

**TABLES**

**TABLE 1**  
**ADAPTED IMPERVIOUS VALUES FOR SELECTED LAND USES**

	A	B	C	D	Adapted Values
Agriculture	.02	-	.02	0	.02
Commercial	.72	.83	.72	-	.72
Forest	.50	-	.5	0	0
High Density Urban	-	-	-	.85	-
Industrial Light	.53	-	-	-	.53
Industrial Heavy	-	.69	-	-	.69
Institutional	.34	-	-	-	-
Open Urban Land	-.09	-	-	-	.09
Res Low Density	.13	-	.13	.12	.13
Res Medium Density	-.25	-	.25		.25
Res High Density	.33	.41	.33	-	.33
Roads	-	-	.75	-	.75
Shopping Center (Mall)	-	.92	-	-	.92
Strip Mine	-	-	-	0	0
Water	0	-	-	-	0
Wetlands	-	-	-	0	-

**Notes:**

1. All values are out of 1, where 1 is a completely impervious surface.
2. A dash is shown where no data was available.

**Sources:**

- A. Capiella, Karen and Kenneth Brown. 2001. *Land Use and Impervious Cover in the Chesapeake Bay Region*. Watershed Protection Techniques, Urban Lake Management.
- B. Bannerman, R. 2001 unpublished data from Karen Capiella and Kenneth Brown. Jan 2001. *Impervious Cover and Land Use in the Chesapeake Bay Watershed*. Watershed Protection Techniques.
- C. Capiella, Karen and Kenneth Brown. 2001. *Impervious Cover and Land Use in the Chesapeake Bay Watershed*. Watershed Protection Techniques.
- D. U.S. Environmental Protection Agency. 2001. *Metals and pH TMDLs for the Tygart Valley River Watershed, West Virginia*.



TABLE 2 WATERSHED CHARACTERISTICS FOR ALLEGHENY COUNTY

KEY	WATERSHED	BASIN	Stream Order	Built Ratio	Area
1	Big Sewickley Creek	Ohio	4	1	4
2	Little Sewickley Creek	Ohio	3	1	2
3	Kilbuck Run	Ohio	3	1	2
* 4	Toms Run	Ohio	2	1	1
5	Lowries Run	Ohio	3	1	3
6	Spruce Run	Ohio	2	3	1
7	Jacks Run	Ohio	2	4	1
8	Shouse Run	Ohio	2	1	1
9	Flaugherty Run	Ohio	3	3	2
10	Narrows Run	Ohio	2	2	1
11	Thorn Run	Ohio	2	3	1
12	McCabe Run	Ohio	2	2	1
13	Montour Run	Ohio	4	1	4
14	Moon Run	Ohio	3	3	2
15	Chartiers Creek	Ohio	5	4	6
* 16	Sawmill Run	Ohio	2	5	3
17	Girtys Run	Allegheny	3	2	3
* 18	Pine Creek	Allegheny	4	1	6
19	Guyasuta Run	Allegheny	2	2	1
* 20	Squaw Run	Allegheny	3	1	2
21	Powers Run	Allegheny	1	2	1
22	Deer Creek	Allegheny	4	1	5
23	Tawney Run	Allegheny	2	2	1
24	Riddle Run	Allegheny	2	2	1
25	Crawford Run	Allegheny	2	1	1
26	Days Run	Allegheny	3	1	1
27	Bulls Run	Allegheny	4	1	5
28	Shades Run	Allegheny	2	5	1

KEY	WATERSHED	BASIN	Stream Order	Built Ratio	Area
* 29	Sandy Creek	Allegheny	3	3	1
* 30	Quigley Creek	Allegheny	2	3	1
31	Indian Creek	Allegheny	1	4	1
32	Plum Creek	Allegheny	3	1	4
33	Becks Run	Monongahela	2	5	1
* 34	Streets Run	Monongahela	3	5	2
35	West Run	Monongahela	2	4	1
36	Whitaker Run	Monongahela	2	5	1
37	Thompson Run	Monongahela	2	4	2
38	Curry Hollow	Monongahela	2	5	1
* 39	Coal Valley	Monongahela	2	4	1
40	Peters Creek	Monongahela	4	3	5
* 41	Lobbs Run	Monongahela	3	1	1
42	Nine Mile Run	Monongahela	2	5	2
43	Turtle Creek	Monongahela	5	1	6
* 44	Crooked Creek	Monongahela	2	5	1
45	Long Run Creek	Monongahela	4	3	3
46	Youghiogheny River	Monongahela	2	3	2
47	Boston Hollow	Monongahela	2	1	1
48	Wylie Run	Monongahela	3	1	1
49	Douglass Run	Monongahela	4	1	3
50	Fallen Timber Run	Monongahela	3	1	2
51	Perry Mill Run	Monongahela	3	1	1
52	Kelly Run	Monongahela	2	1	1
53	Bunola Run	Monongahela	2	1	1
54	Sunfish Run	Monongahela	2	1	1
55	Kelly Run	Monongahela	2	1	1
56	Becketts Run	Monongahela	3	1	1

\* Denotes a priority watershed

**APPENDIX A**

Glossary of Terms

### **Acid Mine Drainage (AMD)**

Heavily acidic water that drains from a surface or subsurface mine. This water will have an extremely low pH (high concentration of hydrogen ions), often combined with high concentrations of sulfur, aluminum, iron, and other heavy metals (Exploring the Environment: Water Quality, website).

### **Combined Sewer Overflows (CSOs)**

An outfall condition that results from a combined wastewater and storm water management infrastructure. When a combined sewer system is overloaded by rainwater, untreated sewage is discharged through outfall structures. This system is designed to discharge only during extreme wet weather conditions, but overflows can also occur due to poor operation and maintenance (3 Rivers Wet Weather, website).

### **Drainage Path**

The flow course of water through the landscape.

### **Geographic Information Systems (GIS)**

A computer system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data related to positions on the Earth's surface (Dictionary.com, website).

### **Georeferencing**

The process of locating a place based on its coordinates, usually done with a GPS unit.

### **Global Positioning System (GPS)**

A system of satellites, computers, and receivers that is able to determine the latitude and longitude of a receiver on Earth by calculating the time difference for signals from different satellites to reach the receiver (Dictionary.com, website).

### **Hydrology**

The scientific study of the properties, distribution, and effects of water (Dictionary.com, website).

### **Impervious**

Incapable of being penetrated by water (i.e. pavement). A hard surface that is completely impermeable is said to be 100% impervious. The opposite of pervious.

### **Non-Perennial stream**

A stream that only runs during wet weather conditions, typically after a rainstorm or other runoff event.

### **Non-Point Source Pollution (NPS)**

Water pollution originating from a wide variety of common, everyday sources. Typical NPS pollution sources are contaminants on land that are carried off in surface runoff (during rainfall or snow melt) that make their way into nearby streams. Runoff can carry excess nutrients and chemicals from agriculture, golf courses, and lawns; salt from highways; oils from parking lots; and sediments from eroding stream banks (Watershed Atlas, website).

### **Perennial stream**

A stream that runs in both wet weather and dry weather conditions (during all seasons).

### **Point Source Pollution**

By-products emanating from an end-of-pipe source, such as an industrial discharge or smokestack emission (Watershed Atlas, website).

### **Riparian**

Referring to the riverside environment adjacent to a stream channel (Riley, 408).

### **Stream**

A flow of water in a channel.

### **Stream Order**

A system of numbering streams based on sequence in tributary hierarchy (Black, 425). Looking at figure 1 for example, the smaller tributary legs, labeled 1 and 2, feed the main trunk of the stream, labeled 3.

### **Watershed**

A unit of land on which all water that falls collects at a common outlet. Also known as: catchment area and drainage basin (Black, 278).

### **Watershed Outlet**

The lowest point, or base level, in a watershed.

