisfy a proposed use, particularly when that use is consumptive with respect to waters of the basin." At December 4, 2008, business meeting, the Commissioners discussed incentives for the use of waters impacted by mining activities. Incentives captured in Resolution 2009-01.

Policies on Lesser Quality Waters

SRBC Resolution 2012-01: Use and Reuse of Lesser Quality Water.

"A RESOLUTION of the Susquehanna River Basin Commission establishing a policy to encourage and require the use and reuse of lesser quality water."

Policies on Lesser Quality Waters

SRBC Resolution 2012-06: Regulatory Program Fee Schedule.

Condition 11. . . . . .“Any requests for waivers or partial waivers for application fees related to projects proposing to use mine degraded water shall be considered in accordance with Commission Policy No. 2009-01.

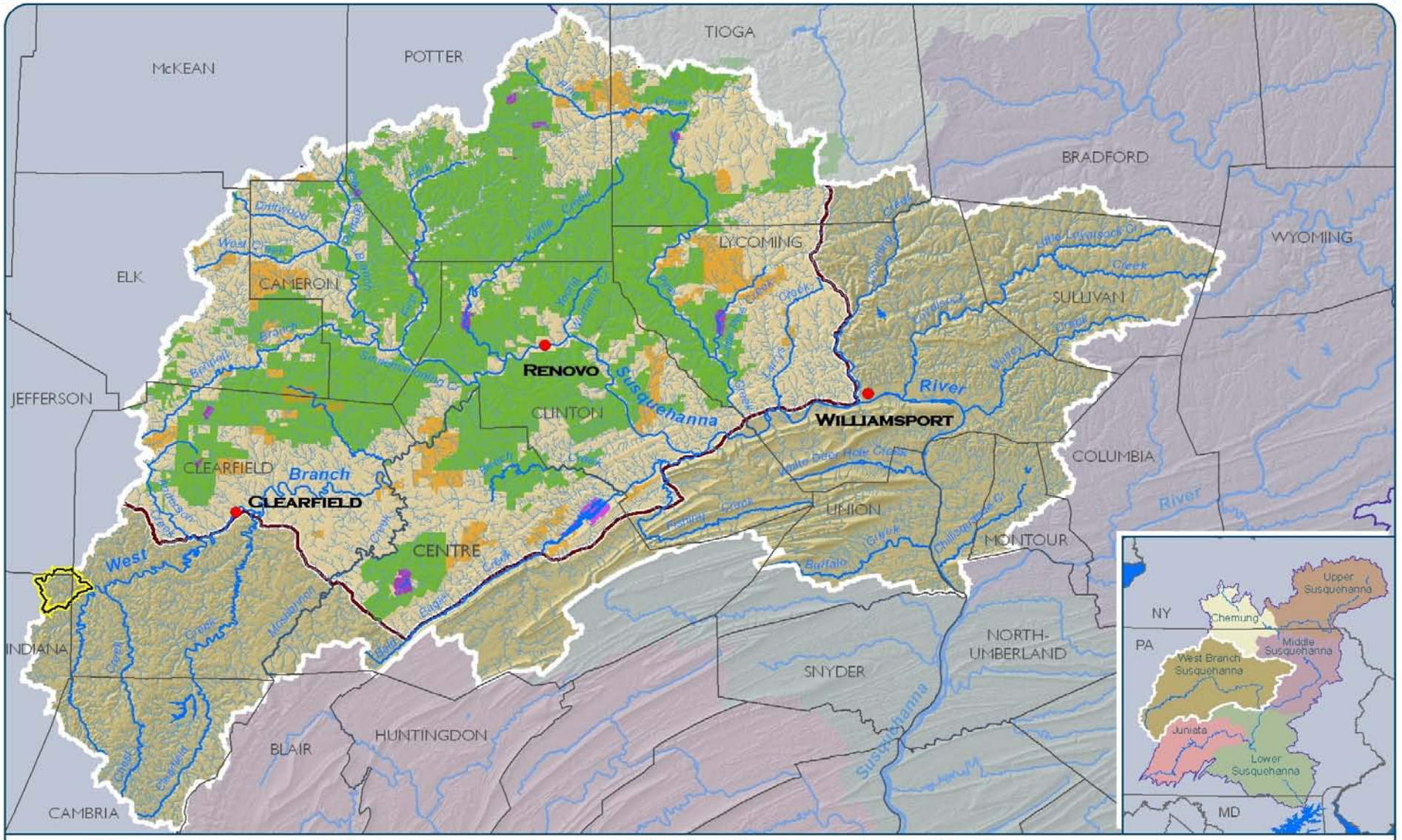
SRBC Mine Drainage Projects

- **Mine Drainage Water Quality Data Portal**
- **Bear Run Renaissance Initiative**
- **Old Forge Borehole/Duryea Breach Treatment**
- Drury Run/Birch Island Run Restoration
- Mine Pool Mapping w/EPCAMR


Bear Run Watershed
Renaissance Project

BEAR RUN WATERSHED & THE PENNSYLVANIA WILDS

In Reference to the West Branch Susquehanna Subbasin



State Forest | Gameland | Population Center | Major Stream | Bear Run Watershed

State Park | PA Wilds Boundary | County Boundary | Water Body | 2007

Sources

Major Water Features: National Hydrography Dataset (NHD), USGS; Subbasins: SRBC, 2006; Population Centers: Environmental Systems Research Institute;

County Line: PA Department of Transportation, Cartographic Information Division, 1997; PA Wilds, State Parks, State Forests: PA Department of Conservation & Natural Resources, Gamelands: PA Game Commission, 2004.

