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# A Regional Landslide Inventory for Southwestern Pennsylvania

## IRISE Annual Meeting

Daniel Bain, Eitan Shelef, Anthony Iannacchione, Abiodun Ayo-Bali, Clement Campbell, Emrah Özpolat, Tyler Rohan, Emma Stearsman

**May 22nd, 2025**

# Thank you to our advisory group!

Michael Adams (PennDOT)

Dan Bliss (PennDOT)

Fatma Ciloglu, PhD, PE, (Michael Baker)

Stacey Dorn (Michael Baker)

Ryan Gordon (SPC)

Ezequiel Lujan (FHWA)

Beverly Miller (PennDOT)

Jonathan Moses (PennDOT)

Dennis Neff (PennDOT)

Roy Painter (PennDOT)

Eric Setzler (City of Pittsburgh)

Stephen Shanley (Allegheny County)

Jason Sinay (CAWP)

Jean Statler (Allegheny County)

Ken Urbanec (Allegheny County).

# Landslides in Southwestern Pennsylvania

Hurricane Agnes (1972):

136 landslides in Allegheny County

$2 million 1972 dollars, ($37 million in 2025 dollars)

Spawned the USGS (Pomeroy/Davies) regional mapping, which has served as the gold standard since.

Photo: Tribune Review

# Fast forward to 2018 (wettest year on record)

~$127 million spent by PennDOT in 2018, more than 4x a typical year.

With potential for shifting precipitation patterns due to global warming, these wet years may become more common.

How much needs to be set aside to cover these costs?

# Project Goals

Produce an inventory of landslides that :

1) Amalgamates data from multiple agencies

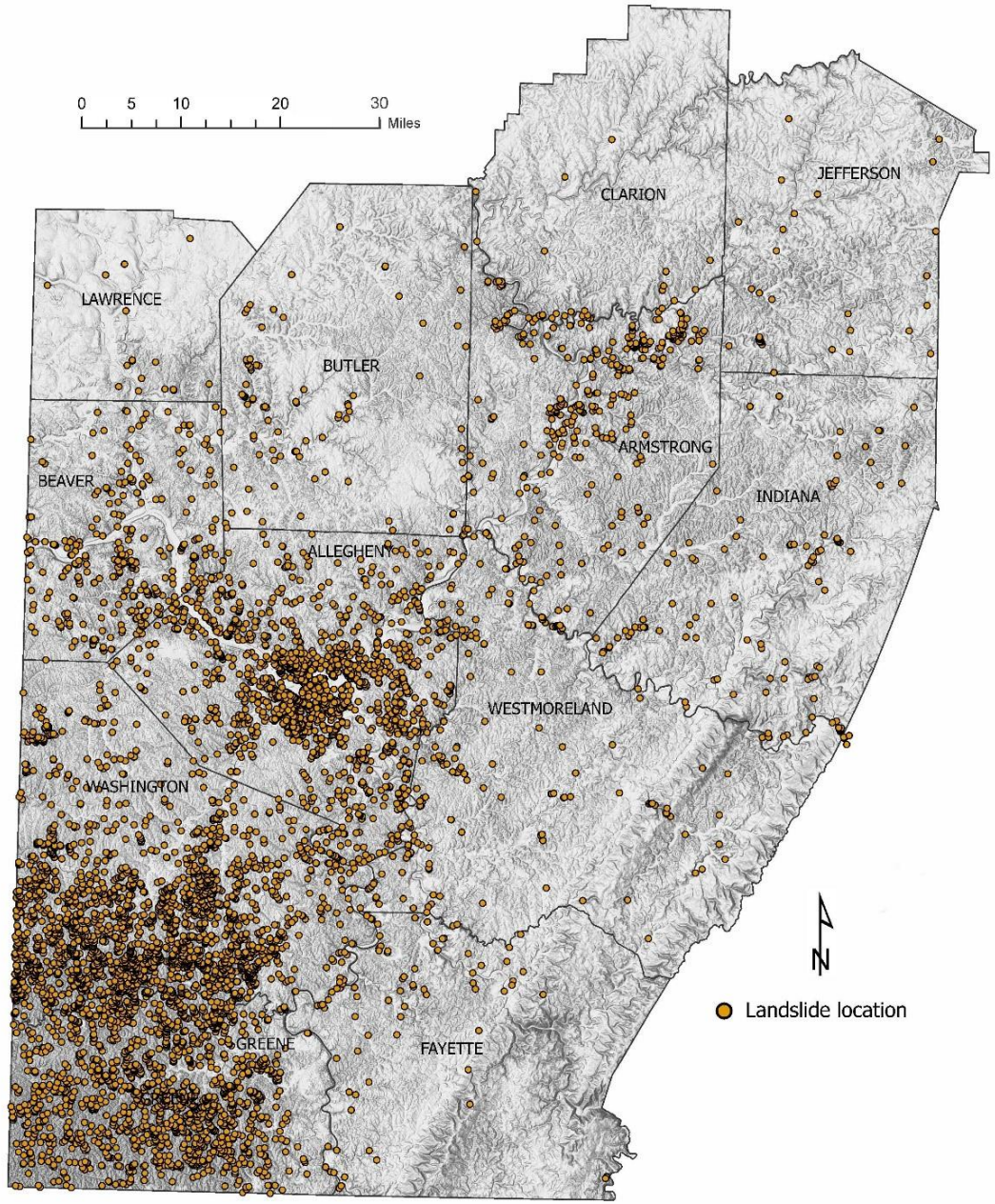
2) Is in a systematic and standardized format

3) Effectively addresses the data needs of the interested agencies.