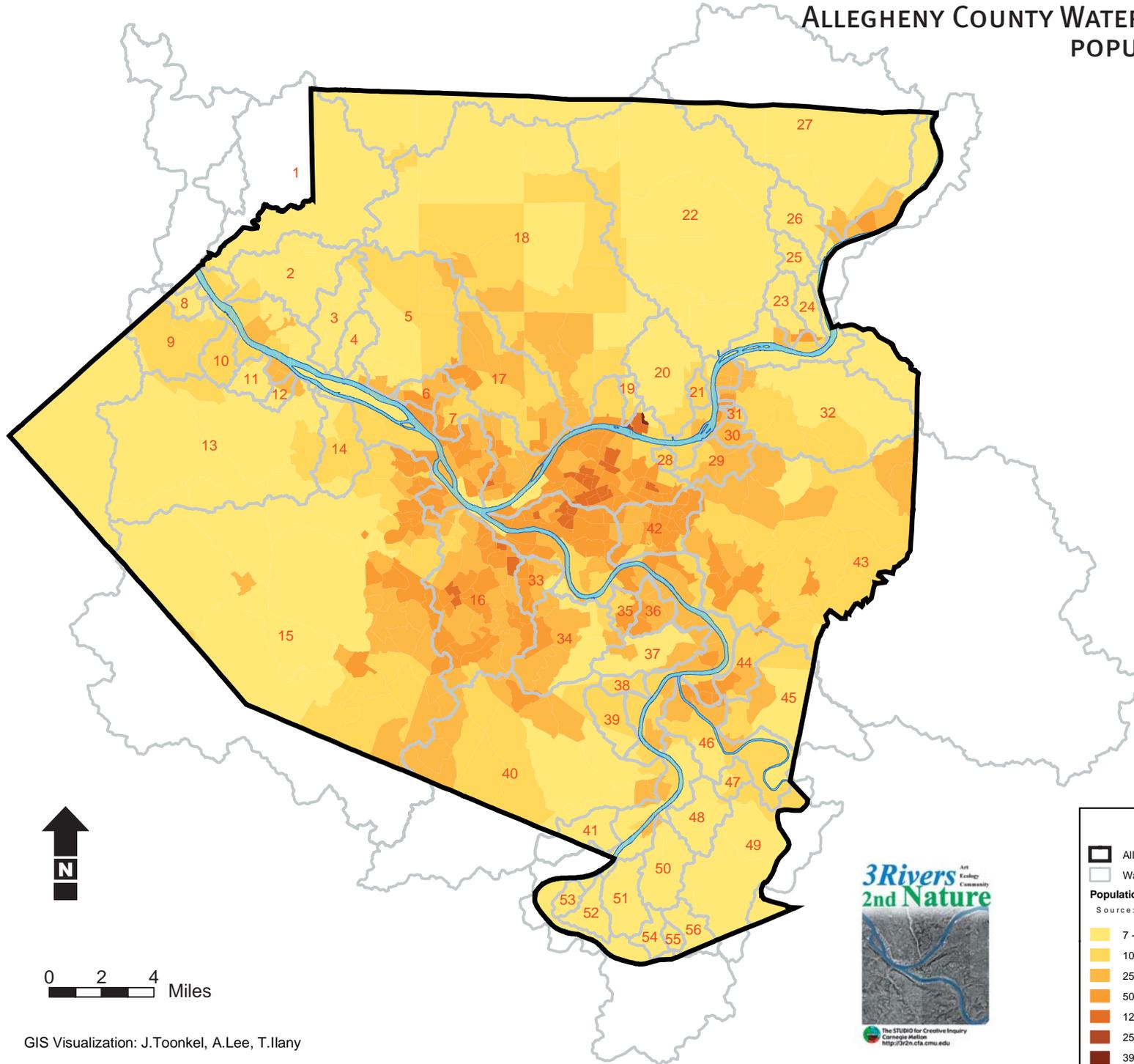
**APPENDIX B**

Urban Stream Impact Protocol Maps: Allegheny County

KEY	WATERSHED
1	Big Sewickley Creek
2	Little Sewickley Creek
3	Kilbuck Run
* 4	Toms Run
5	Lowries Run
6	Spruce Run
7	Jacks Run
8	Shouse Run
9	Flaugherty Run
10	Narrows Run
11	Thorn Run
12	McCabe Run
13	Montour Run
14	Moon Run
15	Chartiers Creek
* 16	Sawmill Run
17	Girtys Run
* 18	Pine Creek
19	Guyasuta Run
* 20	Squaw Run
21	Powers Run
22	Deer Creek
23	Tawney Run
24	Riddle Run
25	Crawford Run
26	Days Run
27	Bulls Run
28	Shades Run

KEY	WATERSHED
* 29	Sandy Creek
* 30	Quigley Creek
31	Indian Creek
32	Plum Creek
33	Becks Run
* 34	Streets Run
35	West Run
36	Whitaker Run
37	Thompson Run
38	Curry Hollow
* 39	Coal Valley
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* 41	Lobbs Run
42	Nine Mile Run
43	Turtle Creek
* 44	Crooked Creek
45	Long Run Creek
46	Youghiogheny River
47	Boston Hollow
48	Wylie Run
49	Douglass Run
50	Fallen Timber Run
51	Perry Mill Run
52	Kelly Run
53	Bunola Run
54	Sunfish Run
55	Kelly Run
56	Becketts Run

