

The Never-Ending Landforms of Pennsylvania Project

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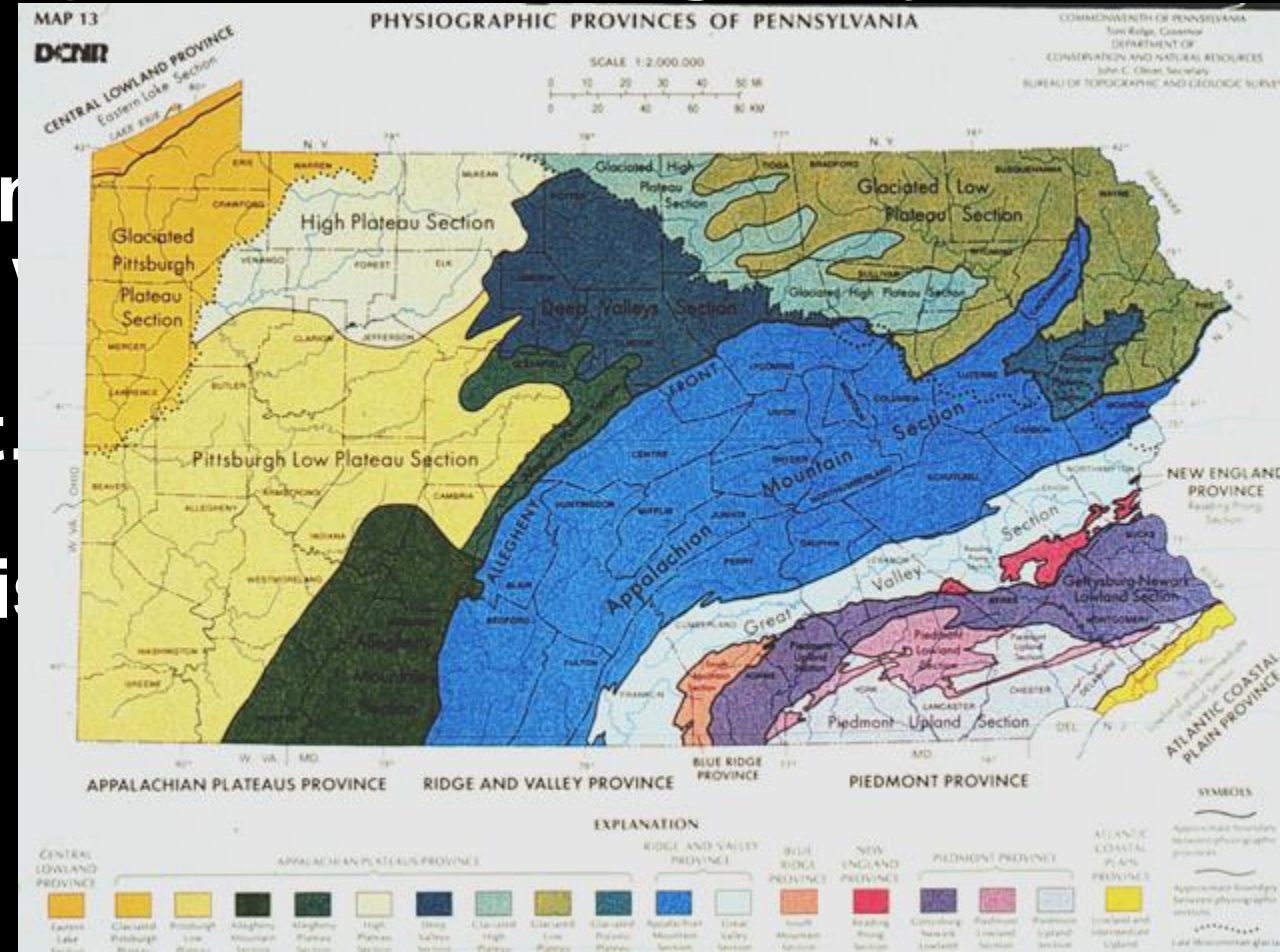
Bureau of Geological Survey

In the mid 1990s DCNR's Bureau of Forestry was working with the USEPA on a project to define the eco-regions of the United States