# Over the last several years, we cataloged many landslides

| Data Source | Number of Slides |
|---|---|
| Ackenheil Dissertation | 90 |
| Pitt Landslides of Consequence | 8 |
| Adams Dissertation | 223 |
| USGS | 4844 |
| NASA | 127 |
| PennDOT District 10 | 243 |
| PennDOT District 11 | 282 |
| PennDOT District 12 | 427 |
| Allegheny County | 55 |
| City of Pittsburgh | 78 |
| Pittsburgh 311 | 1033 |
| Borough of Forest Hills | 3 |

# These landslides are distributed across 12 counties

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# Project Goals

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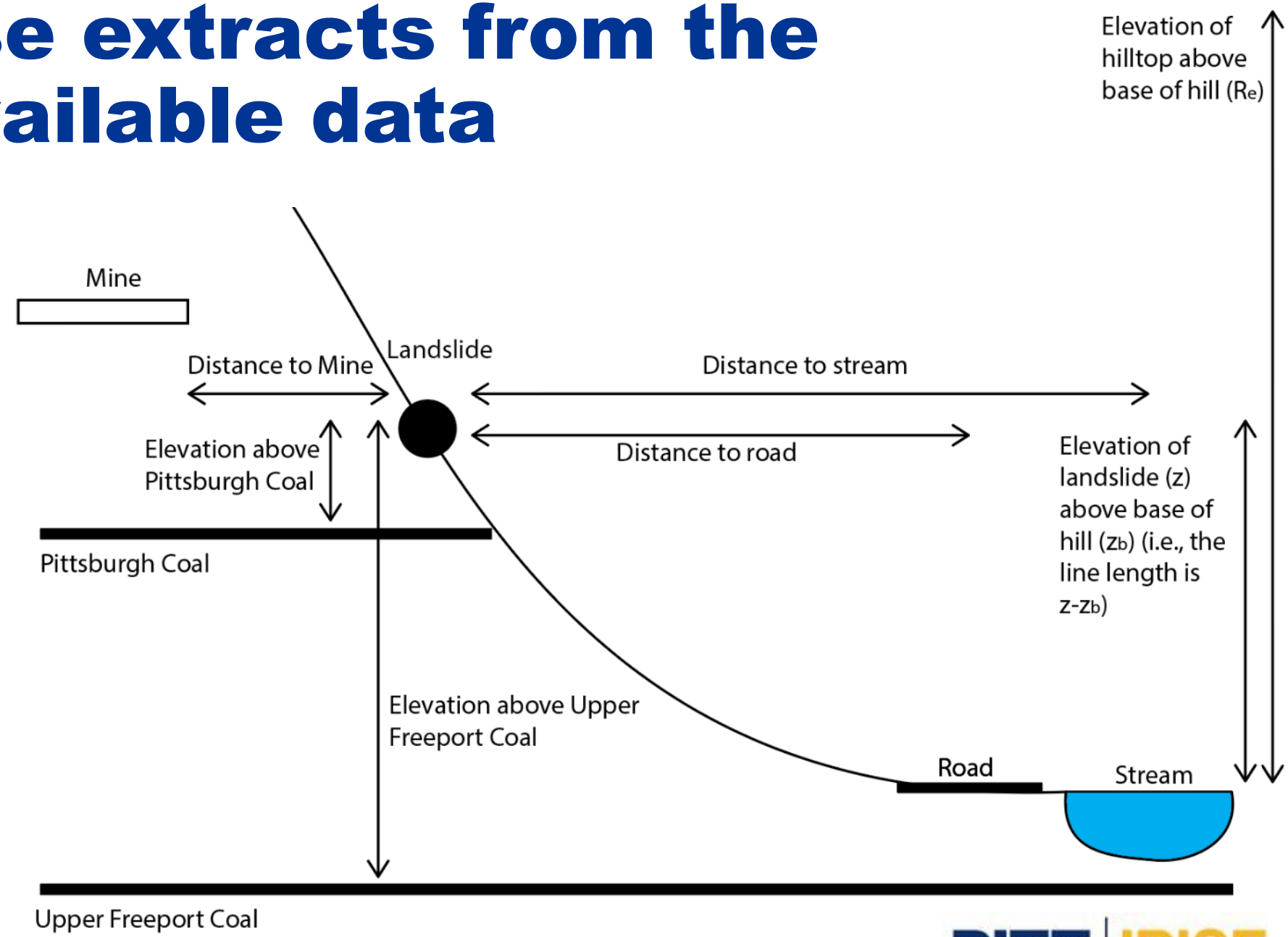
# The database extracts from the wealth of available data



# All of these methods are included in the report

Soon to be housed on the IRISE website.

Database will be available through the Western Pennsylvania Regional Data Center:

https://data.wprdc.org/dataset/irise-regional-landslide-inventory-for-southwestern-pennsylvania

