

# Georeferencing Water Quality Assessments to NHDPlus Catchments

A New Approach to Evaluating and  
Measuring Progress in Surface Water Quality

---

WENDY REID, U.S. EPA, OFFICE OF WATER

# Outline

---

## Georeferencing Pilot (GeoPilot)

- Background and Goals
- Methods in Brief
- Results

## Using Catchment-Based Indexing to Measure Progress

- Benefits
- Examples

# Clean Water Act

---

## Section 303(d)

- A List of Impaired Waters for which a TMDL still needs to be completed

## Section 305(b)

- An Assessment of the Water Quality of all navigable waters in each State

## Integrated Report (IR)

- Integrates data from Sections 303(d) and 305(b)

# Background

---

States submit IR/303(d)/305(b) decision data and the corresponding location information to EPA

Geospatial data are different formats

- Resolutions
  - Medium Resolution: 1:100,000 scale
  - High Resolution: mixture of scales, typically 1:24,000 or better
- Reference layers
  - NHD/NHDPlus
  - Other than NHD

Current processing is mostly manual

- Time consuming
- Expensive to EPA

GeoPilot initiated to investigate and test potential improvements

# Goals of Georeferencing Pilot

---

1. Reduce cost through automated processing
2. Process and publish geospatial data faster
3. Maintain high data quality
4. Create more complete dataset

# Catchment-Based Indexing

---

## Used NHDPlus Version 2 Catchments

- Approximately 2.6 million catchments in contiguous US
- Average size: 1.1 square miles
- Significant range in size, but 99% smaller than 15 square miles

## Needed to accommodate many types of inputs

- Linear events, Area events, HUC-like events
- Medium resolution (1:100K)
- High resolution (1:24K or better)
- NHD or Non NHD

