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Clean Water Management

Aquatic Life Use Assessments in Pennsylvania's Southeast Region

Watershed Monitoring Workshop

John Heinz National Wildlife Refuge

November 9, 2013

In this presentation

- Biological sampling methods
- Index of Biotic Integrity scoring
  - Dismal Run, Ithan Creek
- Basin results
  - Ridley Creek Watershed, Darby Creek Watershed
- ALU Southeast Region results
- **Fish consumption assessment results for SER**
- **Recreation assessment results for SER**

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Why Benthic Macroinvertebrate Communities?

- Reflect overall ecological integrity.
- Integrate effects of different stressors.
- Good indicator of localized conditions.
- Abundant and diverse in good streams.
- Important energy pathway in streams.

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First, you need a biologist

Ed Filip

Steve Unger

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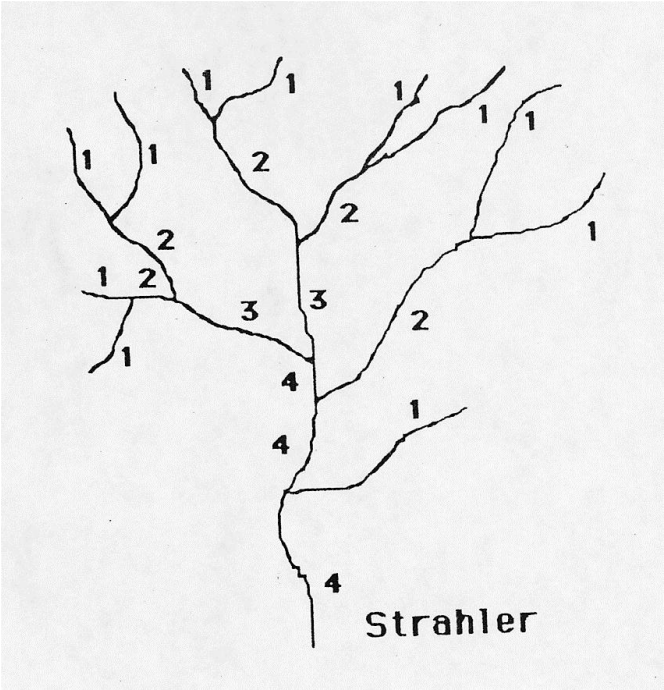
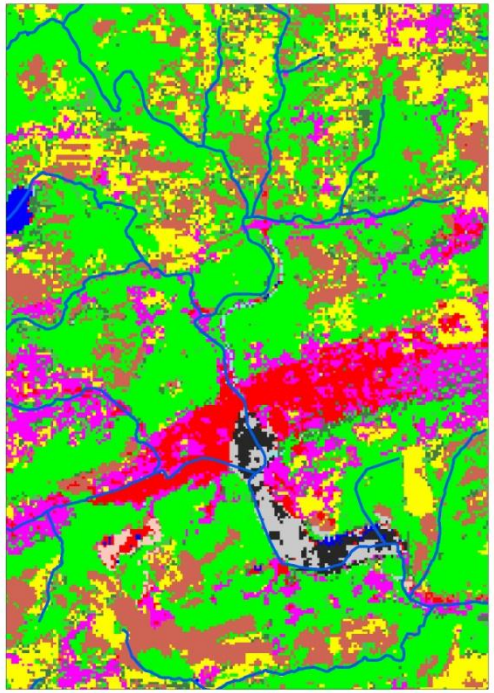
ICE Station Selection

Representative stations chosen with regard to stream order and land use





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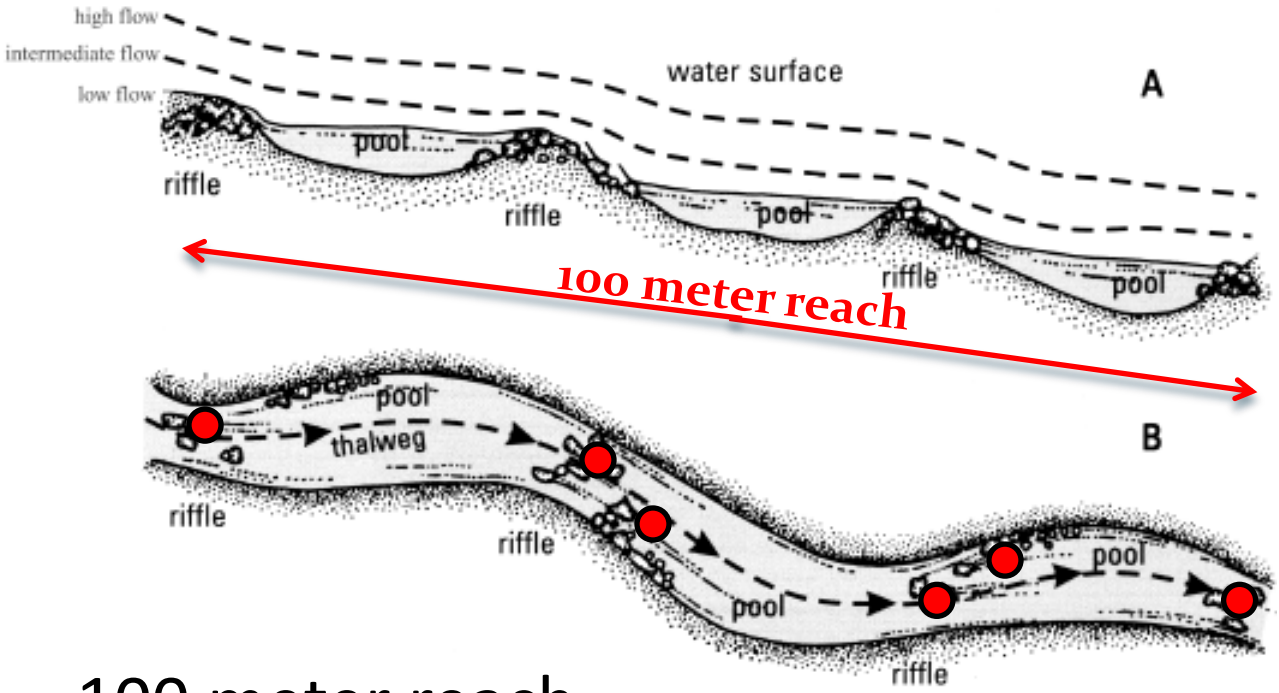

Allen Whitehead

100 meter reach

6 composited d-frame samples

1 sq. meter, 1 minute, 10 cm depth

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Only macroinvertebrates!

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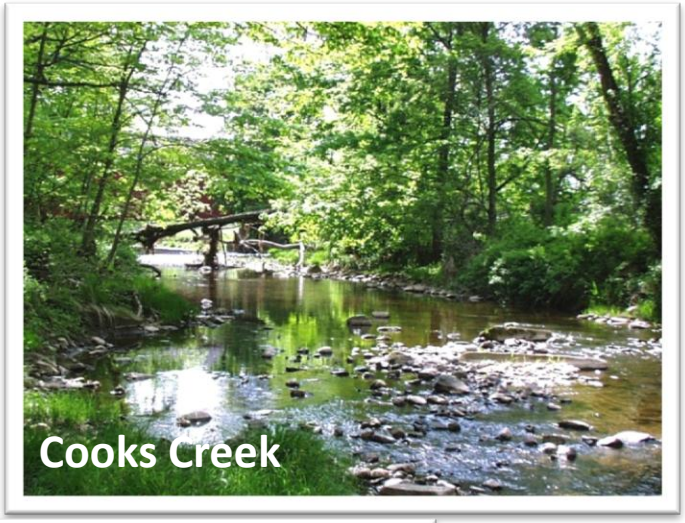
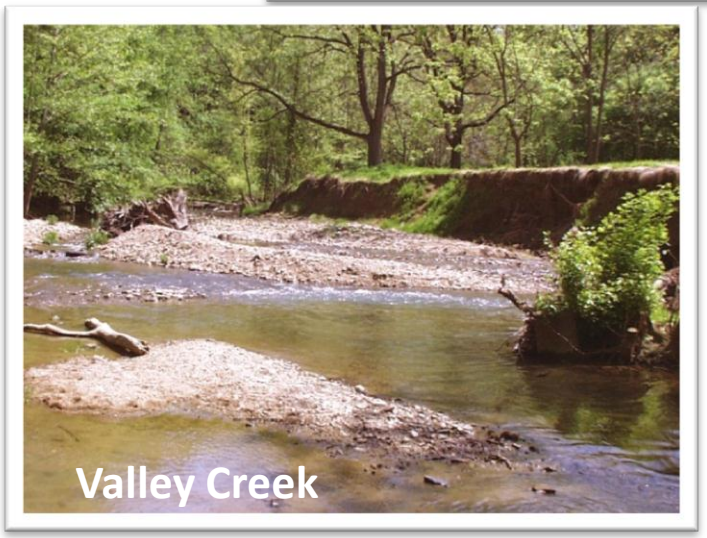
Visual Habitat Assessment

Instream Cover
Epifaunal Substrate
Embeddedness
Velocity/Depth
Channel Alteration
Sediment Deposition
Riffle Frequency
Channel Flow Status
Bank Condition
Bank Veg. Protection
Grazing/Disruption
Riparian Zone Width