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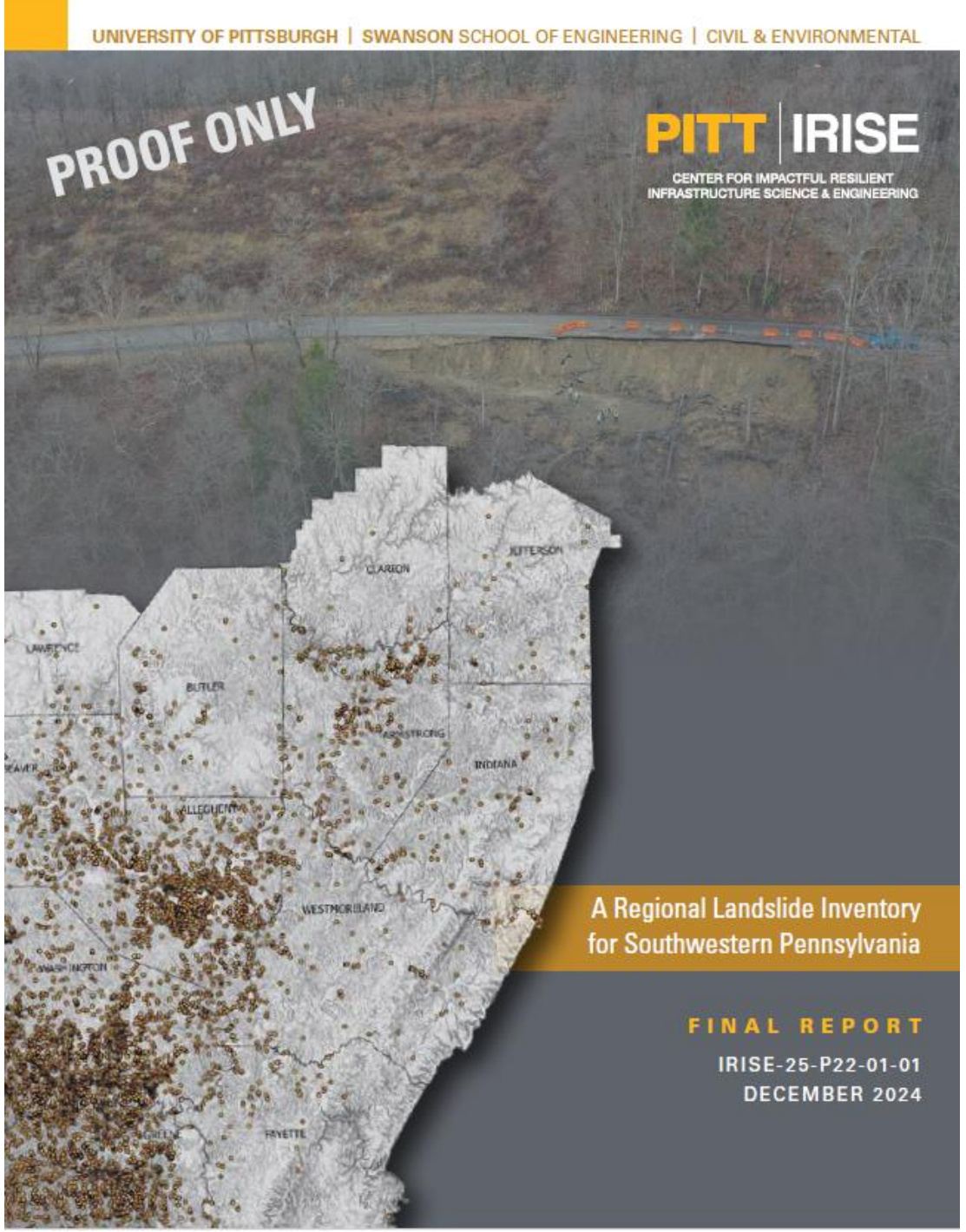
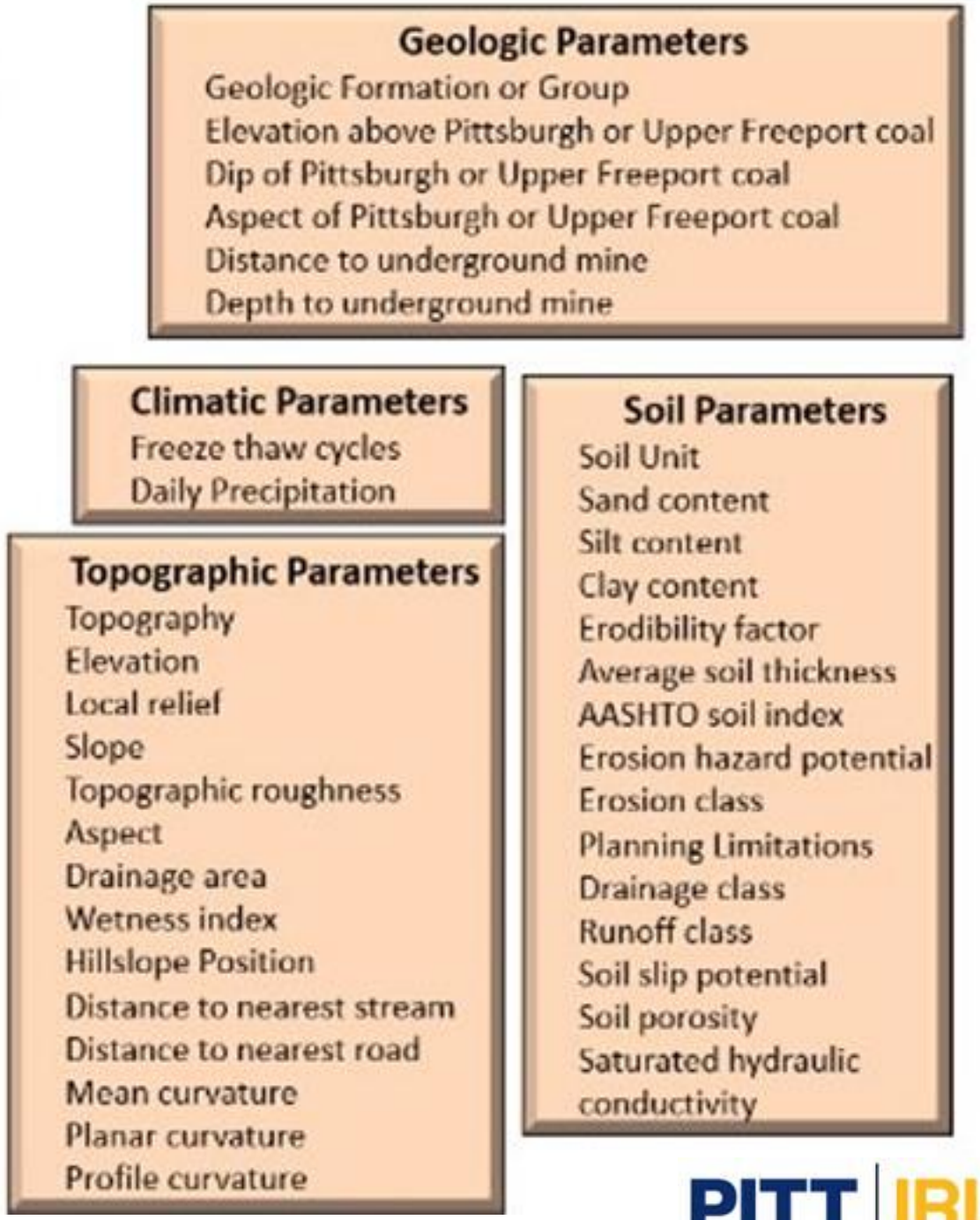
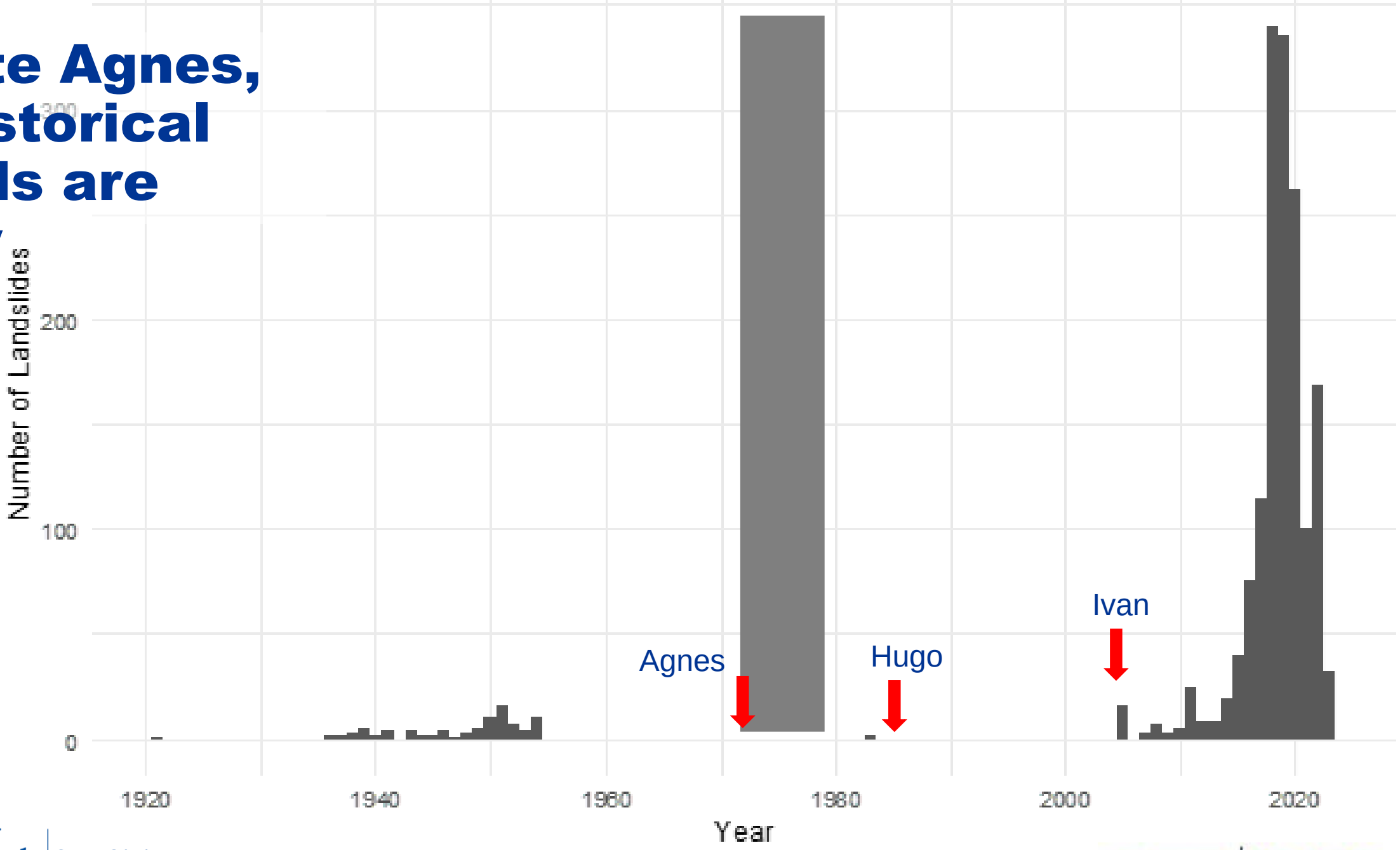