0 5 10 20 Miles

Susquehanna River Basin Commission

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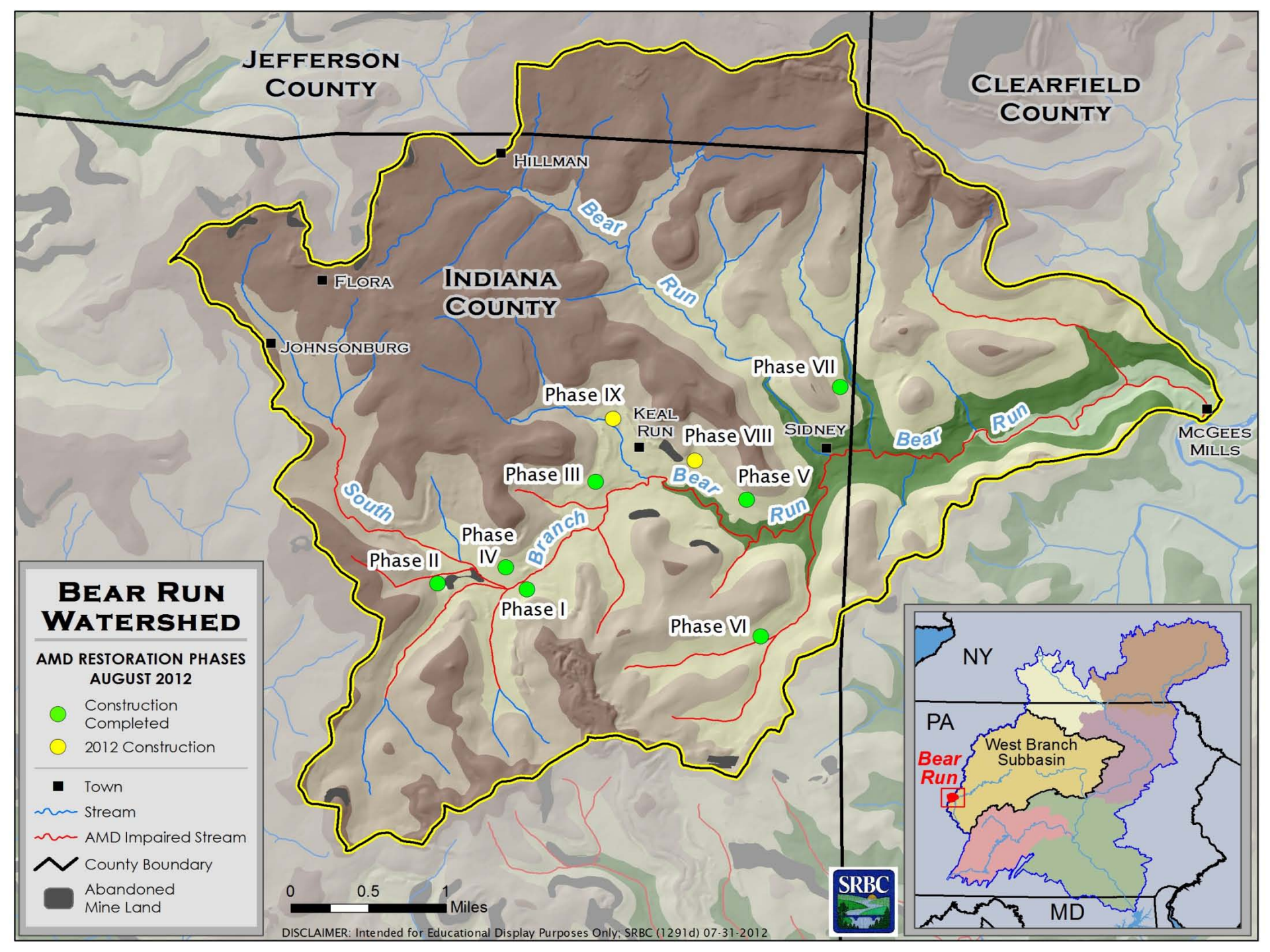
SRBC (1291a) 03-13-2007


Jefferson County
Clearfield County
Indiana County
Hillman
Flora
Johnsonburg
Keal Run
Sidney
McGees Mills
Bear Run
South Branch Bear Run
Phase I
Phase II
Phase III
Phase IV
Phase V
Phase VI
Phase VII
Phase VIII
Phase IX
Bear Run Watershed
AMD Restoration Phases
August 2012
Construction Completed
2012 Construction
Town
Stream
AMD Impaired Stream
County Boundary
Abandoned Mine Land
0
0.5
1
Miles
DISCLAIMER: Intended for Educational Display Purposes Only; SRBC (1291d) 07-31-2012
SRBC
NY
PA
MD
West Branch Subbasin
Bear Run


10/16/2008
1993
2011
Bear Run Phase II 2008
Lochvale Rd
© 2011 Google
Image USDA Farm Service Agency
Google earth
Imagery Date: 5/27/2008
1993
40°51'49.39" N 78°51'13.00" W elev 1639 ft
Eye alt 4797 ft


10/6/2011
1993
2011
Bear Run Phase II 2011
Lochvale Rd
© 2011 Google
Google earth
Imagery Date: 10/6/2011
1993
40°51'49.39" N 78°51'13.00" W elev 1639 ft
Eye alt 4797 ft