## Separating Display and Analysis

# GeoPilot Prototypes

---

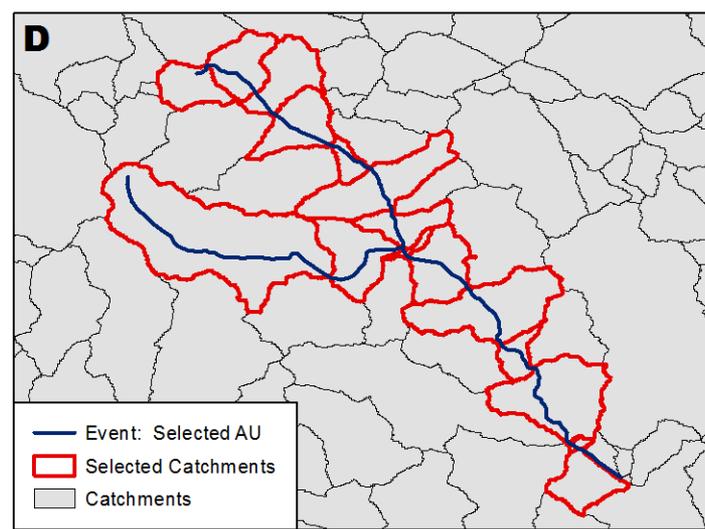
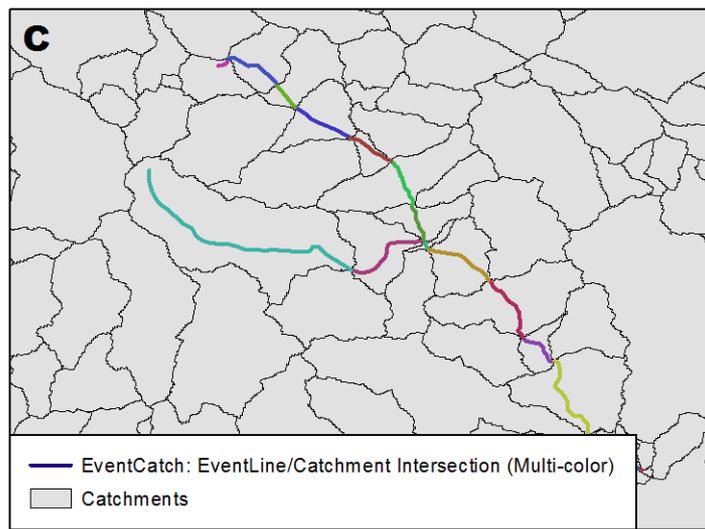
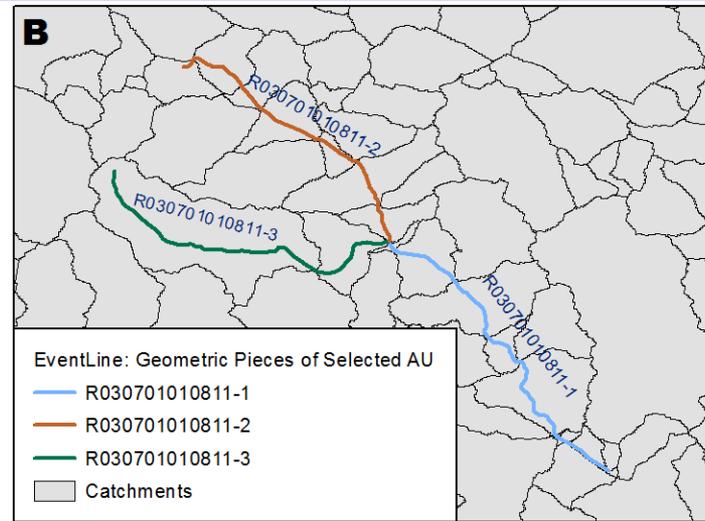
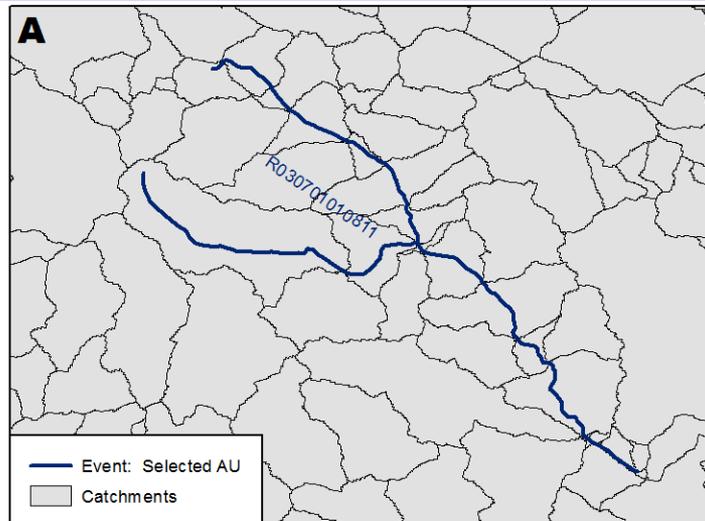
Three prototypes – based on input type

- Linear to Catchment
- Area Waterbody to Catchment
- HUC-like to Catchment

Prototypes use attributes from NHDPlus

- Stream level
- Hydrologic sequence number
- Level path
- Artificial path
- Divergence

# Linear to Catchment Prototype



# Results

---

|                                  | <b>Old Method</b>                  | <b>Catchment-Based Method</b>                |
|----------------------------------|------------------------------------|--|
| <b>Manual Processing Time</b>    | 20-100 hours per state             | 7-15 hours (pre-processing and QA) per state |
| <b>Automated Processing Time</b> | Varies with significant QA/QC time | Varies: 5 minutes to 3 hours per state       |
| <b>Estimated Cost</b>            | ~\$2,000 - \$10,000 per state      | ~\$700-\$1,500 per state                     |
| <b>Outputs</b>                   |                                    |  |
| <b>Resolution for Analysis</b>   | 1:100K NHDPlus                     | 1:100K NHDPlus Catchments                    |
| <b>Resolution for Display</b>    | 1:100K NHDPlus                     | State's original resolution                  |

