

Green Sinks-An Important Tool for Stormwater Management and Flood Mitigation

TEAM
KENTUCKY®

ENERGY AND
ENVIRONMENT CABINET

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Licking River Basin Coordinator

Division of Water



FEMA



**US Army Corps
of Engineers**®



Presentation Outline

- Objective: Inform, answer questions, and generate interest in Green Sinks for stormwater and flood mitigation
 - Basin Coordinator Role in Kentucky
 - Natural Flood Plains
 - Dredging
 - Green Sinks
 - Green Sink Updates



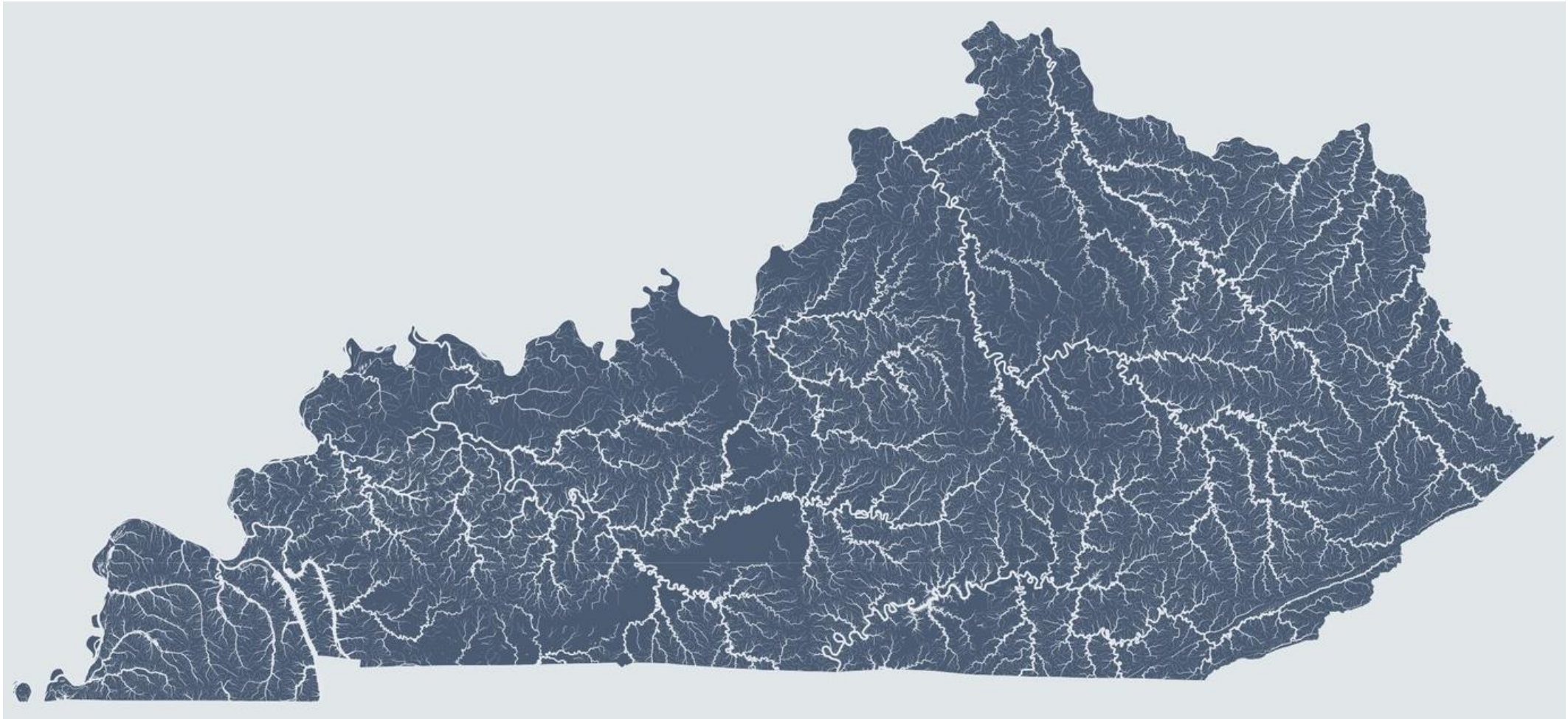
Basin Coordinators

- “Basin Coordinators serve as facilitators for agency activities and as a point of contact for local organizations interested in addressing clean water issues.” (KDOW)

- Match local organizations with experts
 - Flood Mitigation
 - Outdoor Recreation
 - Water Quality
- Match local organizations with funding
- Education and outreach
- Assist with watershed planning
- Listen and learn