# The database includes ~38 parameters for each slide

Some data simply aren't available – for example, when there is no precise date for a landslide occurrence, weather data cannot be extracted



# Despite Agnes, our historical records are spotty

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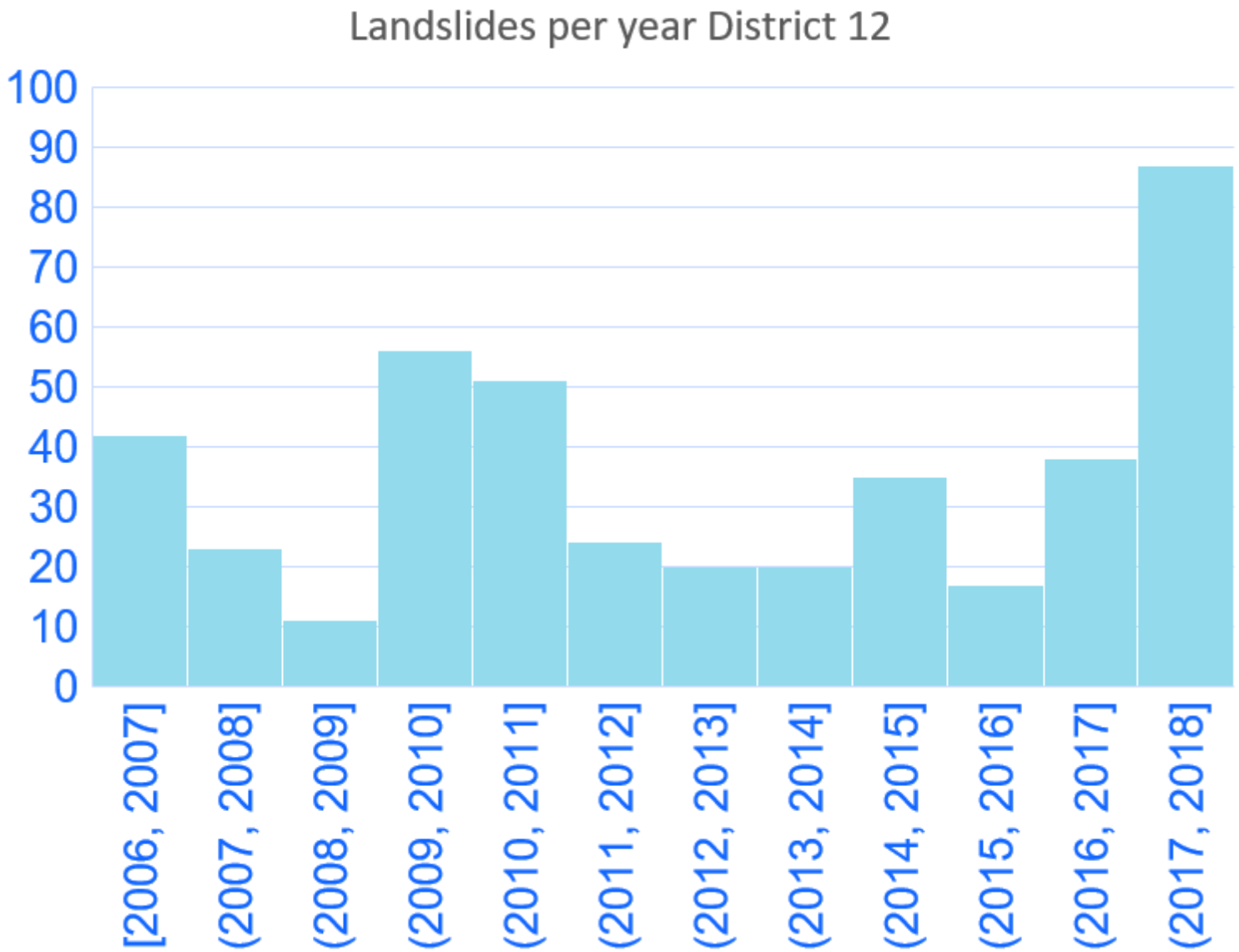
# We know landslides occurred in these time gaps

