LASTING IMPACTS OF OFF-LINE PERIODS IN LIME-DOSED STREAMS - OHIO

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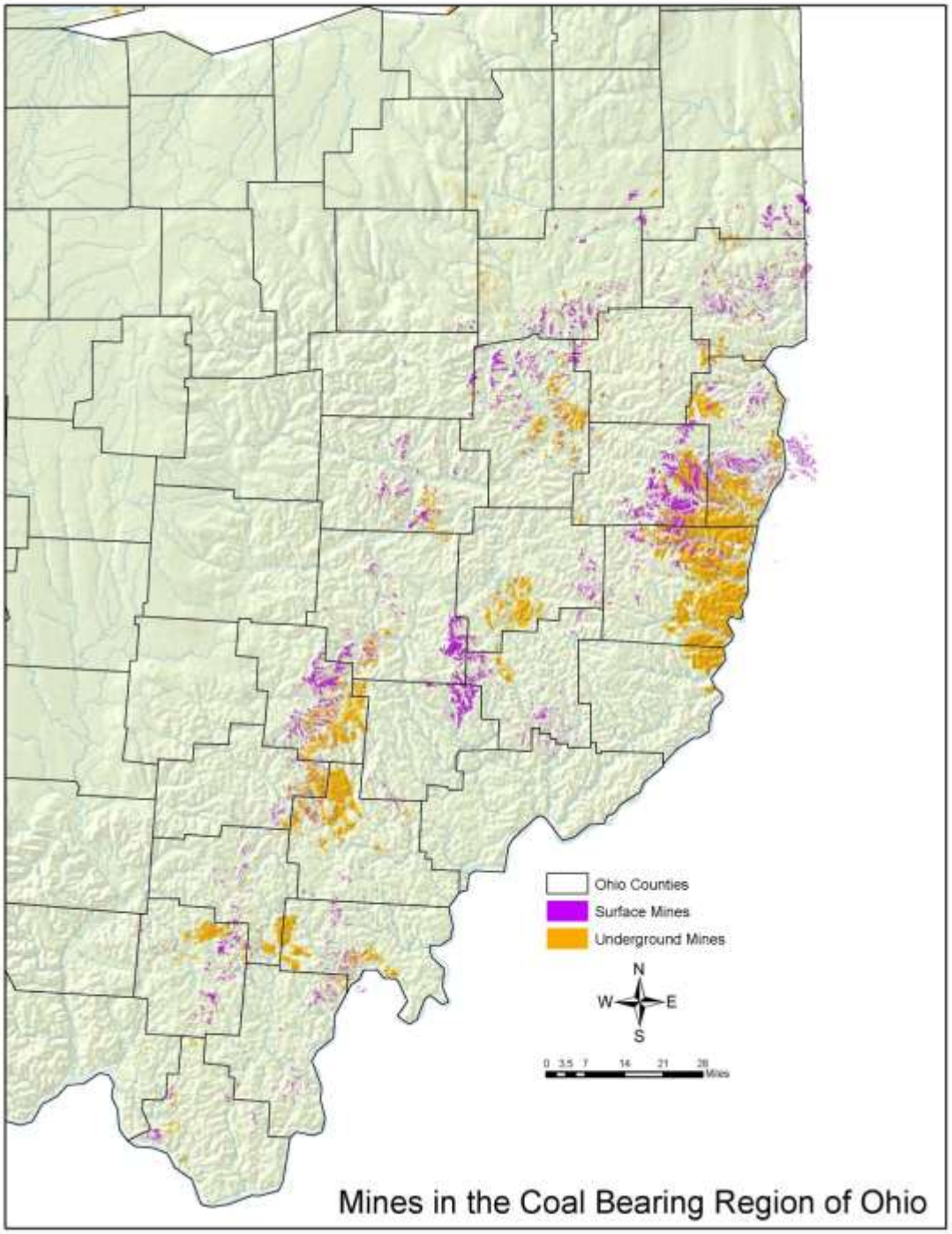
Ohio University

Raccoon Creek Partnership

Ohio Department of Natural Resources

Surface and underground coal mines in Ohio



Ohio AML Program

- Ohio Department of Natural Resources in Partnership with:
  - Ohio EPA
  - Watershed Groups
  - OSM
  - Universities
  - Mining Companies
  - And more…

Attainment Status

- Treatment Goal – maximize attainment of beneficial use within water body.

Narrative Beneficial Uses:

- Cold Water Habitat (CWH)
- Excellent Warm Water Habitat (EWH)
- Warm Water Habitat (WWH)
- Limited Resource Water (LRW-AMD)

