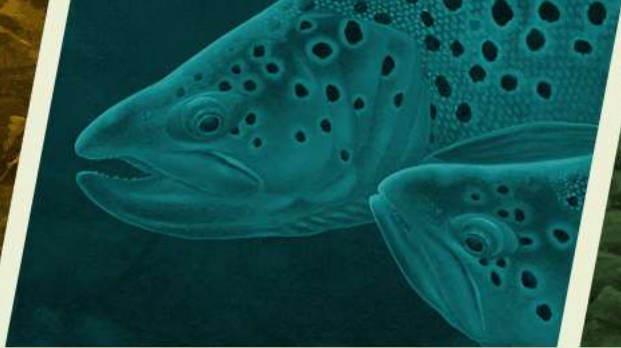


The feasibility of stream mitigation in response to Kentucky flooding devastation



Session D
National Stream Restoration Conference
August 2023

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Mitigation Program
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About Us

- Wetland and Stream Fee-in-Lieu-Of Mitigation Fund (FILO)
- Mission: Perform wetland and stream mitigation under the Clean Water Act
- Over 300 million dollars in receipts to date
- 100 Projects
- 11 Service Areas





Resources and Impacts in Kentucky

- 2nd state in freshwater fish diversity
- Among top states in stream length
- Over 80% of wetlands gone
- Human impacts
- Natural disasters
 - 2nd state in disaster declarations
 - 1st in flood-related disasters

Summer 2022

Severe Storms, Flooding, Landslides, and Mudslides



The conterminous United States are projected to become more prone to flash floods in a high-end emissions scenario

[Zhi Li](#), [Shang Gao](#), [Mengye Chen](#), [Jonathan J. Gourley](#), [Changhai Liu](#), [Andreas F. Prein](#) & [Yang Hong](#)



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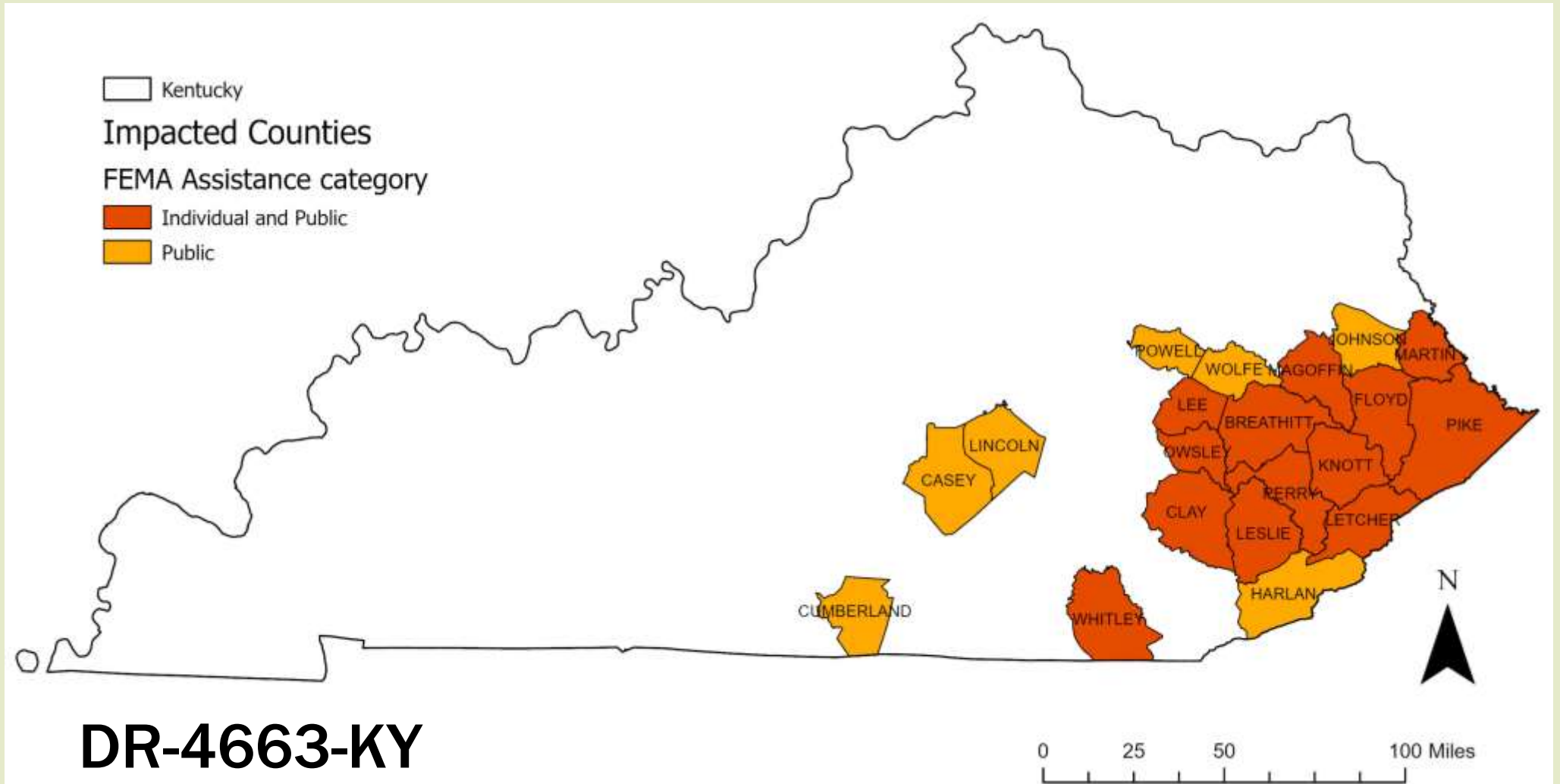