District 12 Log Book

Landslides not included in database (QA of these records beyond the scope)

There were prior periods of increased activity.

What drove landsliding in 2009-2010?



# Project Goals

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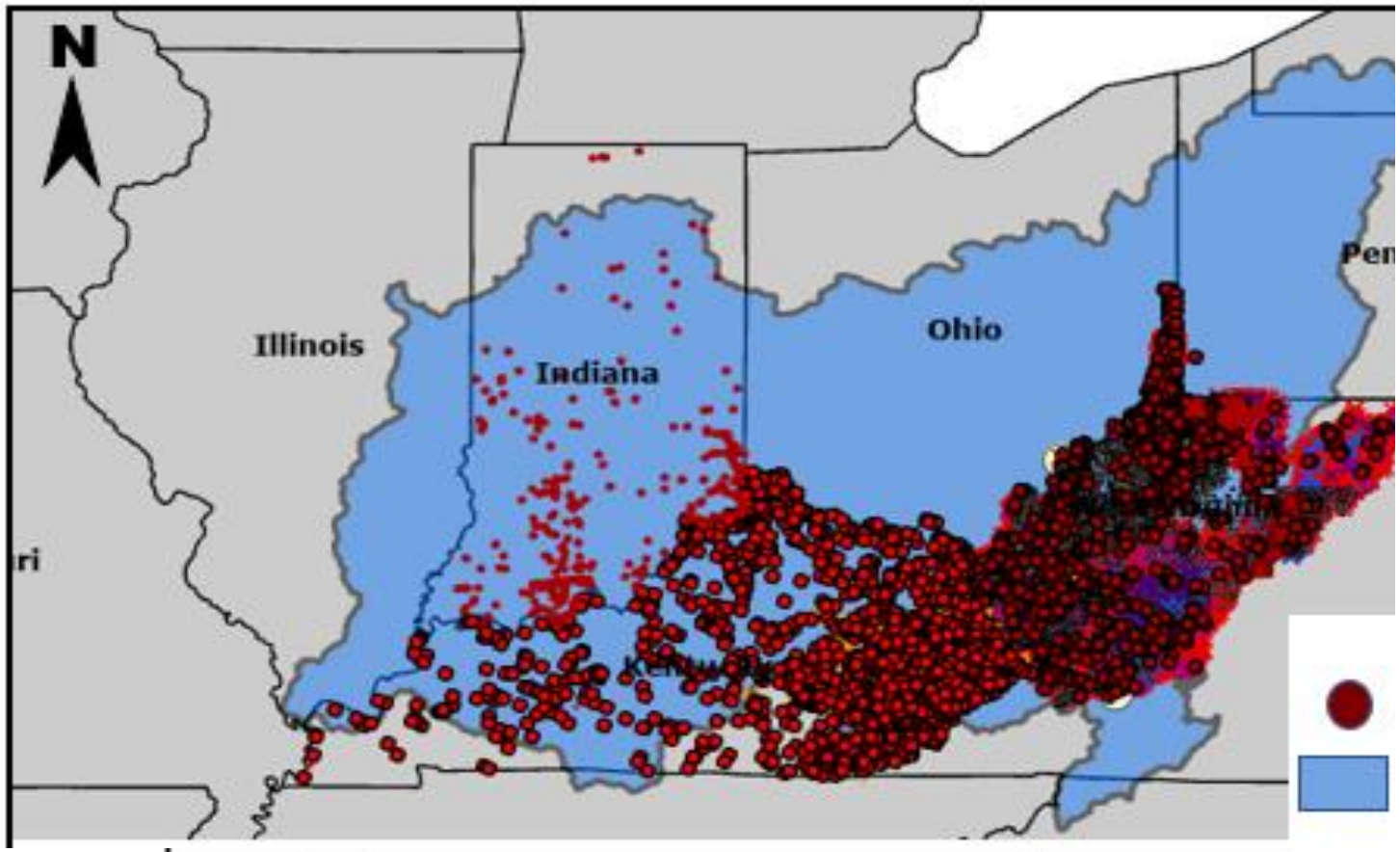
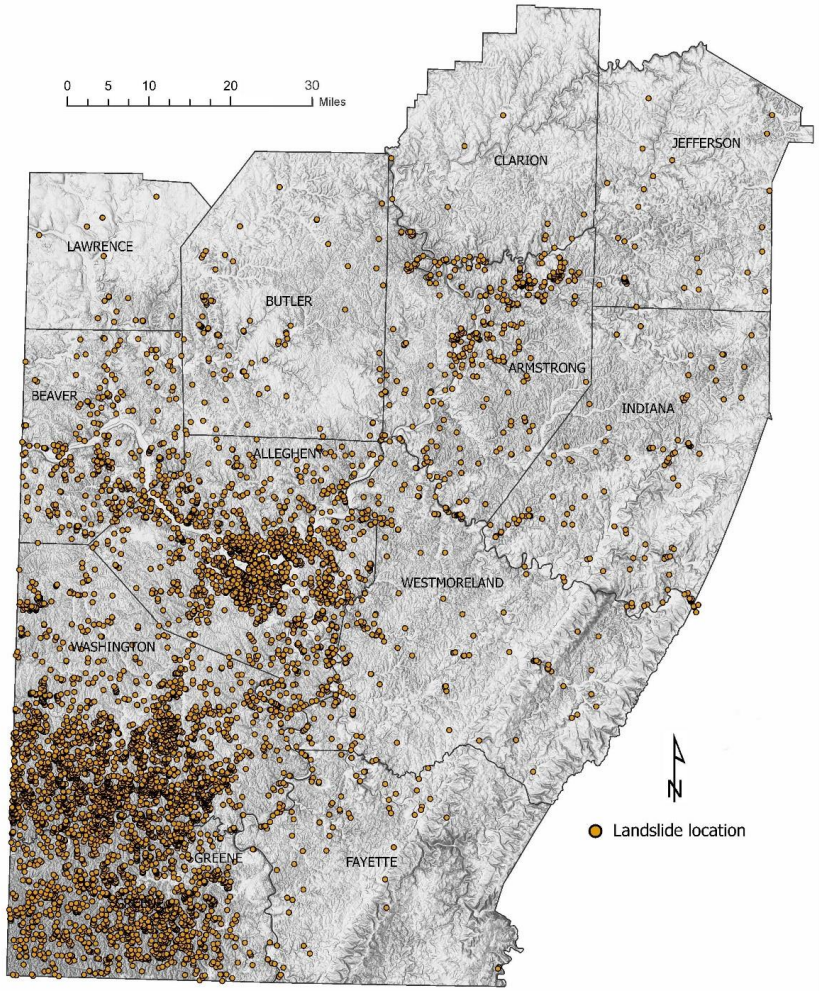
# With IRISE support, we have started to fill a gap

