

Development of a Roadway Landslide Inventory and Analytical Tool for Southwestern Pennsylvania

Daniel Bain

IRISE ANNUAL MEETING

MAY 17, 2023

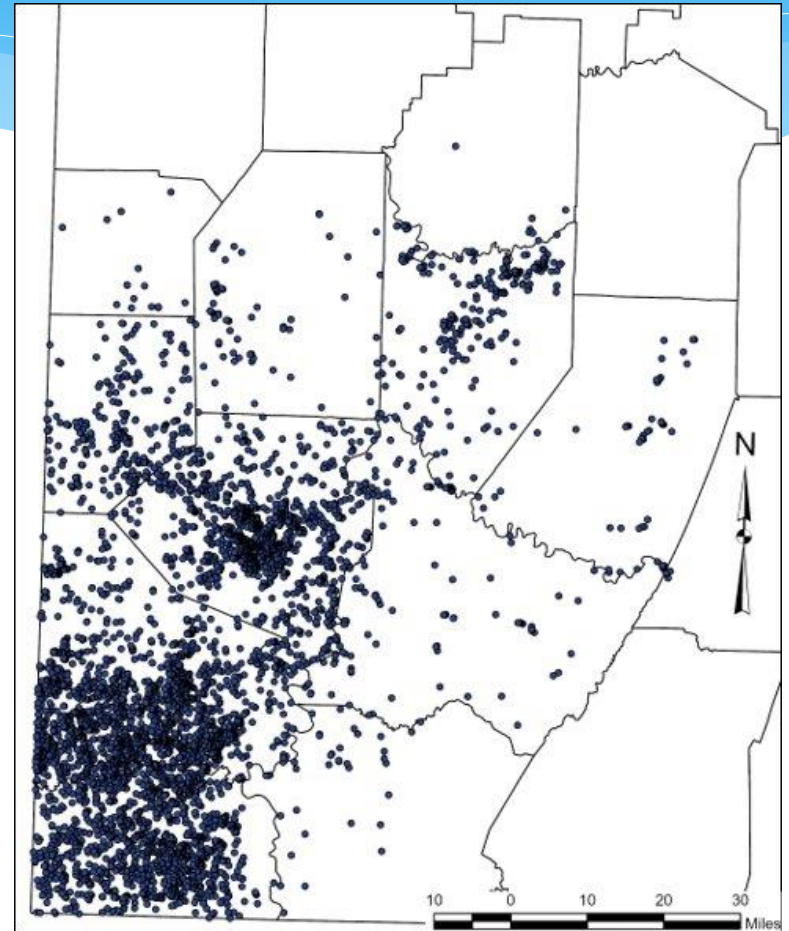
Regional Geology, Soils and Changing Climate Elevate Landslide Risk

- ❑ During wet years, landslide impacts require substantial funding to address (e.g., ~\$127 million spent by PennDOT in 2018, more than 4x a typical year)
- ❑ Patterns in landslides are a challenge to recognize with fractured data