# ALLEGHENY COUNTY WATERSHED ANALYSIS POPULATION DENSITY



**KEY**

- Allegheny County
- Watersheds

**Population Density (per sq. mile)**  
Source: Year 2000 Census

7 - 100
101 - 250
251 - 500
501 - 1250
1251 - 2500
2501 - 3900
3901 - 7000



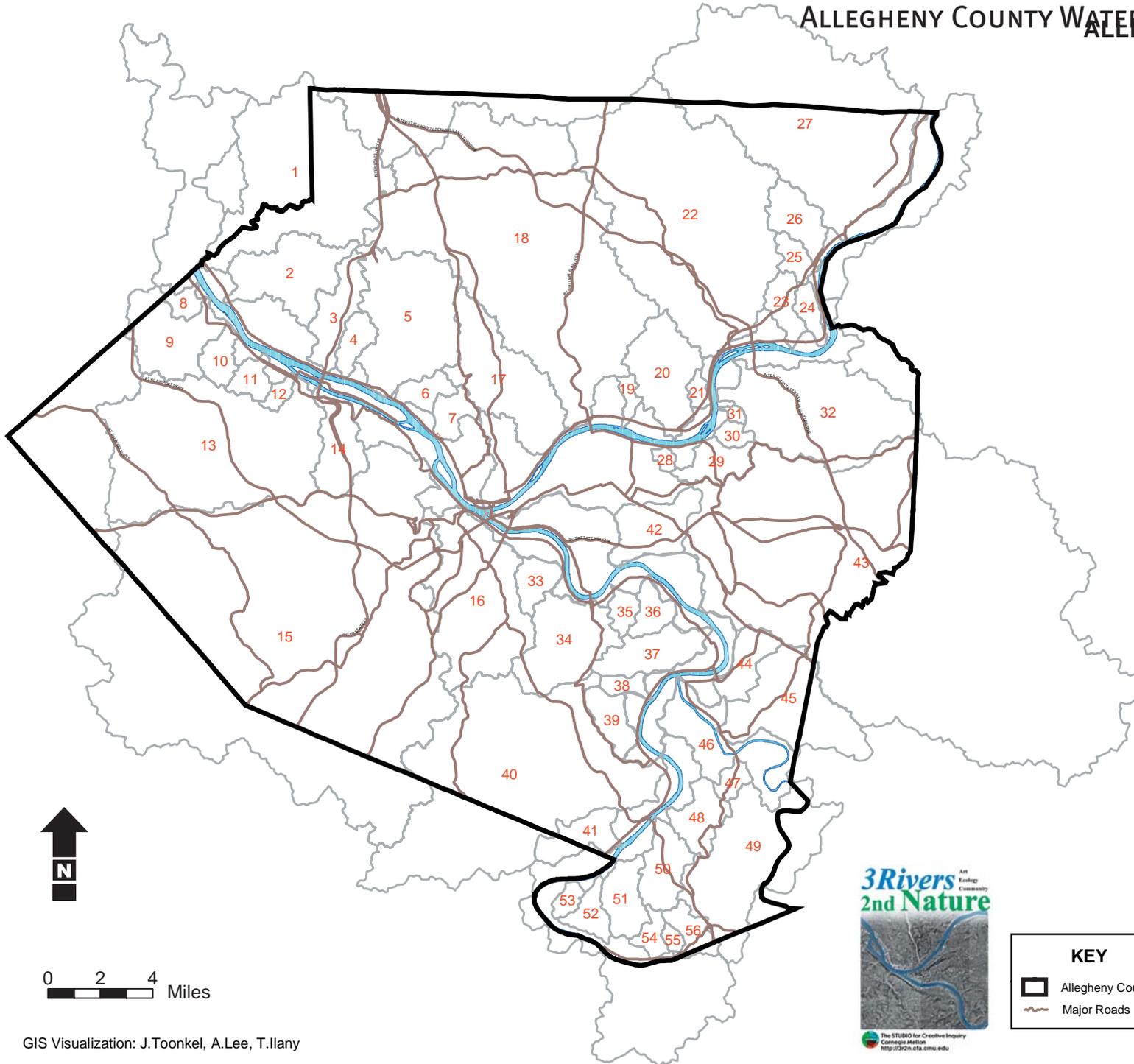
0 2 4 Miles

SOURCE: Y:\13R2\NGIS\wshed\_analysis

GIS Visualization: J.Toonkel, A.Lee, T.Ilany

URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

# ALLEGHENY COUNTY WATERSHED ANALYSIS ALLEGHENY COUNTY ROADS



SOURCE: Y:\3R2\NGIS\wshed\_analysis

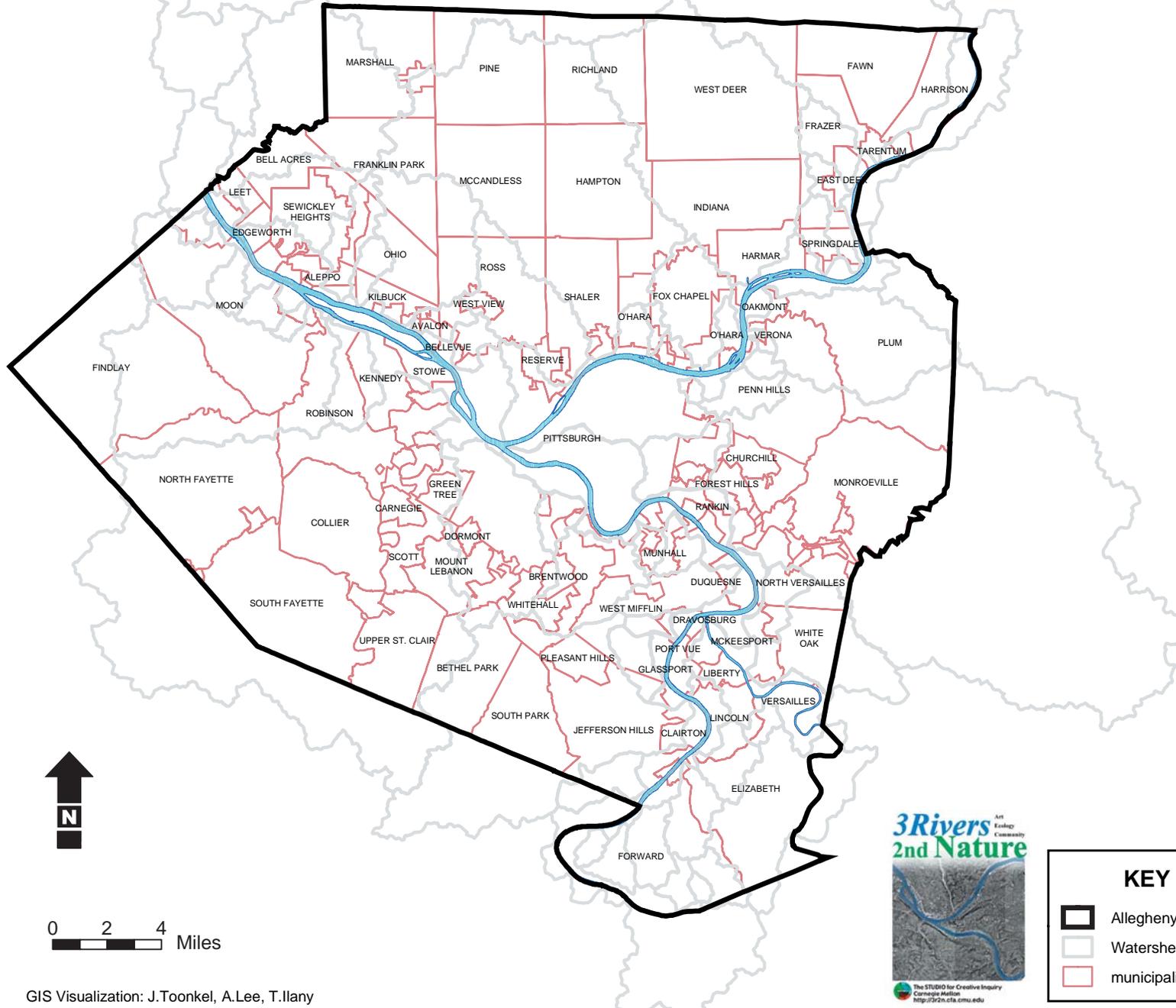
GIS Visualization: J.Toonkel, A.Lee, T.Ilany