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# Application of the Landslide Database

As part of comprehensive PennDOT efforts

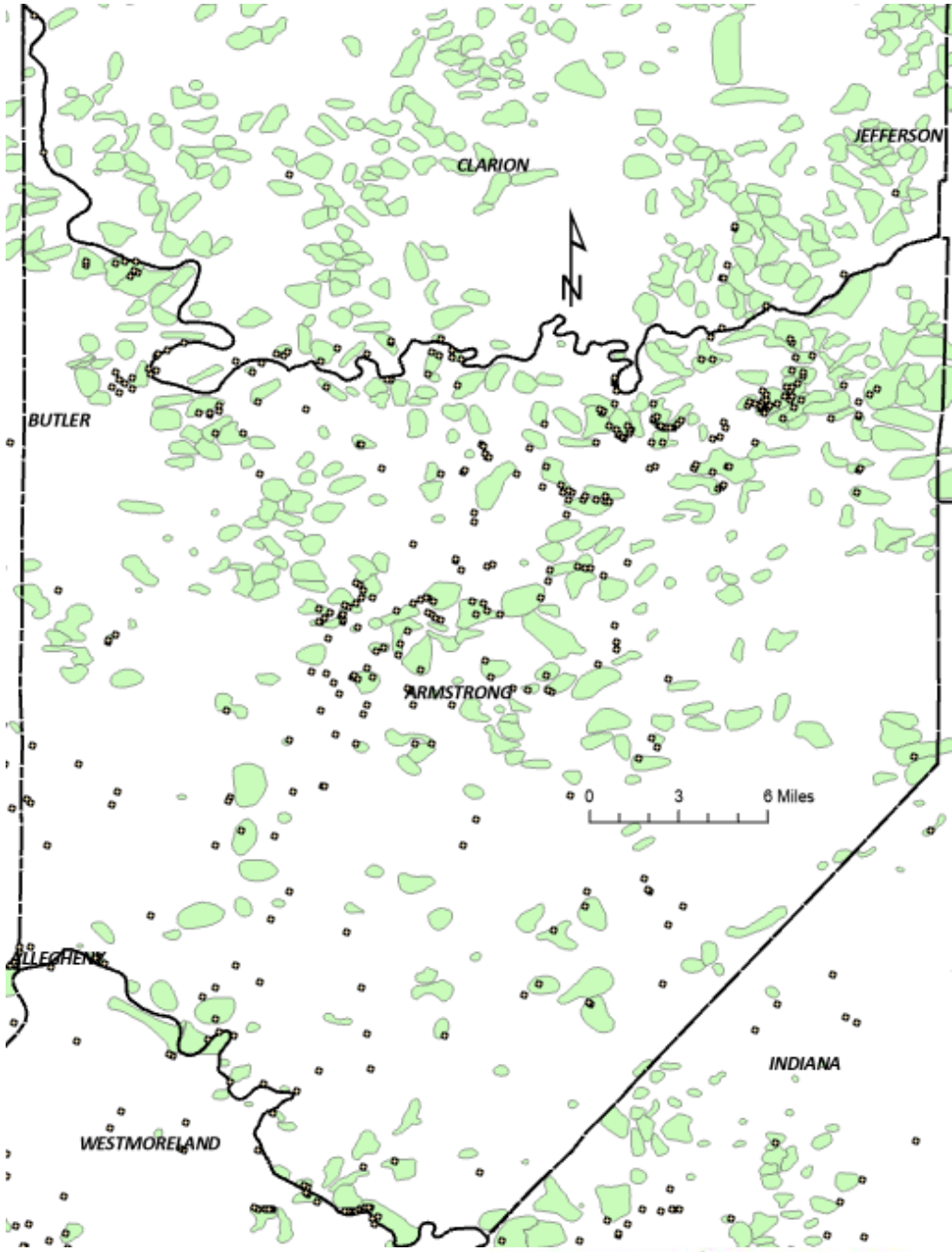
- gINT (geotechnical boring database)
- Geotechnical Asset Management Program
- IRISE Landslide Database
- DCNR database?