Bear Run Phase IV 2008

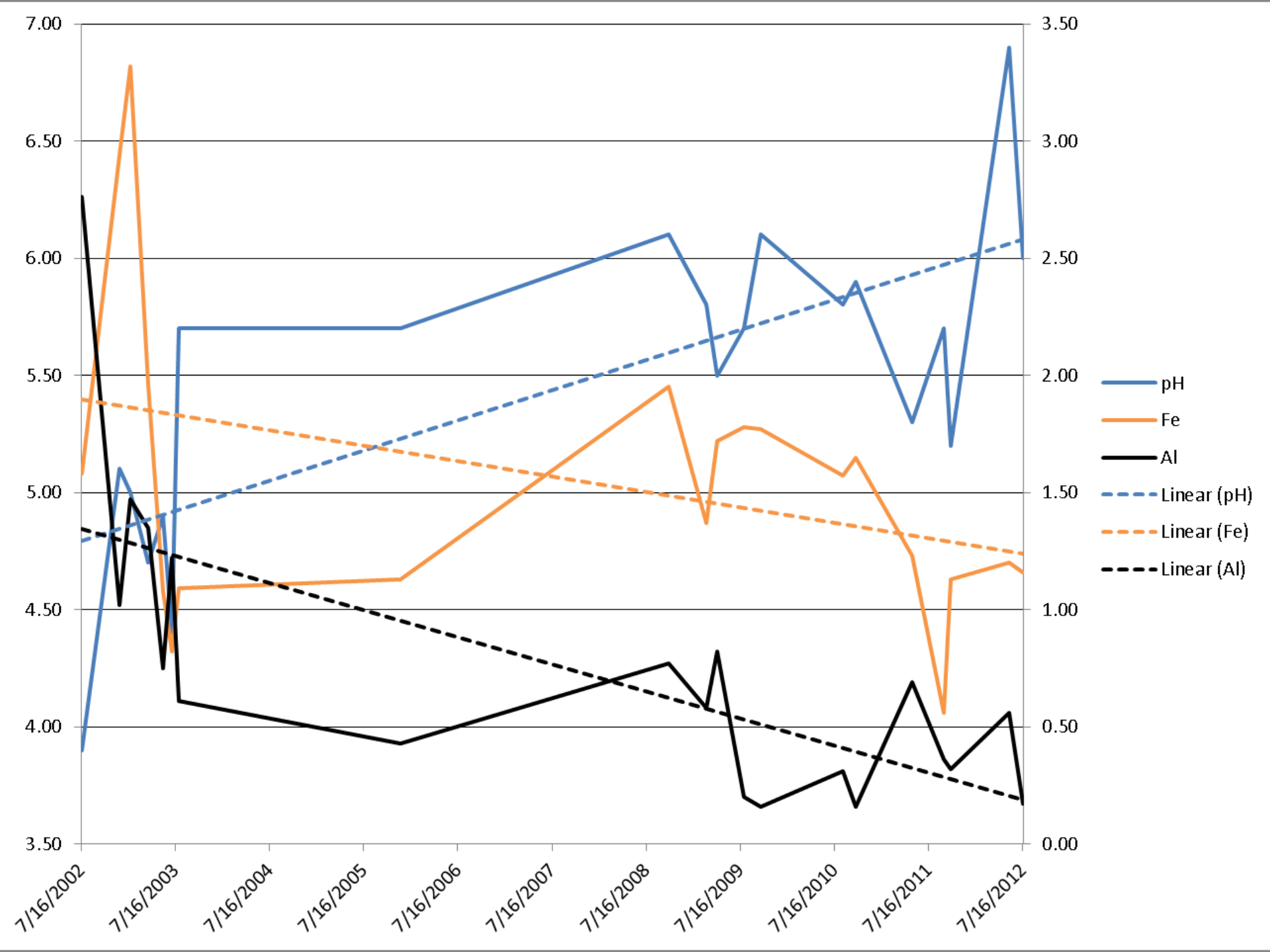
Phase IV Mine Blowout (April 2011)


Phase IV Single Drain


10/6/2011
1993
2011
Bear Run Phase IV 2011
© 2012 Google
Google earth
Imagery Date: 10/6/2011
1993
lat 40.864827° lon -78.846979° elev 1626 ft
Eye alt 2455 ft


Bear Run Phase IV 2012

Bear Run Phase VI Lime Silo

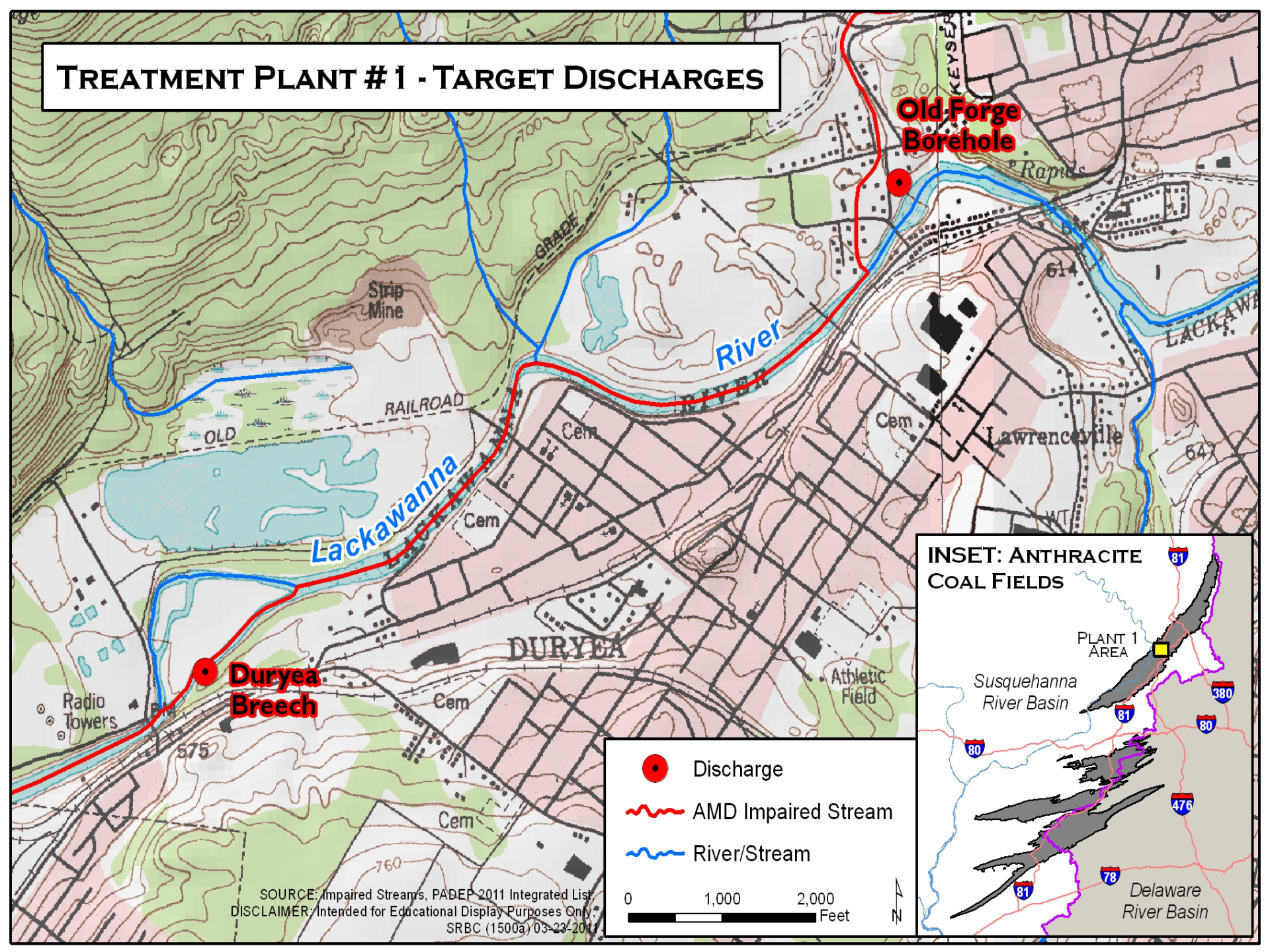

7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
7/16/2002
7/16/2003
7/16/2004
7/16/2005
7/16/2006
7/16/2007
7/16/2008
7/16/2009
7/16/2010
7/16/2011
7/16/2012
pH
Fe
Al
Linear (pH)
Linear (Fe)
Linear (Al)