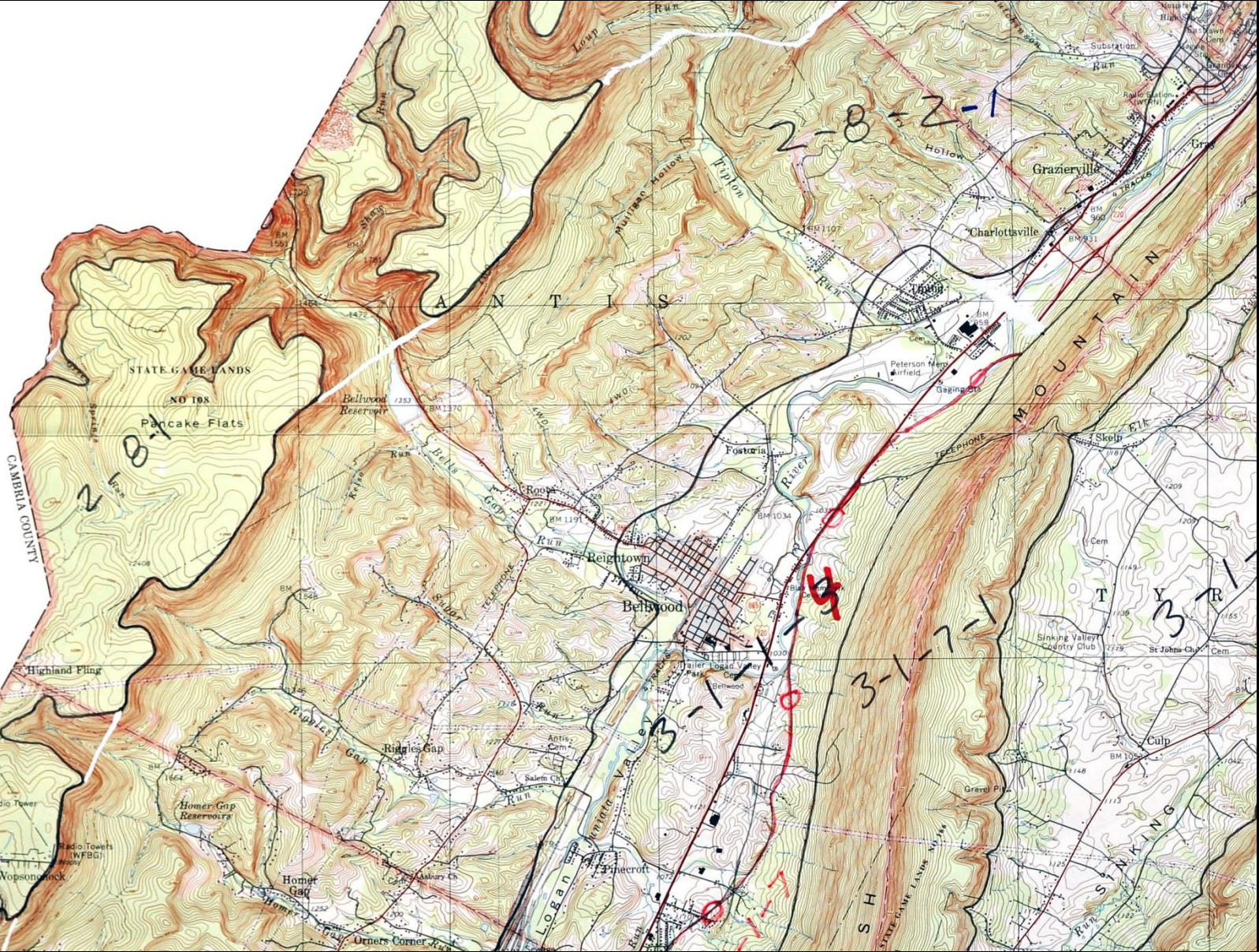
Familiar with our map of Pennsylvania's physiography, the BOF asked for help

Happy to oblige, Bill Sevon, of the Bureau's Physiographic Map, but

Bill was an old school geologist and a paper effort



Subdivisions would be defined by identifying “regional” breaks in topography



The 1:50,000 county topographic map series proved ideal for the task

With a few exceptions, the maps used a 20 foot contour interval - essentially duplicating the topography on the 1:24,000 quadrangles