\*Catchment-based indexing should have a minimal impact to how states submit data

# Strategic Measures and Tracking Progress

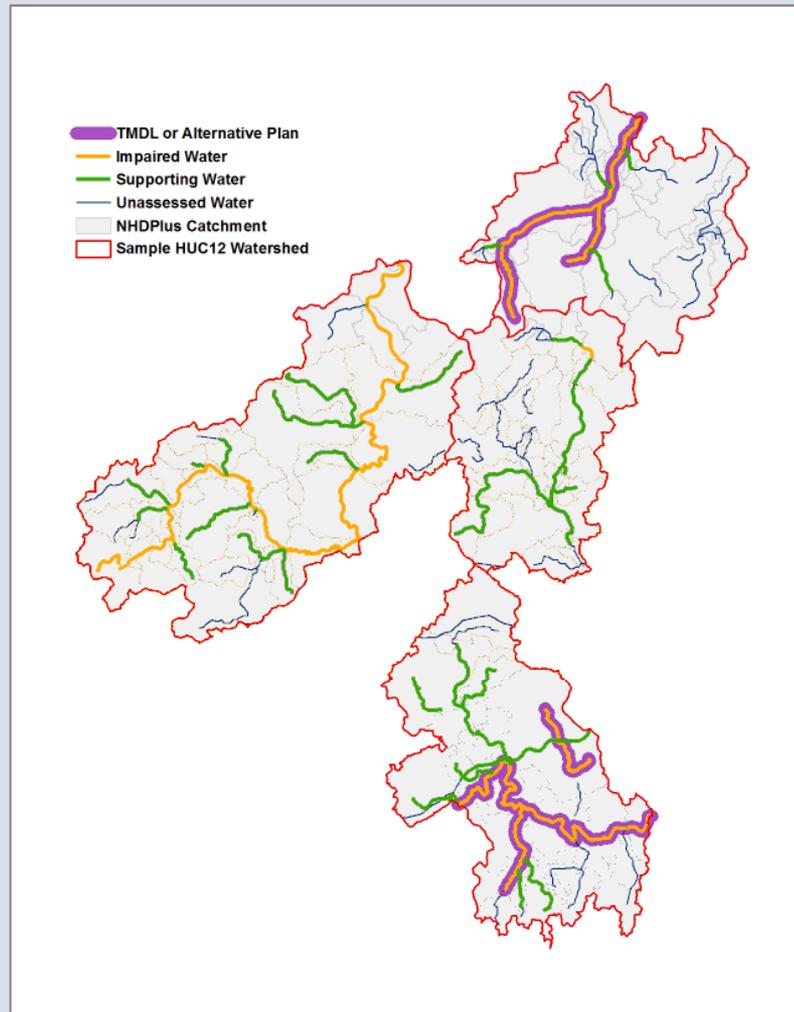
---

## CWA Section 303(d) Measures first to test this approach

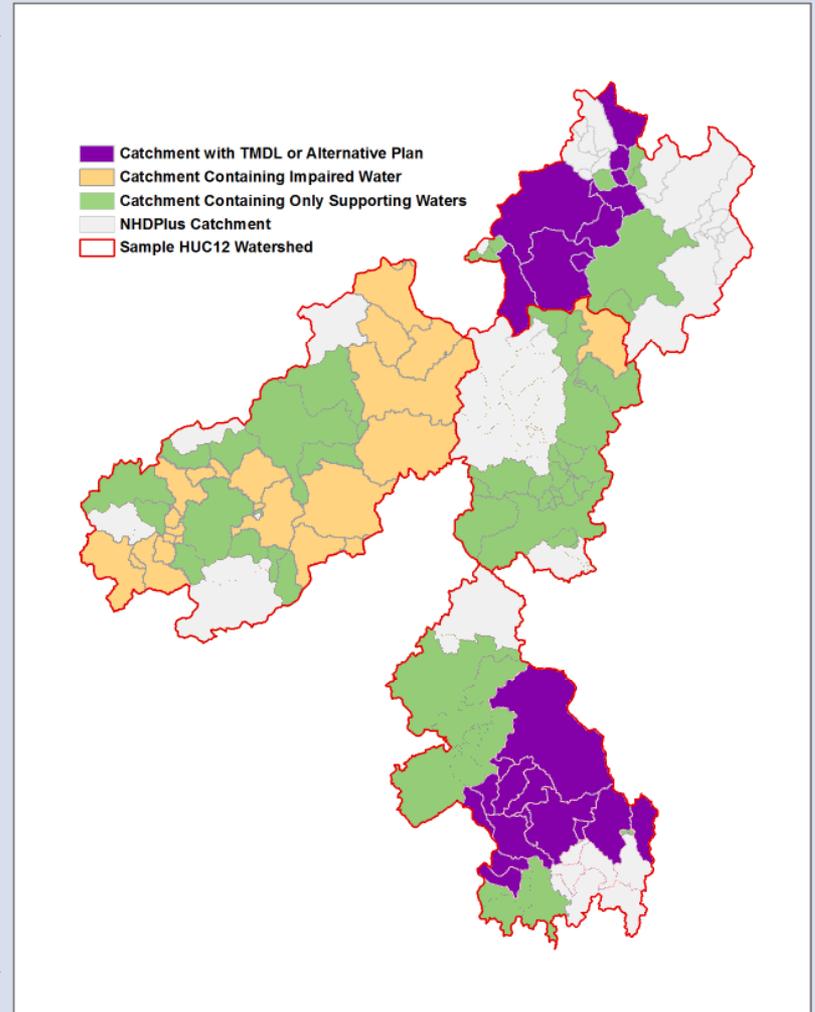
- Extent of priority areas identified by each state that are addressed by EPA-approved TMDLs or alternative restoration approaches for impaired waters that will achieve water quality standards. These areas may also include protection approaches for unimpaired waters to maintain water quality standards.
- State-wide extent of activities leading to completed TMDLs or alternative restoration approaches for impaired waters, or protection approaches for unimpaired waters.