Old Forge Borehole and Duryea Breach Monitoring

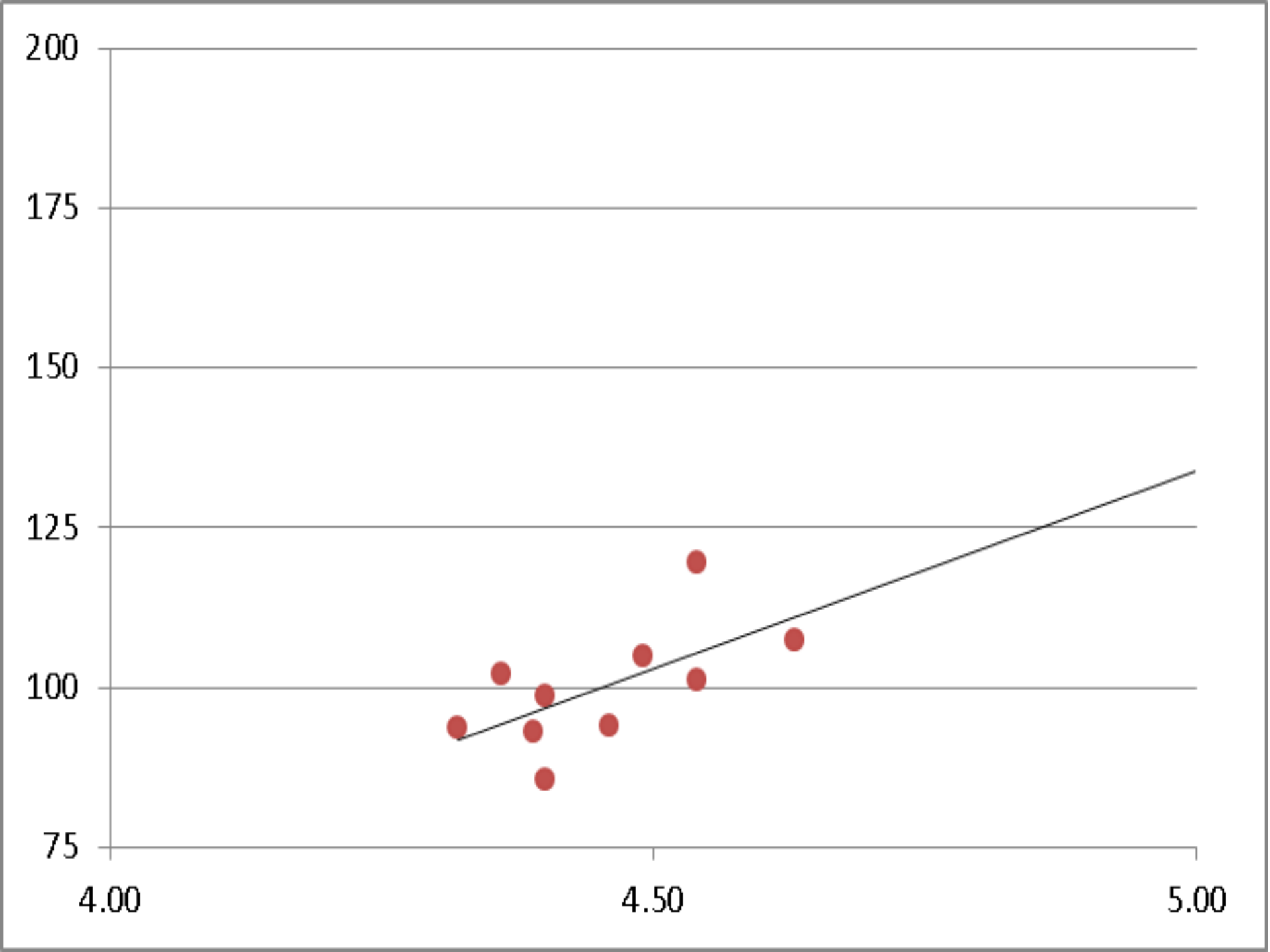
Anthracite Remediation Strategy

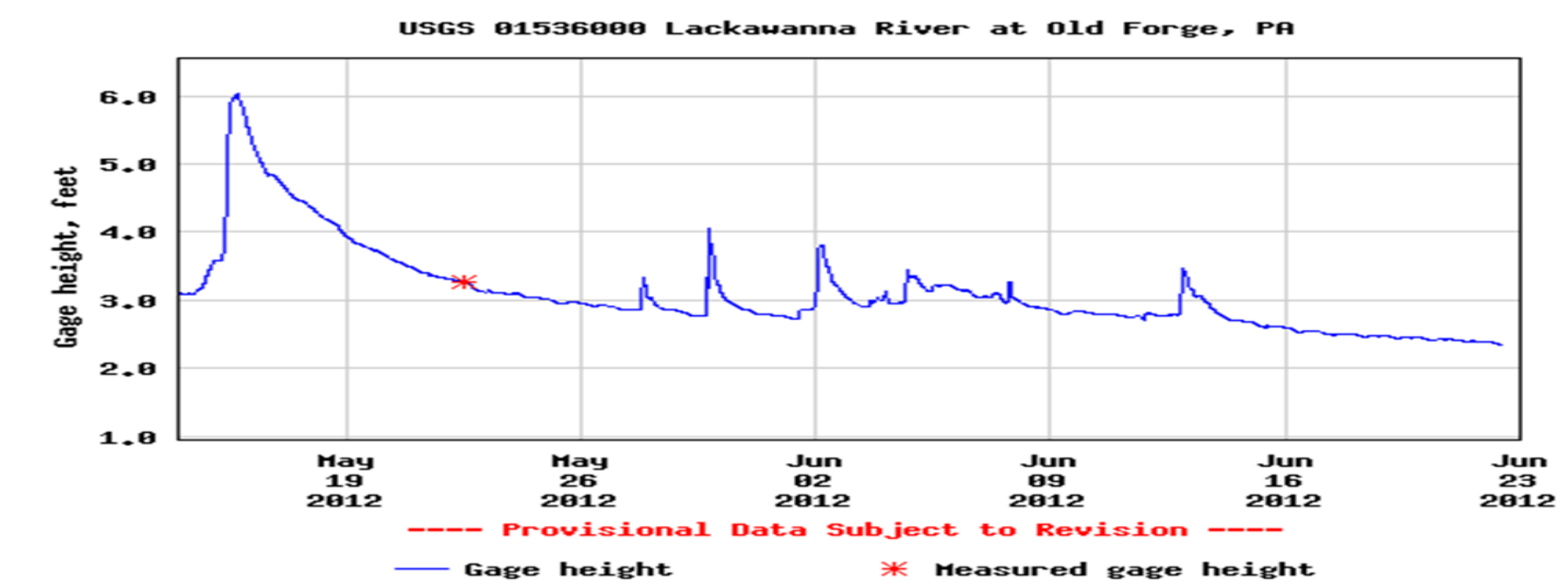
- 10 strategically placed active treatment plants
- Lackawanna Plant (#1 Recommended) would treat the Old Forge Borehole and Duryea Breach in combination.
- Old Forge and Duryea combined contribute 25% of iron loading that enters the Susquehanna Basin from the Anthracite.
- Old Forge never truly monitored for flow and water quality for both is dated.