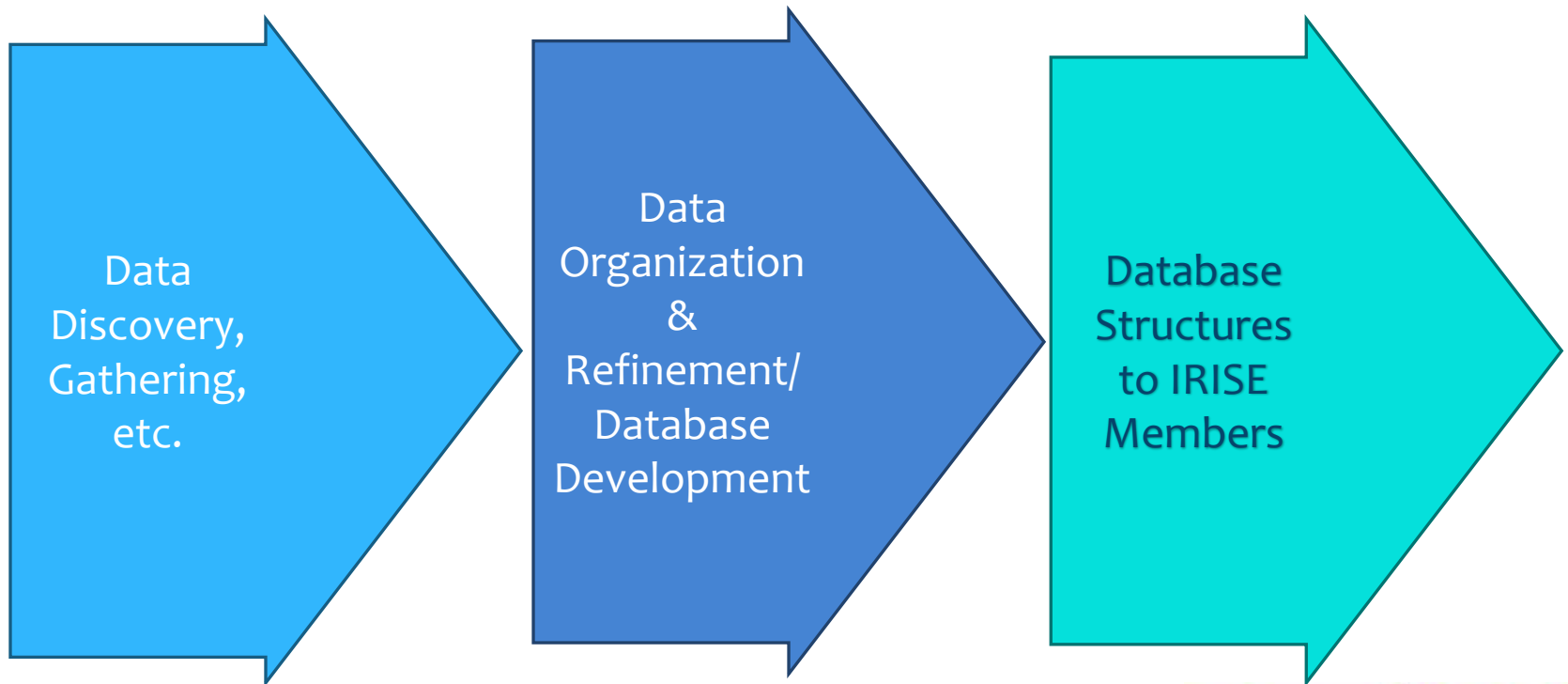


Our Project is Producing an Inventory of Landslides that:

- ❑ Amalgamates data from multiple agencies (~6500 modern slides, 5000 prehistoric slides)
- ❑ Uses a systematic and standardized format
- ❑ Effectively addresses the data needs of the interested agencies.



Project Can Be Split Into ~3 phases