KEY	
	Allegheny County
	Major Roads

URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

# ALLEGHENY COUNTY WATERSHED ANALYSIS MUNICIPALITIES



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0 2 4 Miles

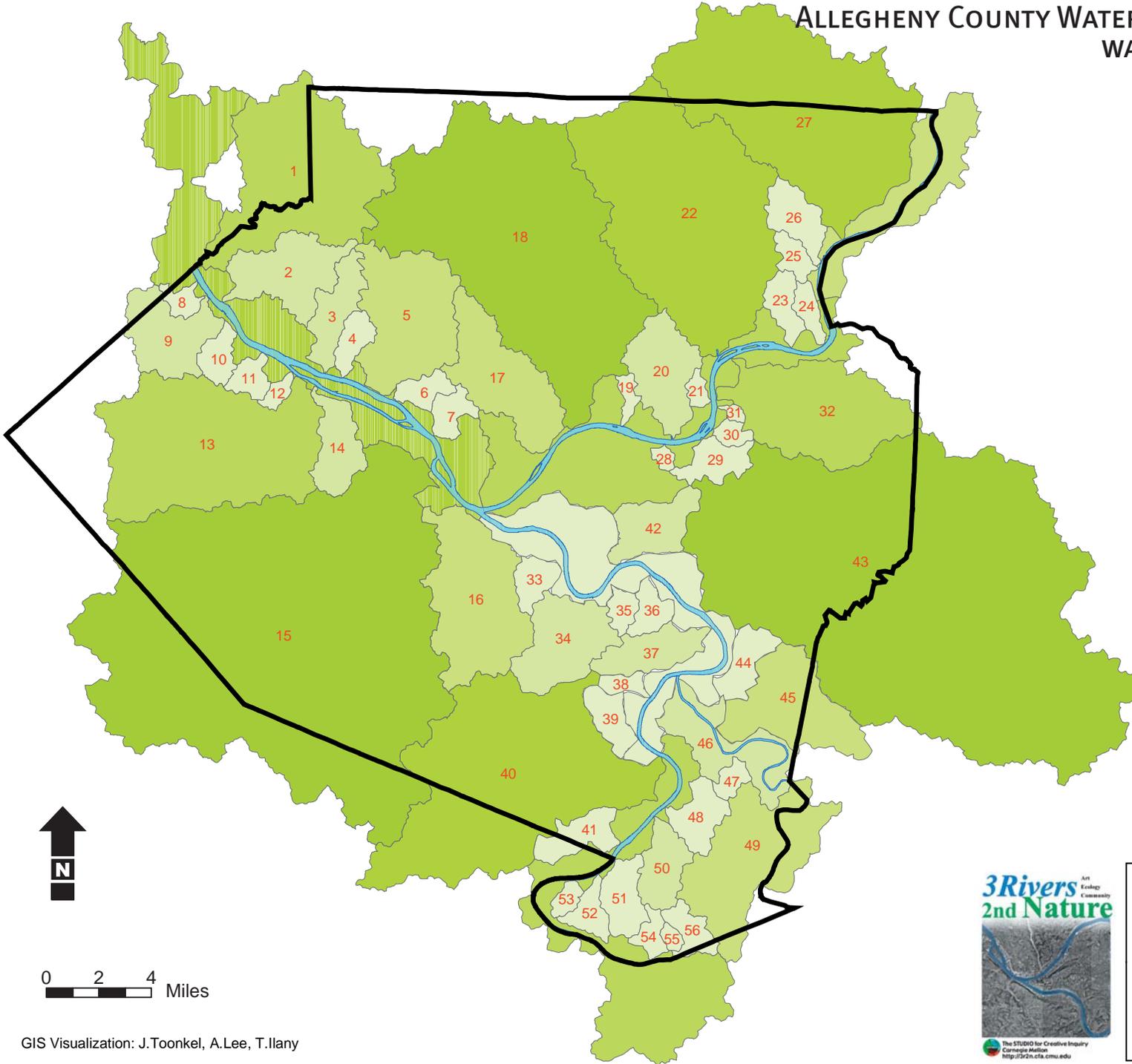
GIS Visualization: J.Toonkel, A.Lee, T.Ilany



KEY	
	Allegheny County
	Watersheds
	municipalities

URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

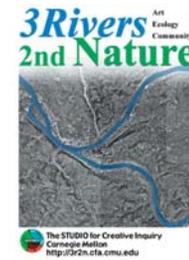
# ALLEGHENY COUNTY WATERSHED ANALYSIS WATERSHED AREAS



SOURCE: Y:\3R2\GIS\Wshed\_analysis

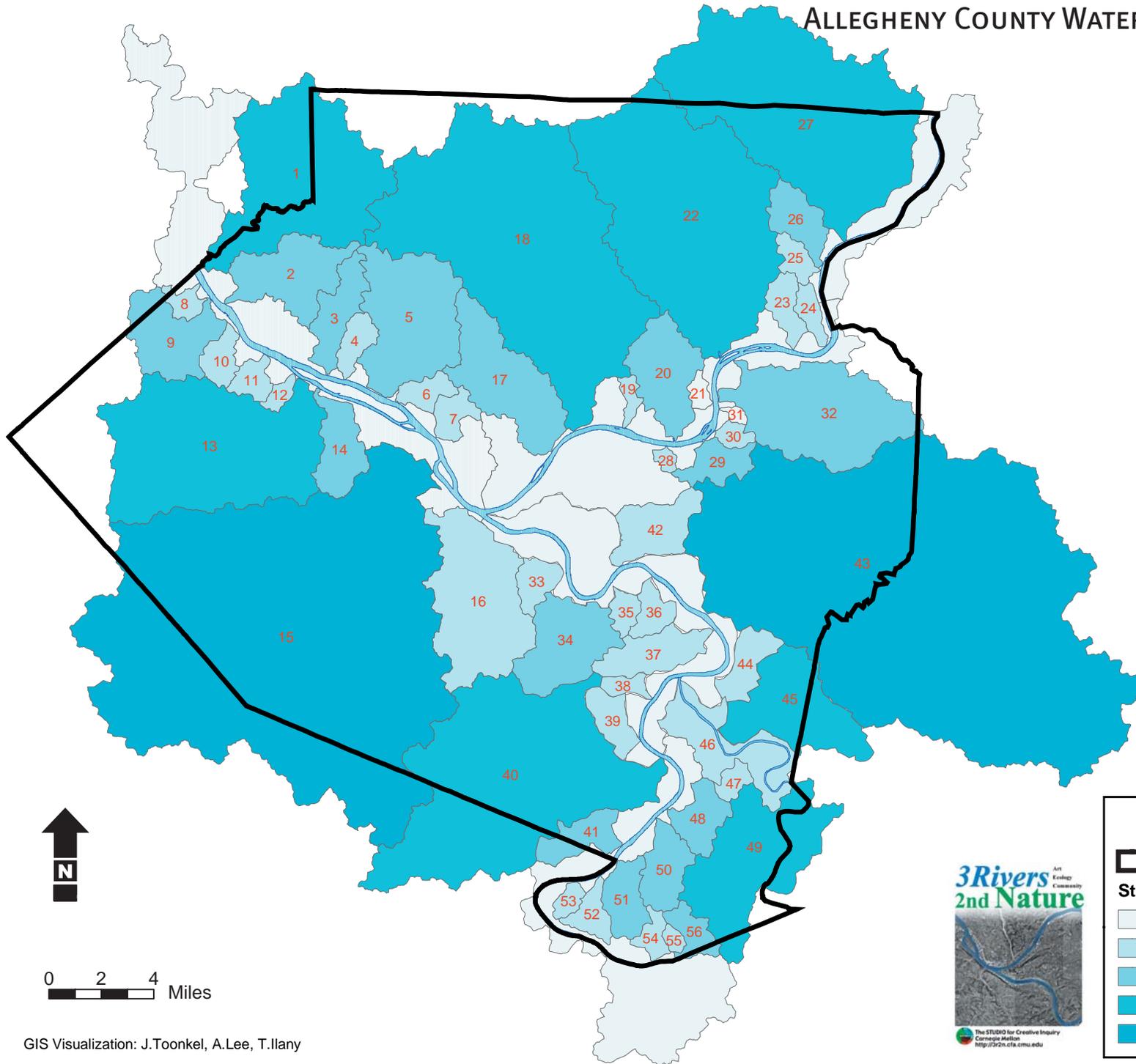
GIS Visualization: J.Toonkel, A.Lee, T.Ilany

KEY	
	Allegheny County
Watershed Area (Acres)	
	0 - 3,000
	3,000 - 6,500
	6,500 - 13,000
	13,000 - 24,000
	24,000 - 43,000
	43,000 - 100,000



URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

# ALLEGHENY COUNTY WATERSHED ANALYSIS STREAM ORDER



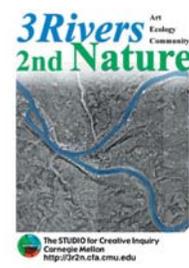
URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