Breathitt Co., picture credit: KY Transportation Cabinet

- July 26th to 30th 2022
- Peak total rainfall 14-16“
- North Fork of the Kentucky River at Jackson set new record crest of 43.47 ft
- 80% of inundated homes were outside of “high-risk areas”



Summer 2022 Severe Storms, Flooding, Landslides, and Mudslides



DR-4663-KY



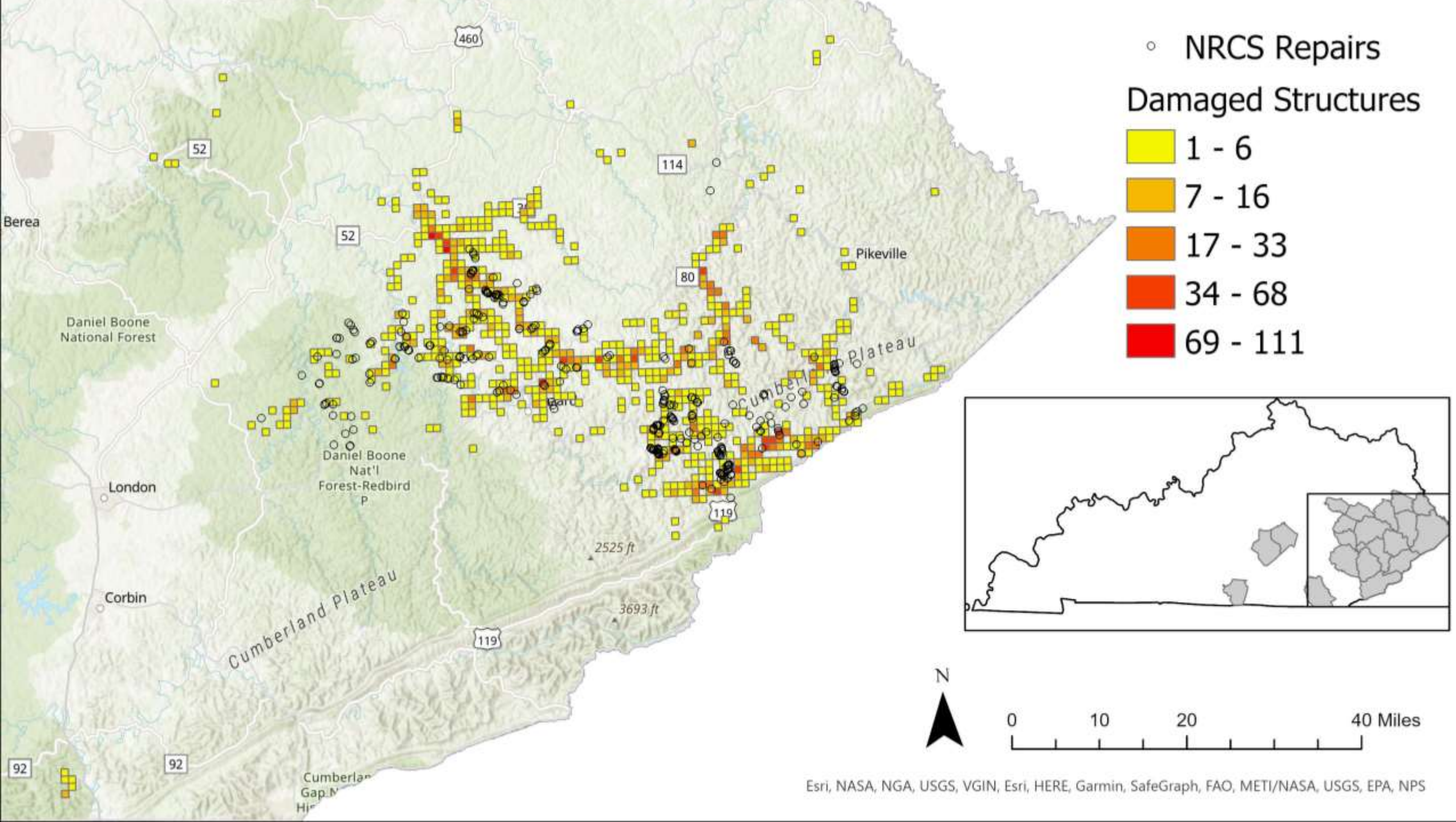
Combining flood mitigation with stream and wetland restoration

- USACE asked us to focus some of our search for new projects in the impacted zone
 - Target most affected areas
 - Compound positive effects of different agencies' mitigation efforts (buyouts, repairs...)
- Different funding source: FILO reserve
- Higher risk tolerance
- Broader scope of activities