County maps were manageable in size yet large enough to provide a regional view of the landscape

Here is an image of the compilation on the northern portion of the Blair County map

Starting with the Physiographic Provinces and Physiographic Sections

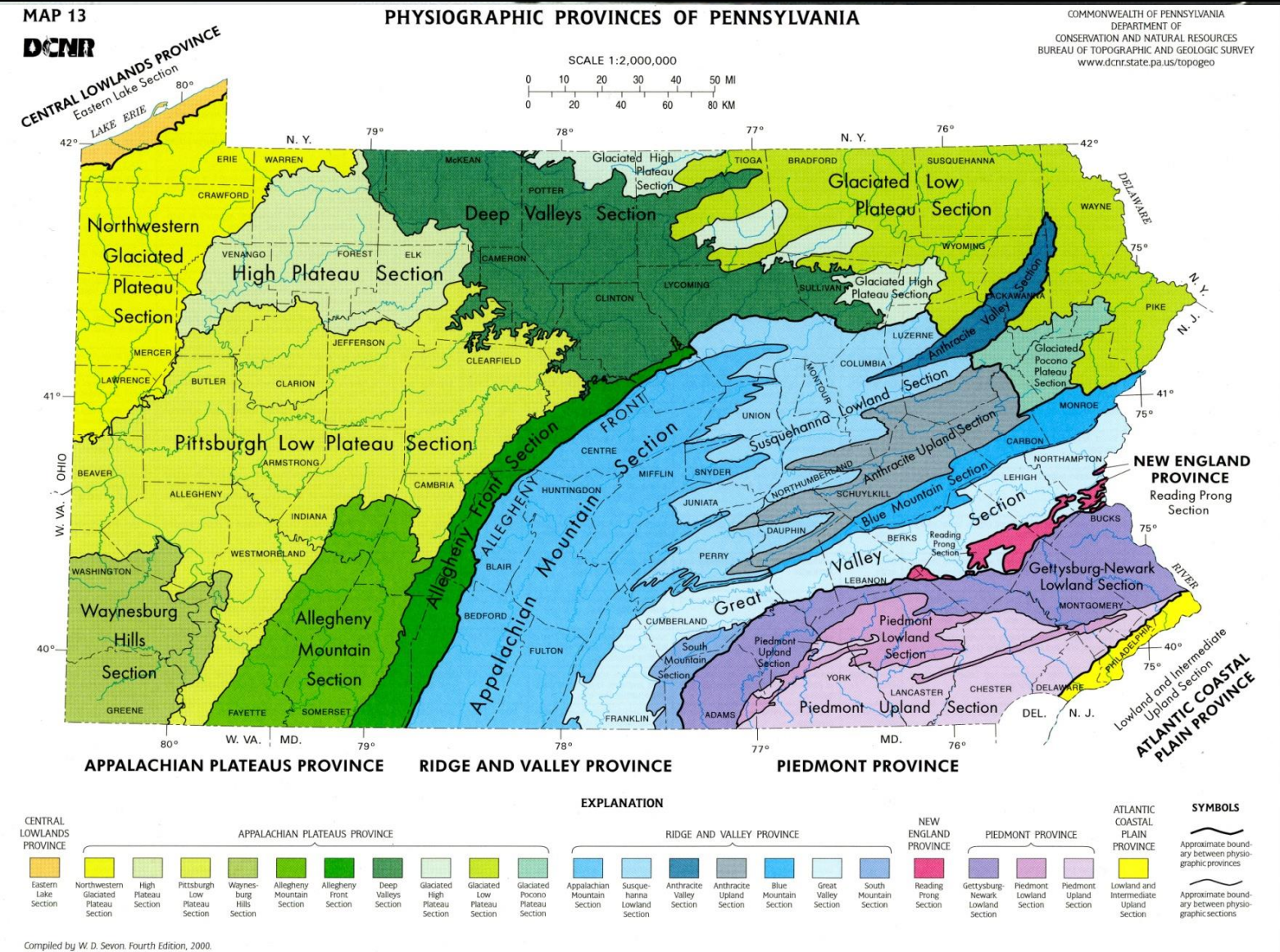
Three additional semi-hierarchical landform levels were defined