KENTUCKY BASIN COORDINATORS

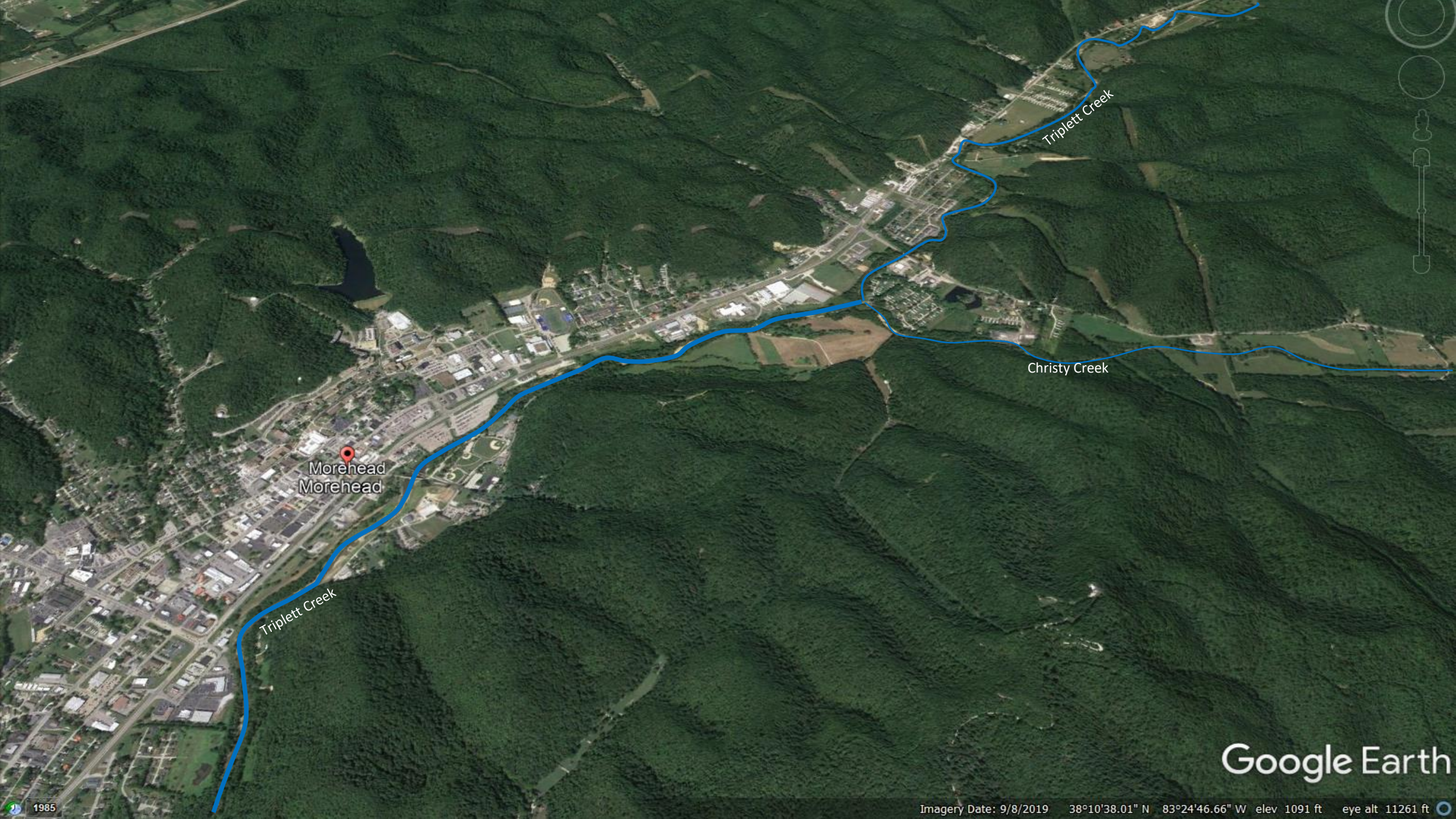
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Upper Cumberland Basin	Alice Mandt	Mandt@ky.gov	502-782-7369
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Big Sandy Basin	Nathan Alexander	Nathan.alexander@ky.gov	502-330-6795



92,000 miles of streams



Salmon River, Northern Alaska (Arctic)
Used with permission from Roman Dial



Morehead
Morehead

Triplet Creek

Triplet Creek

Christy Creek

Google Earth

1985

Imagery Date: 9/8/2019 38°10'38.01" N 83°24'46.66" W elev 1091 ft eye alt 11261 ft



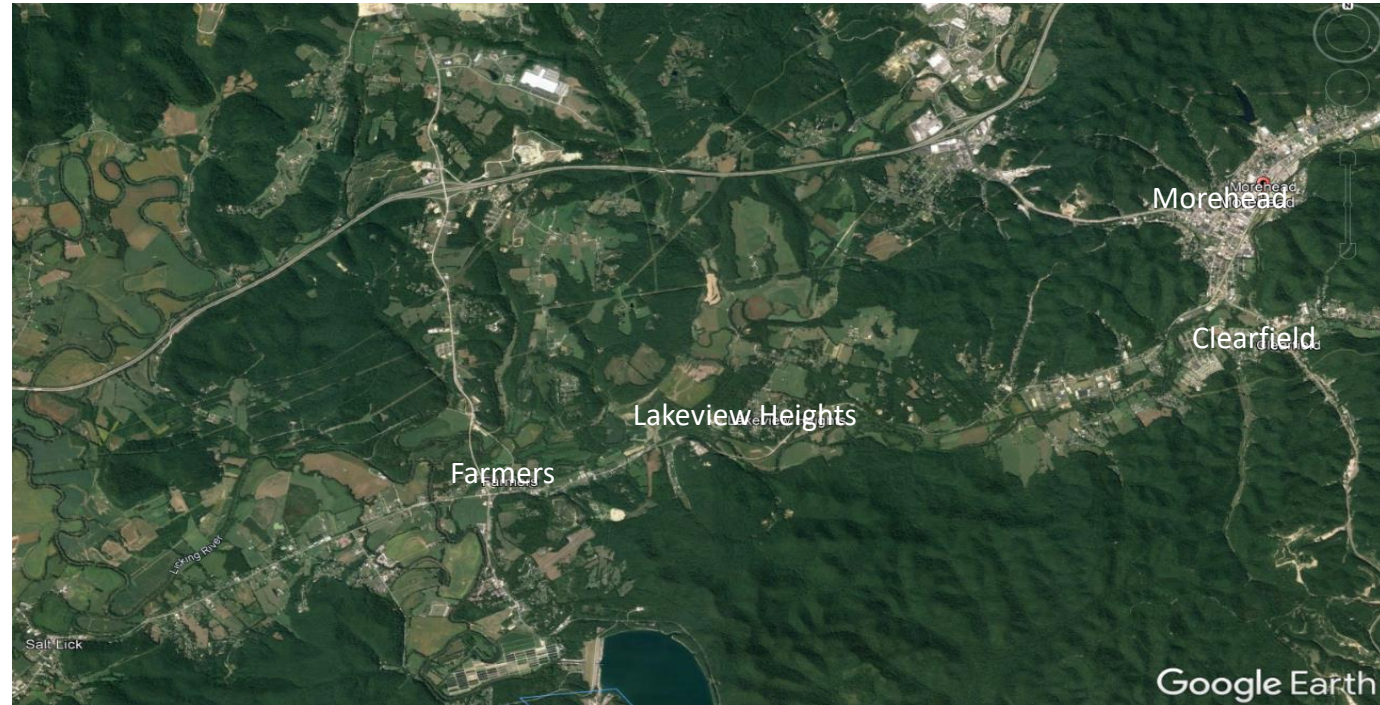
Photo source unknown.



Used with permission, Gabe Osborne

Why Not Dredge Our Way Out?

- Used to improve waterway navigation, not flood regulation
- Massively expensive
- Destroys stream and bank habitat
- Bridge and culvert foundations are undermined
- Creates continuous erosion, property loss, and habitat destruction
- Faster, more powerful streams are even more dangerous to downstream communities



Used with permission, Loring Bullard

If we can't let the water spread out or dredge our way out, where do we go?