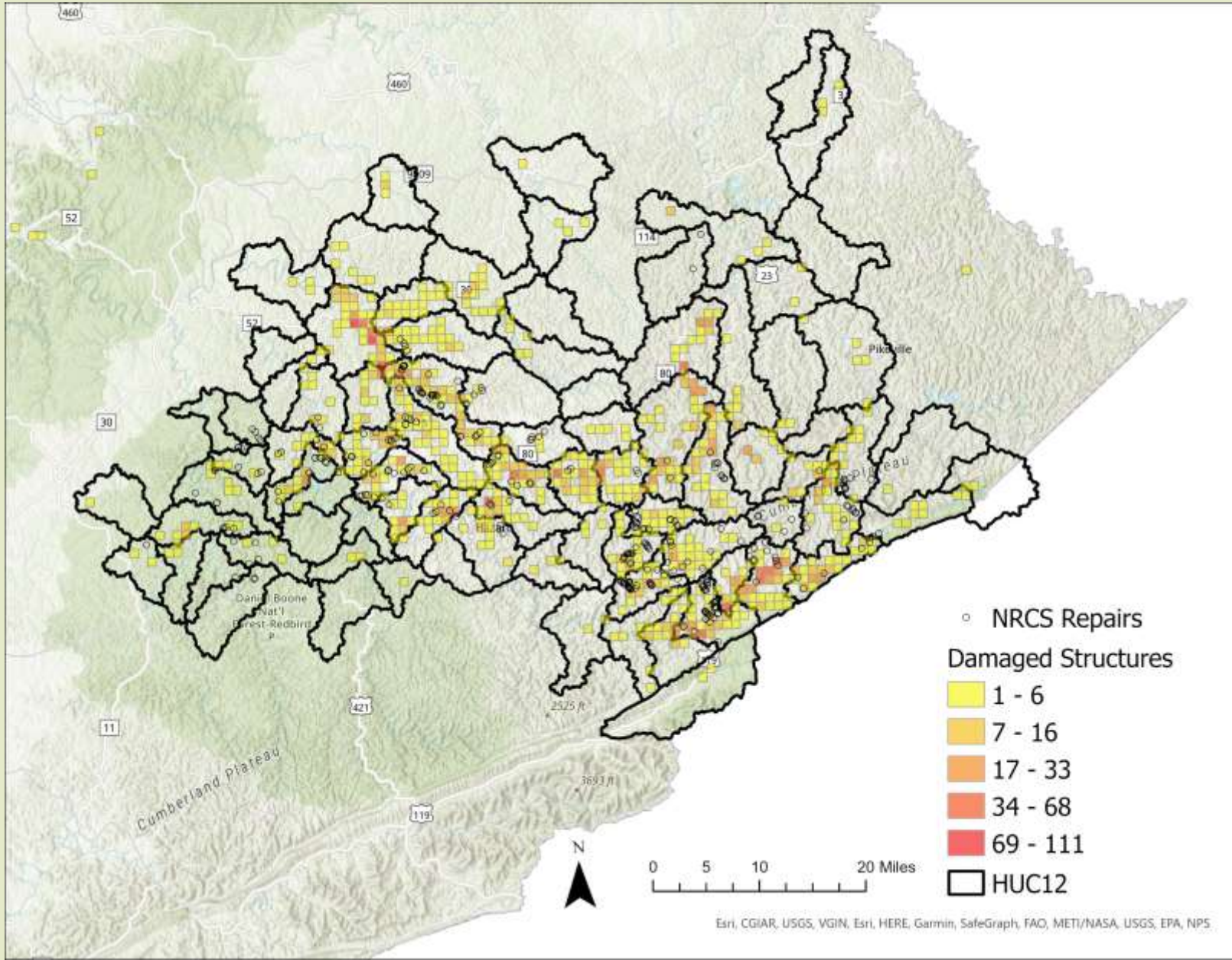
Preliminary service area

- Unit: 12-Digit Hydrologic Units (HUC12 – Subwatersheds)
- Initial selection criteria
 - KYEM Structure Damage Hotspots
 - NRCS Emergency Watershed Protection Program (EWPP) Repairs





Preliminary selection of HUC12s





HUC12 Priority Ranking

- Select prioritization criteria
- Quantify criteria within each HUC12
 - Normalize parameters by HUC area
 - Sort into classes, ranked 1-5 (Jenks Natural Breaks)
 - Sum criteria ranks by HUC to obtain priority “score”