Regions

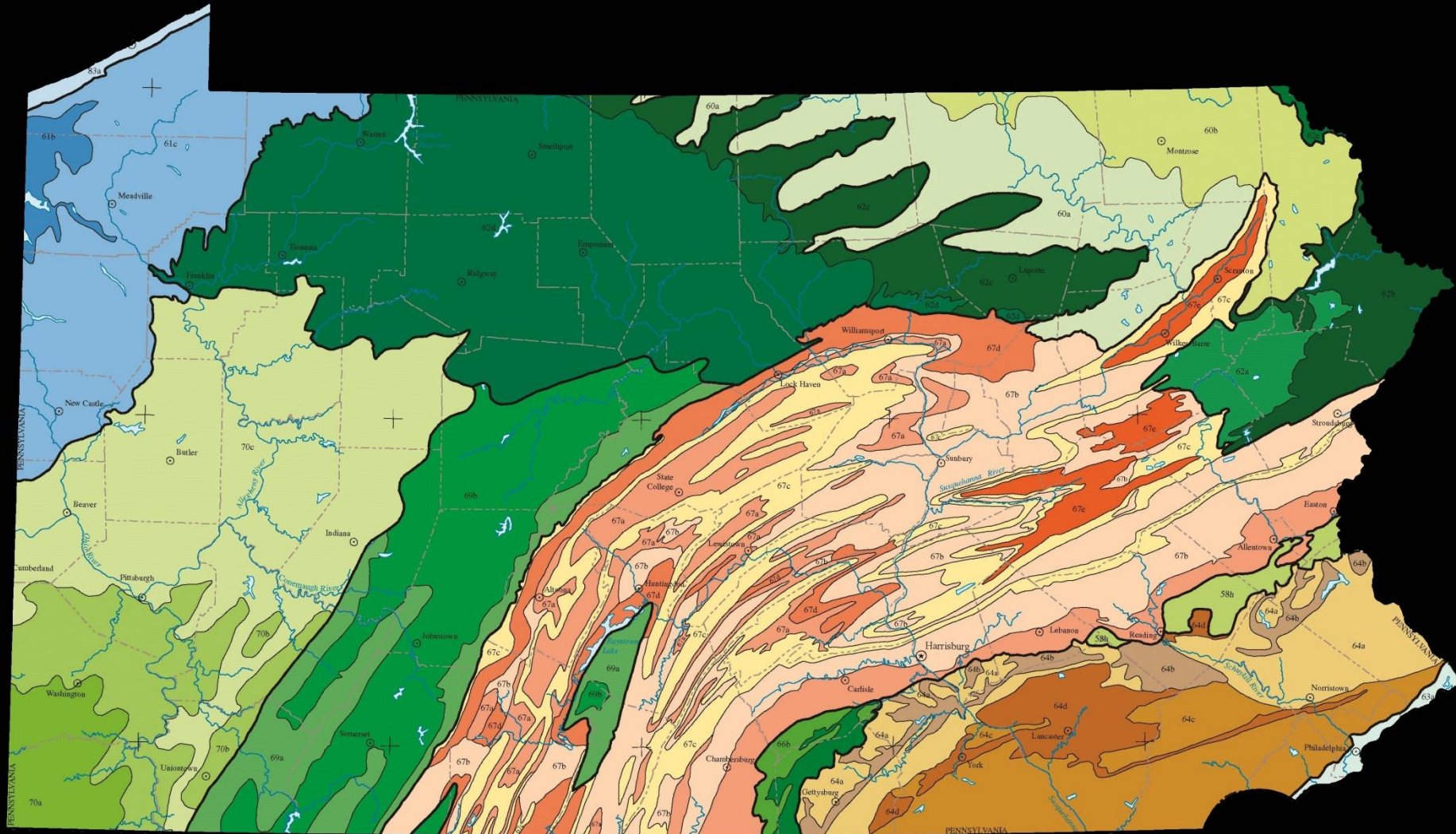
Districts

Areas

Eventually, new, more detailed physiographic boundaries were reflected in our published map



The landform units became the building blocks of the EPA Eco-Regions for Pennsylvania



Map Number
Province
Section
Region
District
Area
County (County or counties where map unit occurs)
Quadrangle (Representative quadrangle containing map unit, 1:50,000 scale)

Today, technology makes it easier to graphically characterize each unit which in turn helps users visualize differences more easily than could be done with the numbers and text of these original attributes.