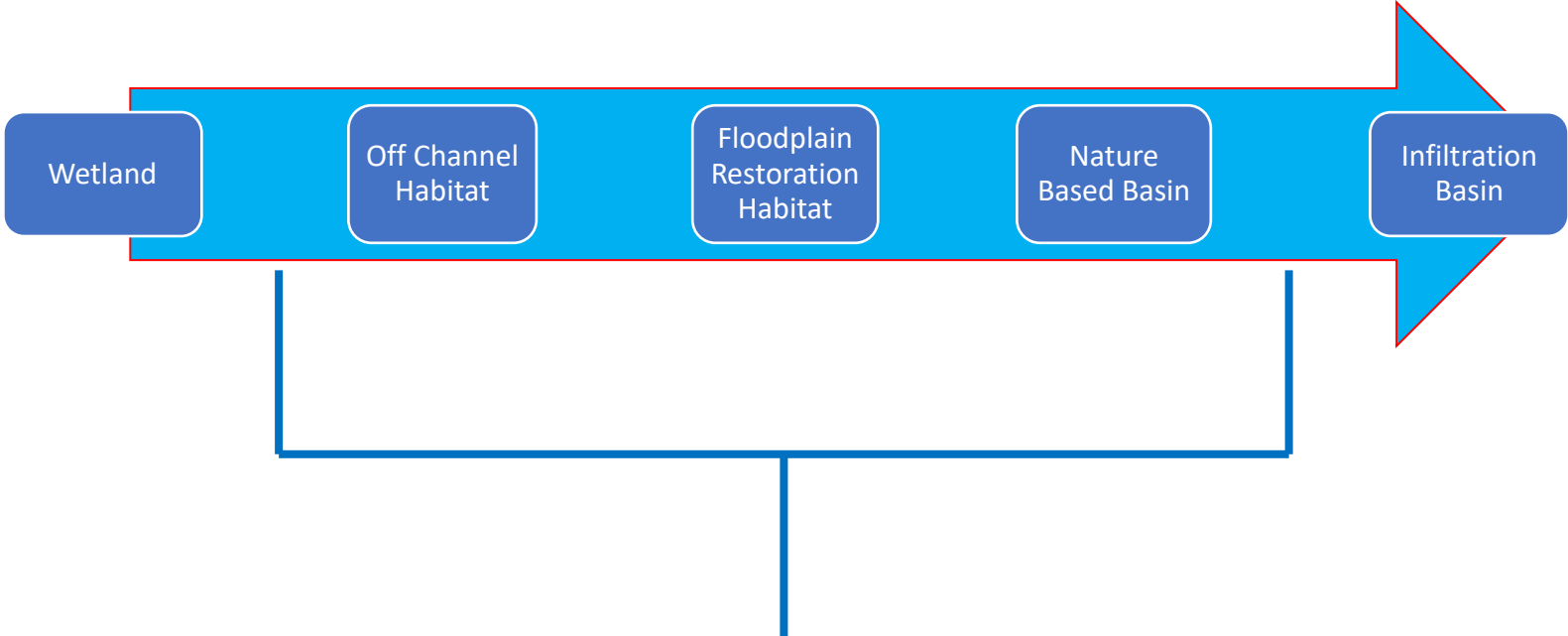
We Go Deep



Off-Channel Basins for Flood Mitigation



Permanent Pool

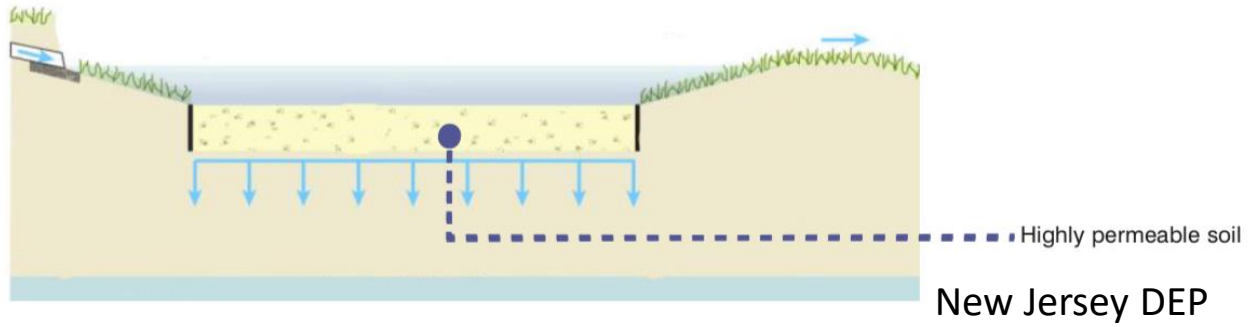


Green Sinks



Dry: 24-48 hrs

Green Sinks



Benefits of Green Sinks

- Reduces power and volume of floods
- Reduce stream erosion
- Improves water quality
- Recharge ground water
- Cost effective
- Design flexibility
- Public green space





Morehead, Kentucky
Planning Assistance to States Study
Flood Risk Reduction on Triplett Creek



Performed by Nashville District, U.S. Army Corps of Engineers
For Louisville District, U.S. Army Corps of Engineers
February 2018