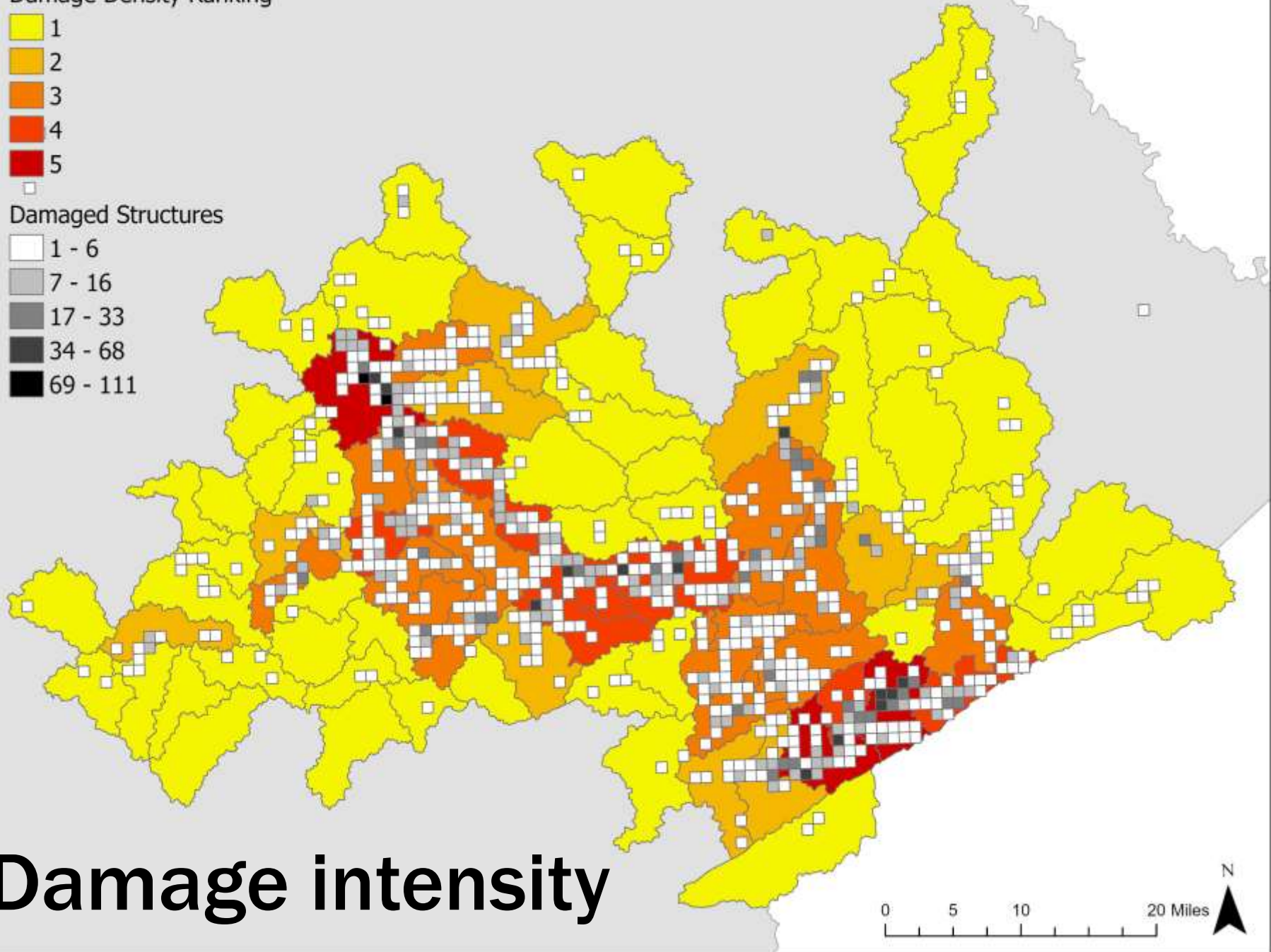


Damage Density Ranking

- 1
- 2
- 3
- 4
- 5

Damaged Structures

- 1 - 6