Working with the advisory board we have identified 36 parameters to include for every mapped slide

Location Data

Feasible + Important

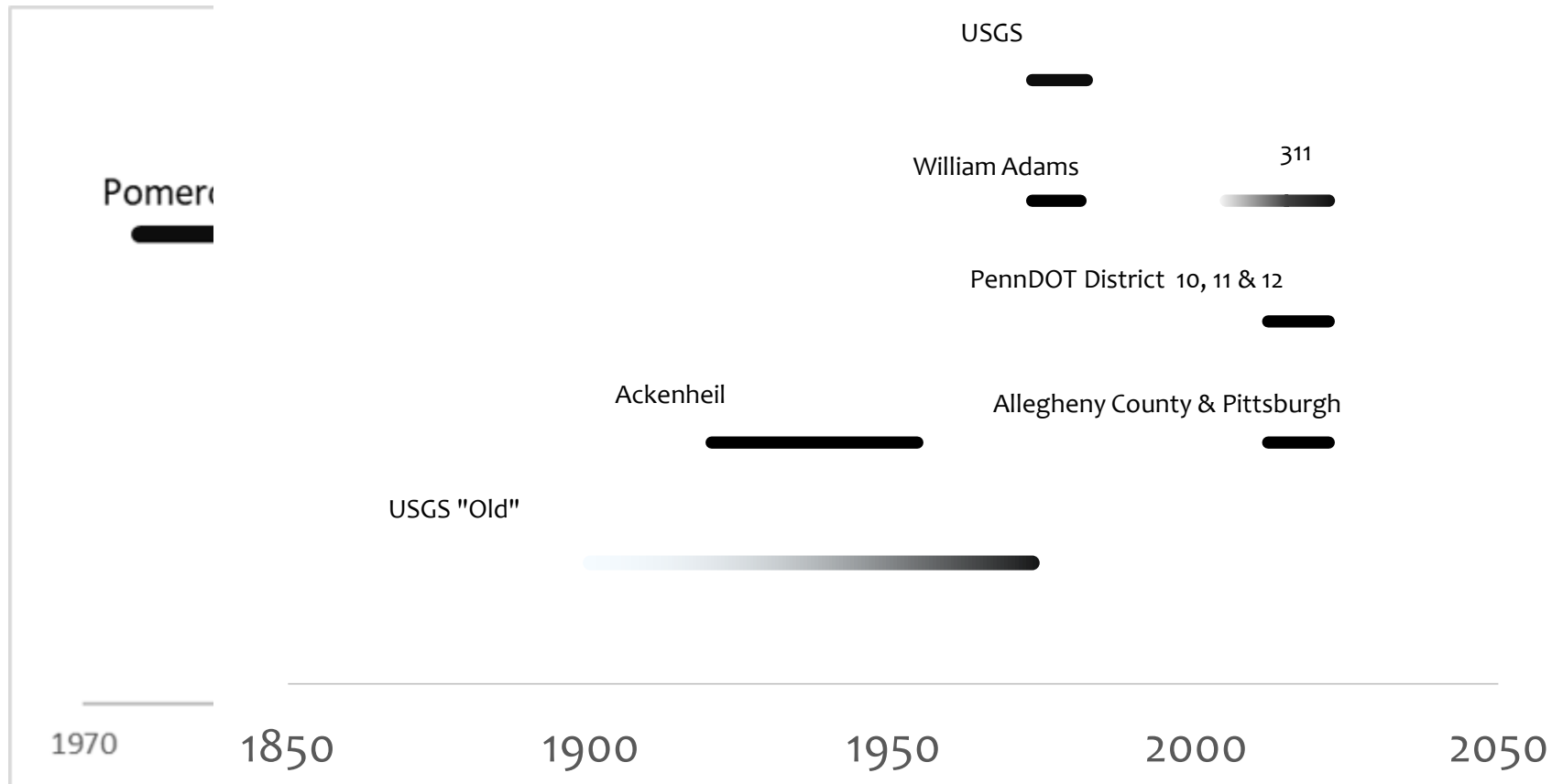
latitude/longitude
state route
section
start segment
offset from start segment beginning
end segment
offset from end segment beginning
local road name
distance to mines (slope loading from debris, drainage)
municipality
county