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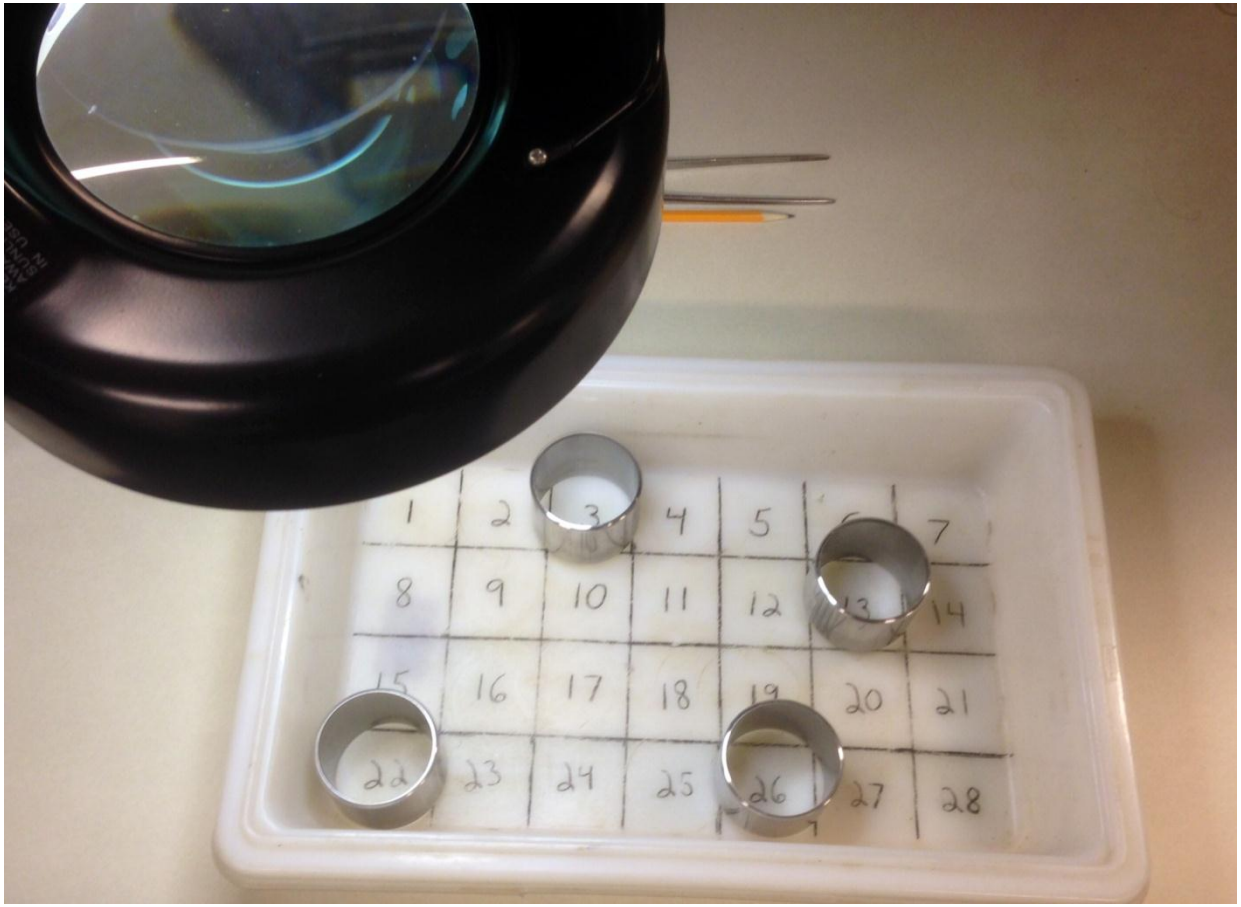
Laboratory Processing

subsampling
&
identification



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Index of Biological Integrity Scoring

Macroinvertebrate Taxa

Dismal Run	#	Ithan Creek	#
Ameletus	2	*Chimarra*	2
Acentrella	3	*Ceratopsyche*	12
Ephemerella	48	*Hydropsyche*	2
Paraleptophlebia	1	*Glossosoma*	4
Amphinemura	26	*Oulimnius*	1
Acroneuria	6	*Stenelmis*	1
Diplectrona	12	*Clinocera*	1
Ceratopsyche	2	*Hemerodromia*	1
Cheumatopsyche	4	*Antocha*	2
Hydropsyche	3	Chironomidae	177
Rhyacophila	6		203
Ectopria	1		
Helichus	2		
Optioservus	5		
Oulimnius	4		
Anchytarsus	1		
Clinocera	2		
Antocha	2		
Simulium	21		
Chironomidae	37		
Oligochaeta	3		
Cambarus	1		
	192		

Ephemeroptera
Plecoptera
Trichoptera
Coleoptera
Diptera
Decapoda

Dismal Run and Ithan Creek

Land use Information

	Dismal Run	Ithan Creek
% Impervious	2.6	14.2
% Developed	6	69
% Forest	68	24
% Agriculture	22	2

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Wadeable, Freestone, Riffle-Run IBI Metrics

Metric Name	Community Measure	↑ Anthropogenic Stressors
Total Taxa Richness	richness	↓
EPT Richness (0-4)	richness	↓
Becks Index	richness and tolerance	↓
Hilsenhoff Biotic Index	tolerance	↑
Shannon Diversity	richness and evenness	↓
Percent Sensitive Individuals (0-3)	tolerance	↓

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Raw Metric Data

Metric Name	Standardization Value	Dismal Run	Ithan Creek
Total Taxa Richness	33	22	10
EPT Richness (0-4)	19	9	3
Becks Index	38	15	3
Hilsenhoff Biotic Index	1.89	3.42	5.70
Shannon Diversity	2.86	2.37	0.61
Percent Sensitive Individuals (0-3)	84.5	53.6	3.0

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Standardized Metric Score & IBI Score

	Standardized Metric Score	
Metric Name	Dismal Run	Ithan Creek
Total Taxa Richness	66.7	30.3
EPT Richness (0-4)	47.4	15.8
Becks Index	39.5	7.9
Hilsenhoff Biotic Index	81.1	53.0
Shannon Diversity	82.7	21.2
Percent Sensitive Individuals (0-3)	63.4	3.6
IBI Score =	63.5	22.0

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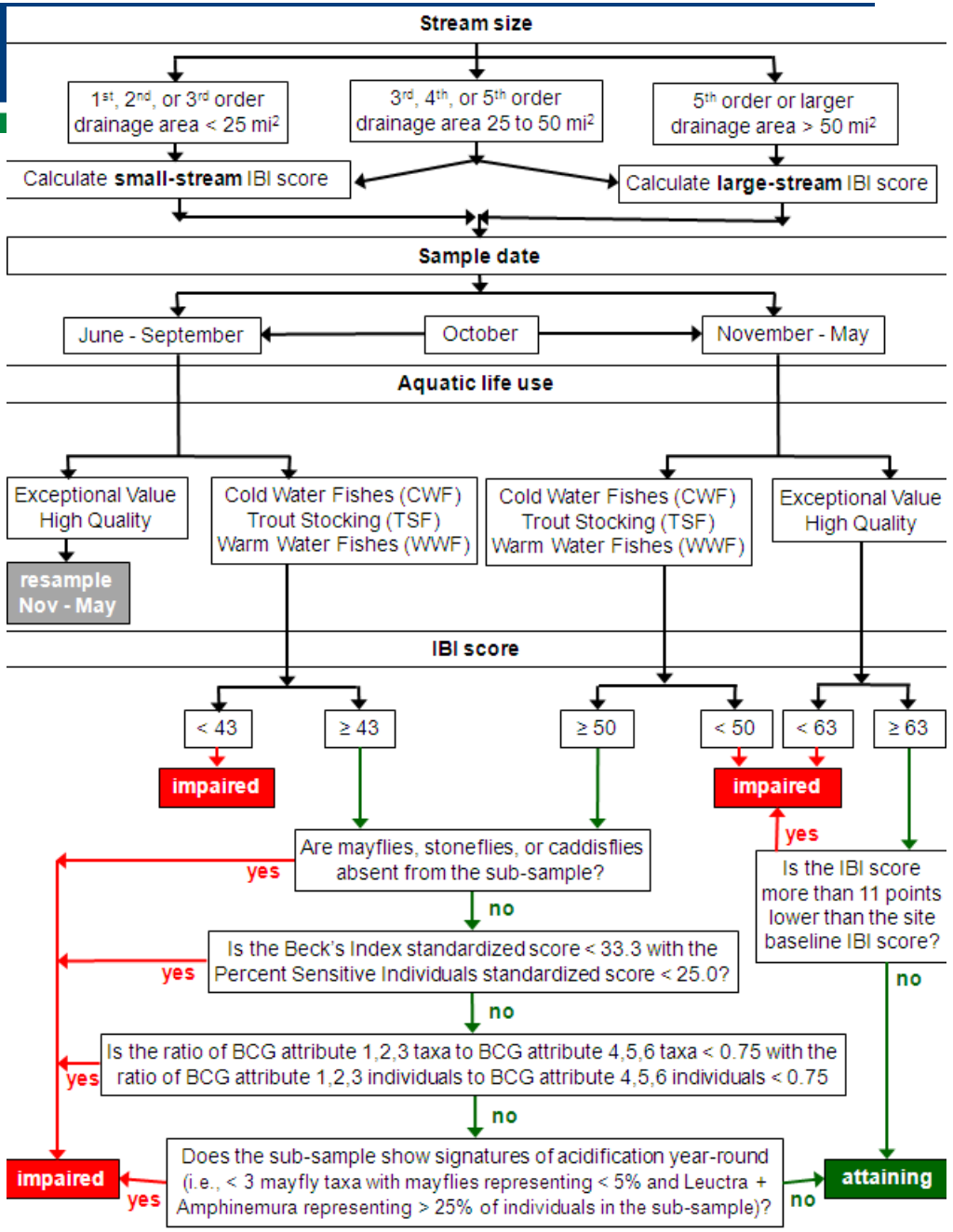
Decision Flowchart