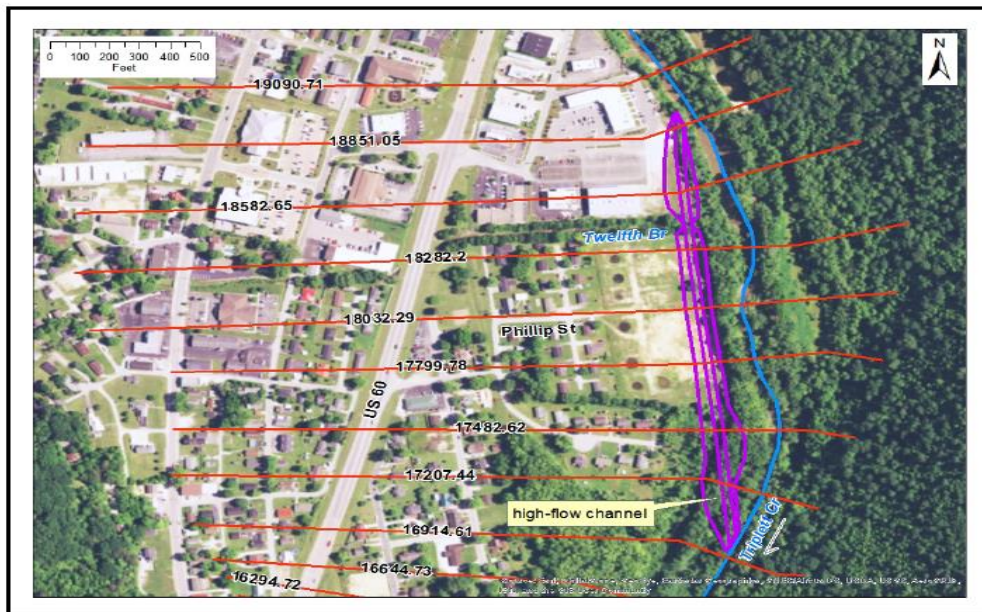
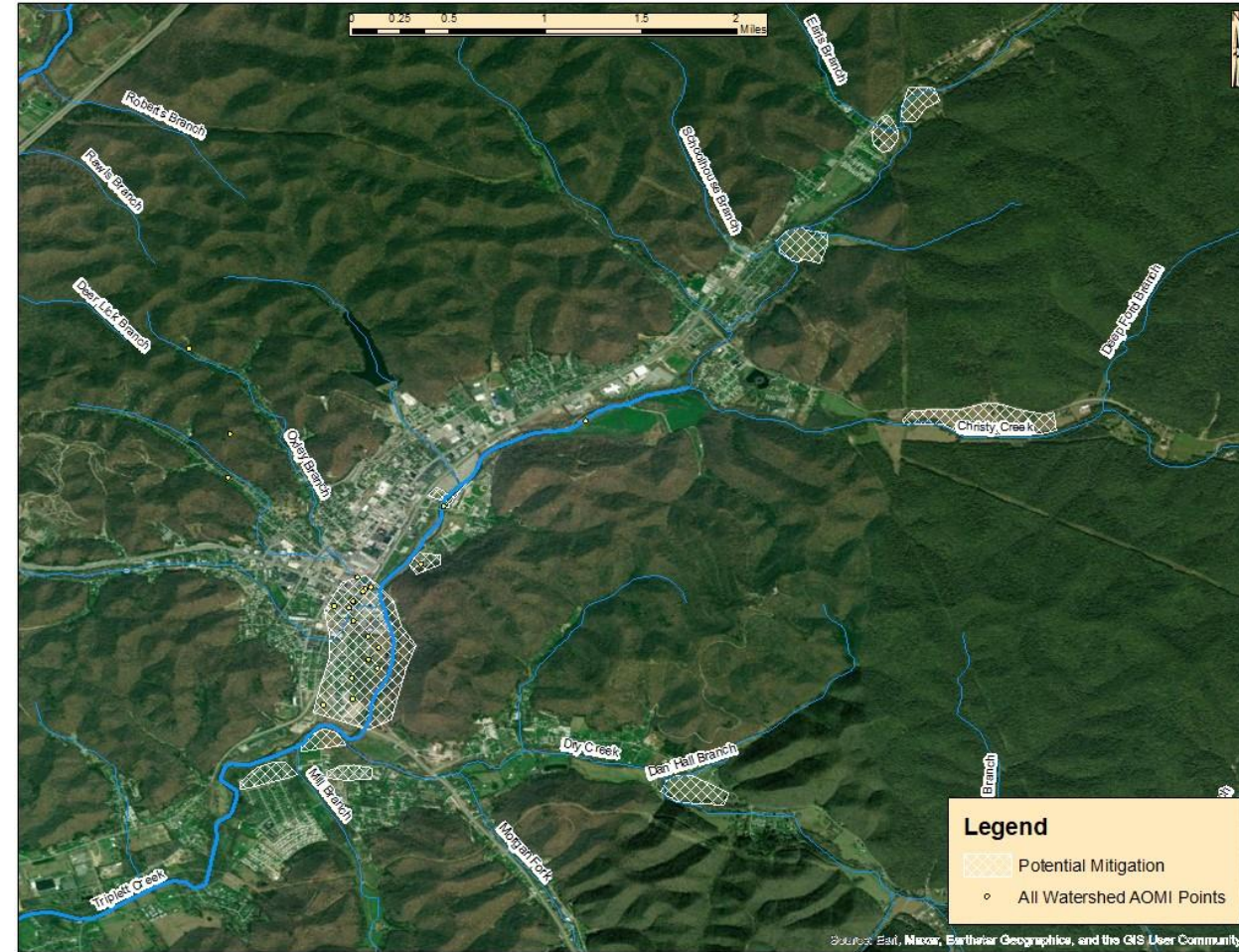


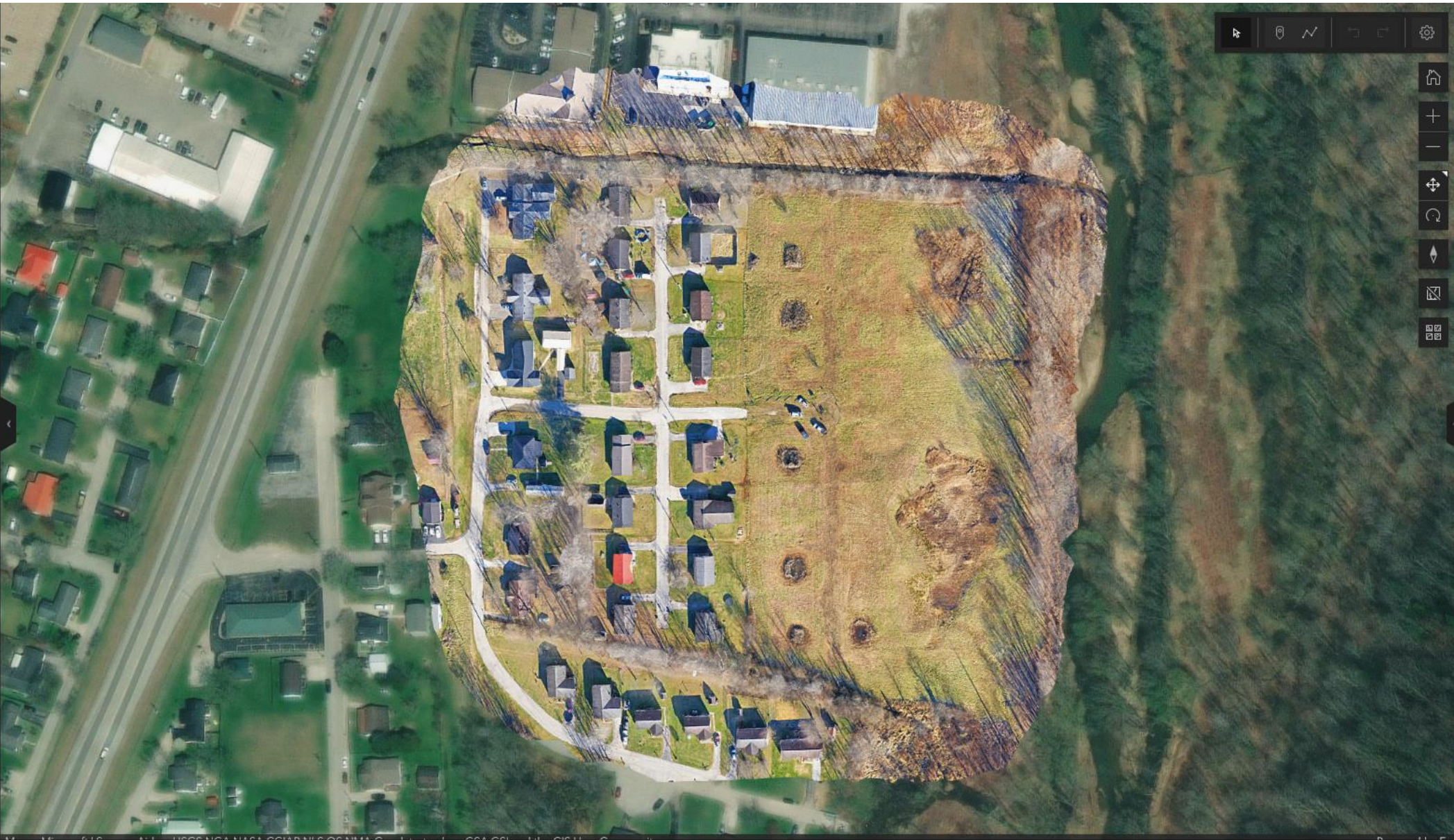
Figure 46. Map of Alternative 3c, high-flow channel between Railroad and Oxley Branch.