Infeasible

Is the slide below/above road

We are extending data back in time

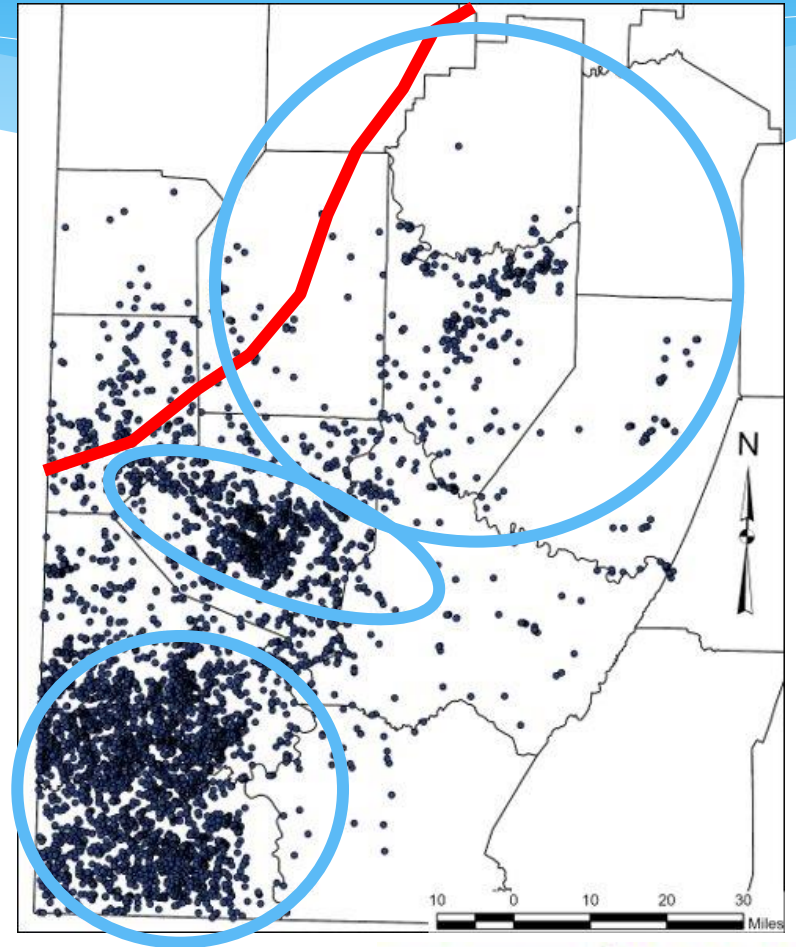
Landslide Data Periods



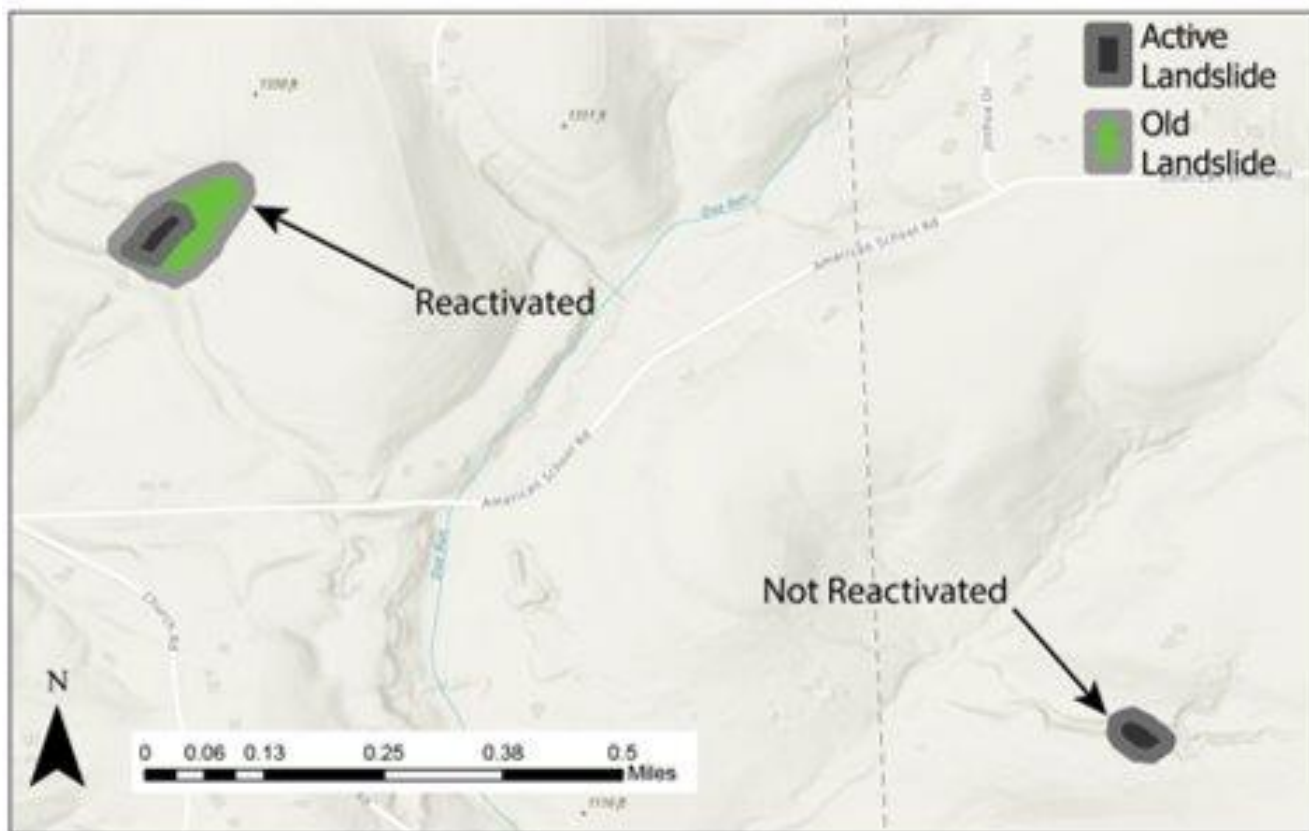
We also have expanded the region of interest

The region has multiple landslide problems

- ❑ Washington/Greene colluvial landslides
- ❑ Slip prone mudstones (e.g., the “Pittsburgh Red Beds”)
- ❑ Slides occurring in “periglacial” areas