Multi-metric Indices

IBI and MIwb

- Fish Community
- Distinct Metric for Headwaters, Wading, Boat

QHEI

- Qualitative Habitat Assessment

ICI

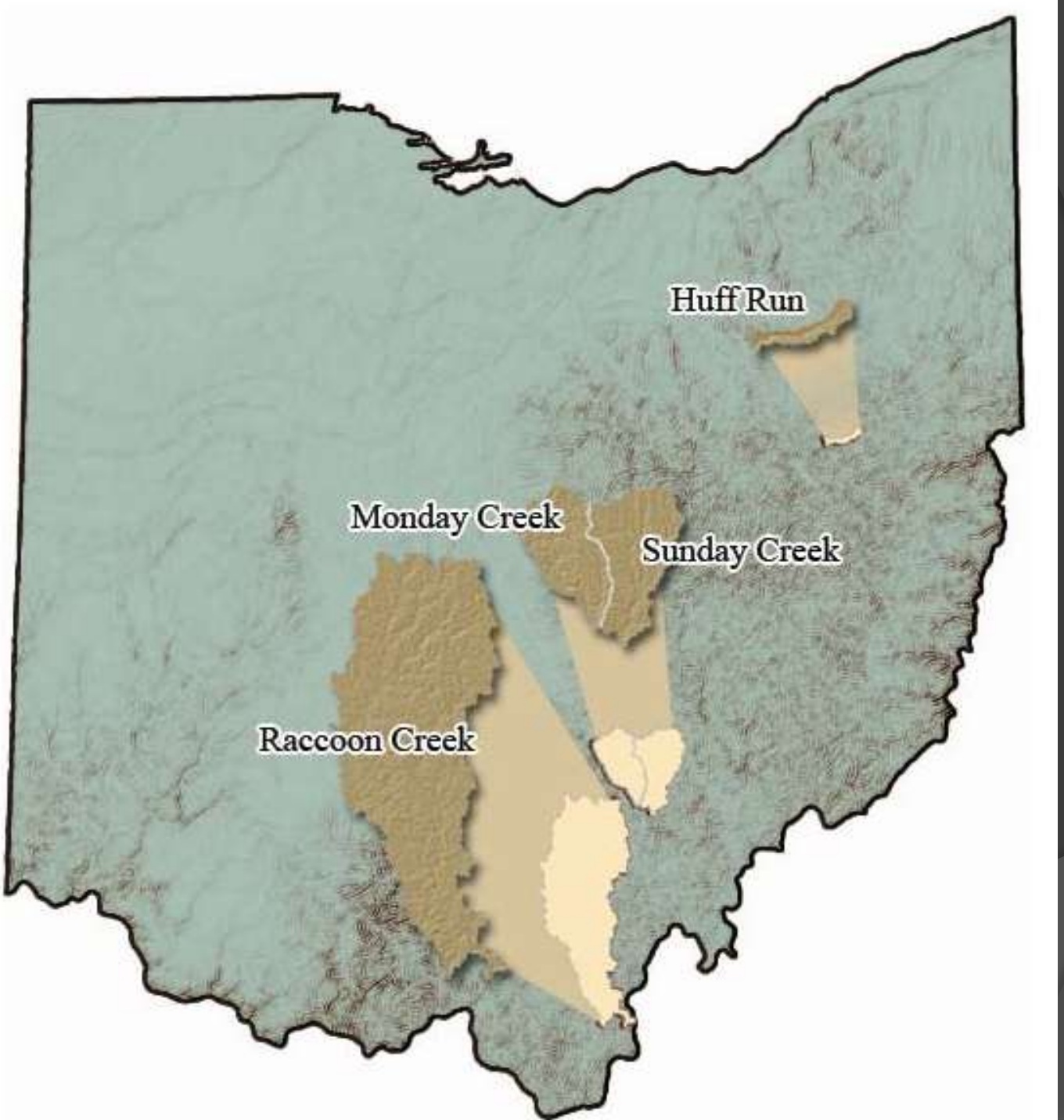
- OEPA Macroinvertebrate metric

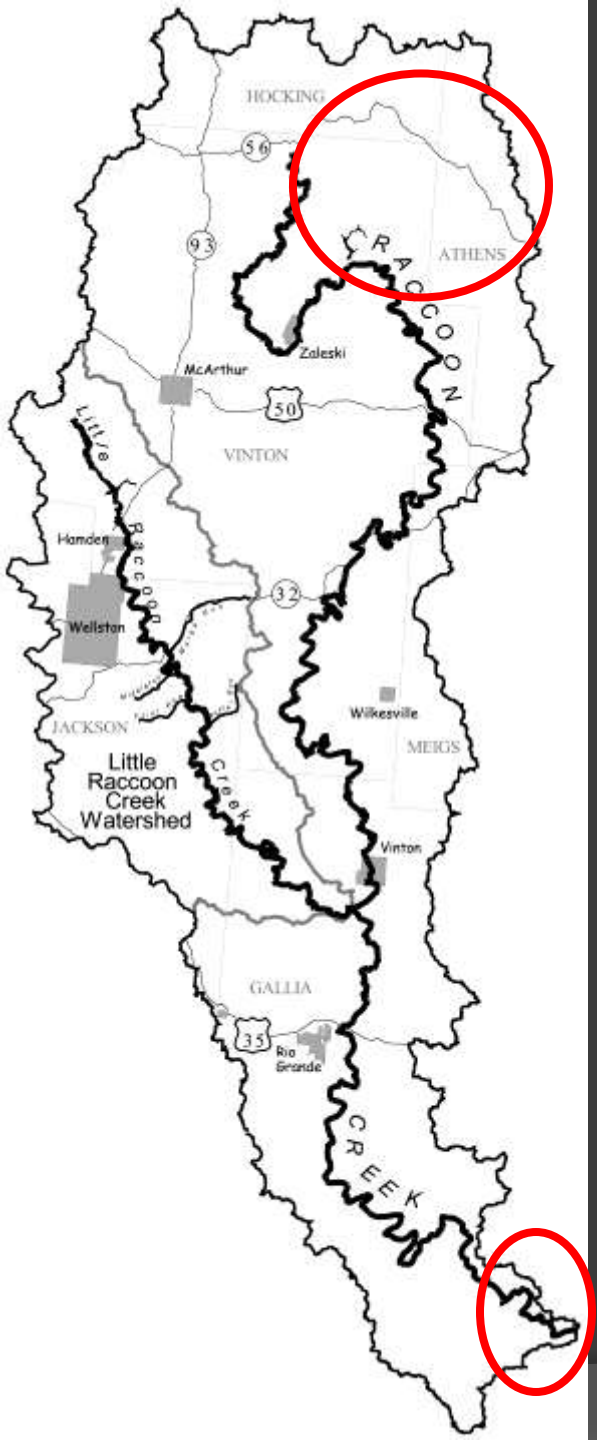
MAIS

- Macroinvertebrate Community
- Rapid Bio-assessment Protocol

Attainment Levels

	Exceptional Warm Water Habitat	Warm Water Habitat	Limited Resource Water – AMD
IBI	50	40	18
MIwb	9.4	8.5	5.9
ICI	48	38	
MAIS		12	
QHEI	75	60	n/a


Huff Run
Monday Creek
Sunday Creek
Raccoon Creek



The Raccoon Creek Watershed

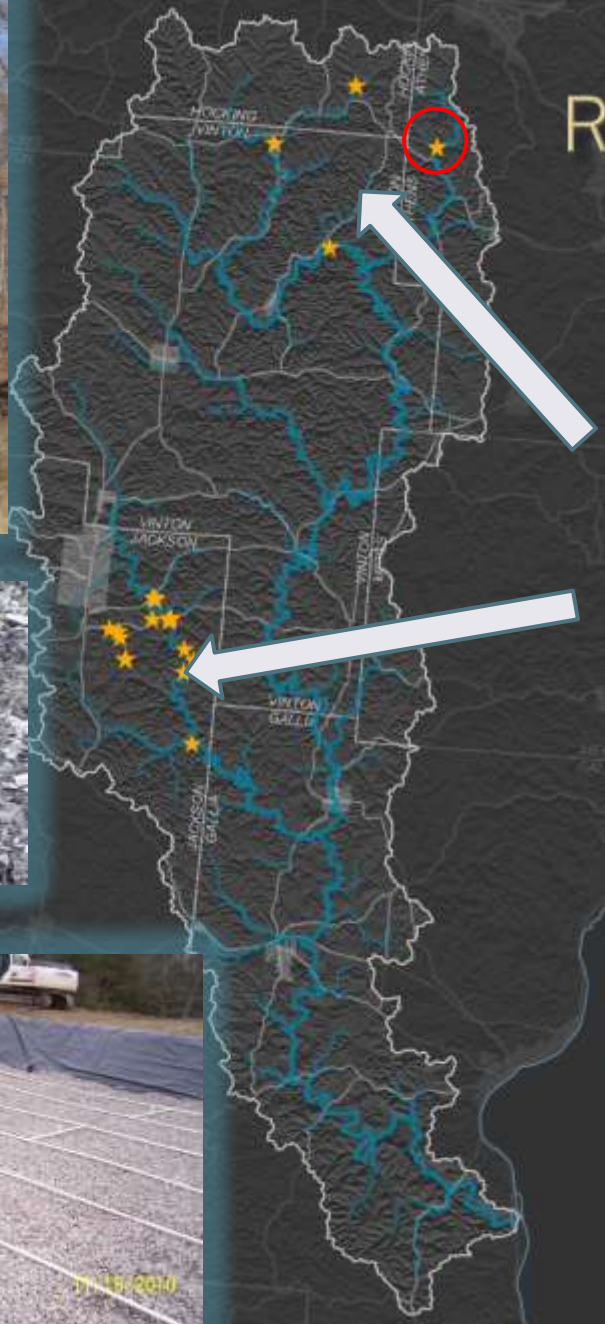
- 683.5 square miles
- 112 miles long
- Flows through 6 counties
  - Hocking (headwaters)
  - Vinton (headwaters)
  - Athens
  - Jackson
  - Meigs
  - Gallia (mouth – Ohio River)

Coal Mining in the Watershed

Surface Mines (21,550 acres)