Slope: Minimum (Percent)
Slope: Mean (Percent)
Ridge Crest Spacing (Feet)
Valley Bottom Width (Feet)
Drainage Pattern (Dendritic, Trellis, etc.)
Drainage Channel Spacing (Feet)
Landform Description (Short verbal description of the landform)

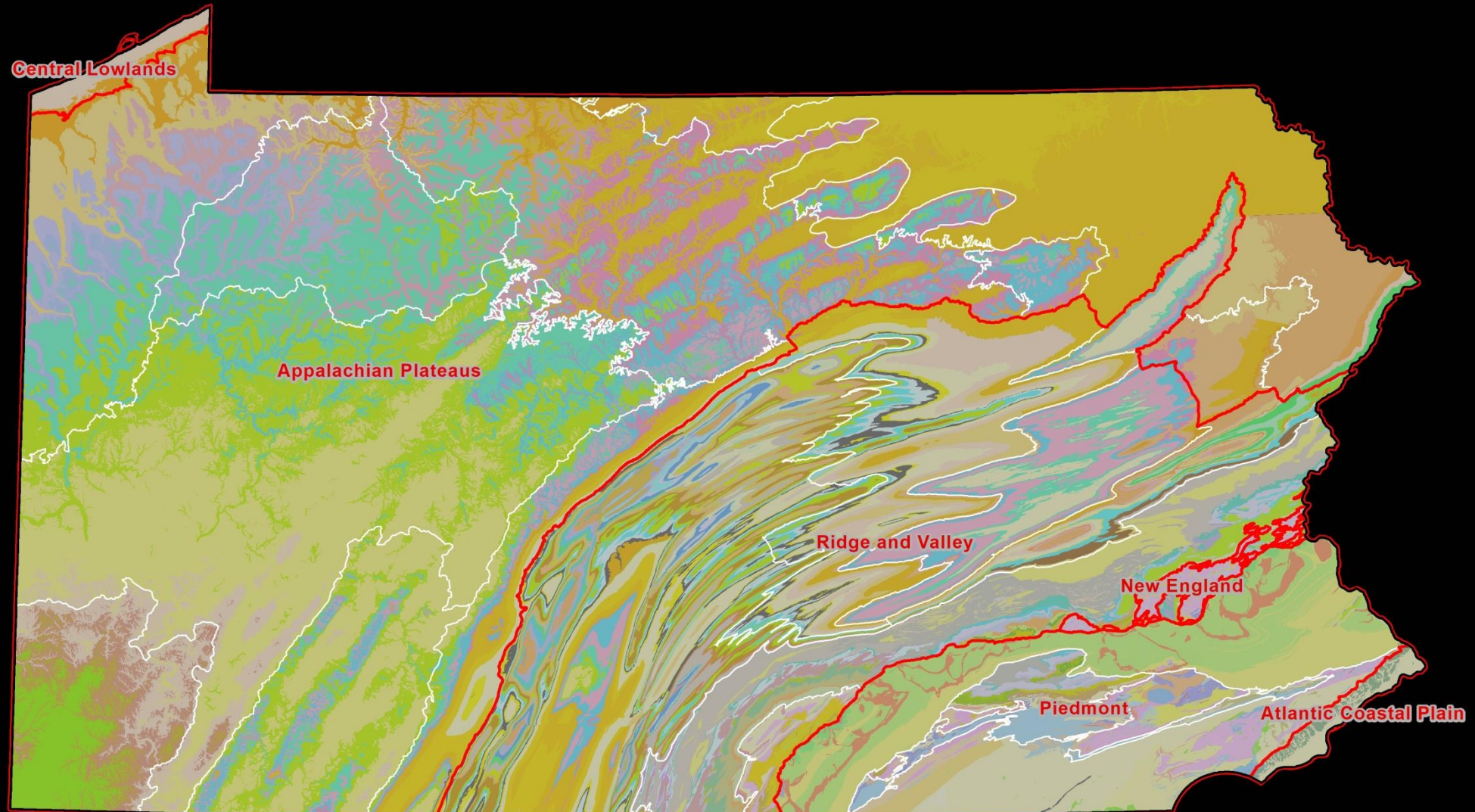
Early on it was recognized that the real utility would come from a long list of attributes that would eventually characterize each unit

Unfortunately Bill retired before attributing could be completed

Since then, early in their tenures, four GIS staffers have dedicated significant time to the project

Primary Takeaway...