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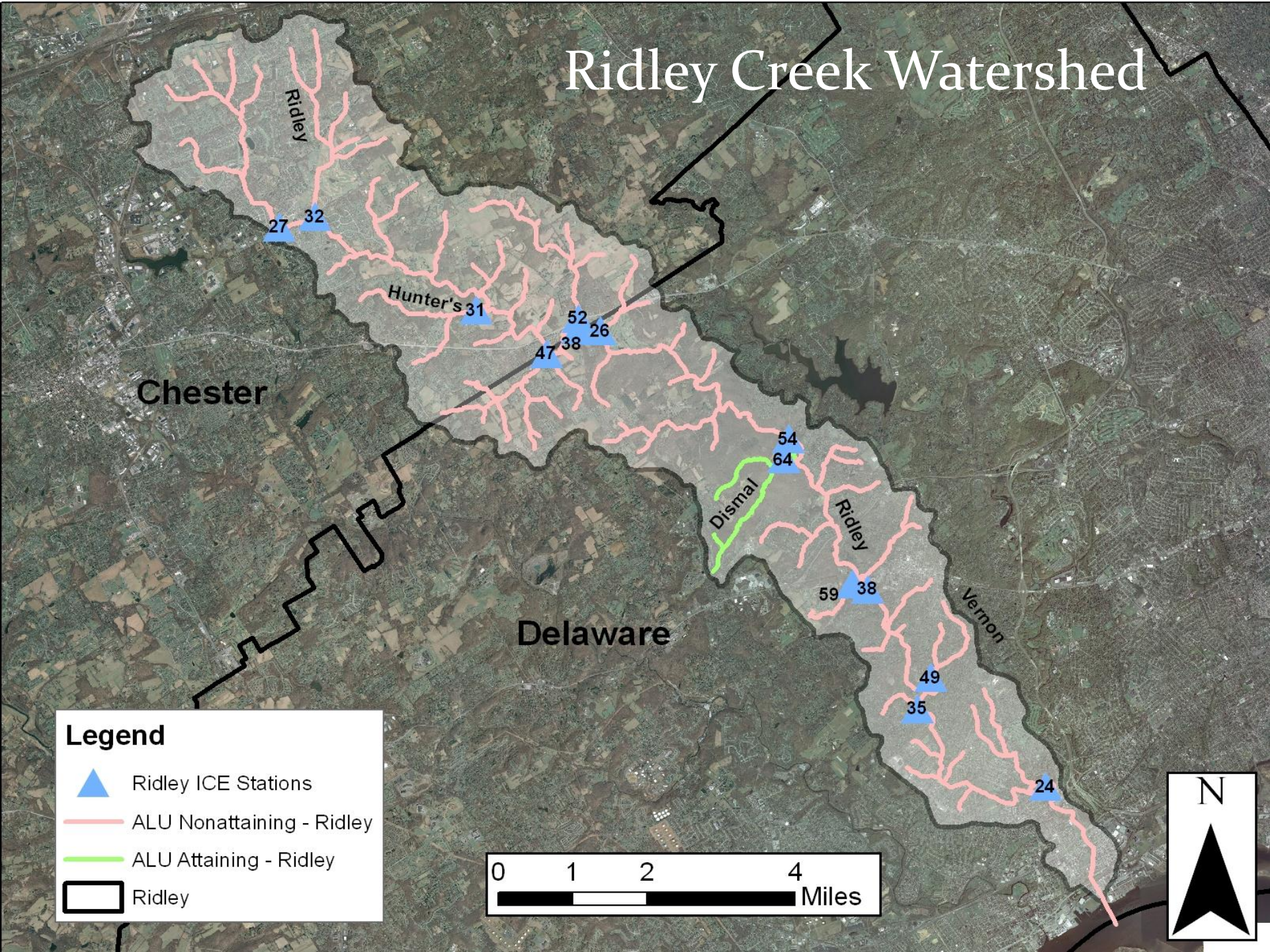
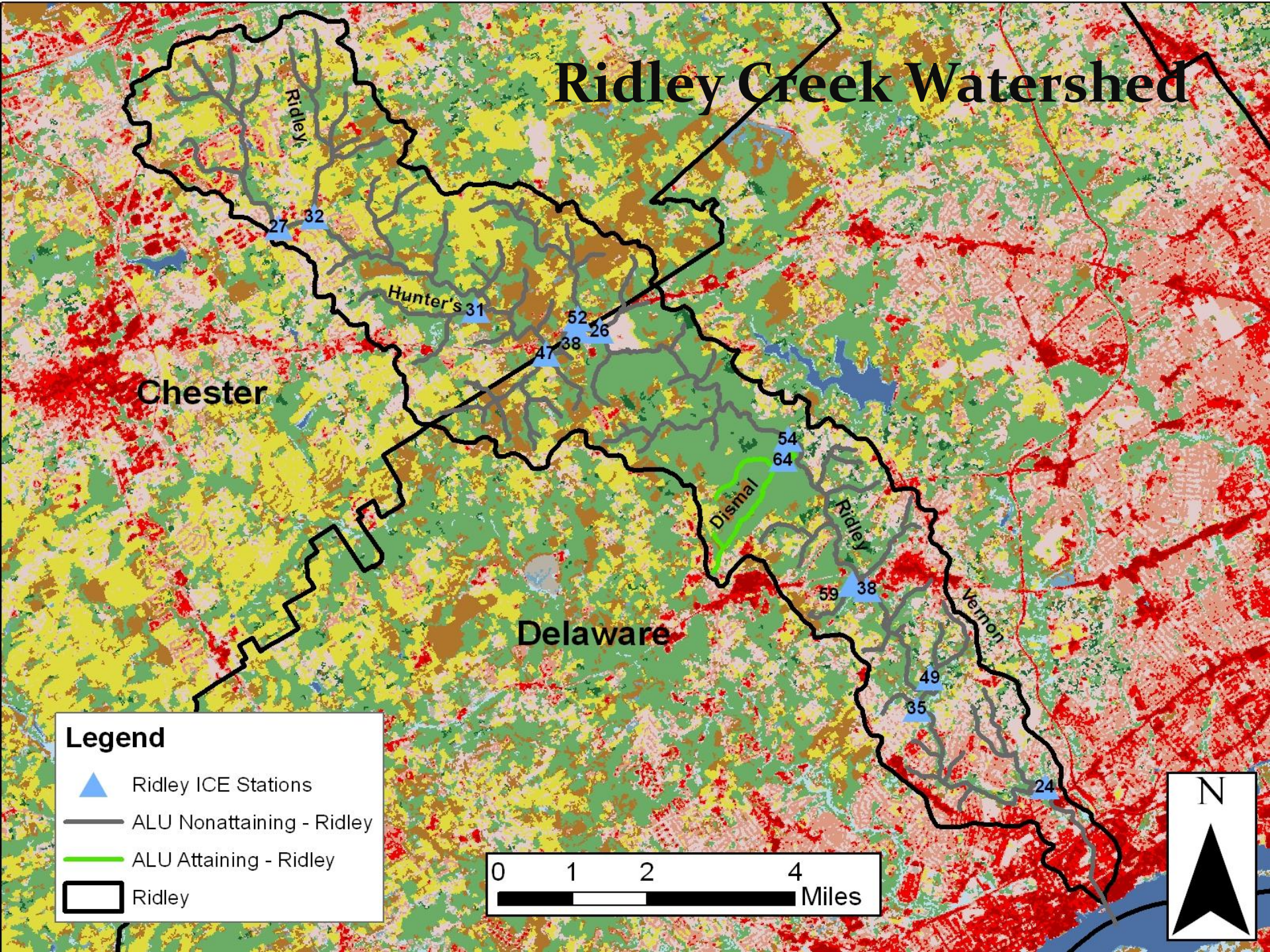

Ridley Creek Watershed
Ridley
27
32
Hunter's
31
52
26
38
47
Chester
54
64
Dismal
Ridley
59
38
Vernon
Delaware
49
35
24
Legend
Ridley ICE Stations
ALU Nonattaining - Ridley
ALU Attaining - Ridley
Ridley
0 1 2 4
Miles
N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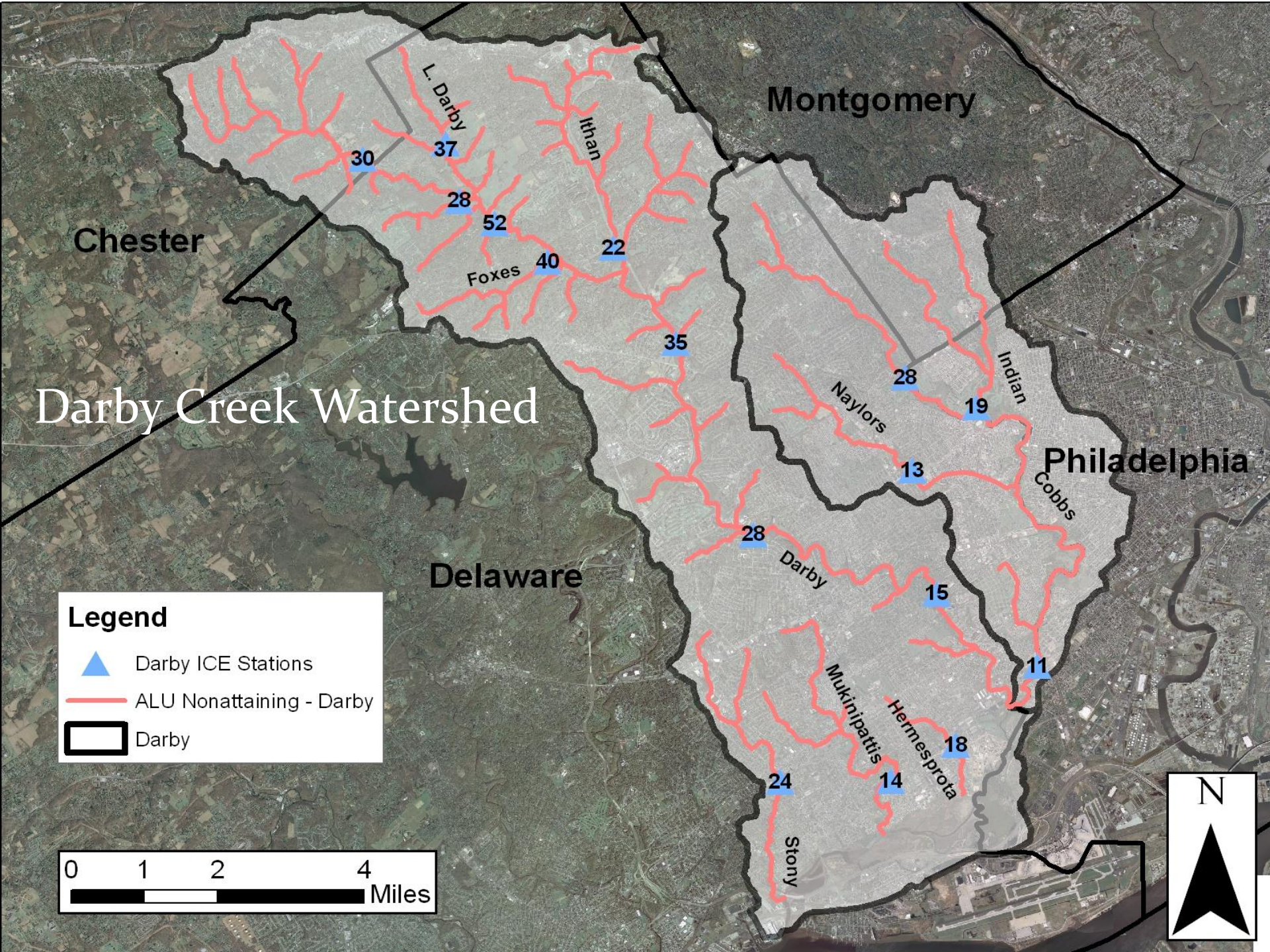
4
Miles
N