# Mapping State GIS Data to the Catchments

## Receive GIS data from States

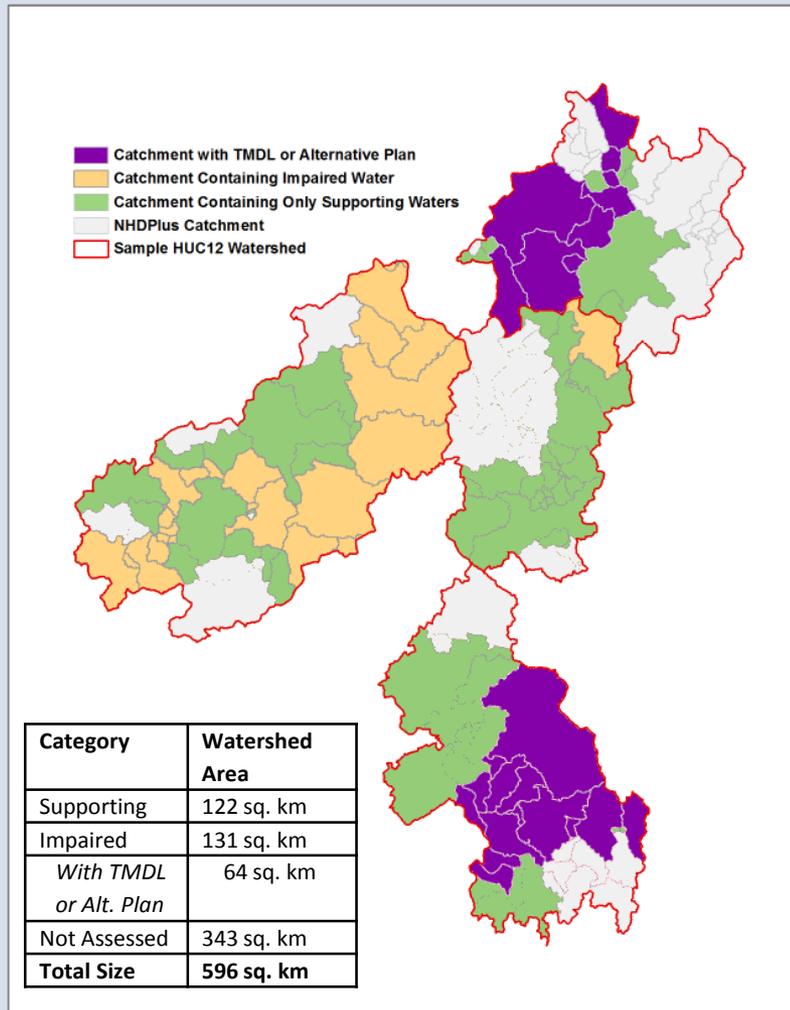


## Translate to Catchments

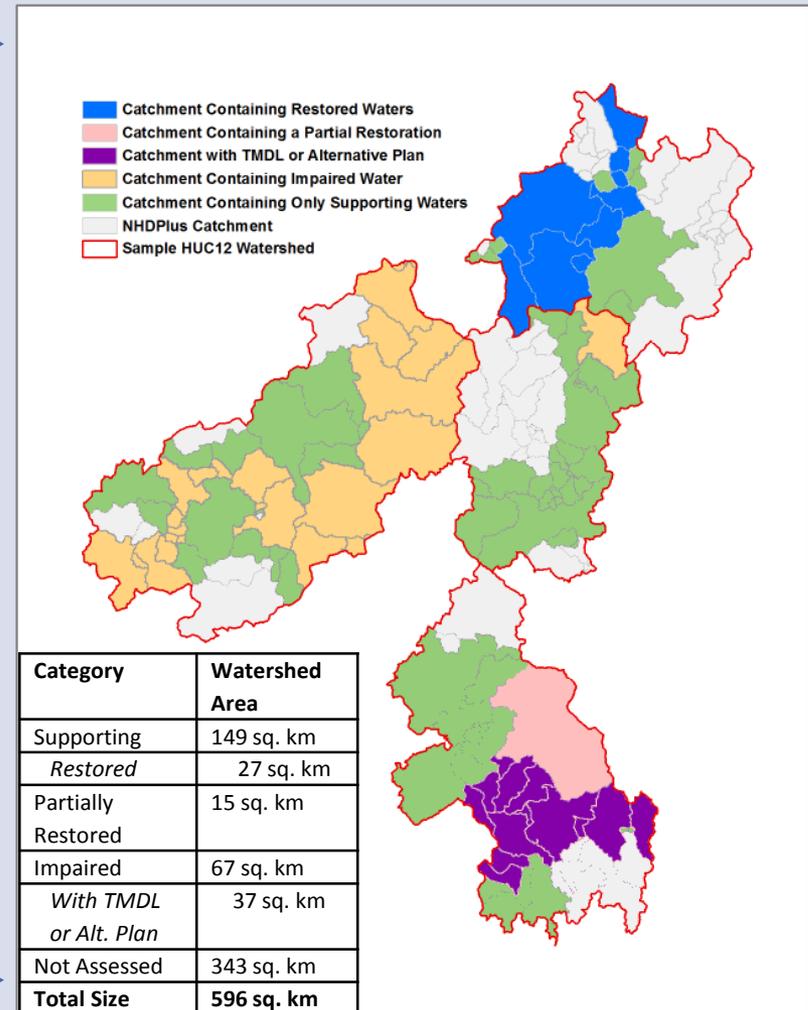


# Using the Catchments to Track Progress

## 2010 303(d)/305(b) Integrated Report



## 2012 303(d)/305(b) Integrated Report



# Next Steps

---

- Finalize the evaluation of this approach using the 303(d) measure as a test case
- Convert from Prototype to Production Process
- Process IR GIS data using Catchment-based indexing method as data are received