☰ **DOW-Morehead Greensinks**
Phillips Drive
12/15/23, 12:00 AM

2D Timeline Cloud Mesh

Mesh Offset (ft)
0 Save

Measurements
No measurements. Use the toolbar on the map to add measurements.



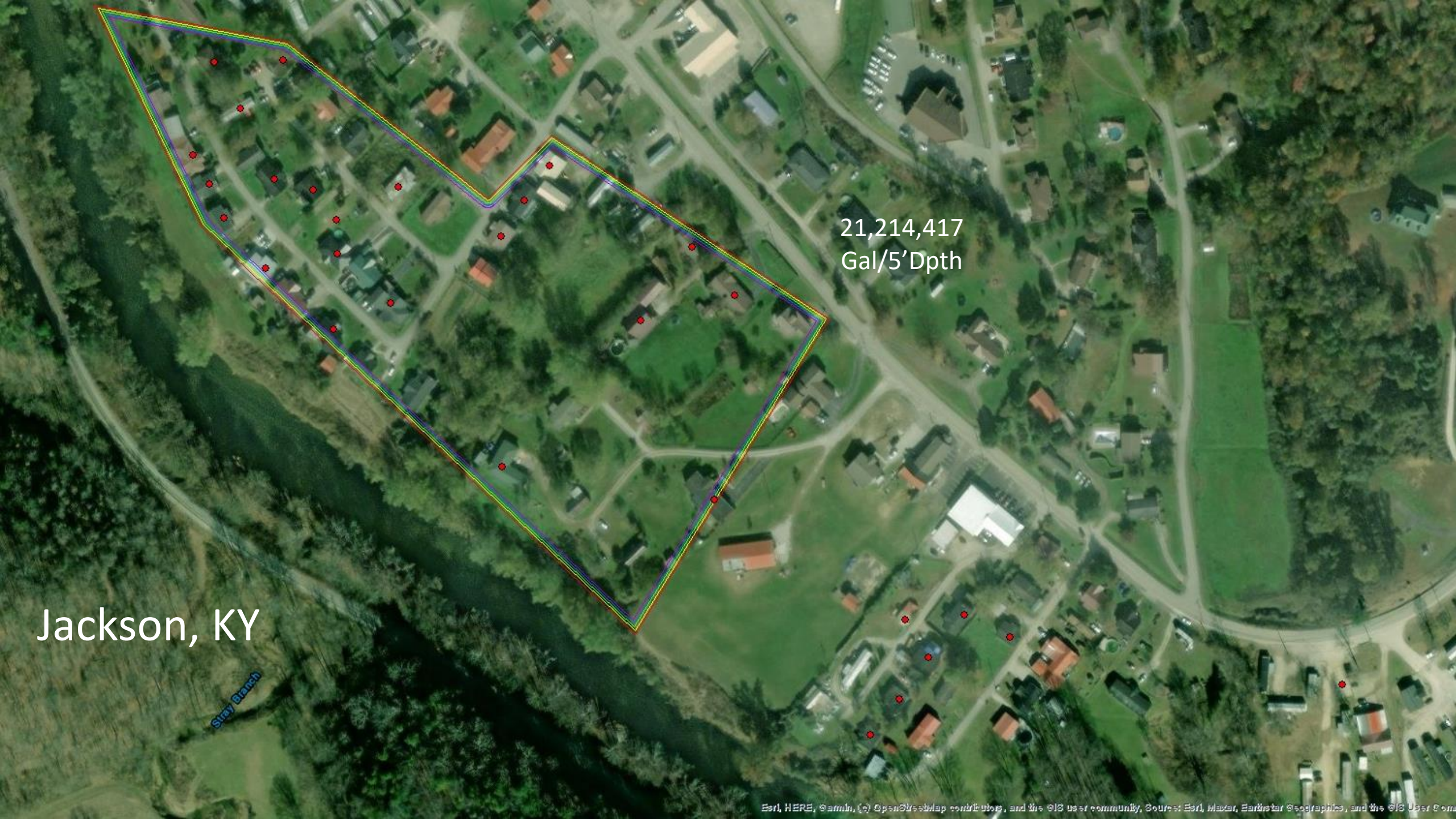
4 [Shield] [Wavy Line] [Square] [Square] [Gear]

[Home] [Zoom In] [Zoom Out] [Full Screen] [Refresh] [Move] [Measure] [Layers]

[Home] [Zoom In] [Zoom Out] [Full Screen] [Share]

1	Morehead						
2		Mosquito Ponds				Square Foot X Depth	Cubic foot X 7.48
3			Polygon	Area (sqft)	Depth	Volume (CubicFt)	Capacity (Gal)
4			0-1	208850	1'	194325	1453551
5				198449	2'	185334	1386298.32
6				188048	3'	176517	1320347.16
7				177647	4'	167841	1255450.68
8				167246	5'	159295	1191526.6
9		Totals		940240		883312	6607173.76