# Application of the Landslide Database

Setting regional priorities for mine reclamation

Consider Armstrong County

| Data Source | Number of Landslides | Occur within AML | Percentage |
|---|---|---|---|
| D10 | 80 | 17 | 21 |
| USGS | 235 | 143 | 61 |
| **Total** | 315 | 160 | 51 |

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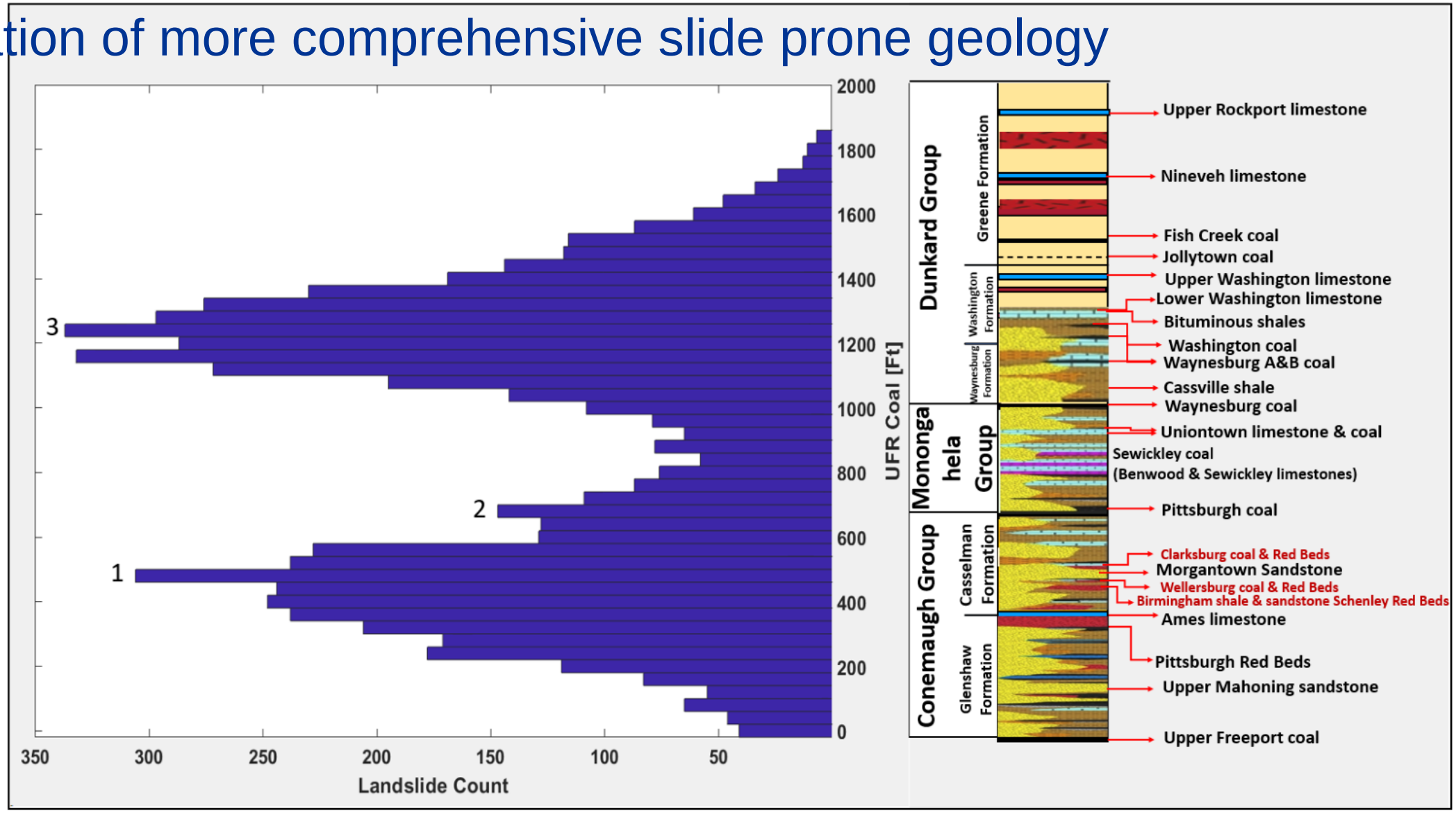
# Application of the Landslide Database

## Identification of more comprehensive slide prone geology

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# Application of the Landslide Database

## Hazard Mitigation Planning

*WLOS (ABC affiliate Asheville, NC) Sept. 27, 2024. (Photo: Joshua Pile).*

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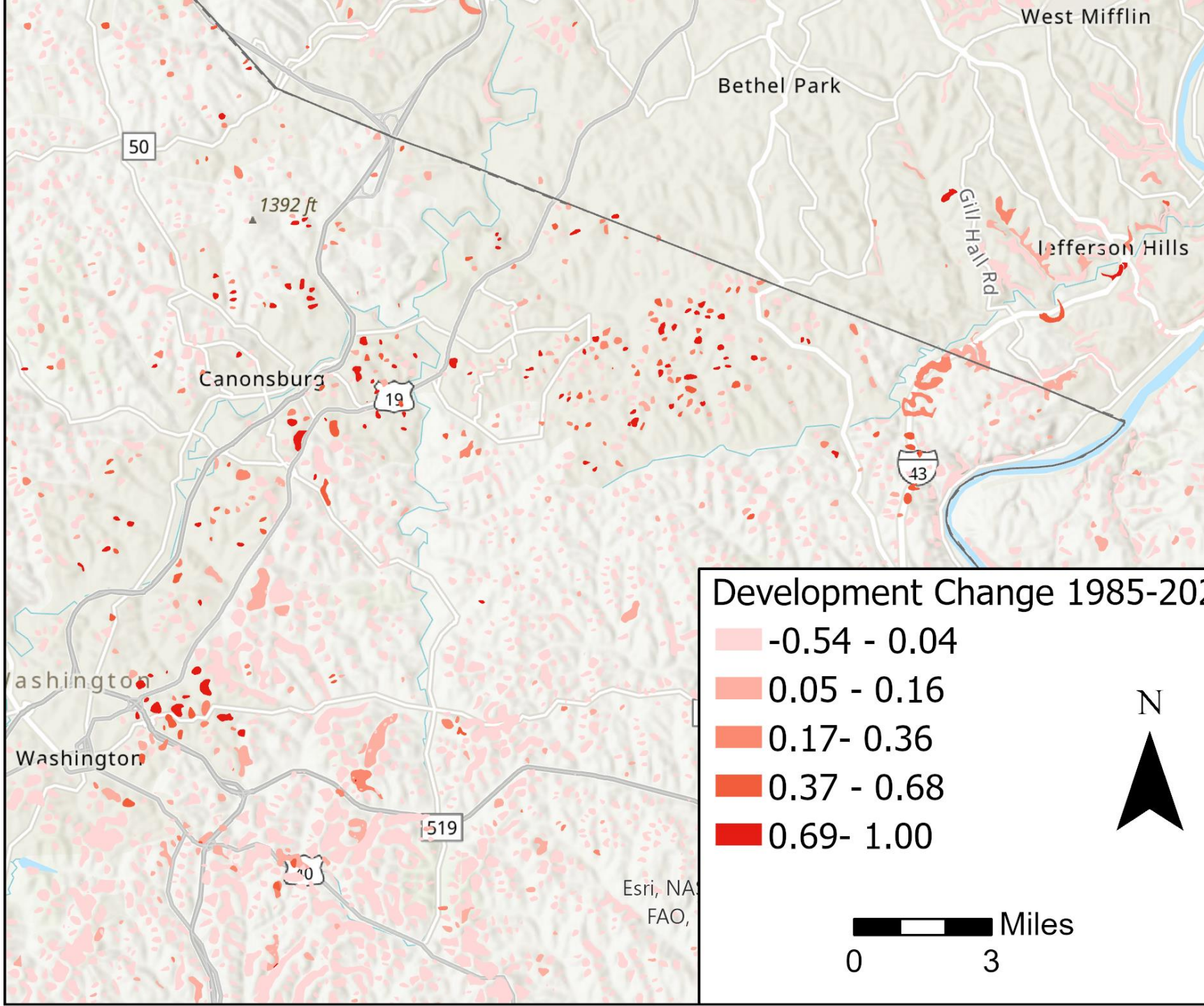
# Failure to apply the database perpetuates the problems