# For More Information

---

For process details, see the IR Georeferencing Pilot Report (coming soon)

Water Quality Assessment and Total Maximum Daily Loads Information

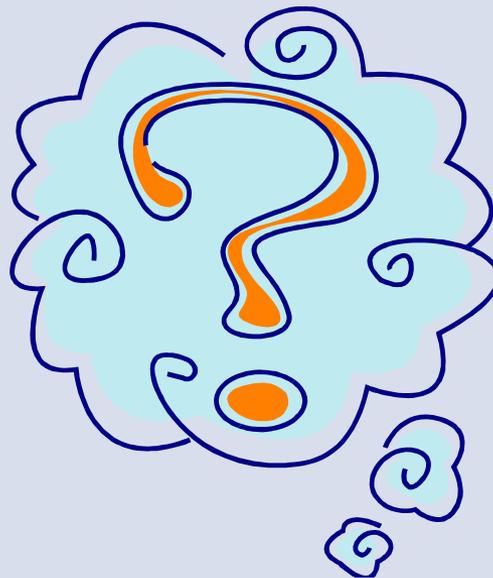
- <http://www.epa.gov/waters/ir/>

## Contact Info

- Wendy Reid, EPA Office of Water
  - [Reid.Wendy@epa.gov](mailto:Reid.Wendy@epa.gov)
- Dwane Young, EPA Office of Water
  - [Young.Dwane@epa.gov](mailto:Young.Dwane@epa.gov)
- Tommy Dewald, EPA Office of Water
  - [Dewald.Tommy@epa.gov](mailto:Dewald.Tommy@epa.gov)