Darby Creek Watershed
Montgomery
Chester
Delaware
Philadelphia
L. Darby
Ithan
Foxes
Naylors
Indian
Cobbs
Darby
Mukinipattis
Hermesprota
Stony
30
37
28
52
40
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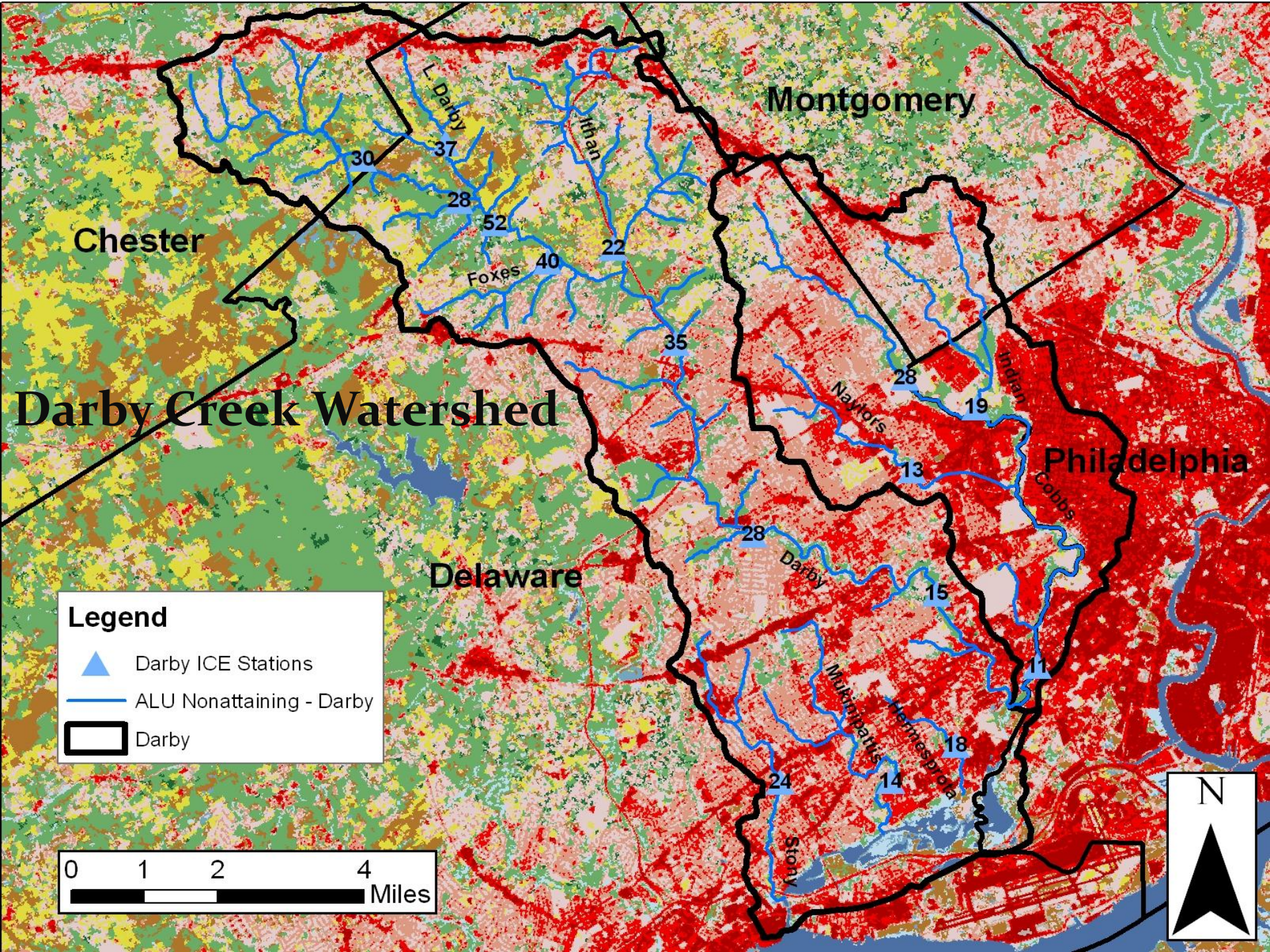
Legend
Darby ICE Stations
ALU Nonattaining - Darby
Darby
0 1 2 4
Miles
N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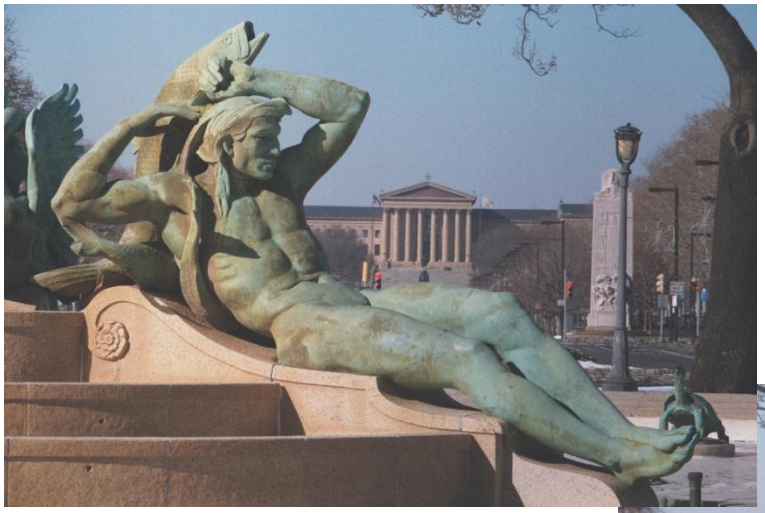
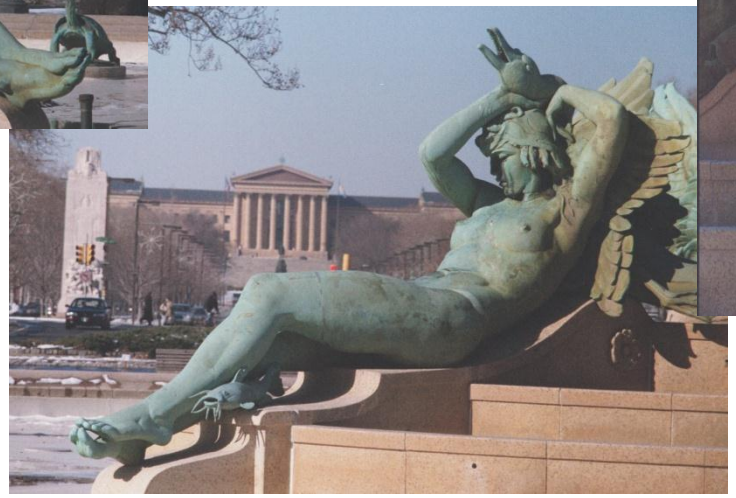
Legend
Darby ICE Stations
ALU Nonattaining - Darby
Darby
0 1 2 4
Miles
N