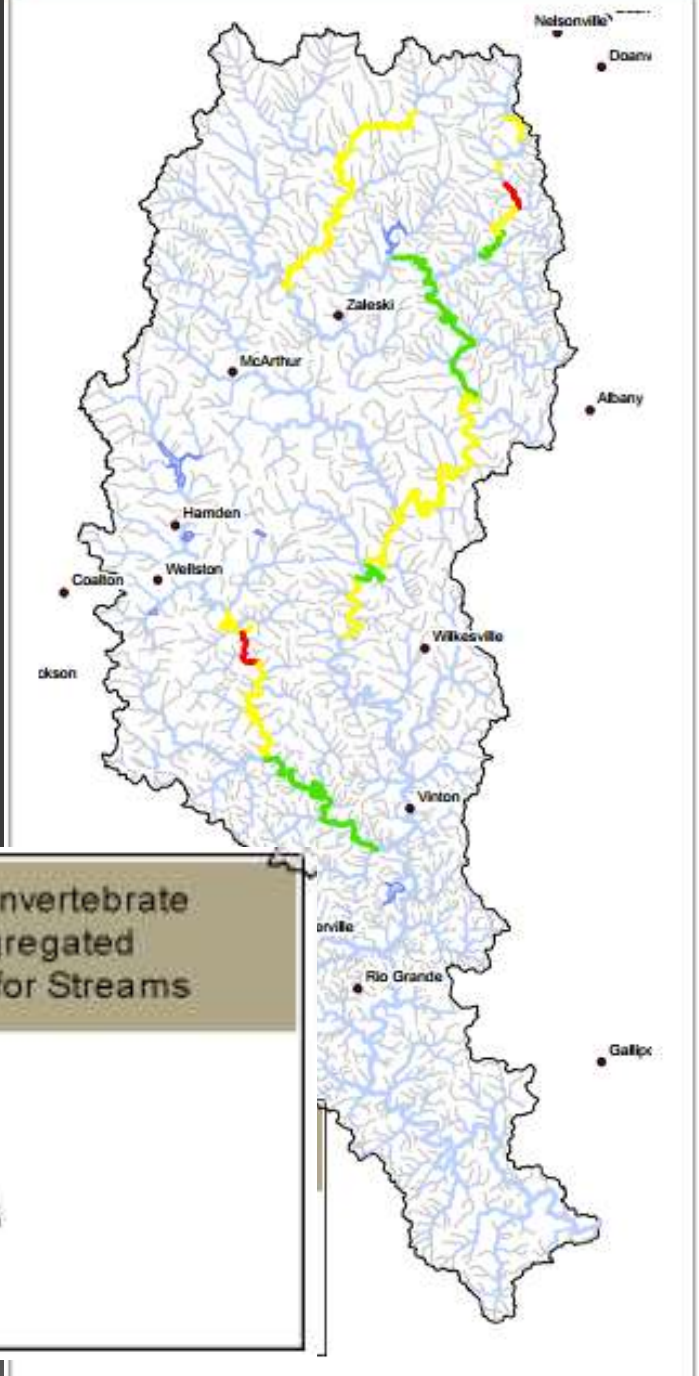
Underground Mines (25,610 acres)

Raccoon Creek Reclamation & Treatment Projects

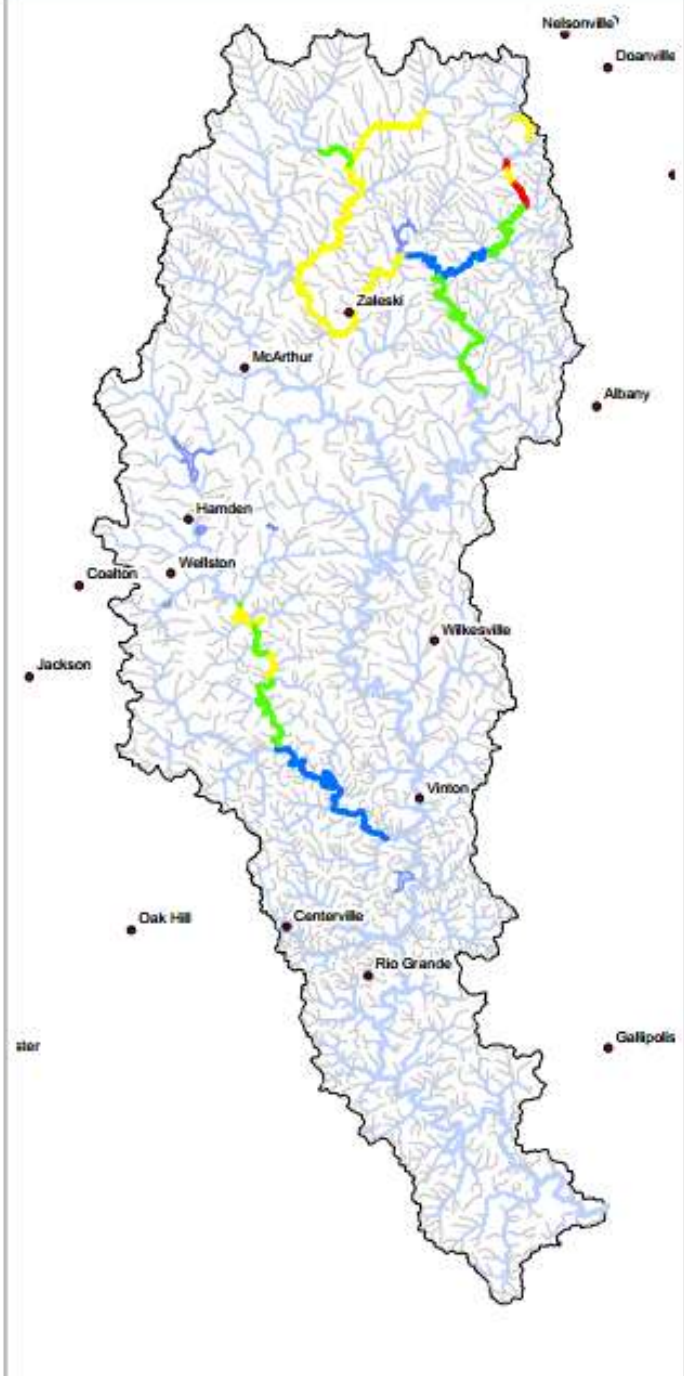


Projects located in the most impacted watershed areas: Headwaters & Little Raccoon Creek