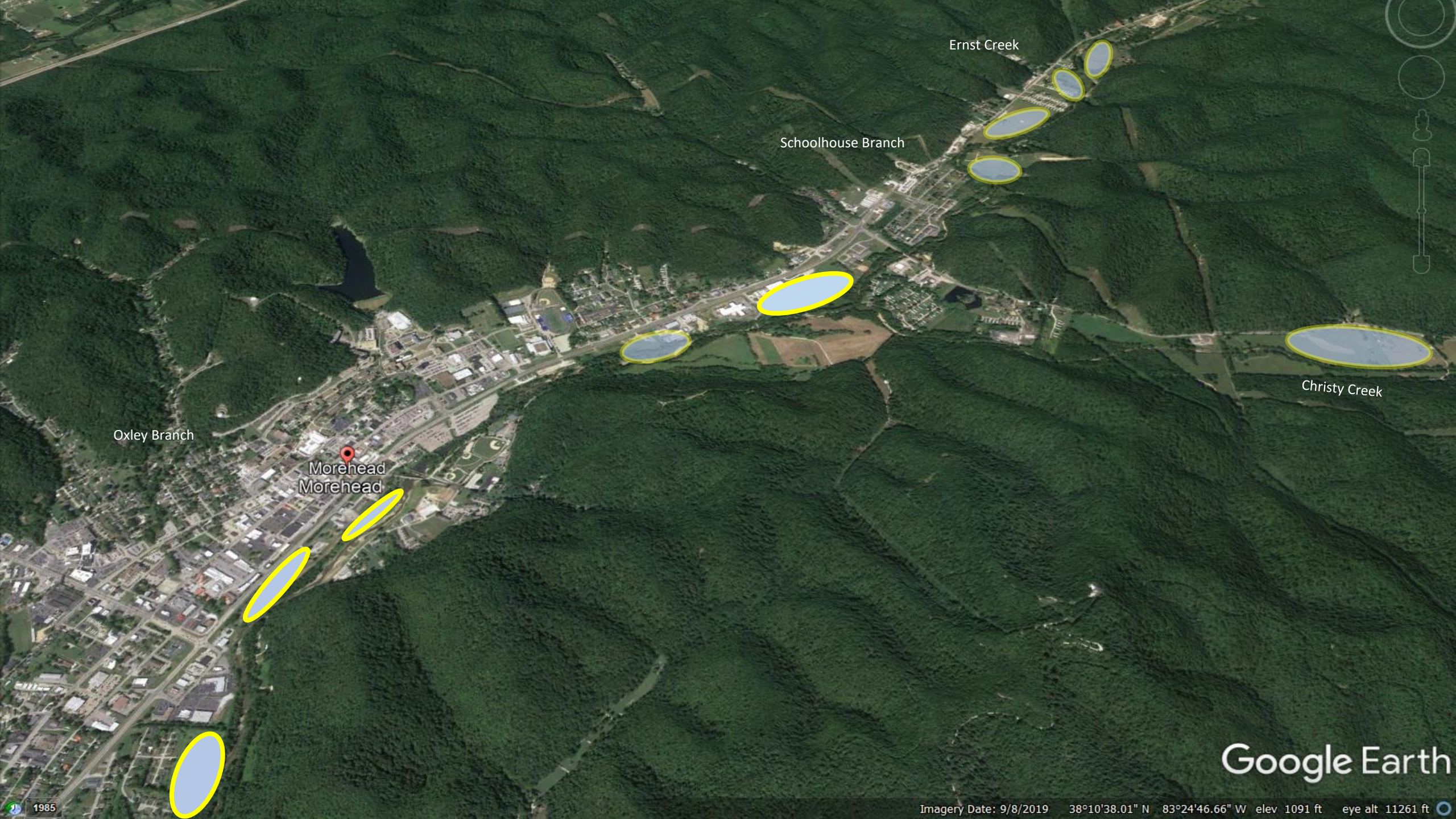




21,214,417
Gal/5' Dpth

Jackson, KY

Stony Branch



Ernst Creek

Schoolhouse Branch

Oxley Branch

Morehead
Morehead

Christy Creek

Google Earth

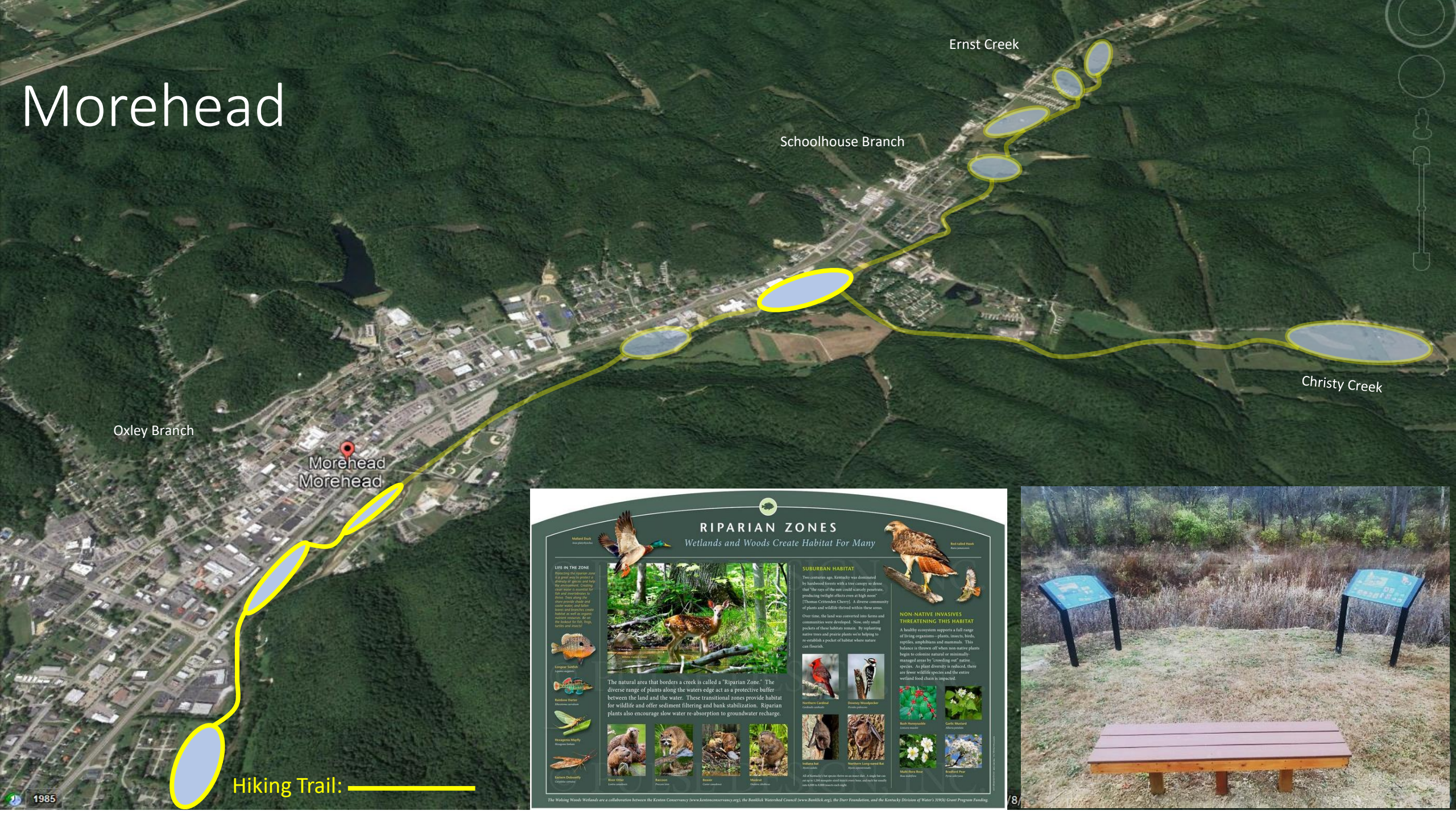
1985

Imagery Date: 9/8/2019 38°10'38.01" N 83°24'46.66" W elev 1091 ft eye alt 11261 ft

Connecting the Basins



Morehead



Oxley Branch

Morehead
Morehead

Ernst Creek

Schoolhouse Branch

Christy Creek

Hiking Trail: _____

RIPARIAN ZONES

Wetlands and Woods Create Habitat For Many

LIFE IN THE ZONE

Wetlands are important areas for a great many plants and animals. They provide a diverse habitat for fish and amphibians. They also provide a home for many birds and mammals. Wetlands are also important for water purification and flood control.

White-tailed Deer

SUBURBAN HABITAT

Two centuries ago, Kentucky was dominated by hardwood forests with a tree canopy so dense that "the rays of the sun could barely penetrate, producing twilight effects even at high noon." (Thomas Catterdale Cherry). A diverse community of plants and wildlife thrived in these areas. Over