**KEY**

Allegheny County

**Stream Order**

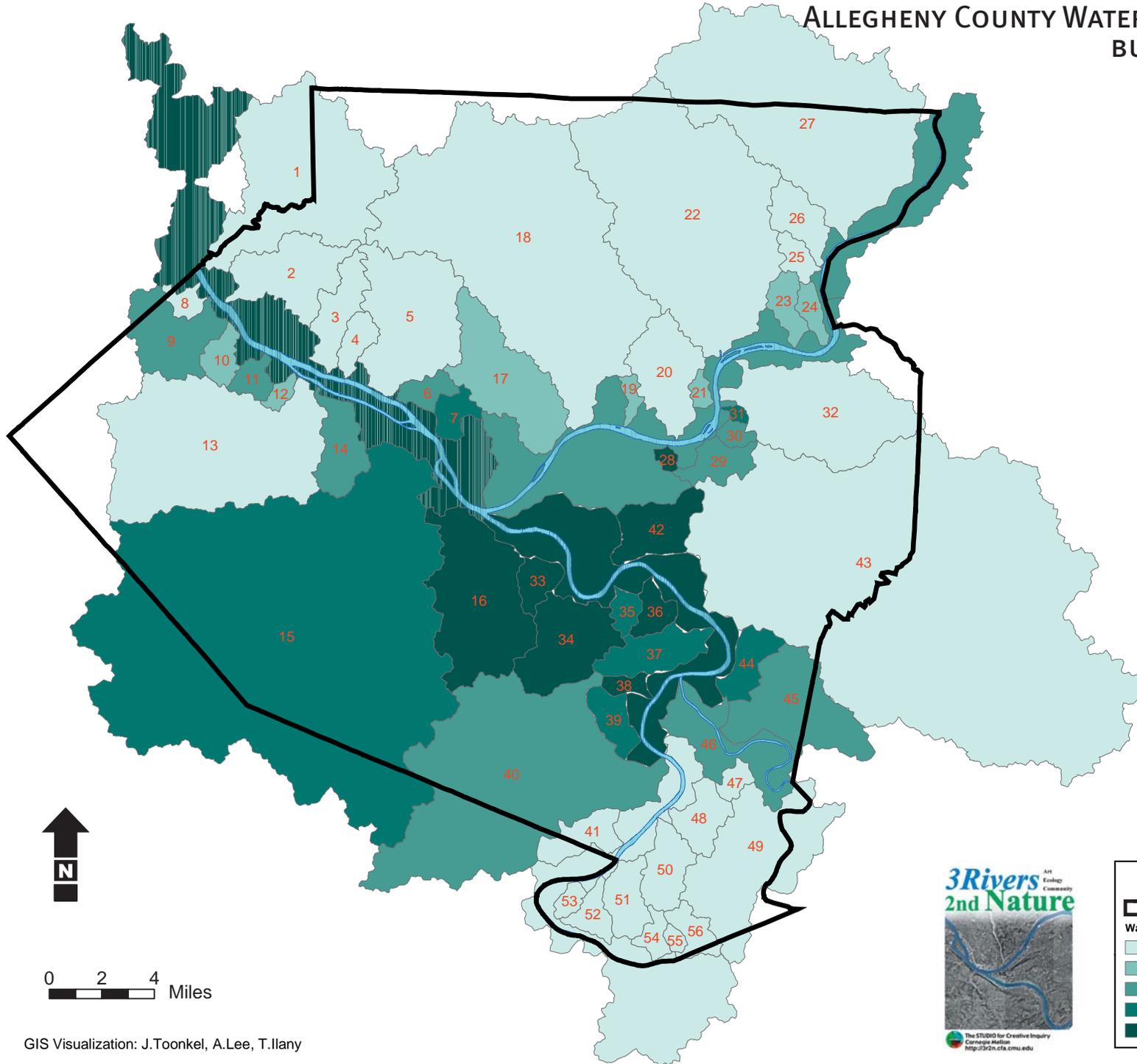
- 1
- 2
- 3
- 4
- 5



SOURCE: Y:\3R2\GIS\wshed\_analysis

GIS Visualization: J.Toonkel, A.Lee, T.Ilany

# ALLEGHENY COUNTY WATERSHED ANALYSIS BUILT PERCENTAGE



SOURCE: Y:\3R2N\GIS\wshed\_analysis

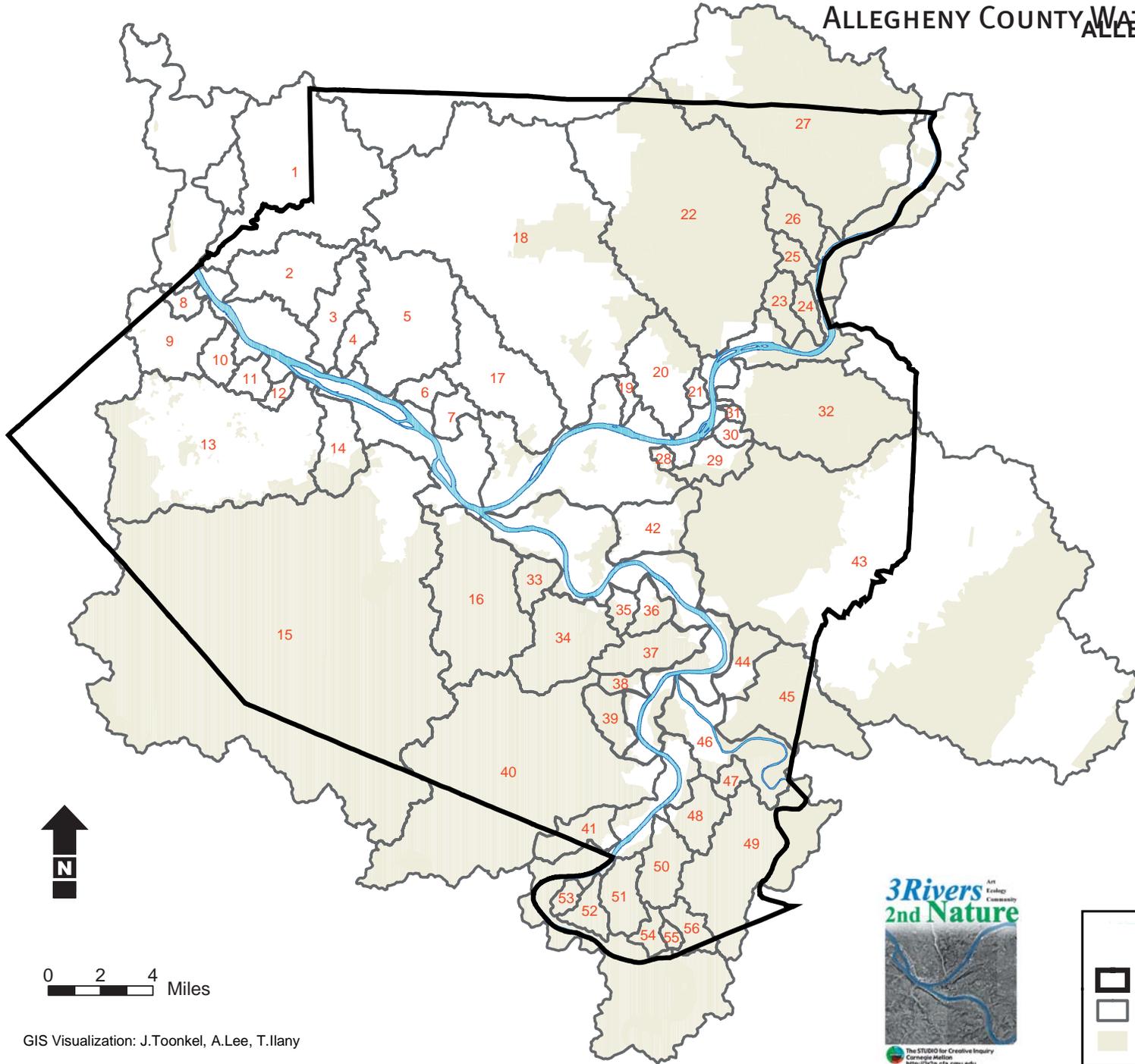
GIS Visualization: J.Toonkel, A.Lee, T.Ilany



KEY	
	Allegheny County
Watershed Development (%)	
	0 - 1
	1 - 2
	2 - 8
	8 - 20
	20 +

URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

# ALLEGHENY COUNTY WATERSHED ANALYSIS ALLEGHENY COUNTY COAL SEAM



0 2 4 Miles

SOURCE: Y:\3R2NGIS\wshed\_analysis

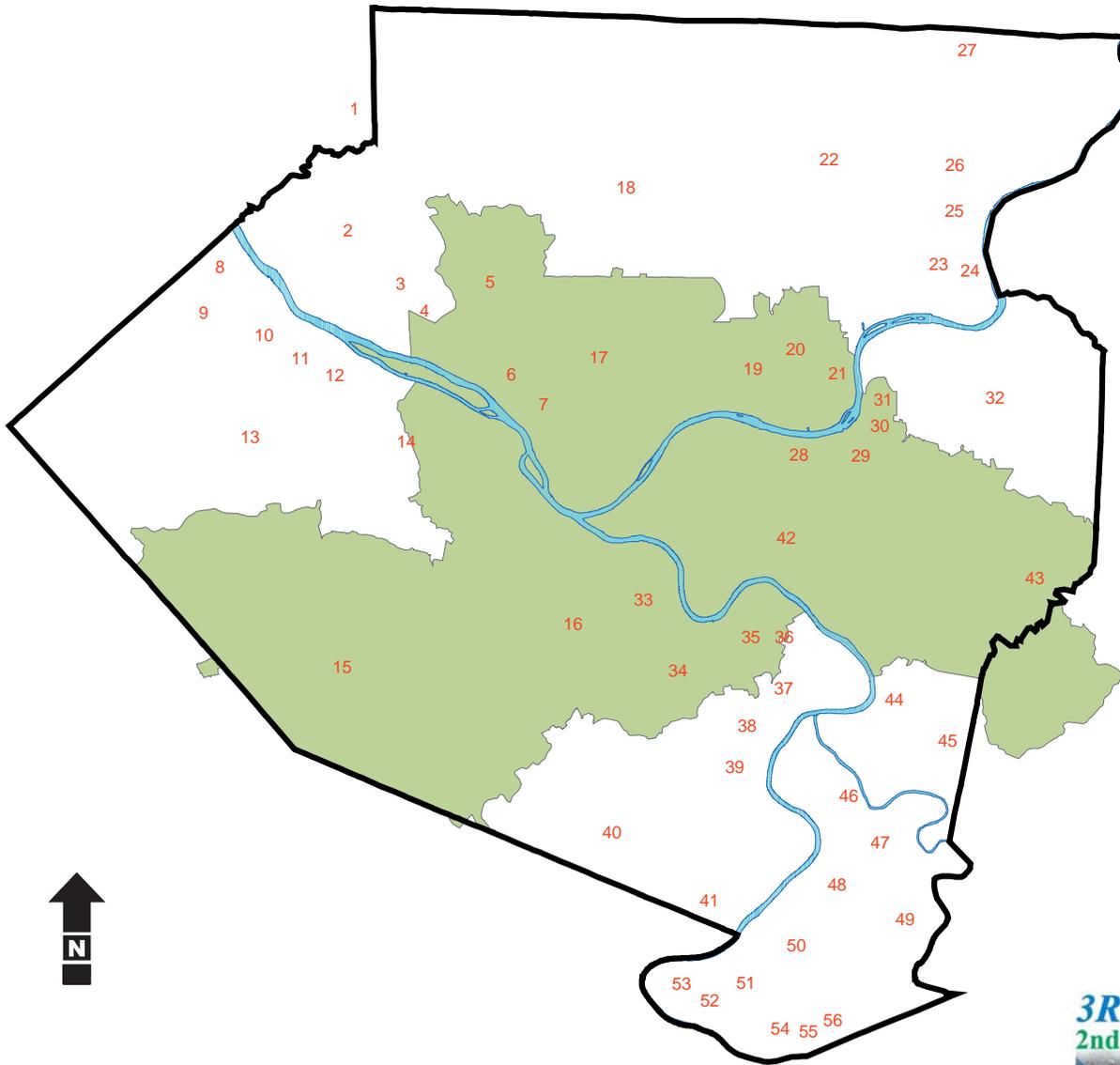
GIS Visualization: J.Toonkel, A.Lee, T.Ilany



KEY	
	Allegheny County
	Watersheds
	Coal Seam

URBAN STREAM IMPACT PROTOCOL  
A GIS-BASED METHODOLOGY FOR ASSESSING WATER QUALITY AND SOURCE DETERMINATION

# ALLEGHENY COUNTY WATERSHED ANALYSIS ALCOSAN COVERAGE

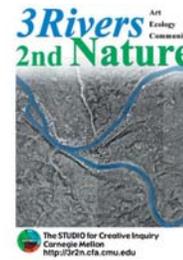


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0 2 4 Miles

GIS Visualization: J.Toonkel, A.Lee, T.Ilany



KEY	
	Allegheny County
	Alcosan Coverage

## **APPENDIX C**

Urban Stream Impact Protocol Maps: Sample Watershed

SOURCE: Y:\13R2\NGIS\wshed\_analysis



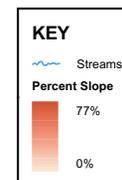
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GIS Visualization: J.Toonkel, A.Lee, T. Ilany