Southeast Region ALU Assessment Results and Summary

Calder's Wissahickon



Calder's Delaware



Calder's Schuylkill

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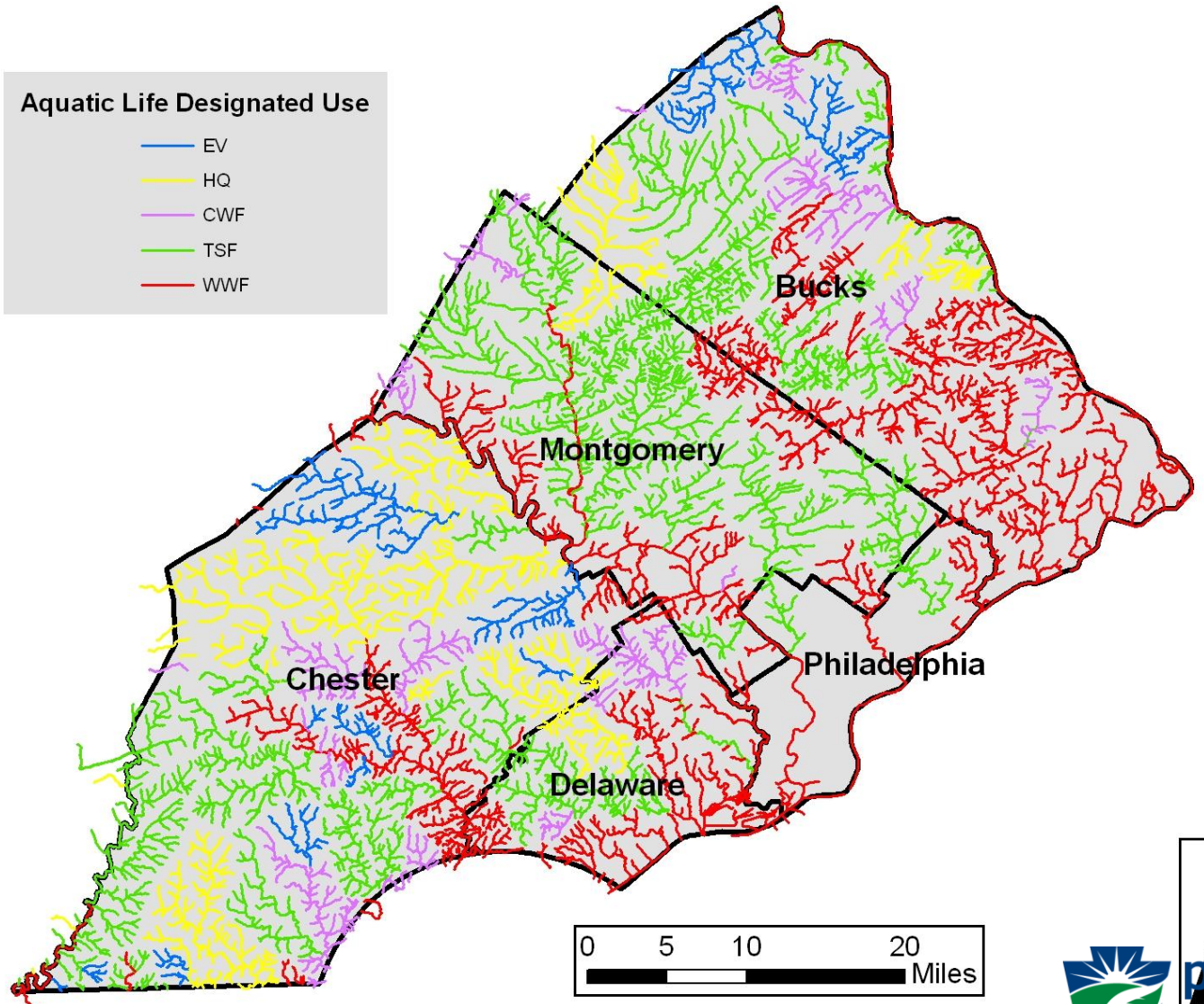
Aquatic Life Designated Uses: Southeast Region



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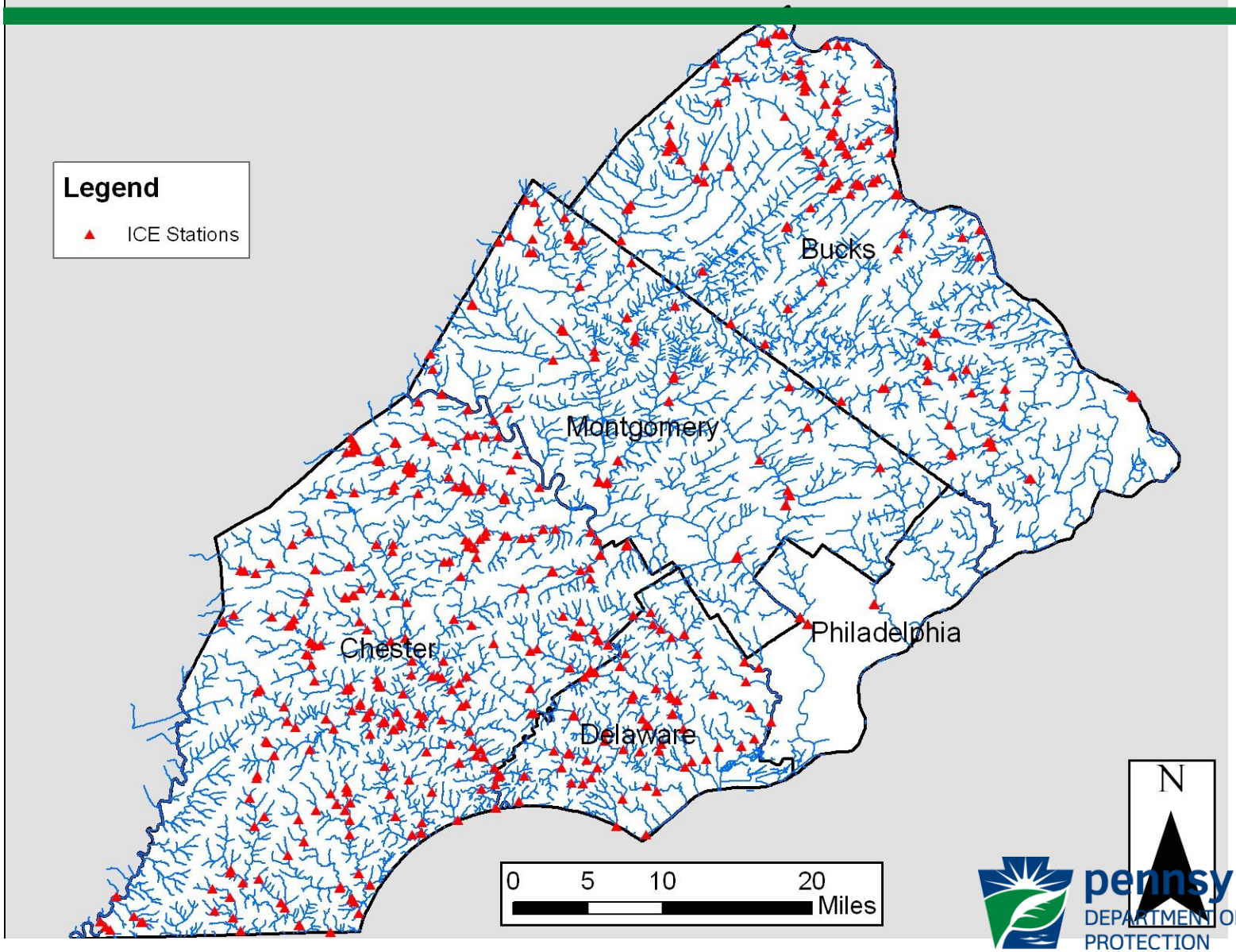
Southeast Region ICE Stations



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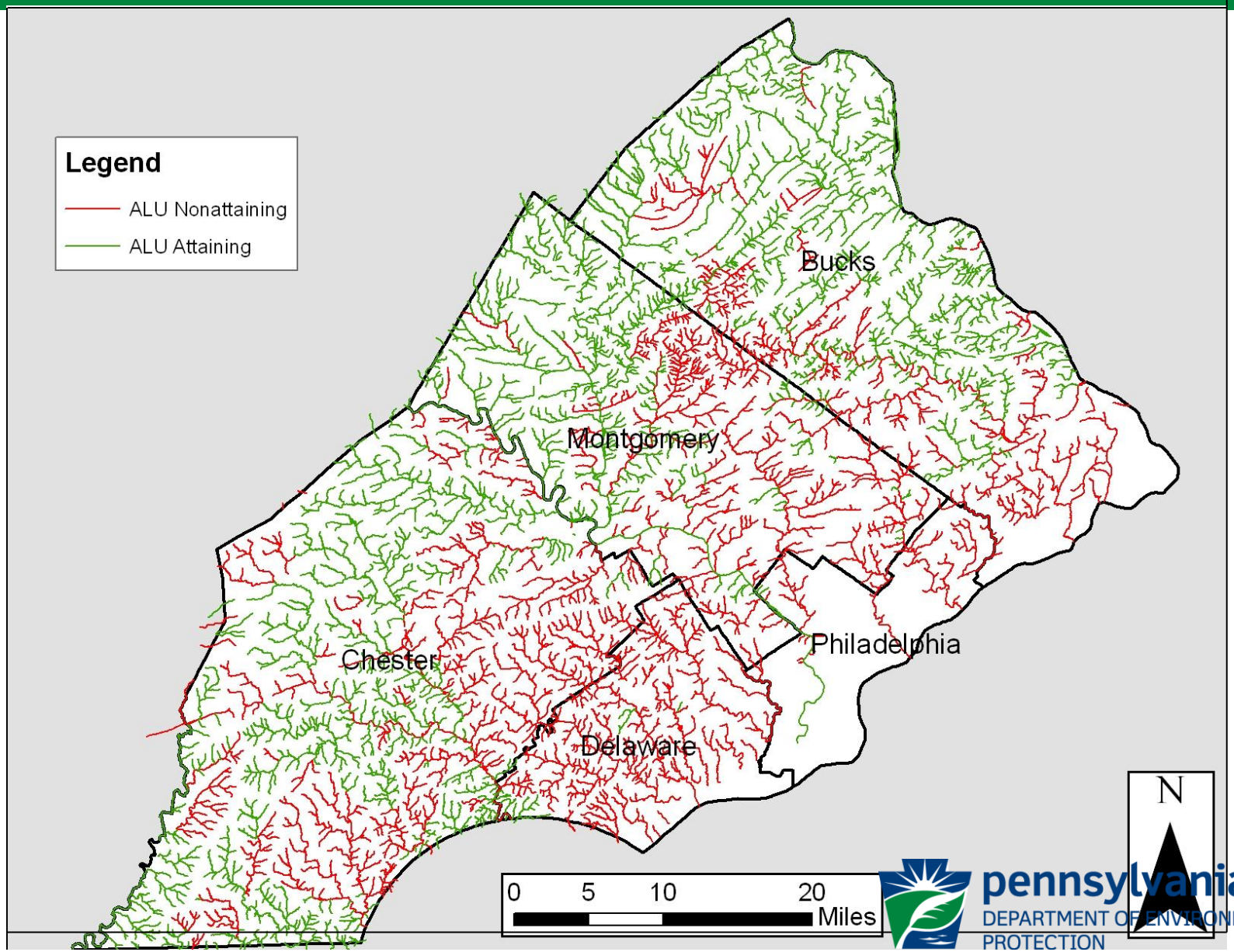
ALU Assessment, PA SER