Look at land use change between 1985 and 2023 within landslide areas mapped in the 1980s.

Some historical landslides have been developed despite the information being there

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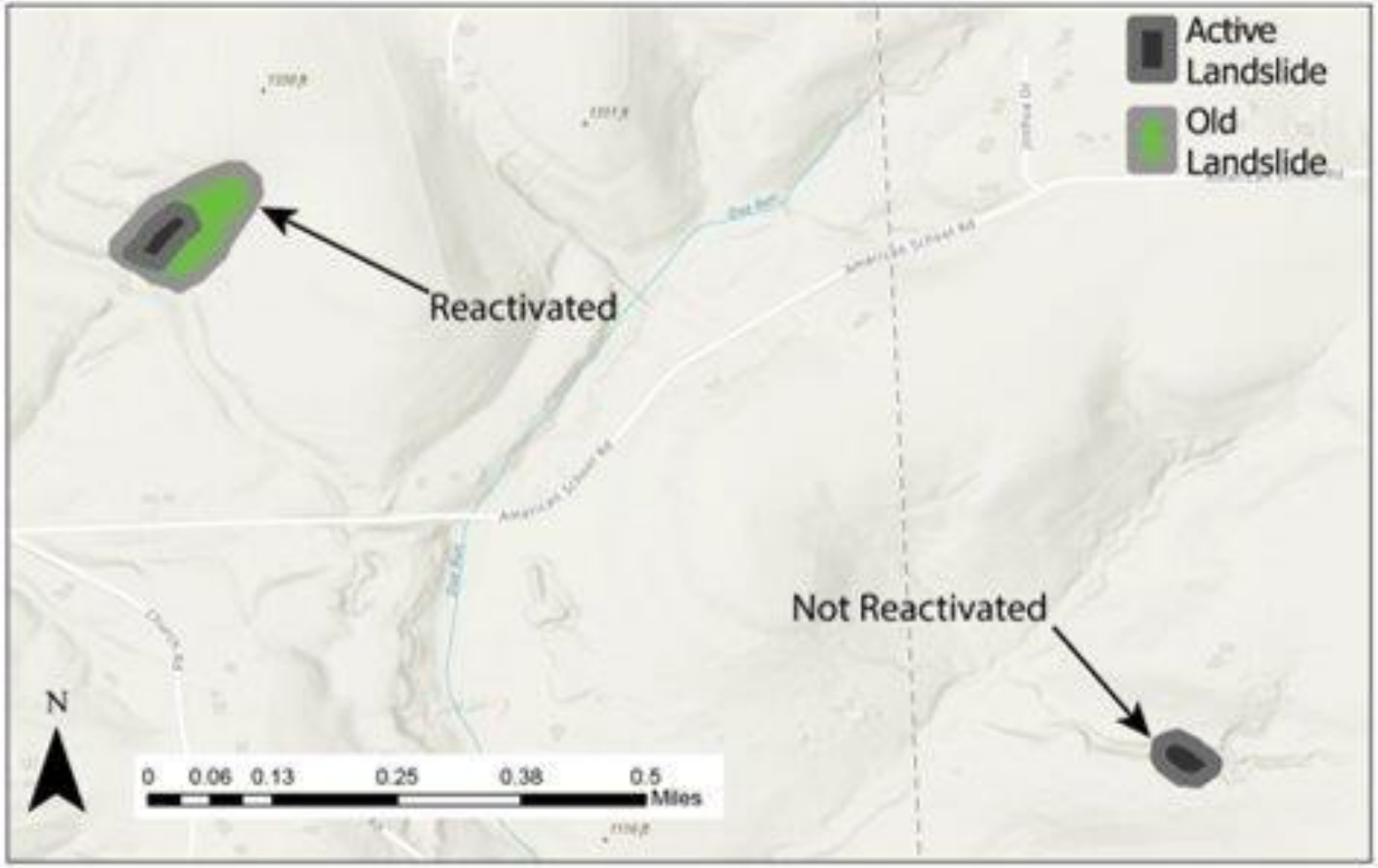
# Application of the Landslide Database

## Landslide Reoccurence

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# Thank you

https://data.wprdc.org/dataset/irise-regional-landslide-inventory-for-southwestern-pennsylvania


**Ashley Solenday**

**Lizzie Pease**

**Olivia Tang**

**Jay Okain (D11)**


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