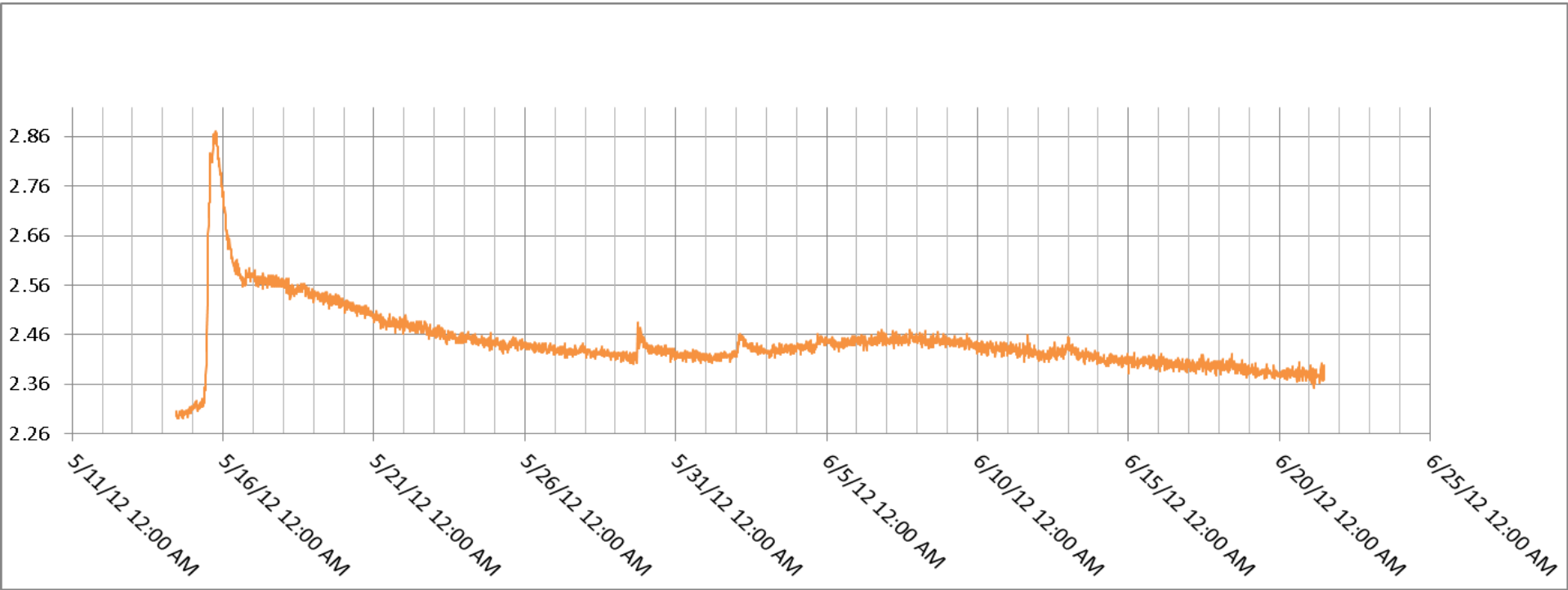
Treatment Plant #1 - Target Discharges



Old Forge Flow Monitoring


200
175
150
125
100
75
4.00
4.50
5.00


USGS 01536000 Lackawanna River at Old Forge, PA
Gage height, feet
6.0
5.0
4.0
3.0
2.0
1.0
May 19 2012
May 26 2012
Jun 02 2012
Jun 09 2012
Jun 16 2012
Jun 23 2012
---- Provisional Data Subject to Revision ----
Gage height
Measured gage height