- 7 - 16
- 17 - 33
- 34 - 68
- 69 - 111

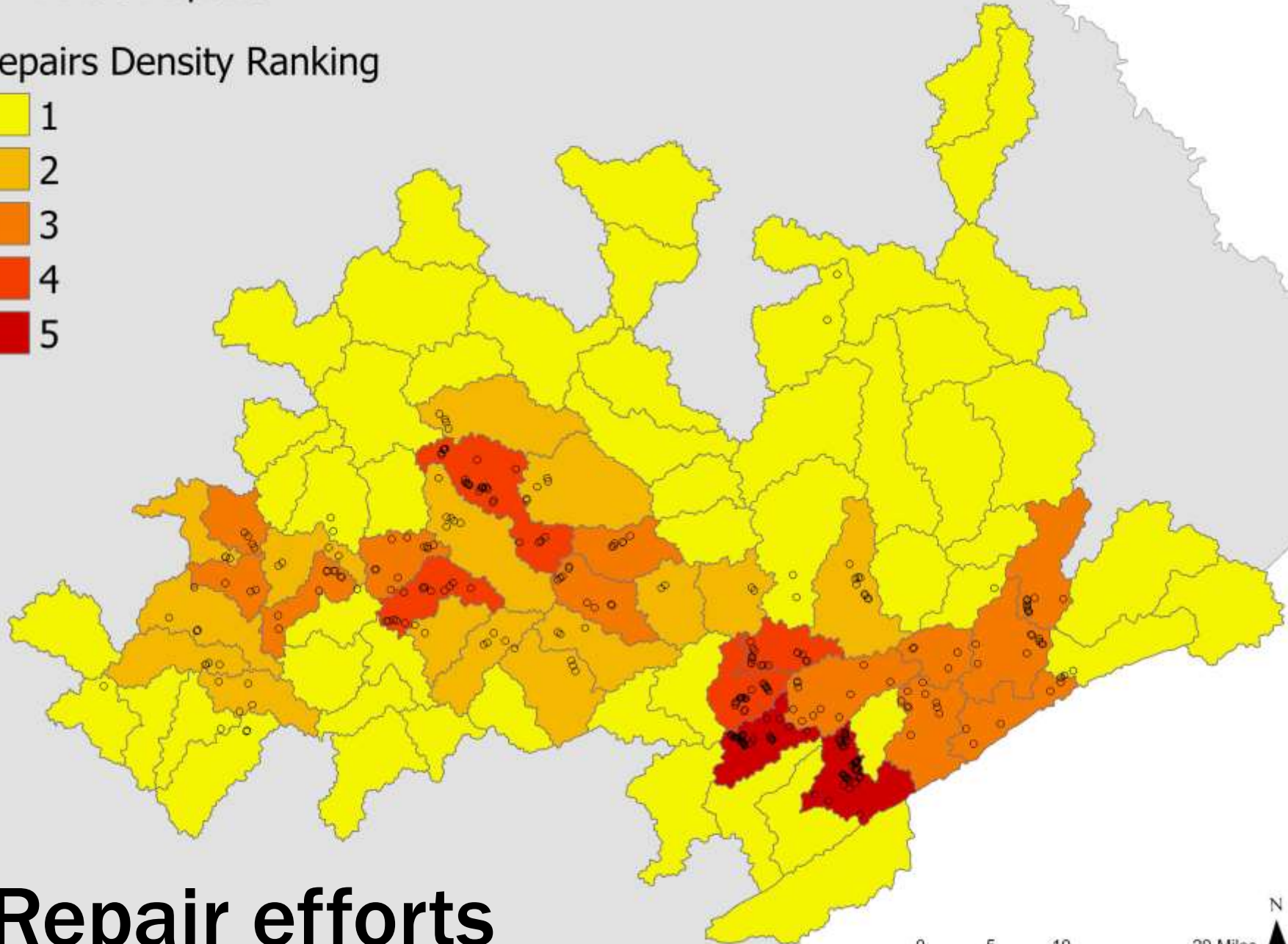
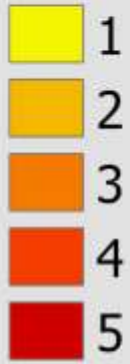