Raccoon Creek baseline MAIS

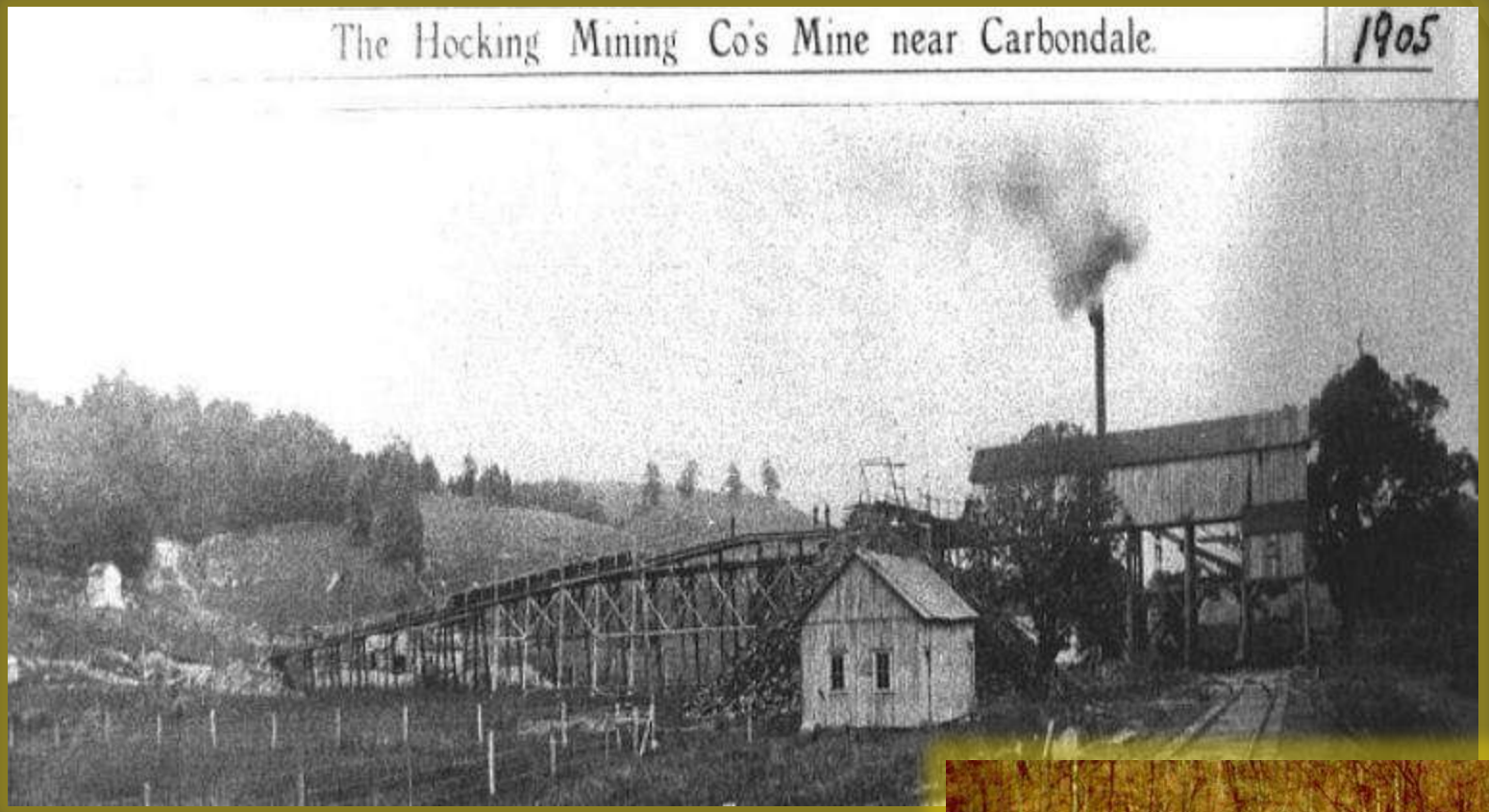


Raccoon Creek 2011 MAIS



Macroinvertebrate Aggregated Index for Streams

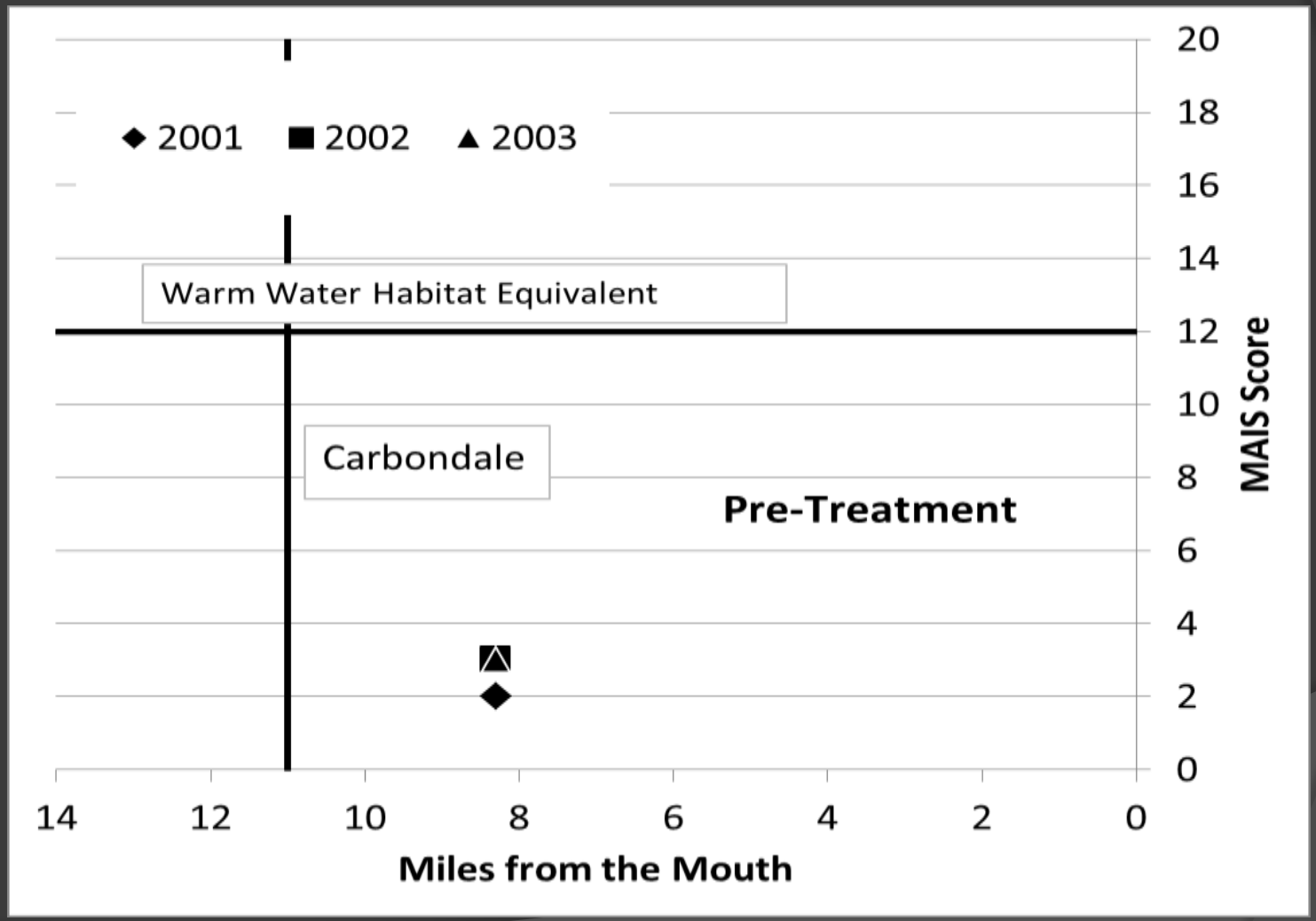
- 0 - 7
- 8 - 11
- 12 - 15
- > 15



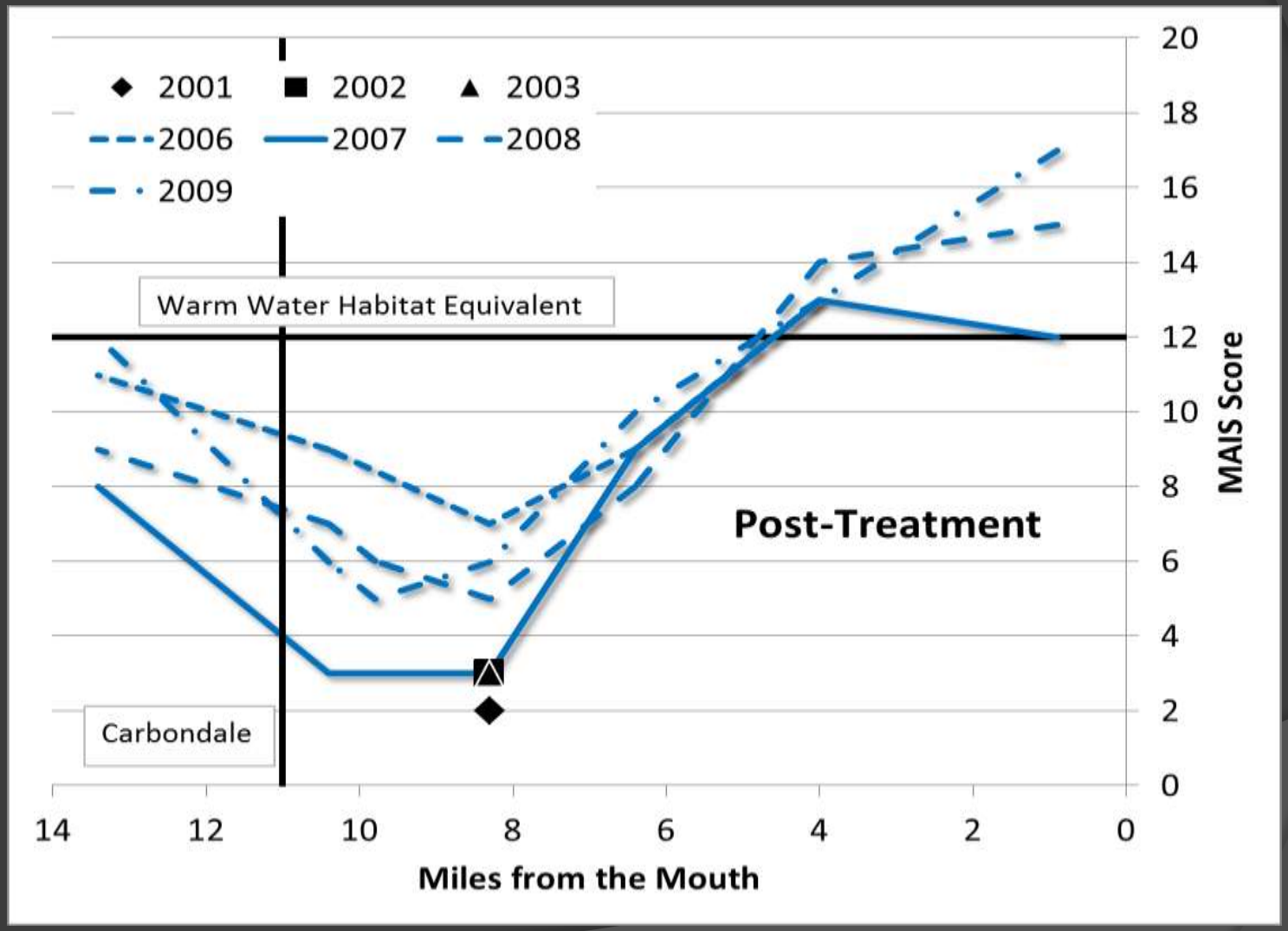