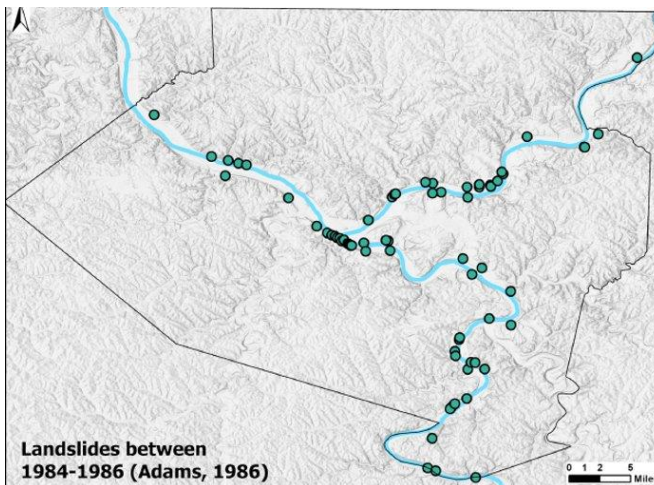
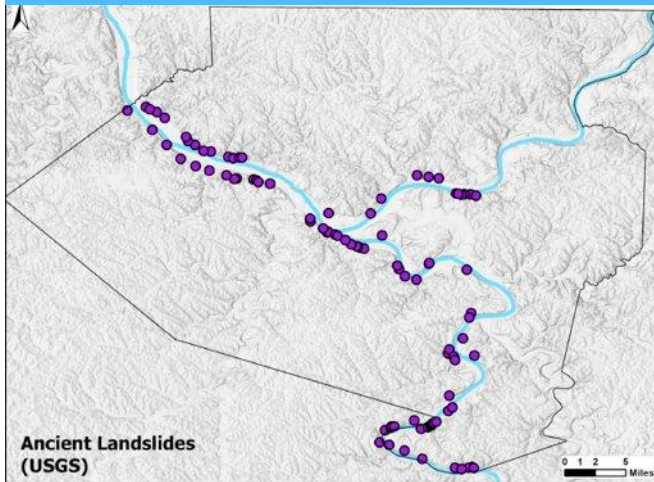


These data allow examination of the role of landslide reactivation

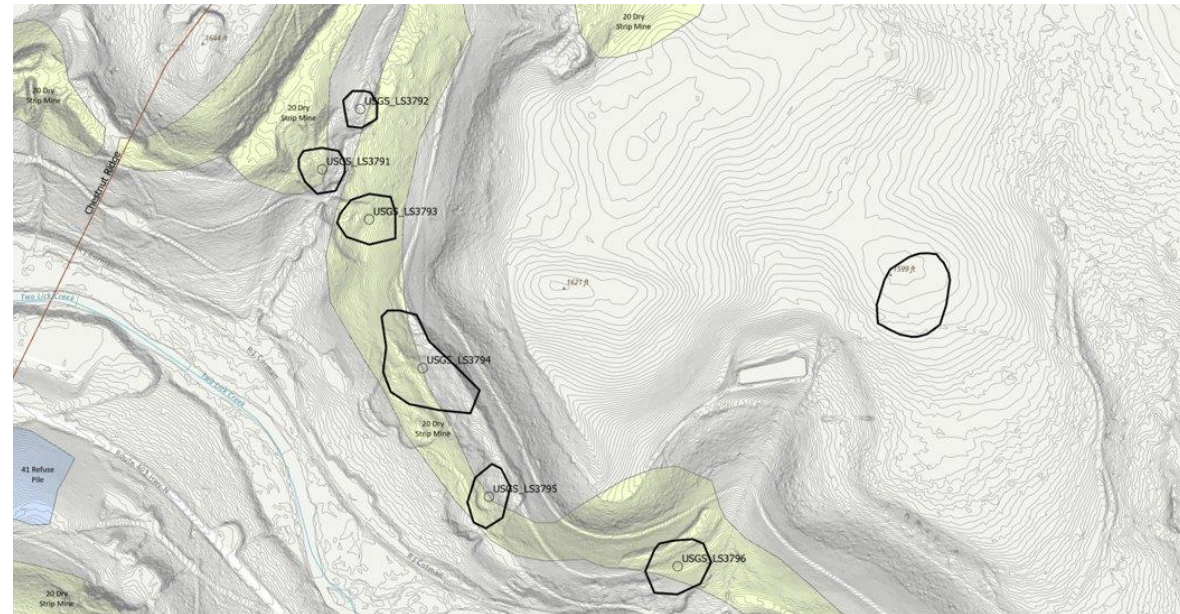


We use special study areas to extract detailed information

River Valley Walls



Mining



Schedule/Status

| Task | 1/22 - 3/22 | 4/22 - 6/22 | 7/22 - 9/22 | 10/22 - 12/22 | 1/23- 3/23 | 4/23 - 6/23 | 7/23 - 9/23 | 10/23 - 12/23 |
|---|----------------|----------------|----------------|------------------|---------------|-------------------|----------------|------------------|
| 1) Establish working group and convene monthly meetings | | | | | | | | |
| 2) Iteratively identify data sources | | | | | | | | |
| 3) Gather Data -- Field Visits | | | | | | | | |
| 4) Data Organization/ Database Development | | | | | | | | |
| 5) Draft Database (and associated report) | | | | | | | | |
| 6) Final database (and associated report) | | | | | | | | |