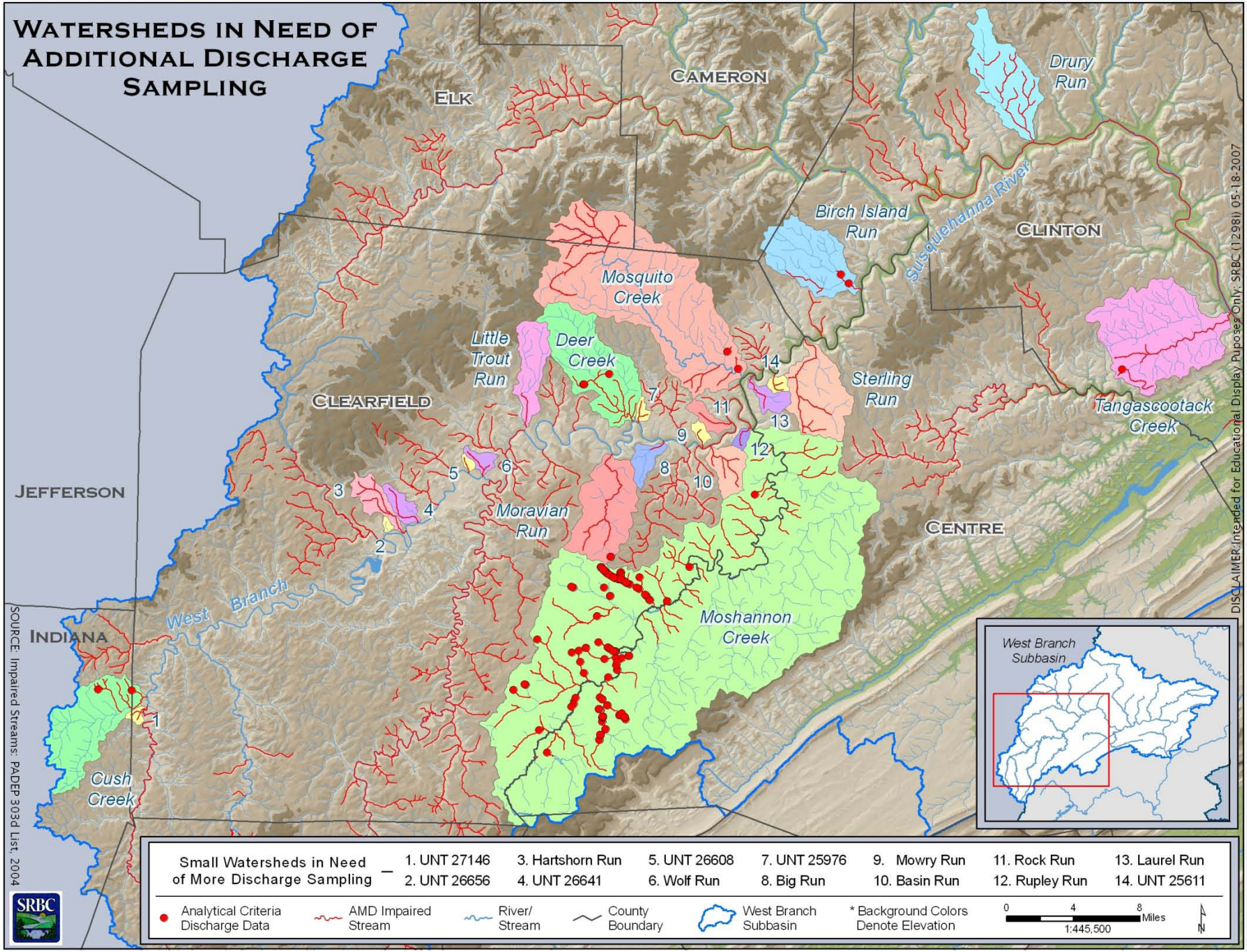

2.86
2.76
2.66
2.56
2.46
2.36
2.26
5/11/12 12:00 AM
5/16/12 12:00 AM
5/21/12 12:00 AM
5/26/12 12:00 AM
5/31/12 12:00 AM
6/5/12 12:00 AM
6/10/12 12:00 AM
6/15/12 12:00 AM
6/20/12 12:00 AM
6/25/12 12:00 AM

Old Forge/Duryea Quality and Loading

Discharge	Ave Flow CFS	Ave Fe mg/l	Ave Mn mg/l	Ave Al mg/l	Ave Net Acid mg/l	Ave Fe Load tons/day	Ave Mn Load tons/day	Ave Al Load tons/day	Ave Net Acid Load tons/day
Old Forge	100	15.0	2.0	0.1	-69.0	4.0	0.5	~0.0	-18.6
Duryea	24	17.0	2.3	0.1	-60.0	1.1	0.7	~0.0	-3.9
Combined OF&D	124					**5.1**	**1.2**	**~0.0**	**-22.5**
Lancashire #15	11	200.0	na	40	na (pH 2.7)	**5.9**	**na**	**1.2**	**na (24 tons/day hydrated lime)**

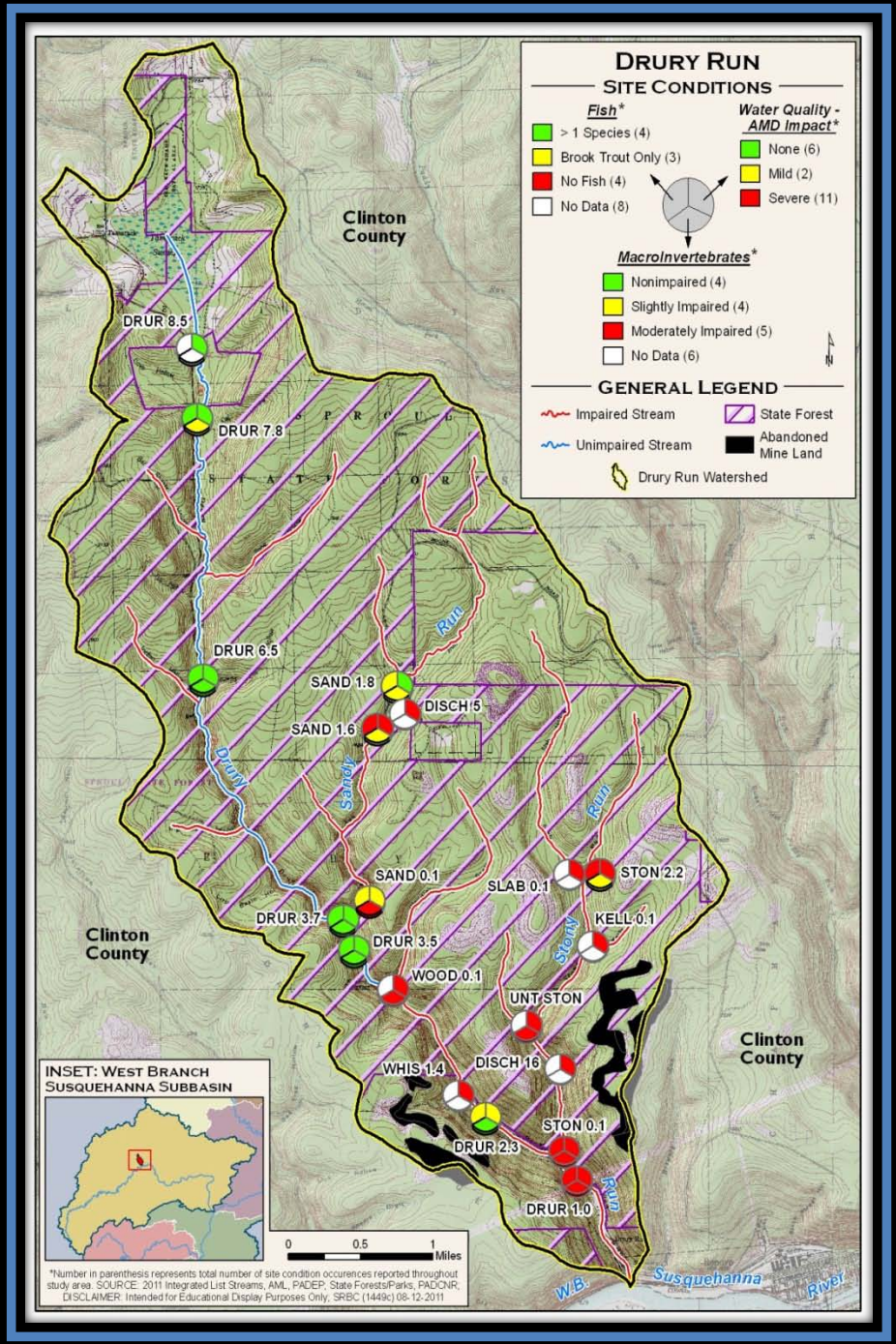
- Since highly (-) net acidic, no alkaline (lime) cost.
- Large flows could be harnessed for electrical needs.
- Since no alkaline material needed, iron sludge should be attractive to business/industry.