Damage intensity



○ NRCS Repairs

Repairs Density Ranking



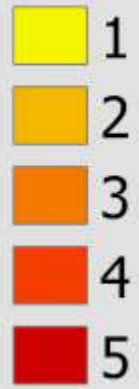
Repair efforts



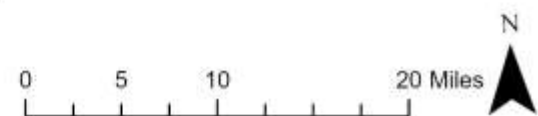


Surface Mines

Mining Intensity



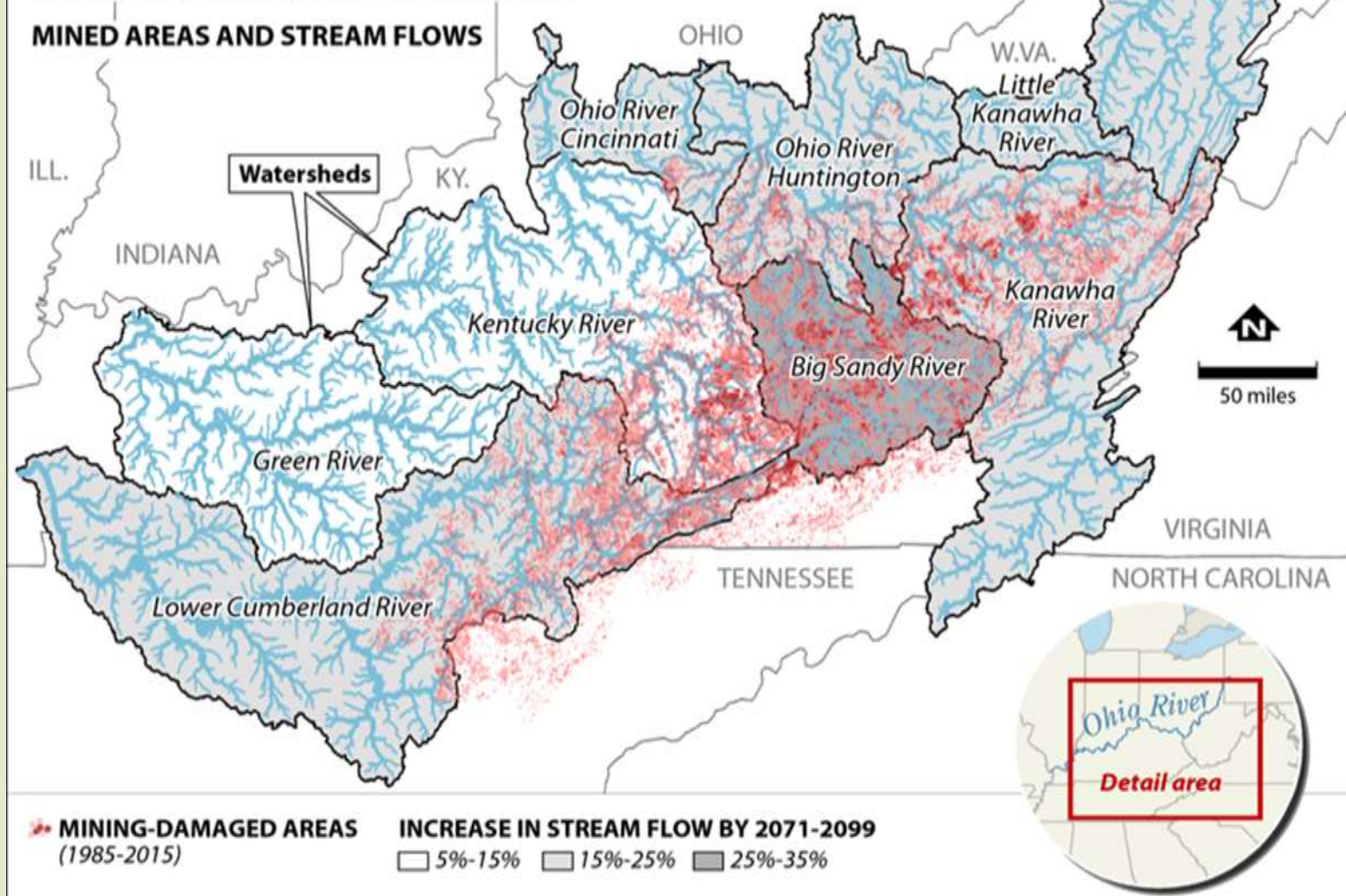
Mining activity





Climate Change and Surface Mining

A U.S. Army Corps of Engineers study forecast how an increase in extreme rainfall as the planet warms could affect stream flows in the Ohio River Basin, including Appalachian coal country. This map shows the area strip-mined from 1985 through 2015, superimposed on the Army Corps' forecast for stream flows. It shows that the area with the most land disturbance from mining could also see the biggest increase in stream flows from climate change.



SOURCE: Alexander Yoshizumi and Megan Ossman, Duke University, using U.S. Army Corps of Engineers and Sky Truth data