Carbondale

Hewett Fork – Carbondale Doser

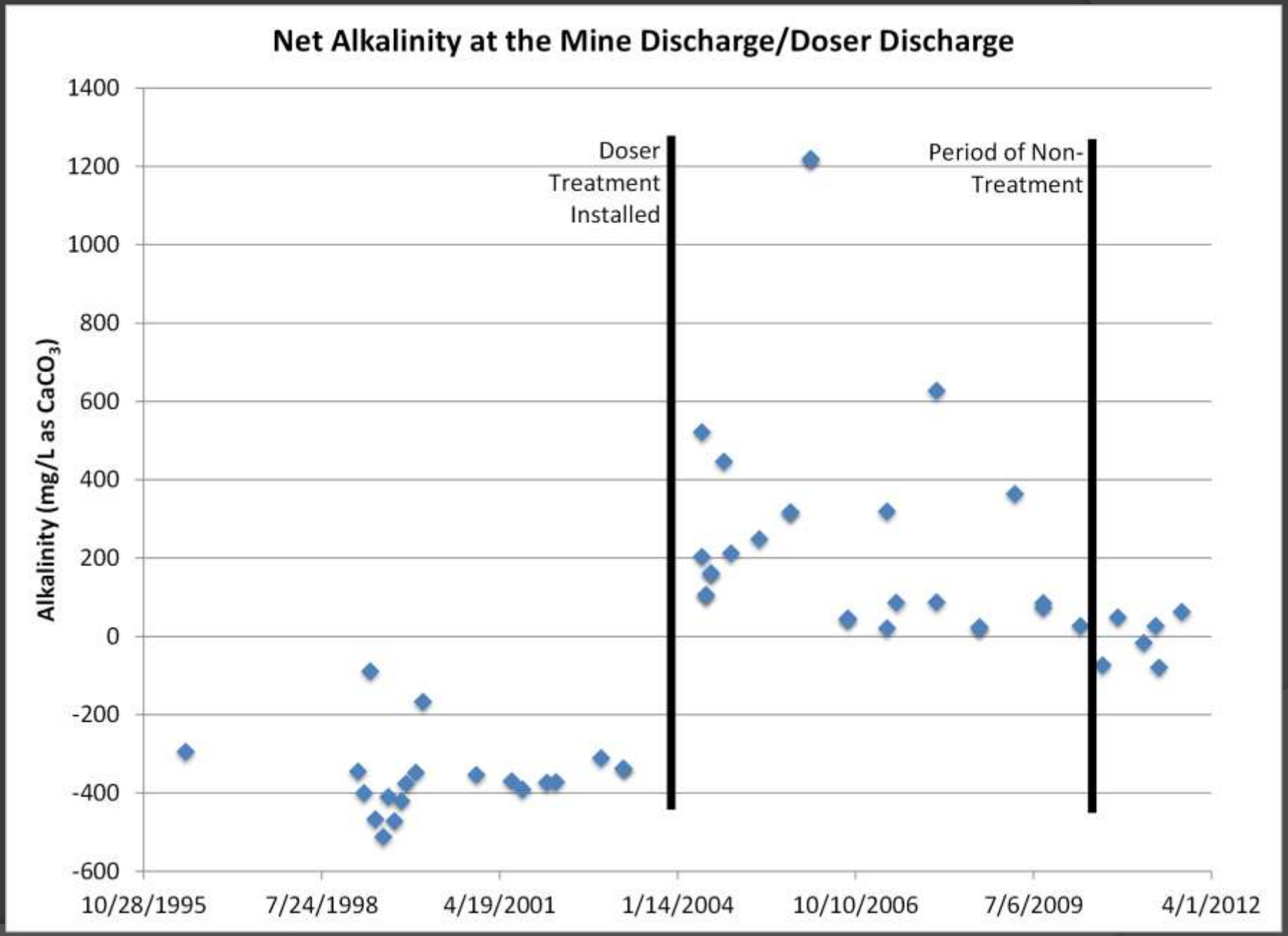
Pre-Treatment Biology

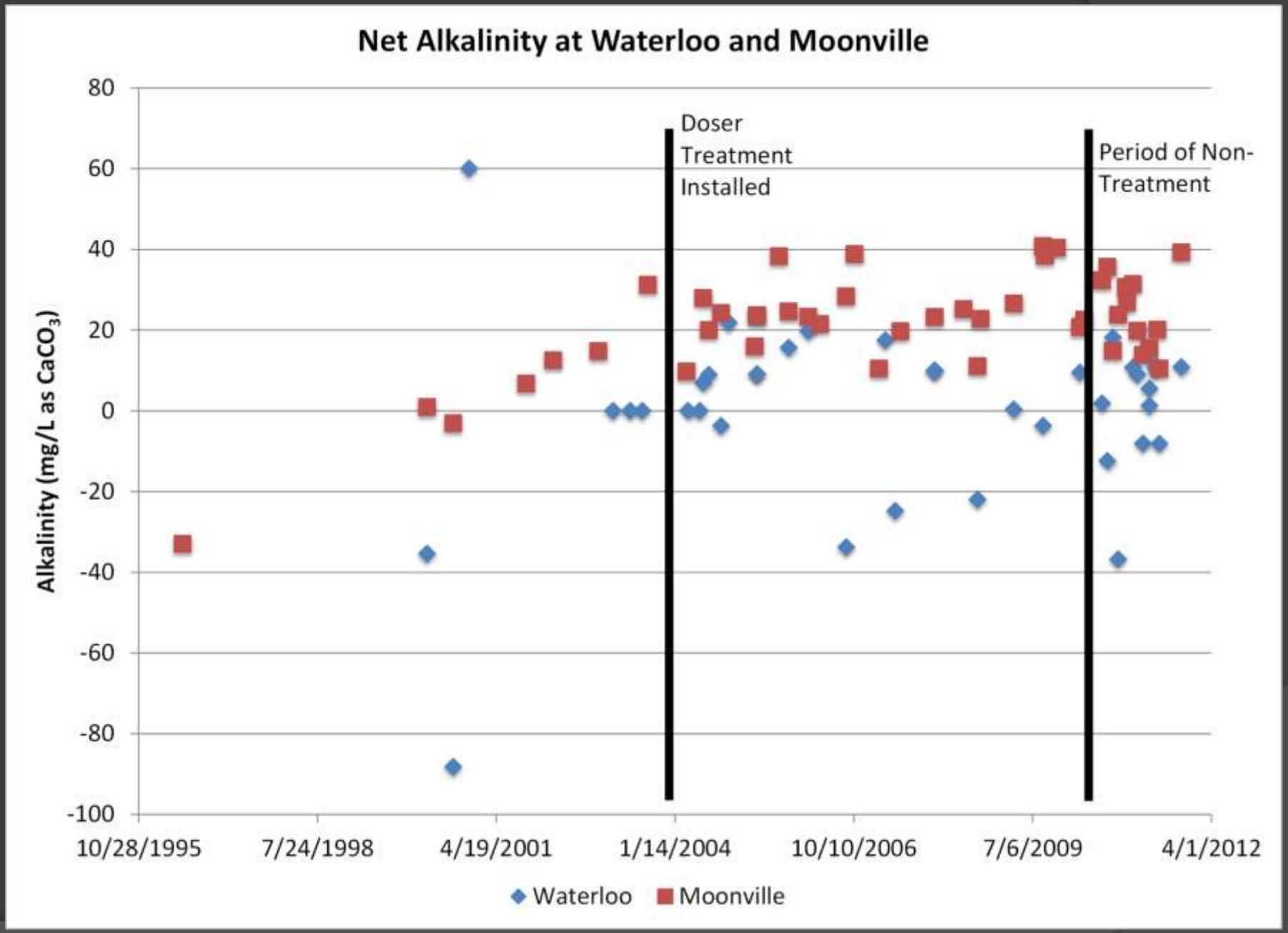


Post-Treatment Recovery

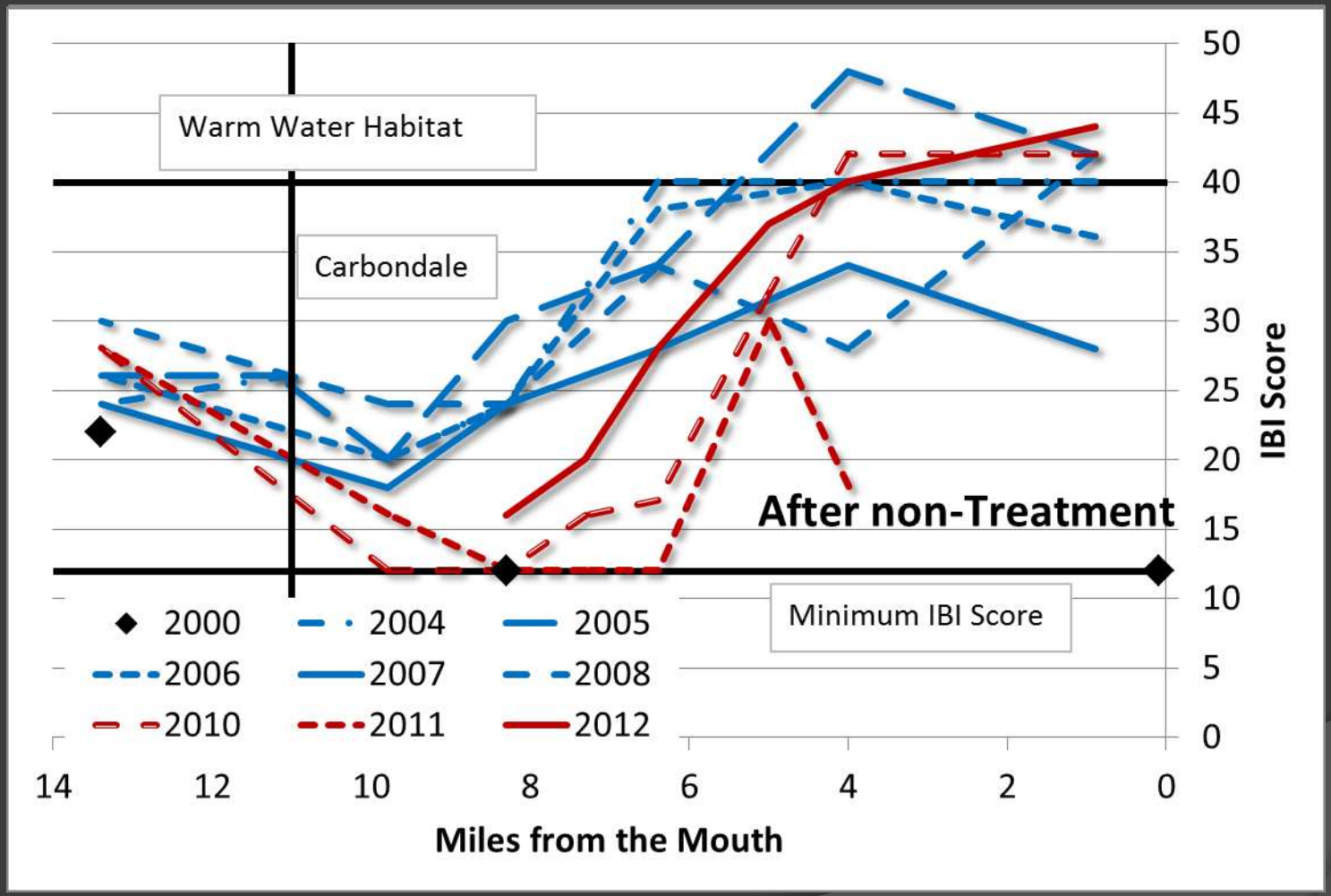


Doser Offline – 2 Weeks June 2010