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

**18**  
SLOPE

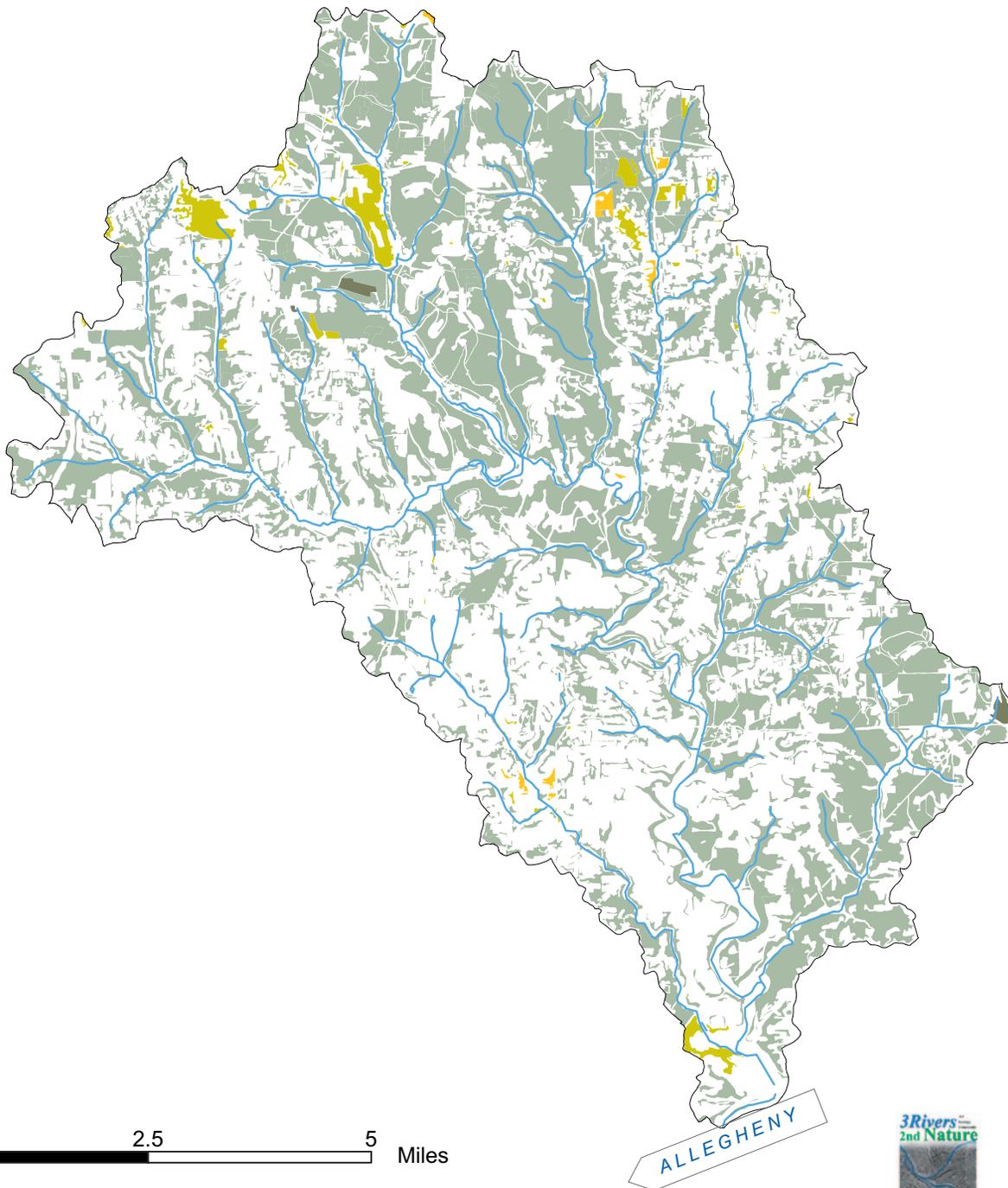


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0 2.5 5 Miles

GIS Visualization: J.Toonkel, A.Lee, T. Ilany



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

**18**

LAND USE RESOURCES



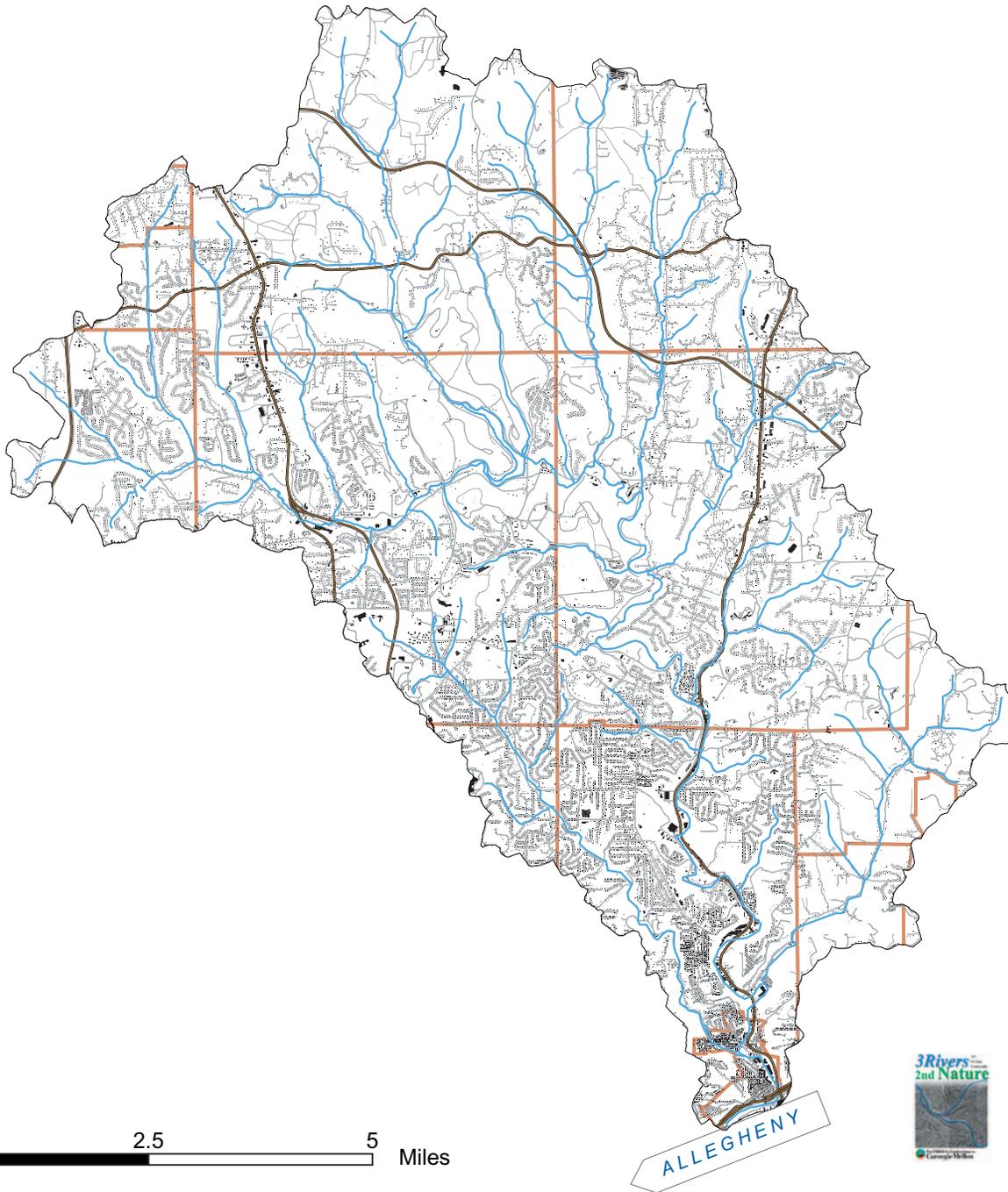
KEY	
	Streams
Land Use Resources	
	Sand/ Mud Areas
	Nurseries/ Orchards
	Cultivated Fields
	Woodlands
	Swamps/ Wetlands