Drury Run/Birch Island Run Restoration


Watersheds in Need of Additional Discharge Sampling
Elk
Cameron
Drury Run
Birch Island Run
Susquehanna River
Clinton
Mosquito Creek
Little Trout Run
Deer Creek
Sterling Run
Tangascootack Creek
Clearfield
Jefferson
Moravian Run
Centre
Moshannon Creek
West Branch
Indiana
Cush Creek
1
2
3
4
5
6
7
8
9
10
11
12
13
14
West Branch Subbasin
Small Watersheds in Need of More Discharge Sampling
1. UNT 27146
2. UNT 26656
3. Hartshorn Run
4. UNT 26641
5. UNT 26608
6. Wolf Run
7. UNT 25976
8. Big Run
9. Mowry Run
10. Basin Run
11. Rock Run
12. Rupley Run
13. Laurel Run
14. UNT 25611
Analytical Criteria Discharge Data
AMD Impaired Stream
River/ Stream
County Boundary
West Branch Subbasin
* Background Colors Denote Elevation
0 4 8 Miles
1:445,500
N
SOURCE: Impaired Streams: PADEP 303d List, 2004
SRBC
DISCLAIMER: Intended for Educational Display Puposes Only. SRBC (12981) 05-18-2007

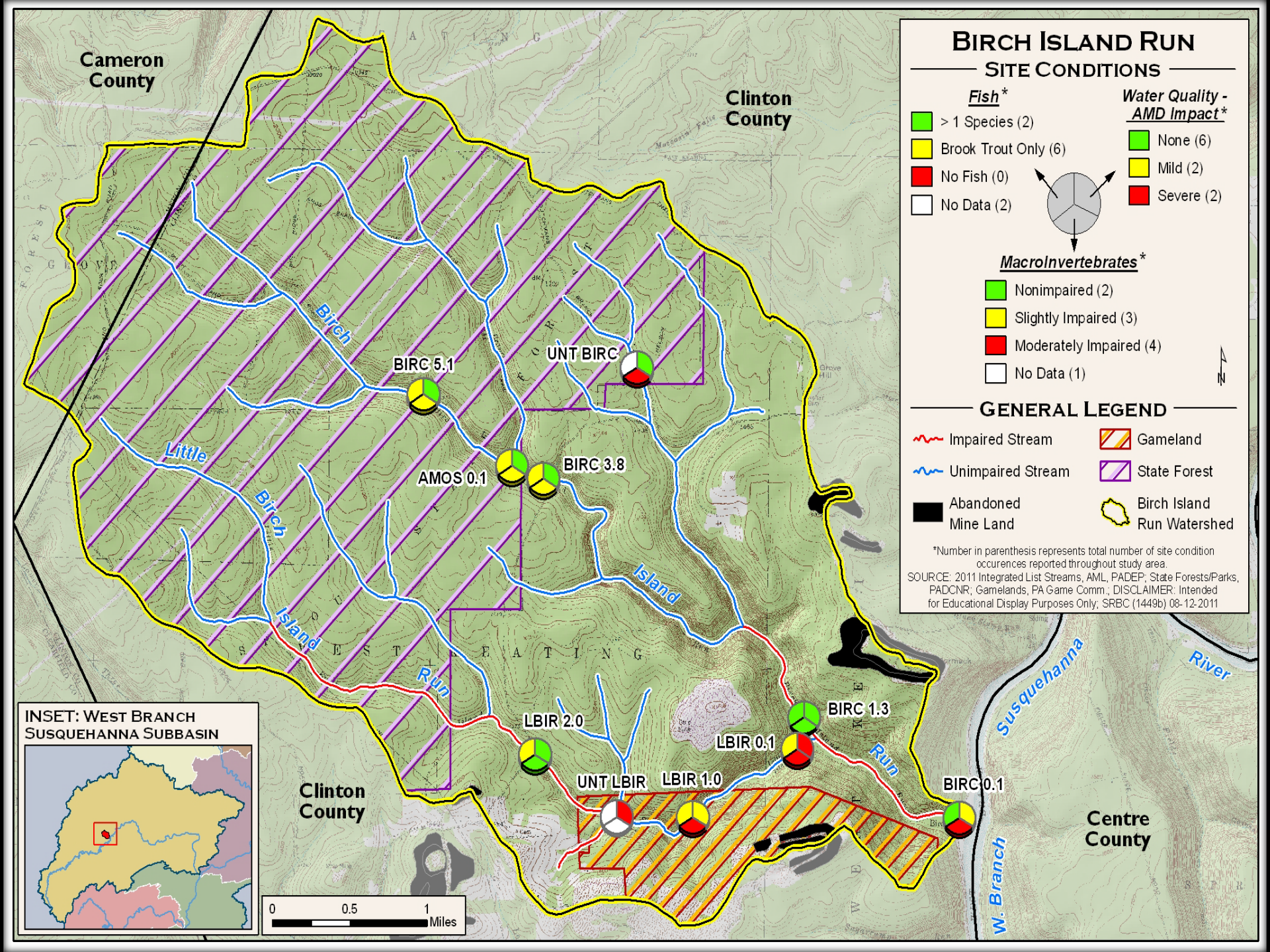
West Branch Year II Assessment

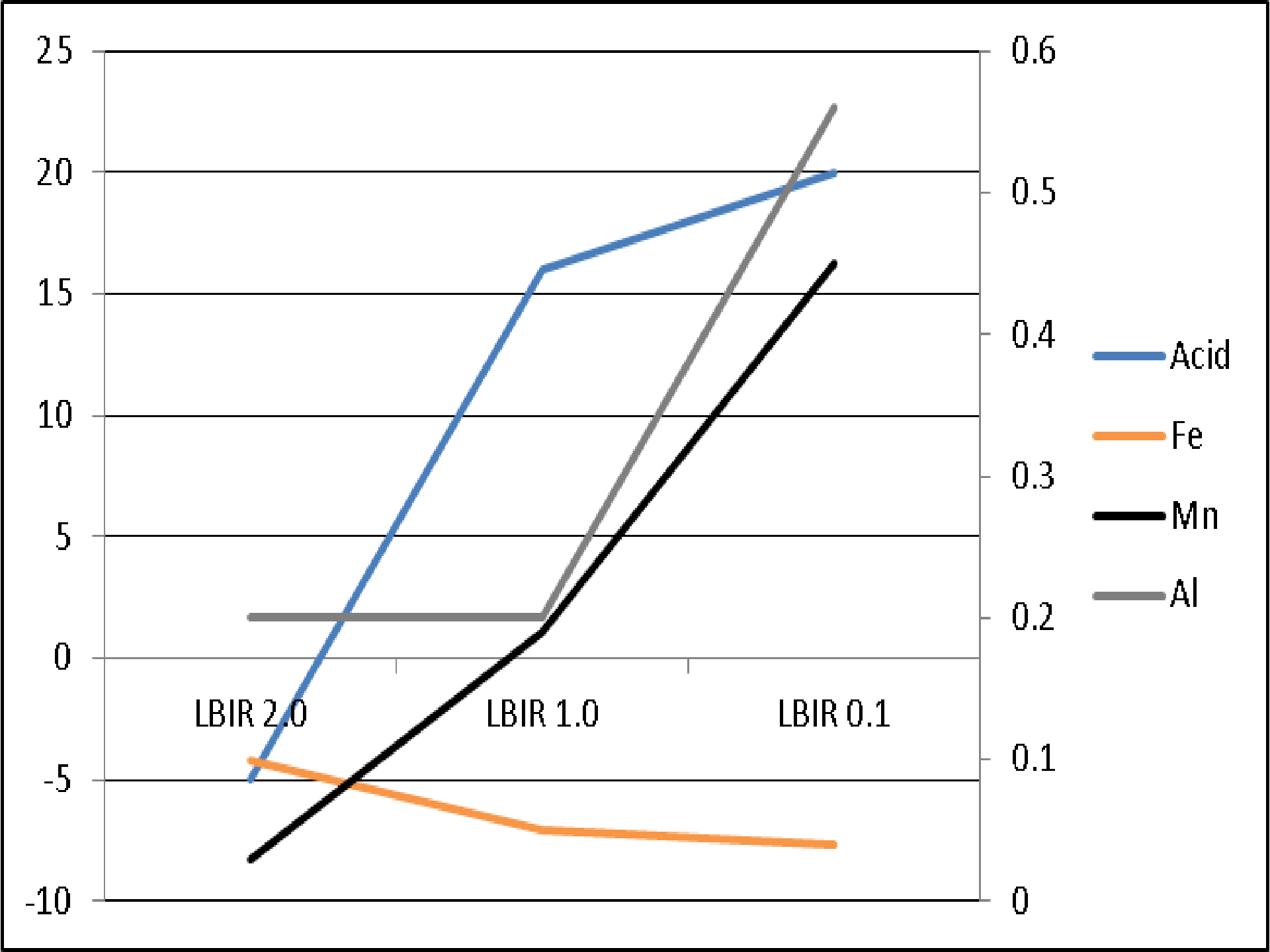
- Assessed discharge and stream stations in Drury Run and Birch Island Run seasonally during 2010-2011.
- Macroinvertebrates and fish also collected.
- Hardcopies of the Year II Report can be found at SRBC's display table.
- Digital copies of the Year II Report can be downloaded at: http://www.srbc.net/pubinfo/techdocs/Publication_275/techreport275.htm



Percent Contributions for Each Tributary Source in Drury Run and Total MD Loading in lbs/day

Tributary	Acid. Load	Mn Load	Al Load	Total Load
Sandy Run	11	3	4	10
Woodley Draft	5	2	6	5
Whiskey Run	17	11	15	16
Stony Run	67	84	75	69
Total lbs/day	550	50	58	658


Cameron County
Clinton County
Clinton County
Centre County
Birch
Little Birch
Island Run
Island Run
Susquehanna River
W. Branch
BIRC 5.1