time, the land was converted into farms and communities were developed. Now, only small pockets of these habitats remain. By replanting native trees and prairie plants we're helping to re-establish a pocket of habitat where nature can flourish.

The natural area that borders a creek is called a "Riparian Zone." The diverse range of plants along the waters edge act as a protective buffer between the land and the water. These transitional zones provide habitat for wildlife and offer sediment filtering and bank stabilization. Riparian plants also encourage slow water re-absorption to groundwater recharge.

River Otter
Lutra canadensis

Raccoon
Procyon lotor

Skunk
Mephitis mephitis

Mink
Mustela vison

Red-shouldered Hawk
Buteo lineatus

Red-tailed Hawk
Buteo jamaicensis

Northern Cardinal
Cardinalis cardinalis

Downy Woodpecker
Picopus pubescens

Blue Jay
Cyanocitta cristata

Field Sparrow
Spizella pusilla

White-flowered Yellowthroat
Geothlypis trichas

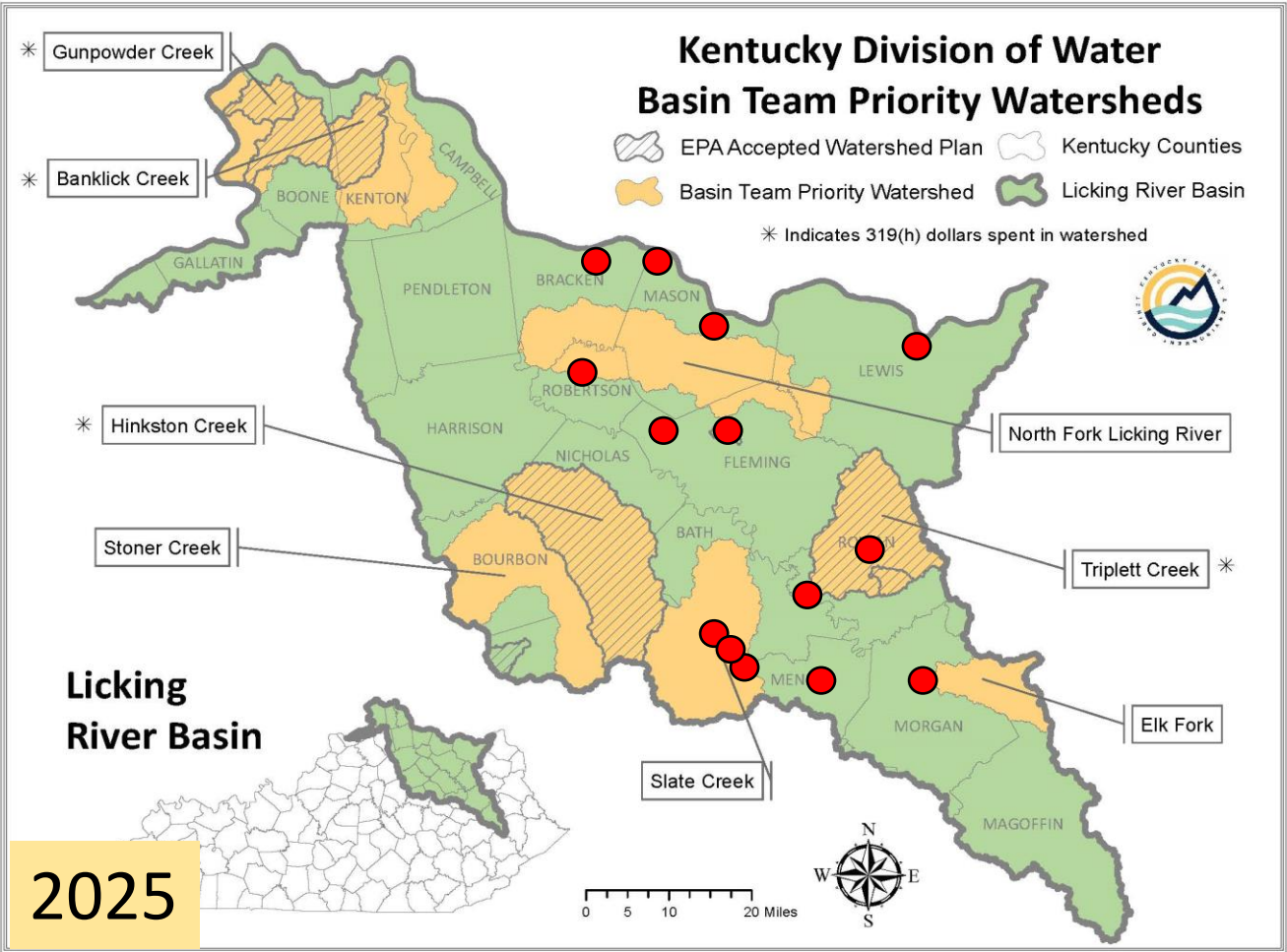
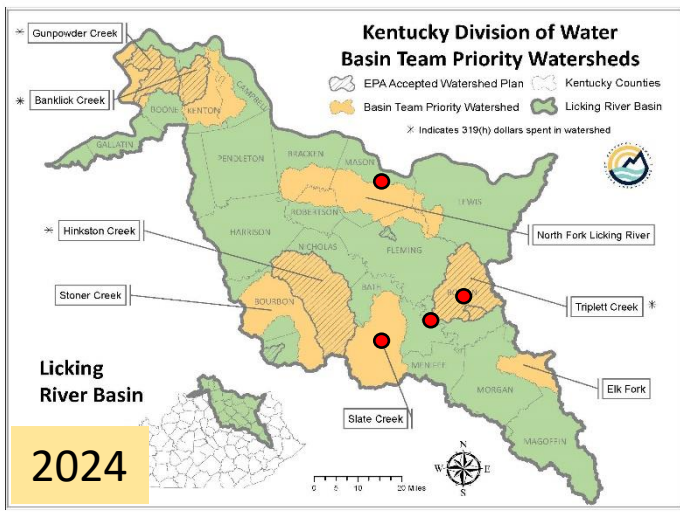
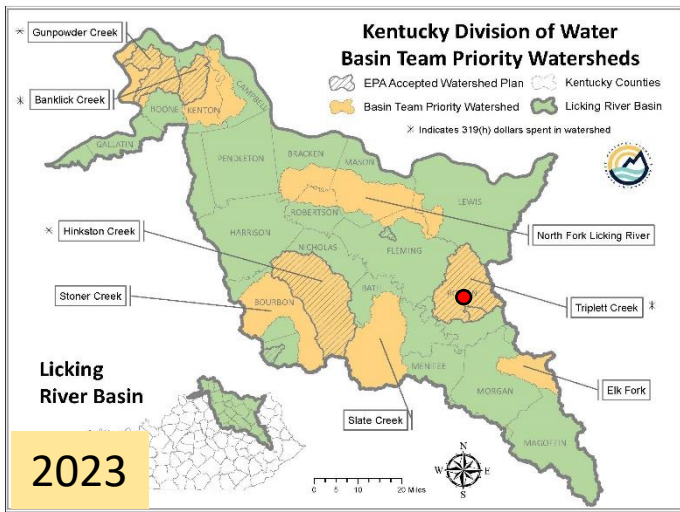
Blue Jay
Cyanocitta cristata