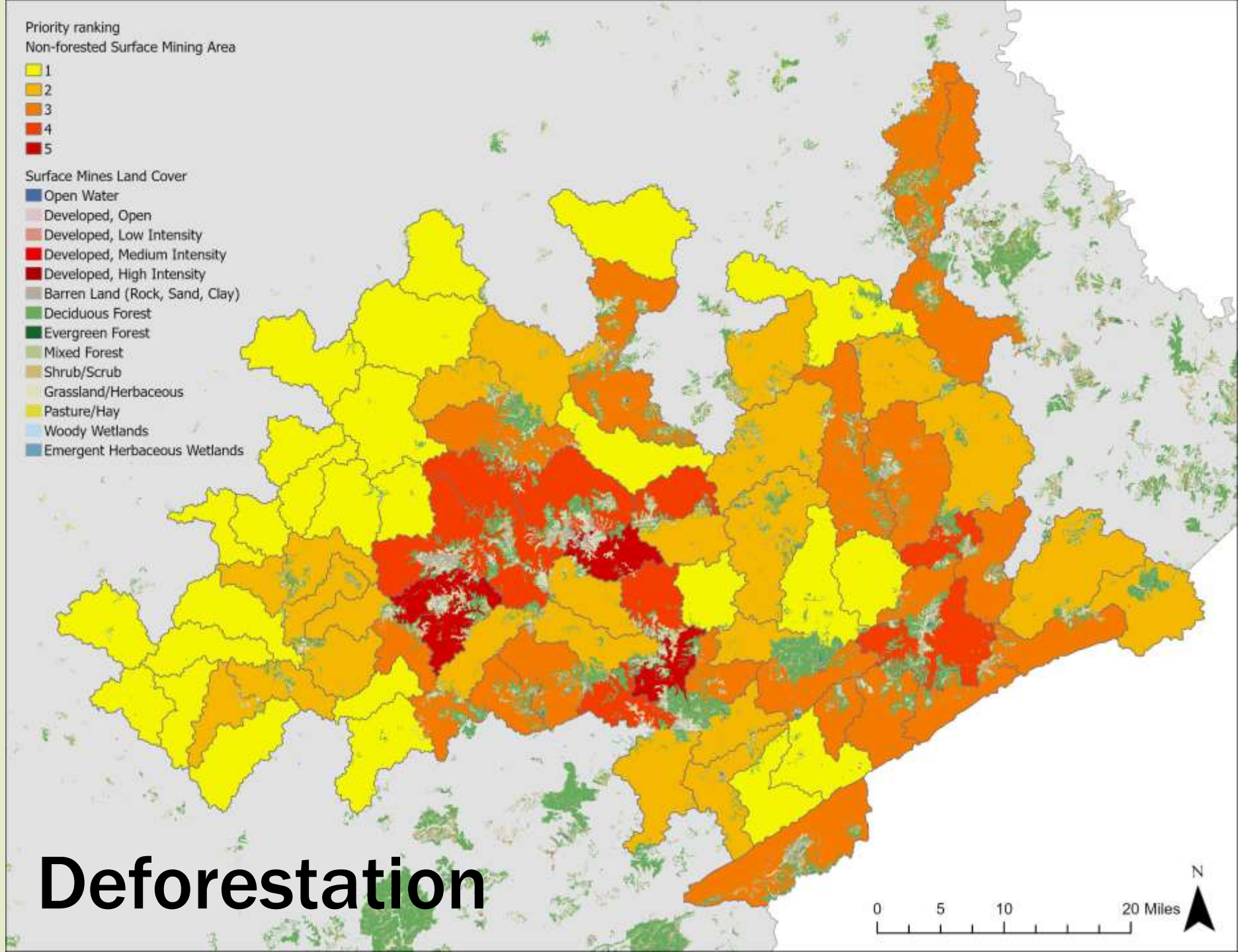


Priority ranking
Non-forested Surface Mining Area

- 1
- 2
- 3
- 4
- 5

Surface Mines Land Cover

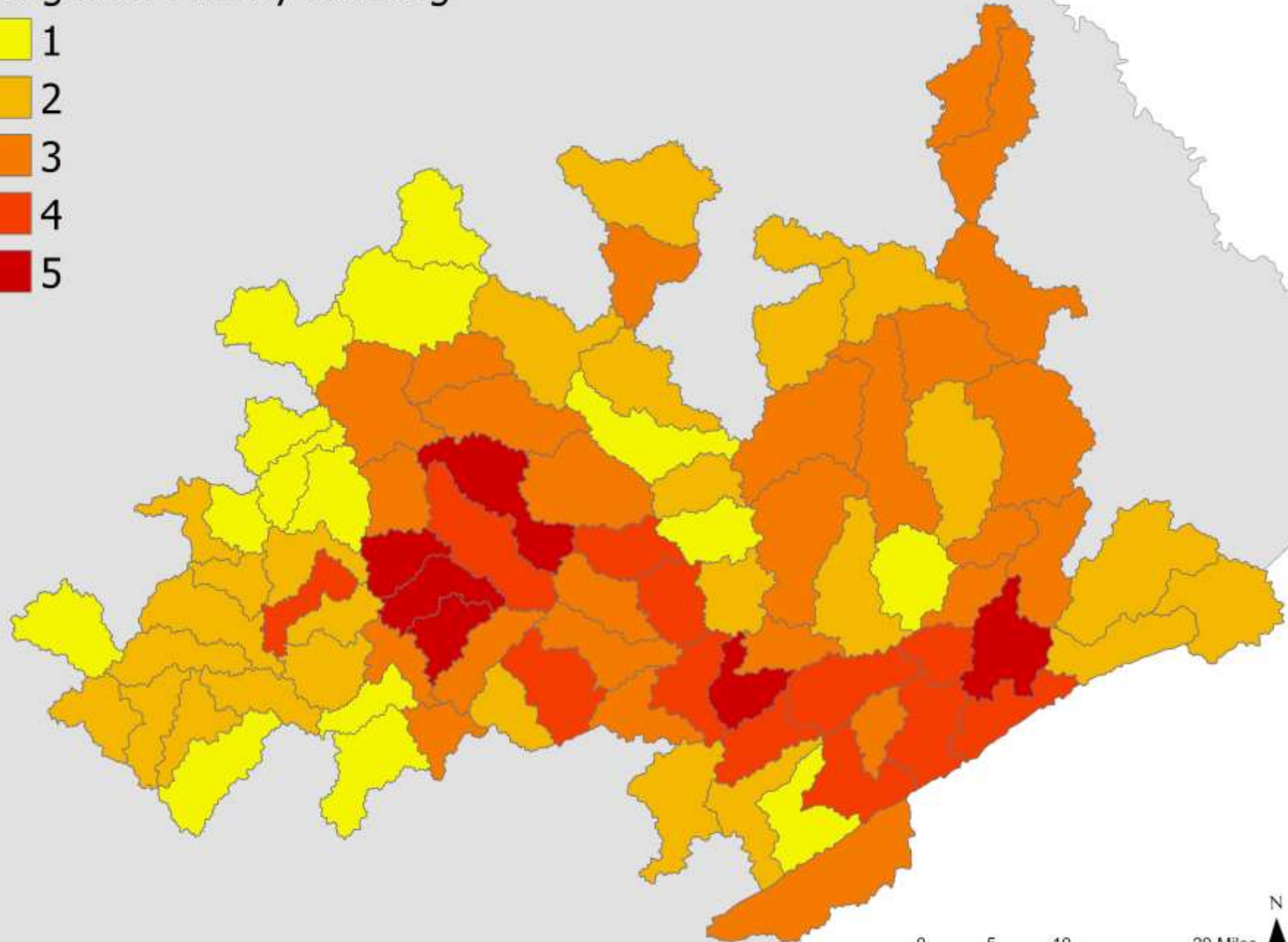
- Open Water
- Developed, Open
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock, Sand, Clay)
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Woody Wetlands
- Emergent Herbaceous Wetlands