# Questions?

---

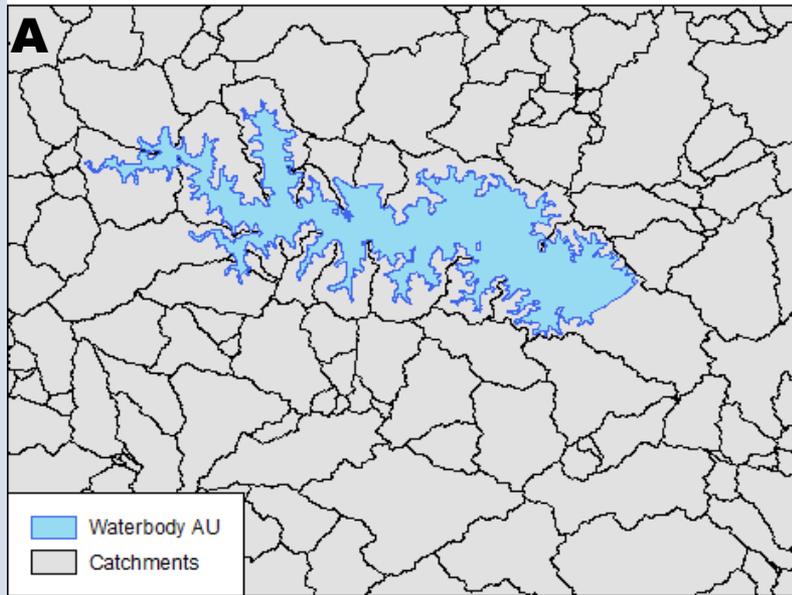


# Appendix

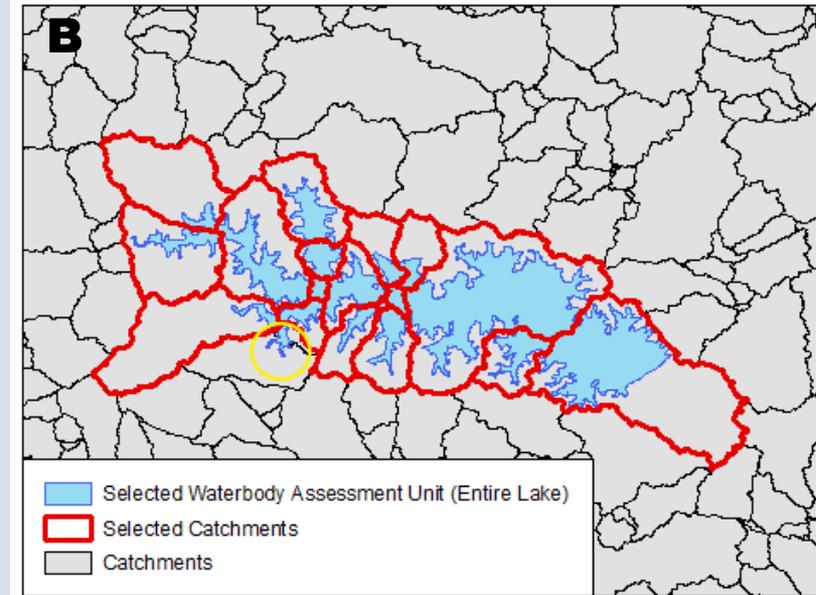
---

# Area Waterbody to Catchment Prototype

## AREA WATERBODY INPUT



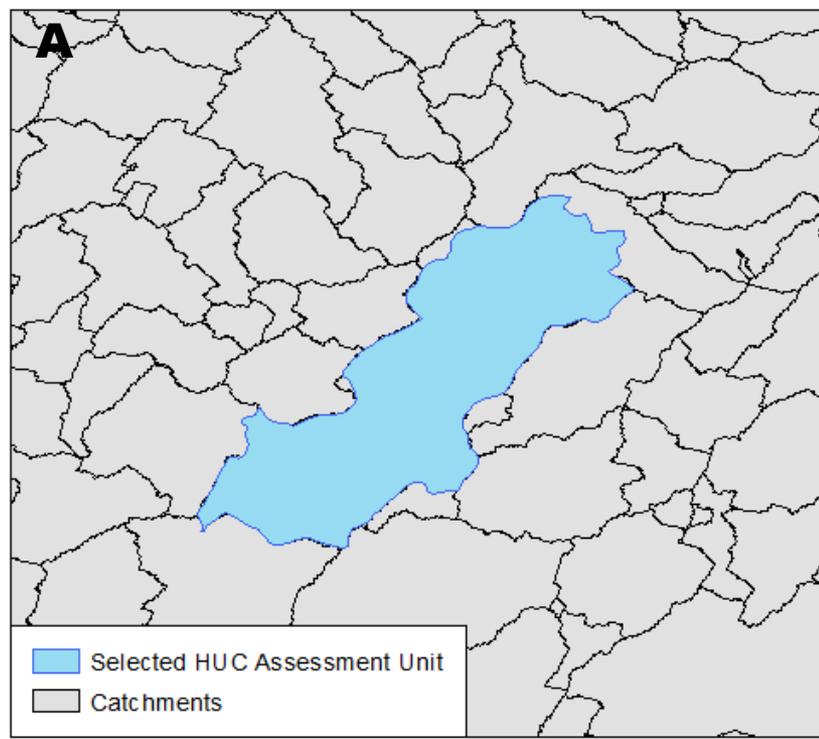
## RESULTS\*



\*Area circled in yellow shows a portion of the waterbody where catchments were not associated with the waterbody because it did not meet the requirements: the pieces were smaller than the threshold used, and they were not part of an NHD artificial path.

# HUC-like to Catchment Prototype

HUC-LIKE INPUT



RESULTS