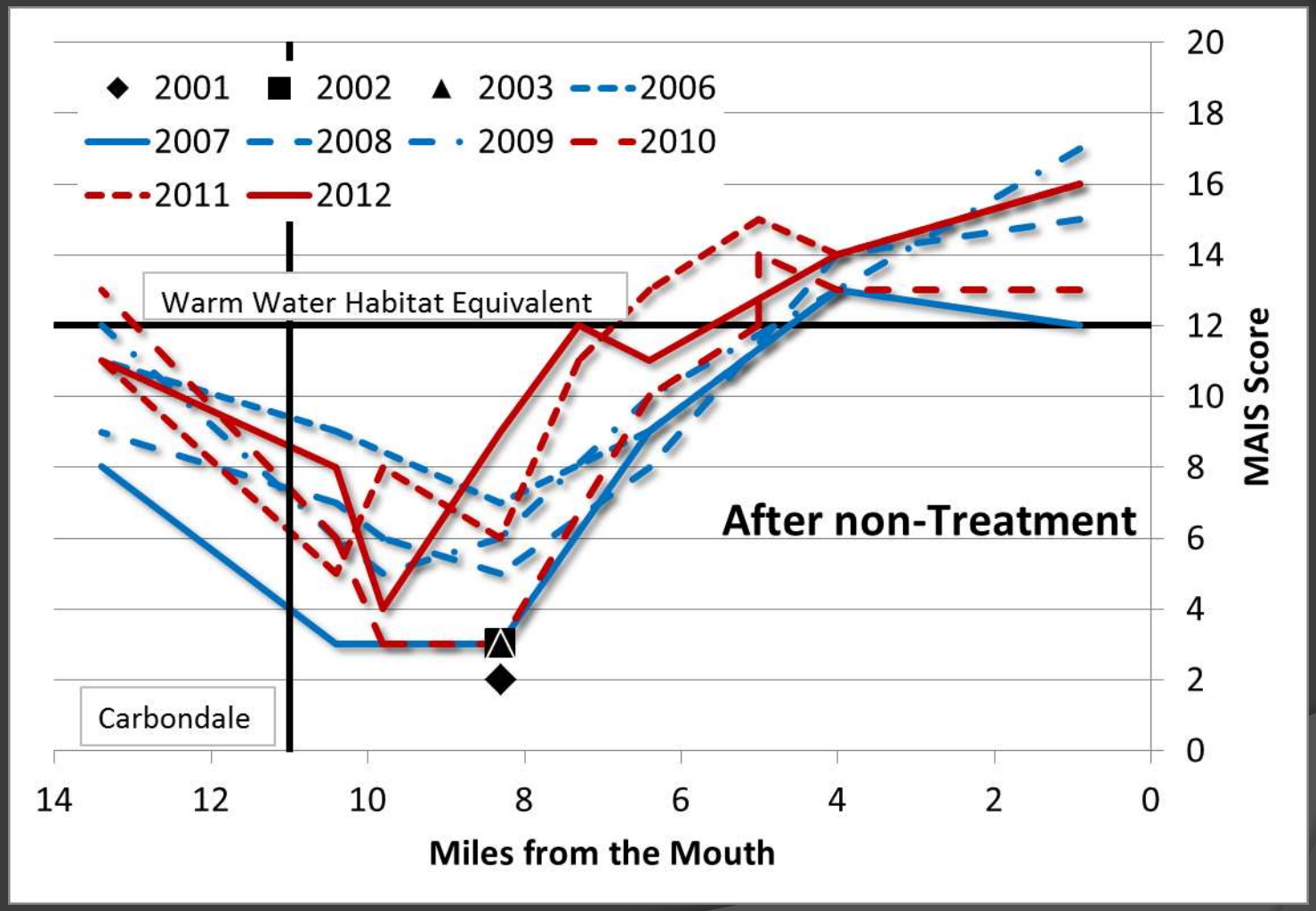

Net Alkalinity at the Mine Discharge/Doser Discharge
Alkalinity (mg/L as CaCO3)
1400
1200
1000
800
600
400
200
0
-200
-400
-600
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
Doser Treatment Installed
Period of Non-Treatment


Net Alkalinity at Waterloo and Moonville
Alkalinity (mg/L as CaCO3)
80
60
40
20
0
-20
-40
-60
-80
-100
Doser Treatment Installed
Period of Non-Treatment
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
Waterloo
Moonville