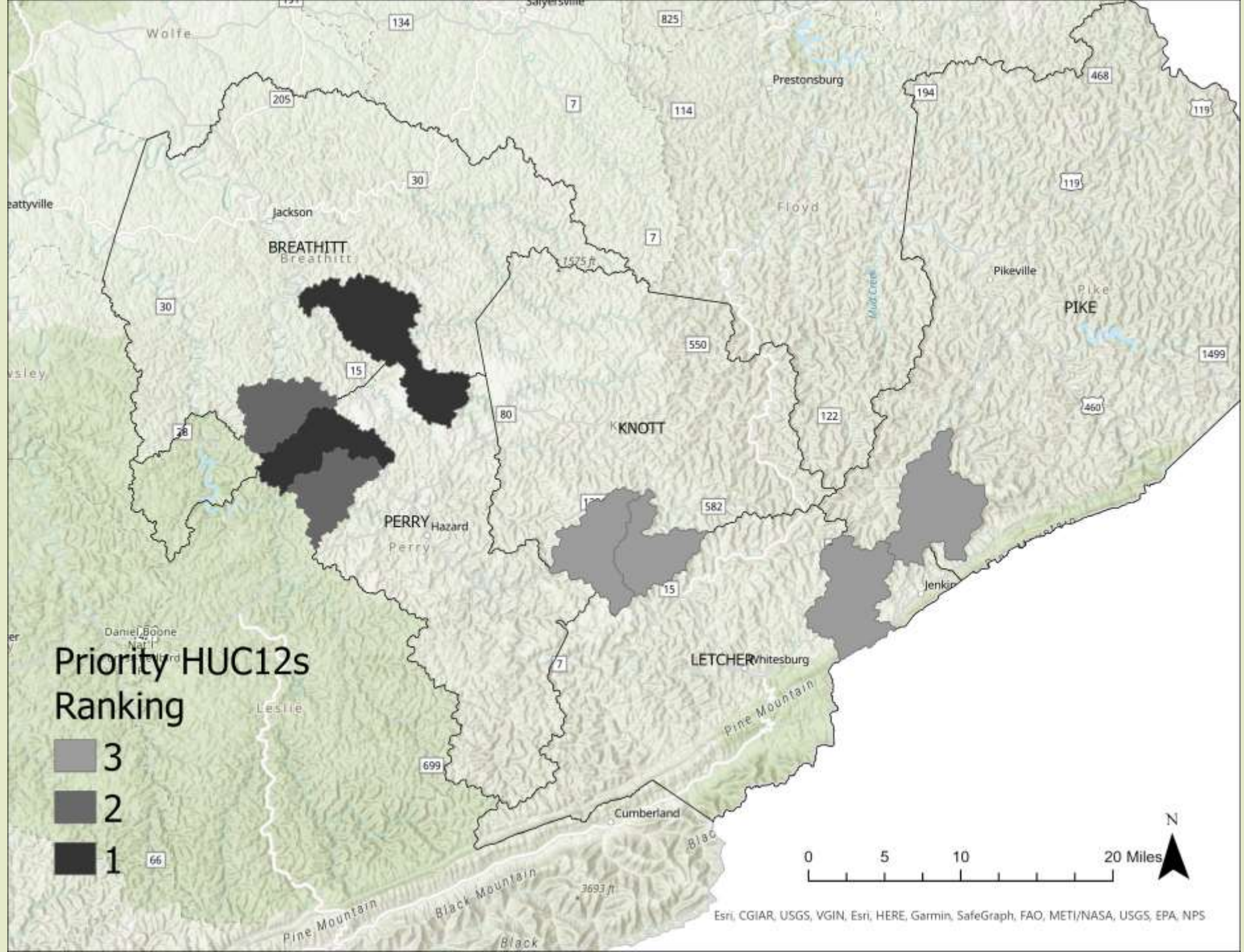


Deforestation



Mitigation Priority Ranking







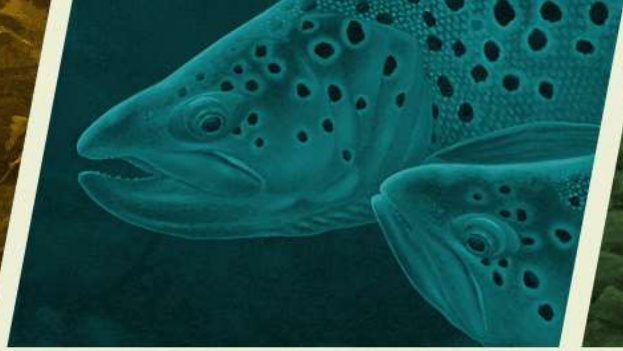
Next Steps

- Continue refining priority areas?
- Other potential criteria:
 - Floodplain permits
 - Presence of small drainage areas
 - Buyout data if available
- Look up plat maps and contact landowners
- Formally establish full scope



Challenges

- Access to data
- Meaningful site selection
- Determining success of future projects
- Balancing efforts with rest of ILF program needs



Thank you

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