UNT BIRC
AMOS 0.1
BIRC 3.8
LBIR 2.0
UNT LBIR
LBIR 1.0
LBIR 0.1
BIRC 1.3
BIRC 0.1
Birch Island Run
Site Conditions
Fish*
> 1 Species (2)
Brook Trout Only (6)
No Fish (0)
No Data (2)
Water Quality - AMD Impact*
None (6)
Mild (2)
Severe (2)
MacroInvertebrates*
Nonimpaired (2)
Slightly Impaired (3)
Moderately Impaired (4)
No Data (1)
General Legend
Impaired Stream
Unimpaired Stream
Abandoned Mine Land
Gameland
State Forest
Birch Island Run Watershed
*Number in parenthesis represents total number of site condition occurences reported throughout study area.
SOURCE: 2011 Integrated List Streams, AML, PADEP; State Forests/Parks, PADCNR; Gamelands, PA Game Comm.; DISCLAIMER: Intended for Educational Display Purposes Only; SRBC (1449b) 08-12-2011
INSET: West Branch Susquehanna Subbasin
0
0.5
1
Miles


25
20
15
10
5
0
-5
-10
0.6
0.5
0.4
0.3
0.2
0.1
0
LBIR 2.0
LBIR 1.0
LBIR 0.1
Acid
Fe
Mn
Al

Drury Run Restoration Recommendations

- Treat Discharge #5 in the Sandy Run Tributary with an Oxic Limestone Drain. Treatment would restore ~2 miles of Sandy Run, a native trout fishery.
- Treat Stony Run with the installation of a headwater lime dosing silo.
- Complete post restoration monitoring to determine if restoration is needed on Whiskey Run and/or Woodley Draft.
- Potential for 11.2 stream miles removed from the Impaired Waters List with another 8.9 miles improved significantly.

Birch Island Run Recommendations

- Little Birch Island Run is impaired by a long stretch of surface mine seeps in very steep topography.
- Consequently, the recommended option is to add alkalinity into Little Birch Island Run to assimilate the MD loading from these many sources.
- Since this impairment is more of a “wet-weather” issue, more sampling is needed to calculate alkalinity amount and timing.