Landform units are largely defined by bedrock geology



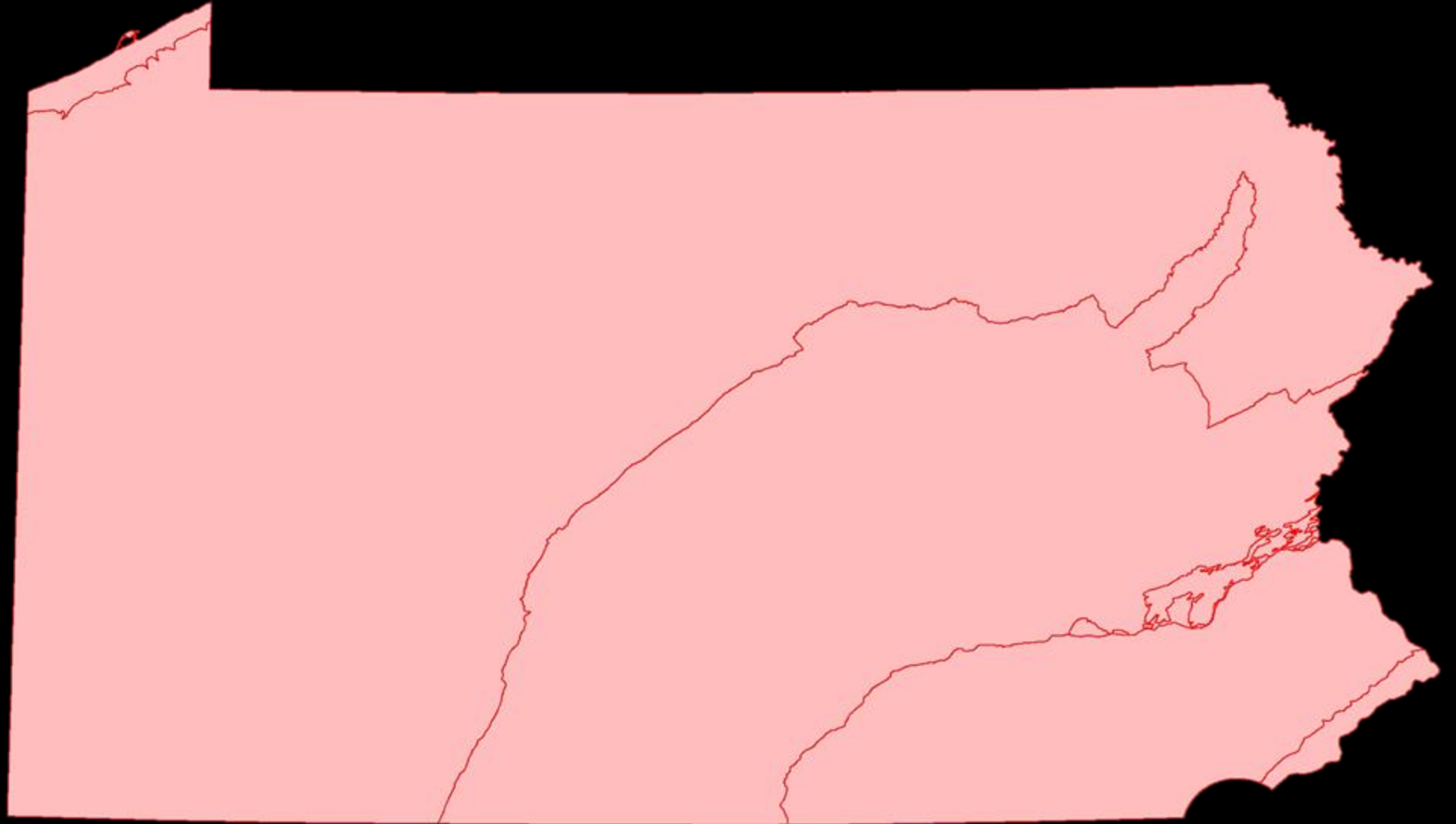