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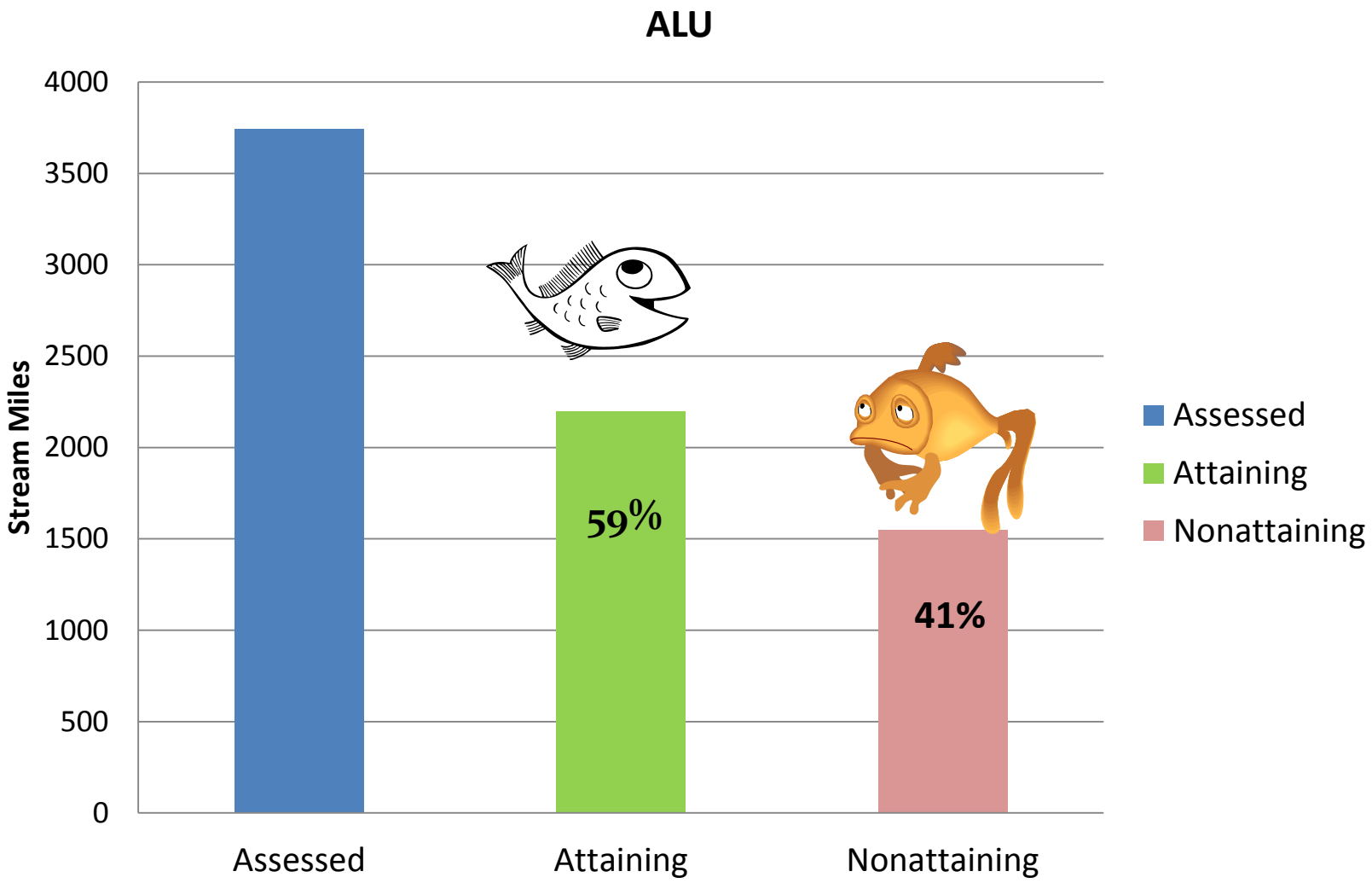
2012 305b Report, SER Summary



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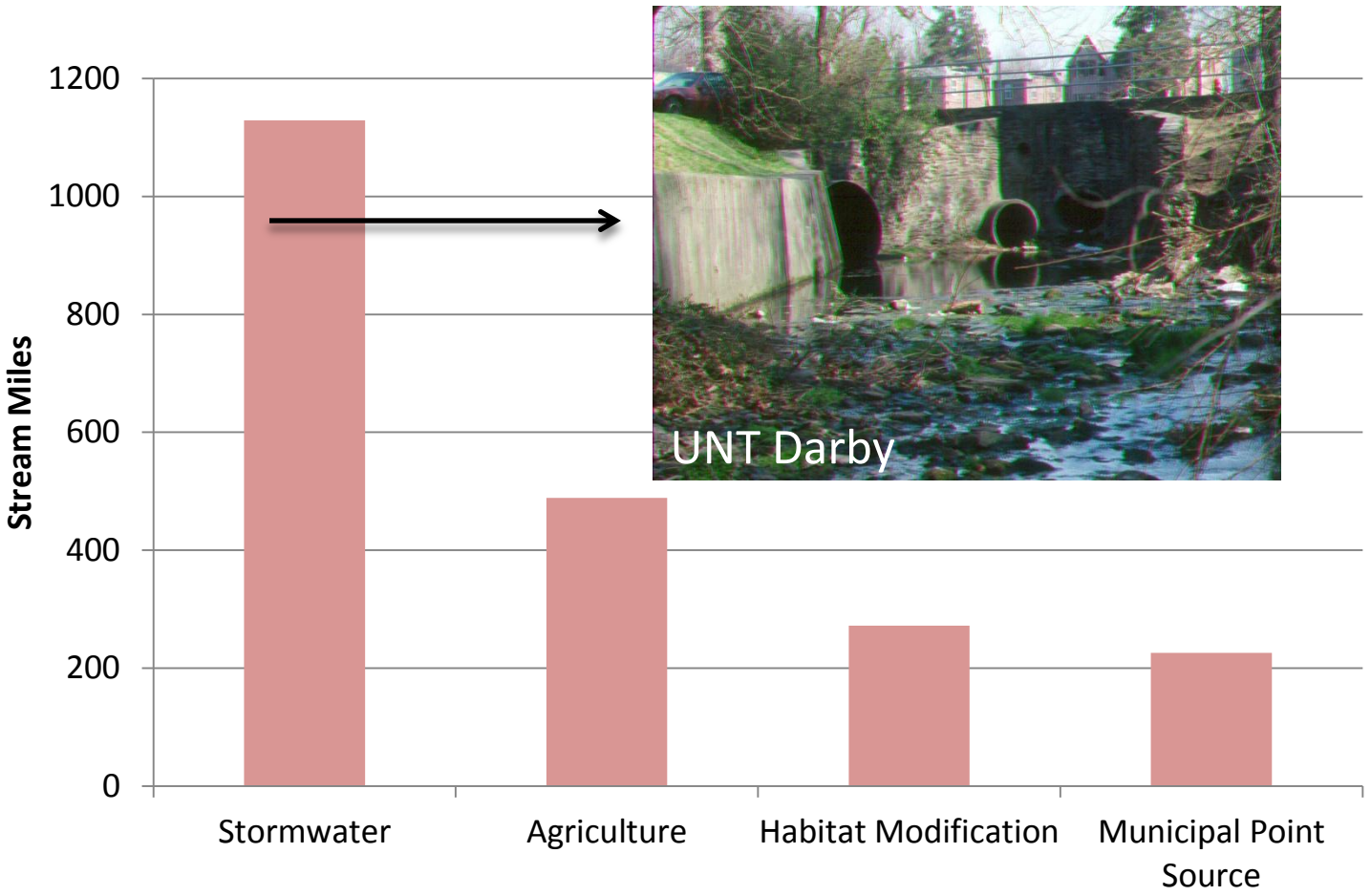
2012 305b Report, SER Summary