Biological Response to Non-Treatment

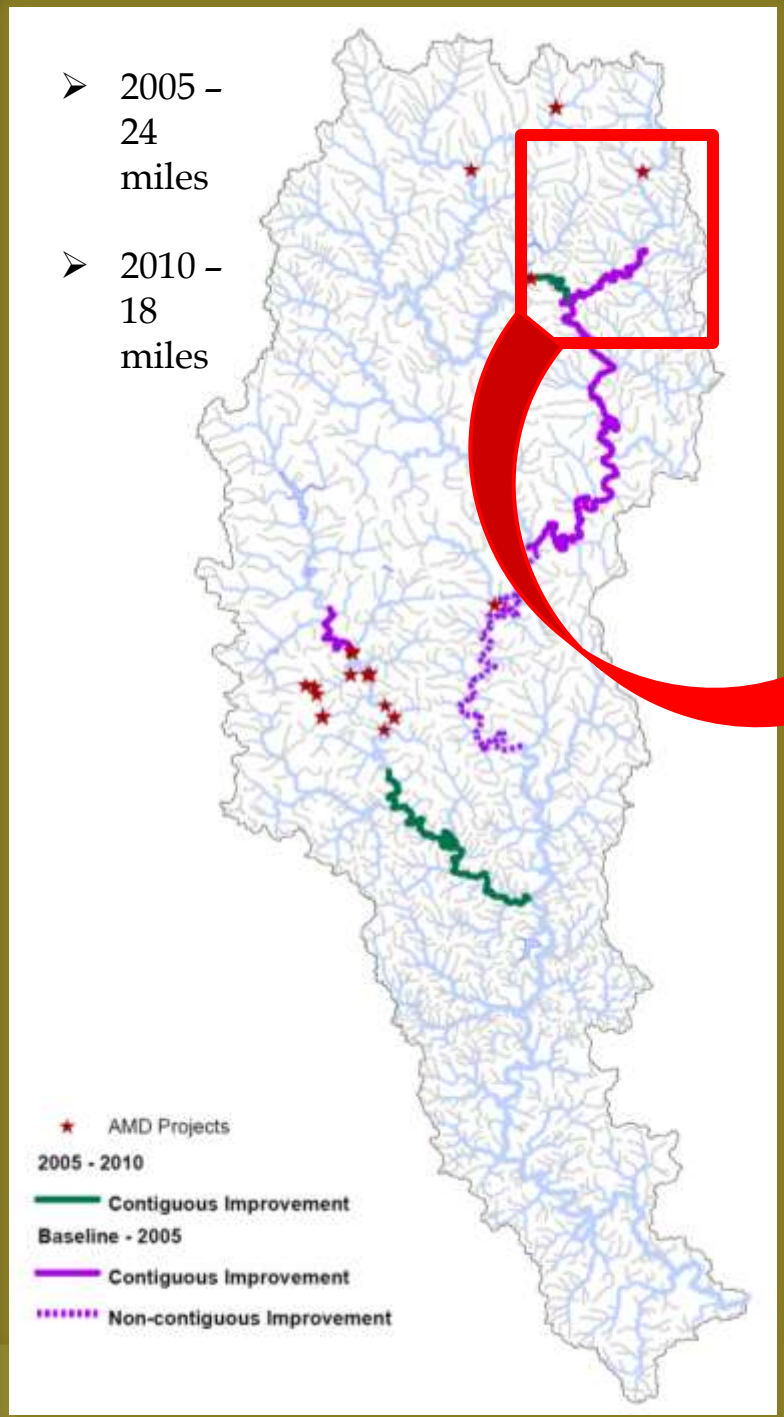


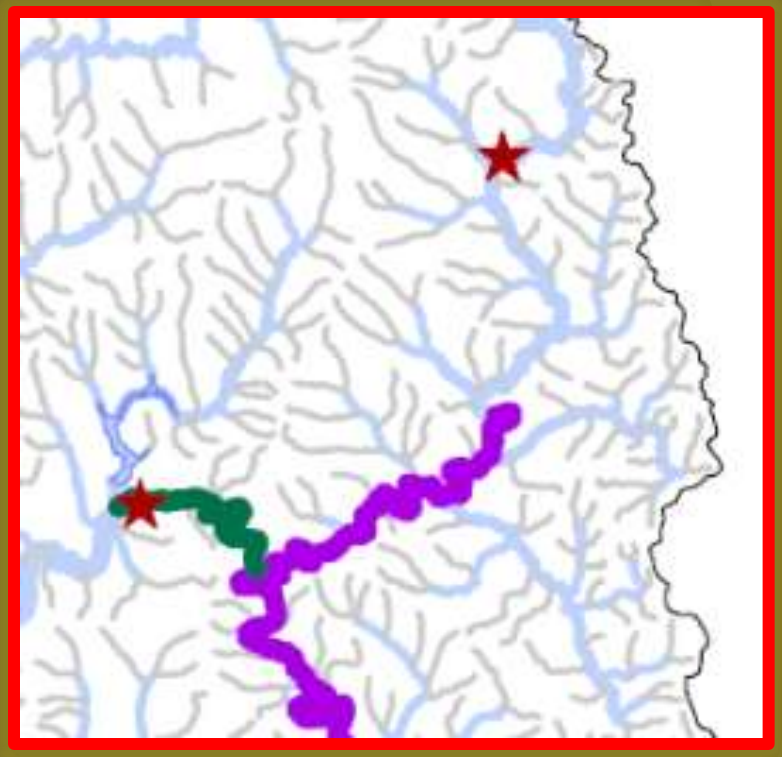
Biological Response to Non-Treatment



Biological Recovery of Hewett Fork

- 2005 – 24 miles
- 2010 – 18 miles

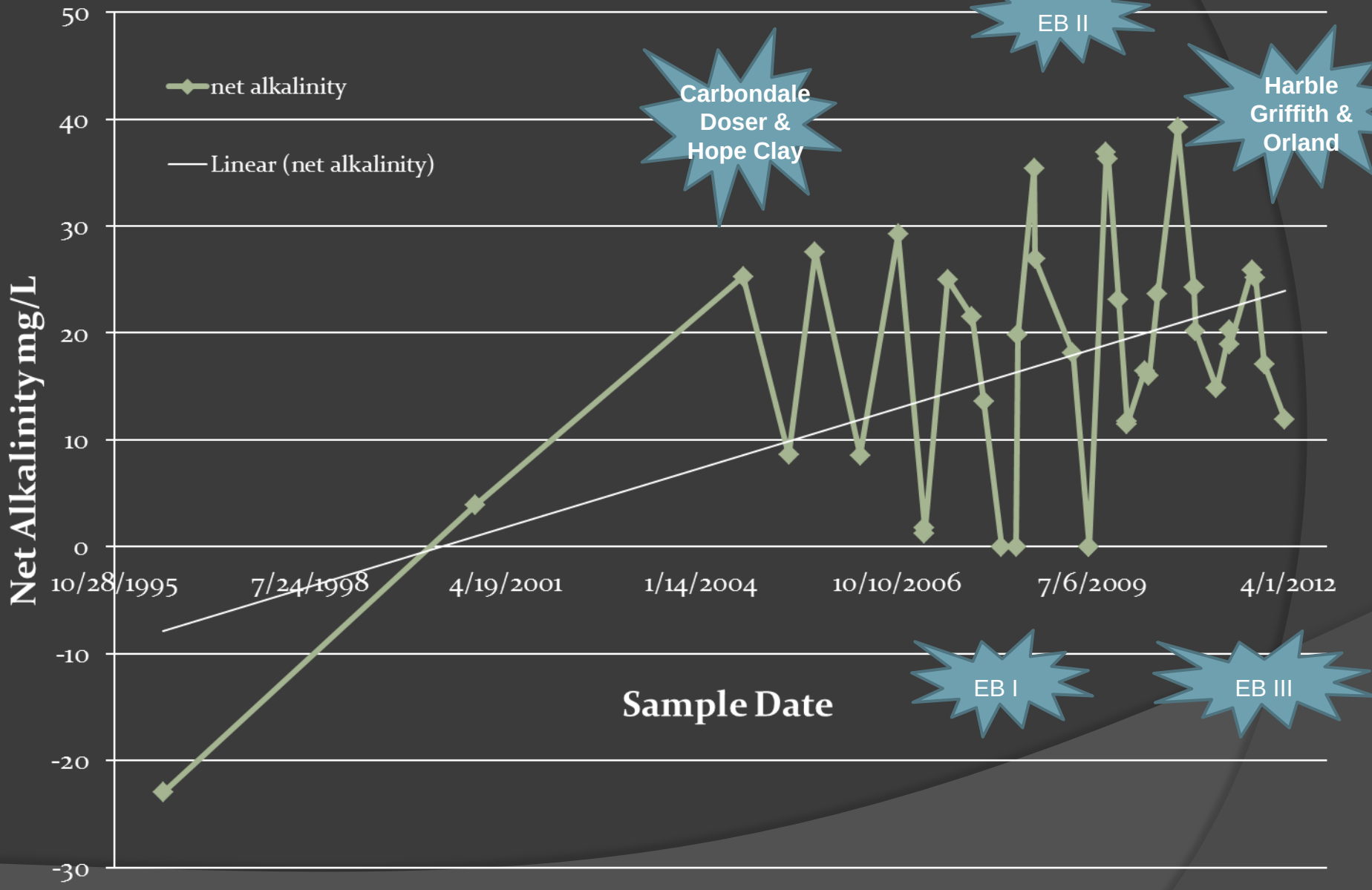




Hewett Fork

- Original goal – minimize the acid load reaching Raccoon Creek from HF
- 4 miles now meeting or partially meeting WWH criteria

Net alkalinity Raccoon Creek Headwaters



Biological Recovery In Raccoon Creek

Raccoon Creek Headwaters – Fish Community Recovery

Average fish per site increased from 82 in the 1990s to 208 in the 2000s!

Thank you for your attention!

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