All of Kentucky's tree species have an even distribution. A single tree can grow up to 100 feet tall and live for over 100 years. The tree canopy can block out 90% of sunlight and 95% of wind.

The Riparian Zones Wetlands are a collaboration between the Kenton Conservancy (www.kentonconservancy.org), the Banklick Watershed Council (www.banklick.org), the Durr Foundation, and the Kentucky Division of Water's 1990s Grant Program Funding.




Green Sinks Flood Mitigation Growth



Maysville



Hiking Trail: 



Department of Landscape Architecture

Martin-Gatton College of Agriculture, Food and Environment

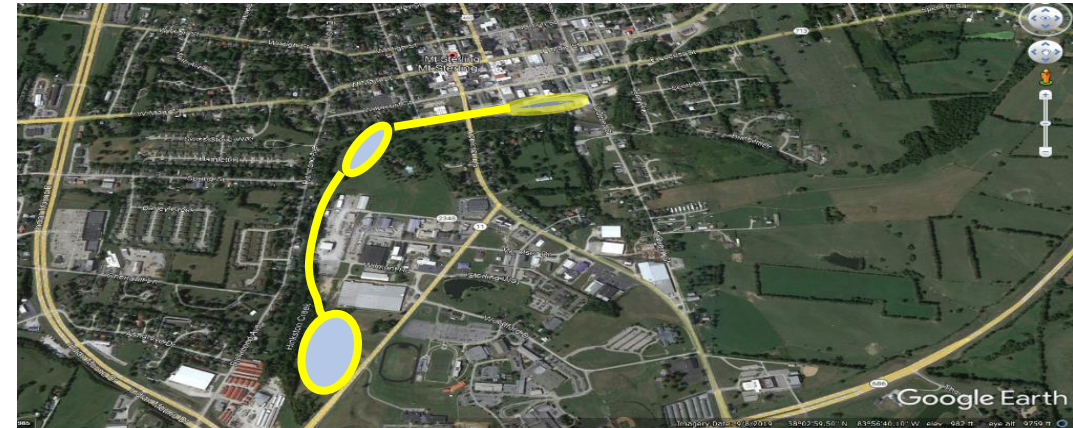


KDOW Green Sinks Flood Mitigation Program

Acknowledgements

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- Katie Cartwright-GWADD
- Kristie Dodge-BTADD
- Melissa Hardy-BTADD
- Rodney Fouch-Morehead Flood Plain Administrator
- NPS and Basin Team
- Brandon Brummett-USACE-Louisville
- Tammy Markert-USACE-Louisville

Questions?



Mosquito Control



Bti

- Naturally occurring bacteria found in soils
- Contains spores that produce toxins that specifically target mosquito larvae
- EPA approved

Maintenance

Table 1. Typical maintenance activities for infiltration basins

Activity	Schedule
<ul style="list-style-type: none">Replace pea gravel or topsoil (when clogged)	As needed
<ul style="list-style-type: none">Ensure inlets are clear of debris, including sediment and oil/greaseStabilize the surrounding areaMow grass and remove grass clippings of filter strip areas, if applicableRepair undercut and eroded areas at inflow/outflow structures	Monthly
<ul style="list-style-type: none">Inspect pretreatment devices and diversion structures for debris accumulation and structural integrity; take corrective action as needed	Semiannually
<ul style="list-style-type: none">Aerate the pretreatment basin bottom or de-thatch it, if applicable	Annually
<ul style="list-style-type: none">Scrape the pretreatment bottom to remove accumulated sediment and re-seed ground cover, if applicable	Every 5 years
<ul style="list-style-type: none">Perform total rehabilitation of the basin and restore design storage capacity Excavate the basin bottom to expose clean soil	Upon failure

Source: MPCA, 2016