Sources of Impairment



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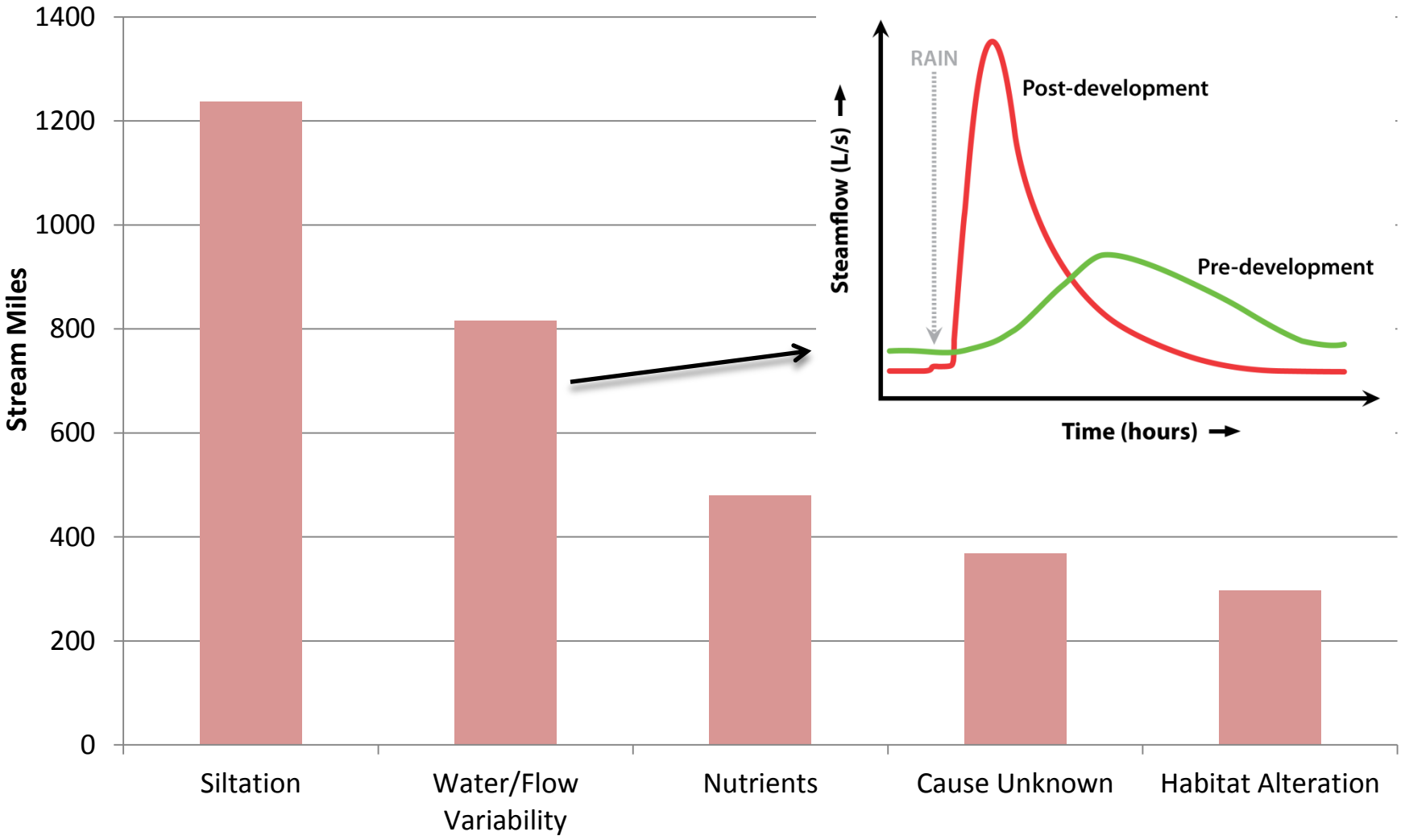
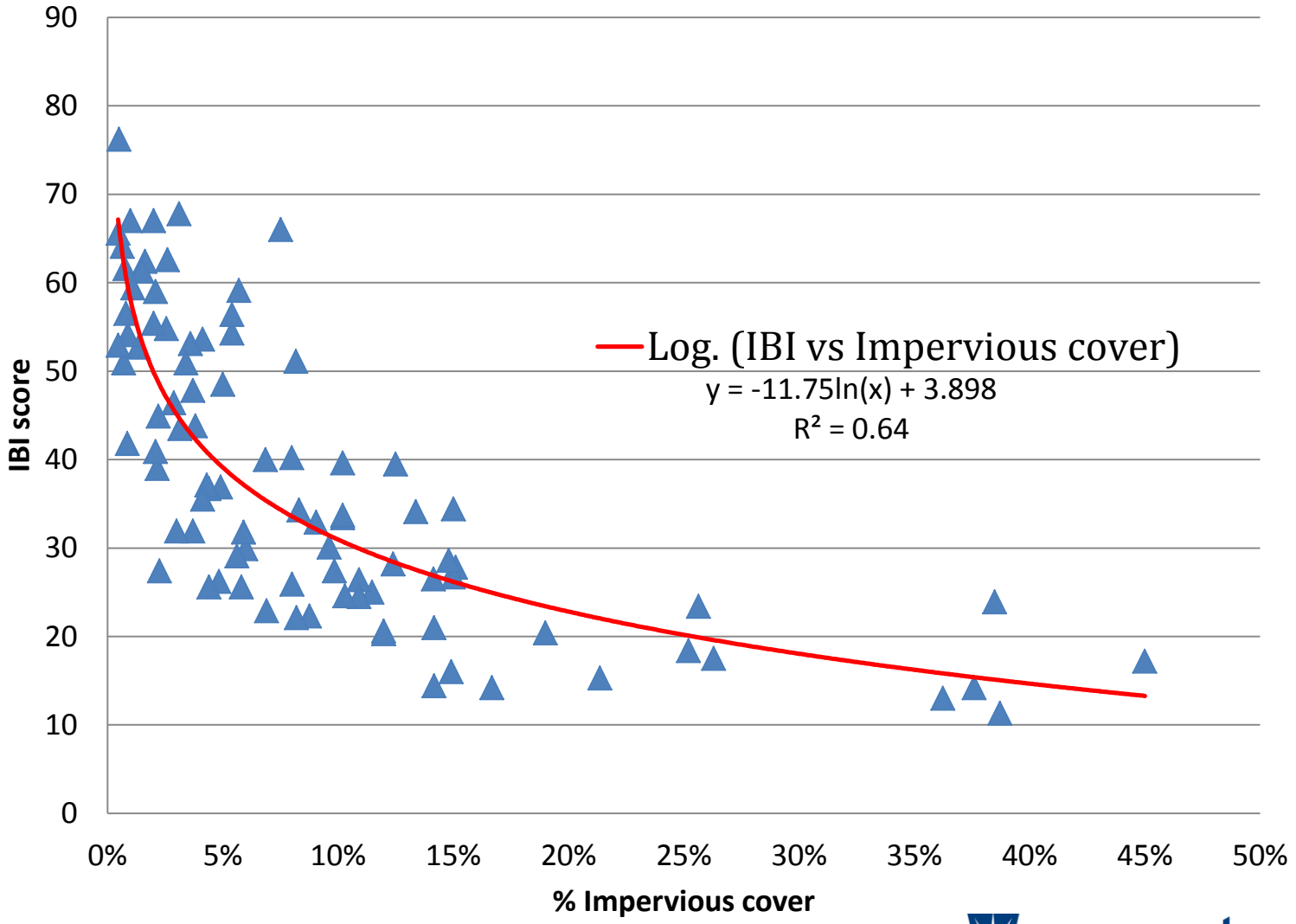
2012 305b Report, SER Summary



Relationship between IBI and % Impervious Cover



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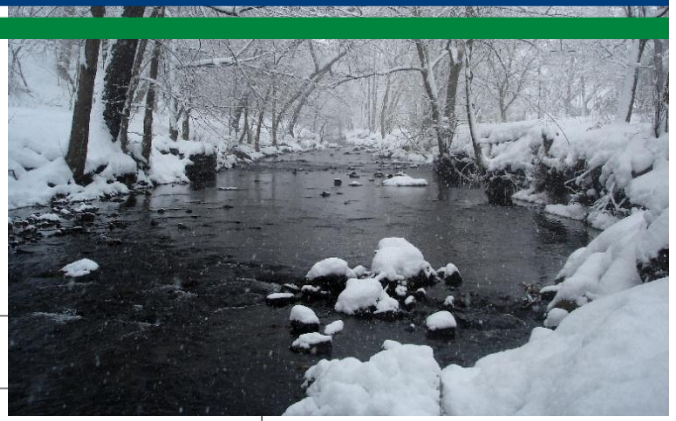
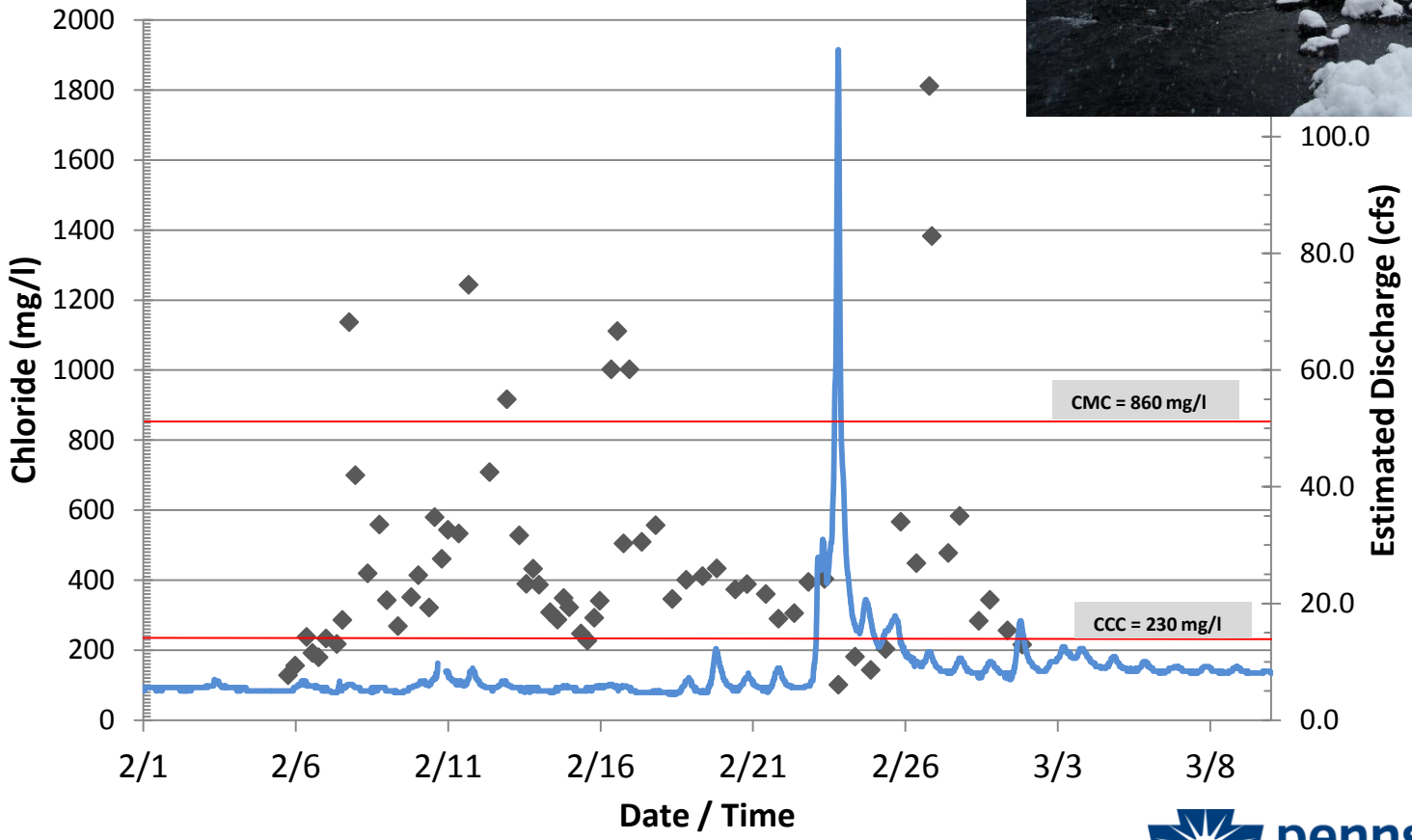
Urban Stream Salinization