SOURCE: Y:\3R2\GIS\wshed\_analysis

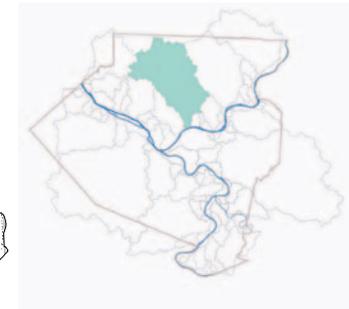


0 2.5 5 Miles



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

**18**  
BUILDINGS



**KEY**

- Streams
- Major Roads
- Roads
- Buildings
- Municipalities

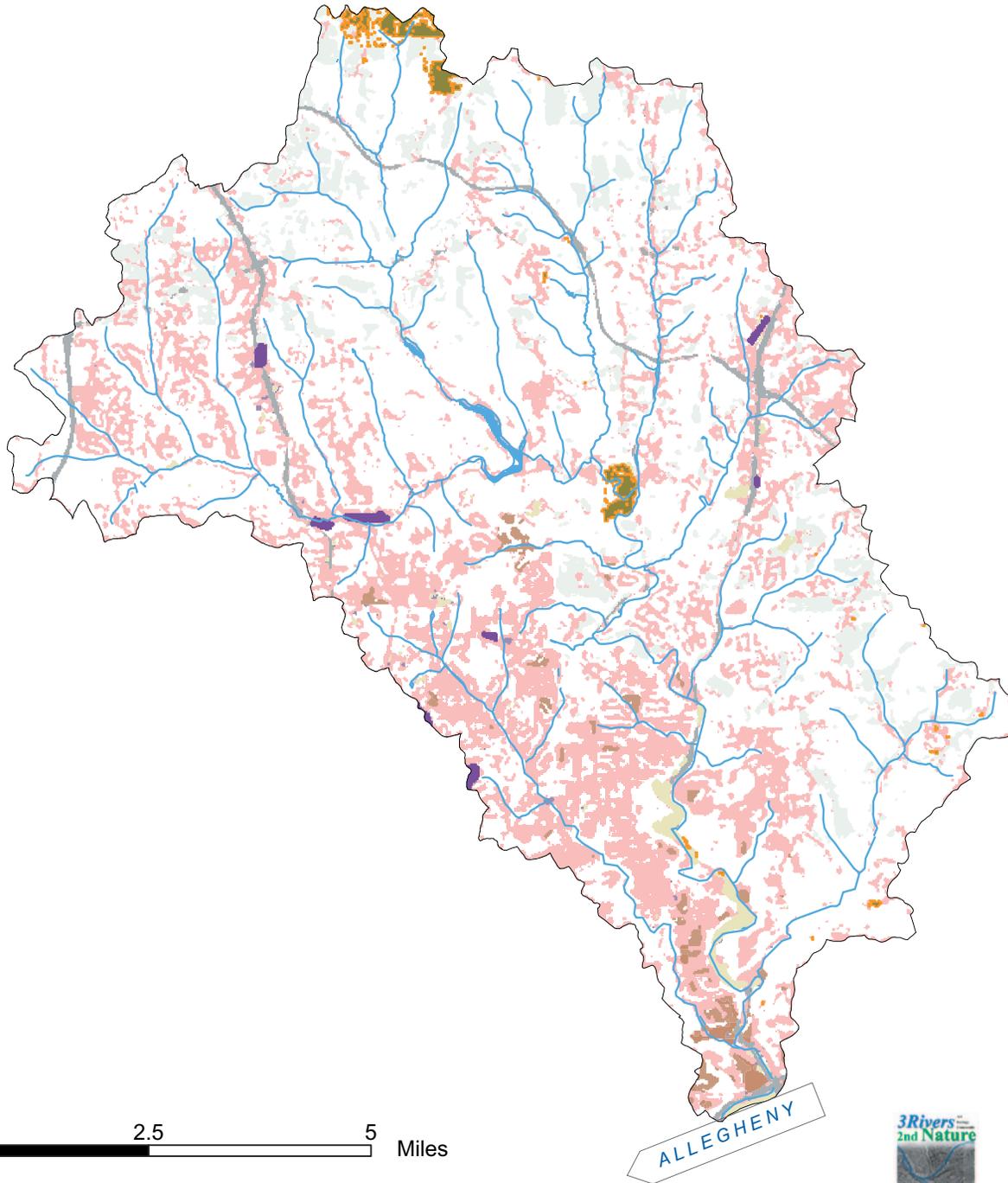


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0 2.5 5 Miles

GIS Visualization: J.Toonkel, A.Lee, T. Ilany



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

18

LAND USE INFRASTRUCTURE



KEY	
	Streams
Land Use	
	Water
	Agricultural/Pasture
	Commercial
	Commercial - Malls
	Residential - Low Density
	Residential - Medium Density
	Residential - High Density
	Transportation
	Industrial - Light
	Industrial - Heavy
	Industrial - Mining



SOURCE: Y:\3R2\NGIS\wshed\_analysis



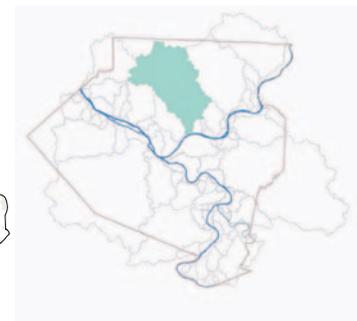
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GIS Visualization: J.Toonkel, A.Lee, T. Ilany



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

**18**  
IMPERVIOUSNESS



KEY	
	Streams
Land Cover Imperviousness	
	0 - 9%
	10 - 19%
	20 - 29%
	30 - 39%
	40 - 49%
	50 - 59%
	60 - 69%
	70 - 79%
	80 - 89%
	90 - 100%

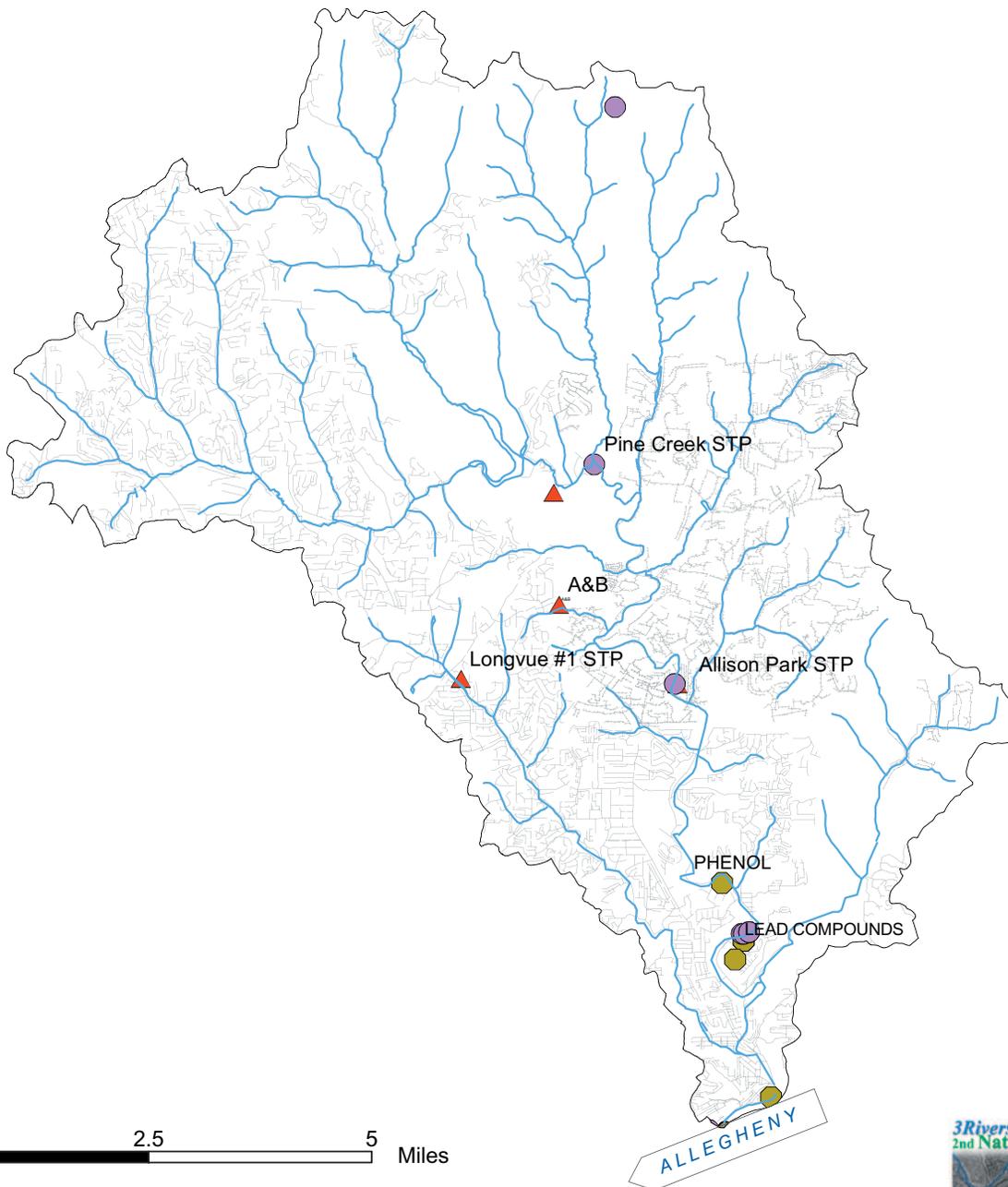


SOURCE: Y:\3R2\NGIS\wshed\_analysis



0 2.5 5 Miles

GIS Visualization: J.Toonkel, A.Lee, T. Ilany



### PINE CREEK WATERSHED ALLEGHENY RIVER BASIN

# 18

SEWERS & OUTFALLS



**KEY**

- Streams
- Sewers
- CSO's
- Outfalls
- Treatment Plants
- Toxic Release Points



SOURCE: Y:\13R2\NGIS\wshed\_analysis



0 2.5 5 Miles

GIS Visualization: J.Toonkel, A.Lee, T. Ilany



**PINE CREEK WATERSHED**  
ALLEGHENY RIVER BASIN

**18**  
USGS TOPOGRAPHY