Tacony Creek, Jenkintown, Winter 2010
22.2 % Impervious Cover



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1. **Biological sampling methods**
2. **Index of Biotic Integrity scoring**
3. **Basin results**
4. **ALU Southeast Region results**

Fish consumption assessment results for SER

Recreation assessment results for SER

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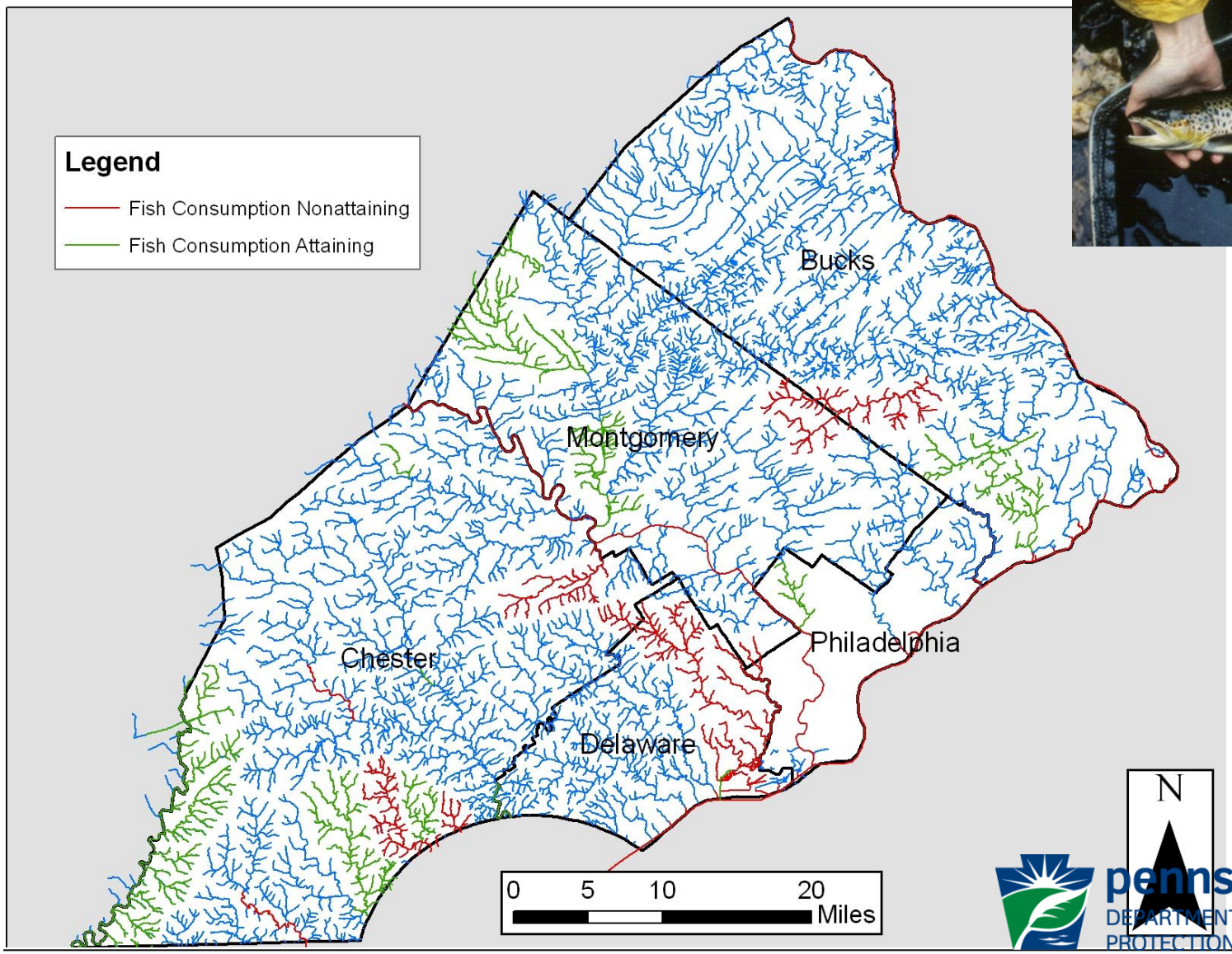
Fish Consumption Assessment, SER



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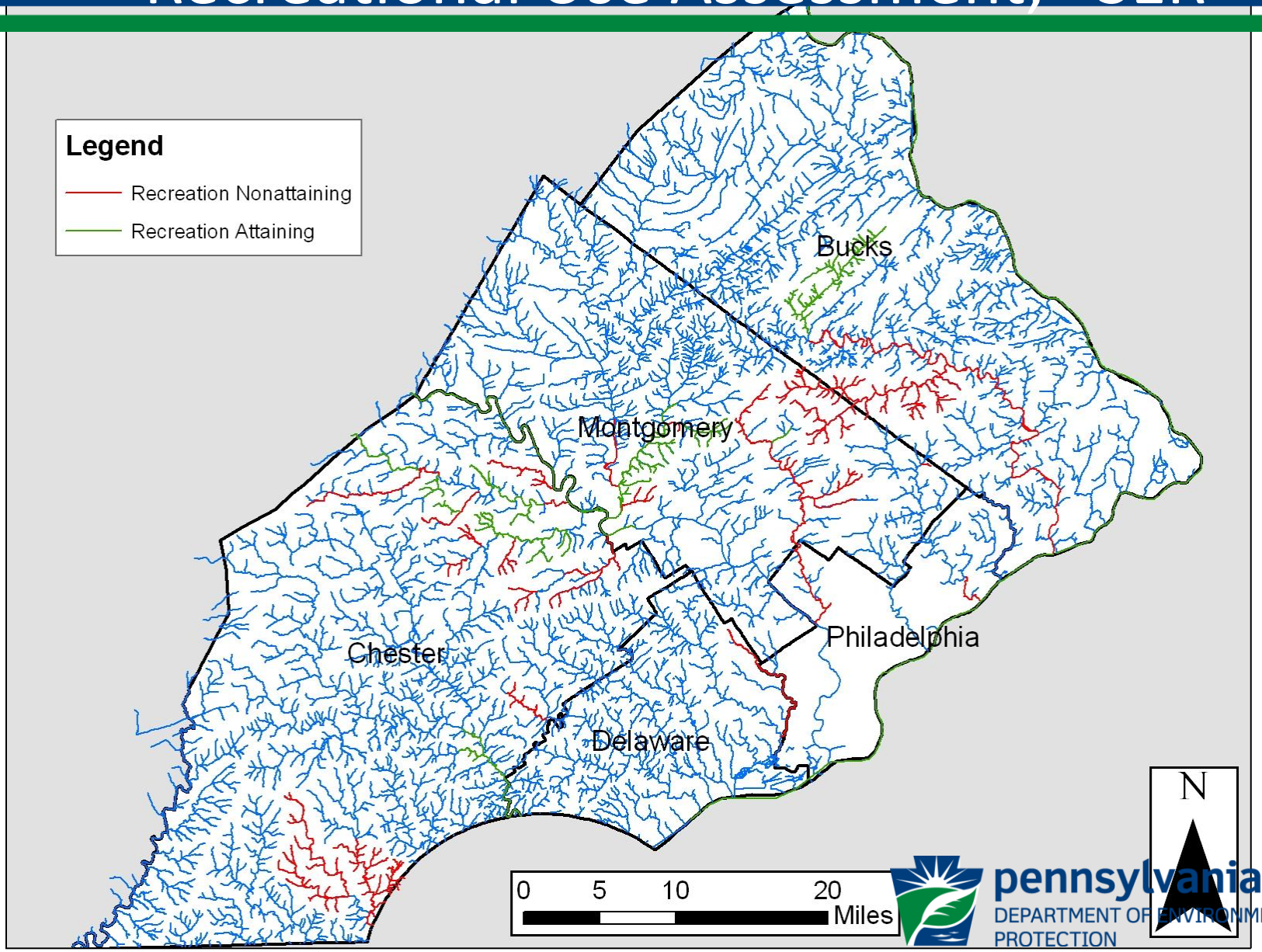
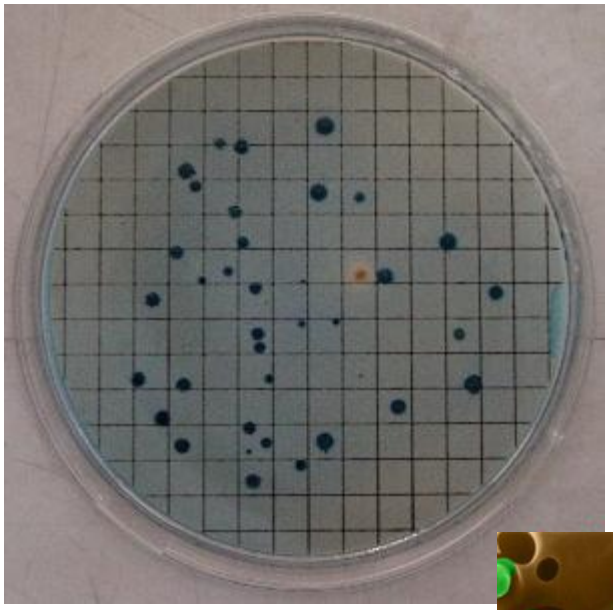
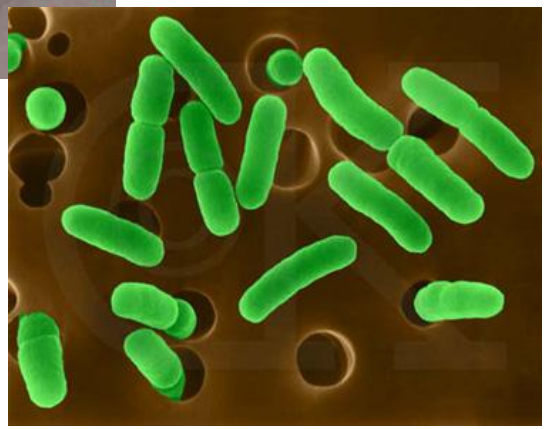
Recreational Use Assessment, SER



Looking for Recreational Use Assessment Volunteers





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