Bedrock Geology of Pennsylvania

Landform Coverage



Landform Coverage

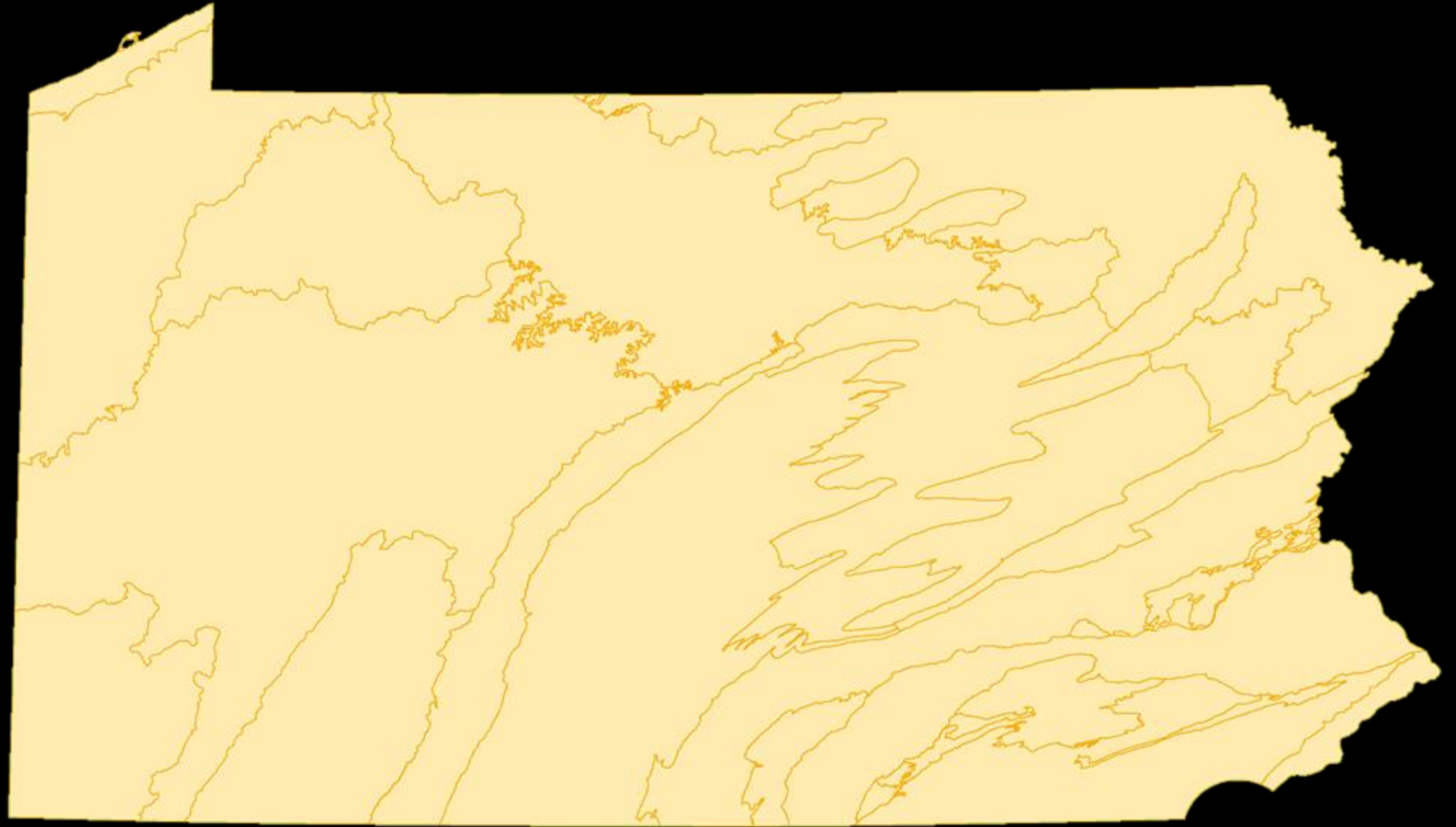
Province



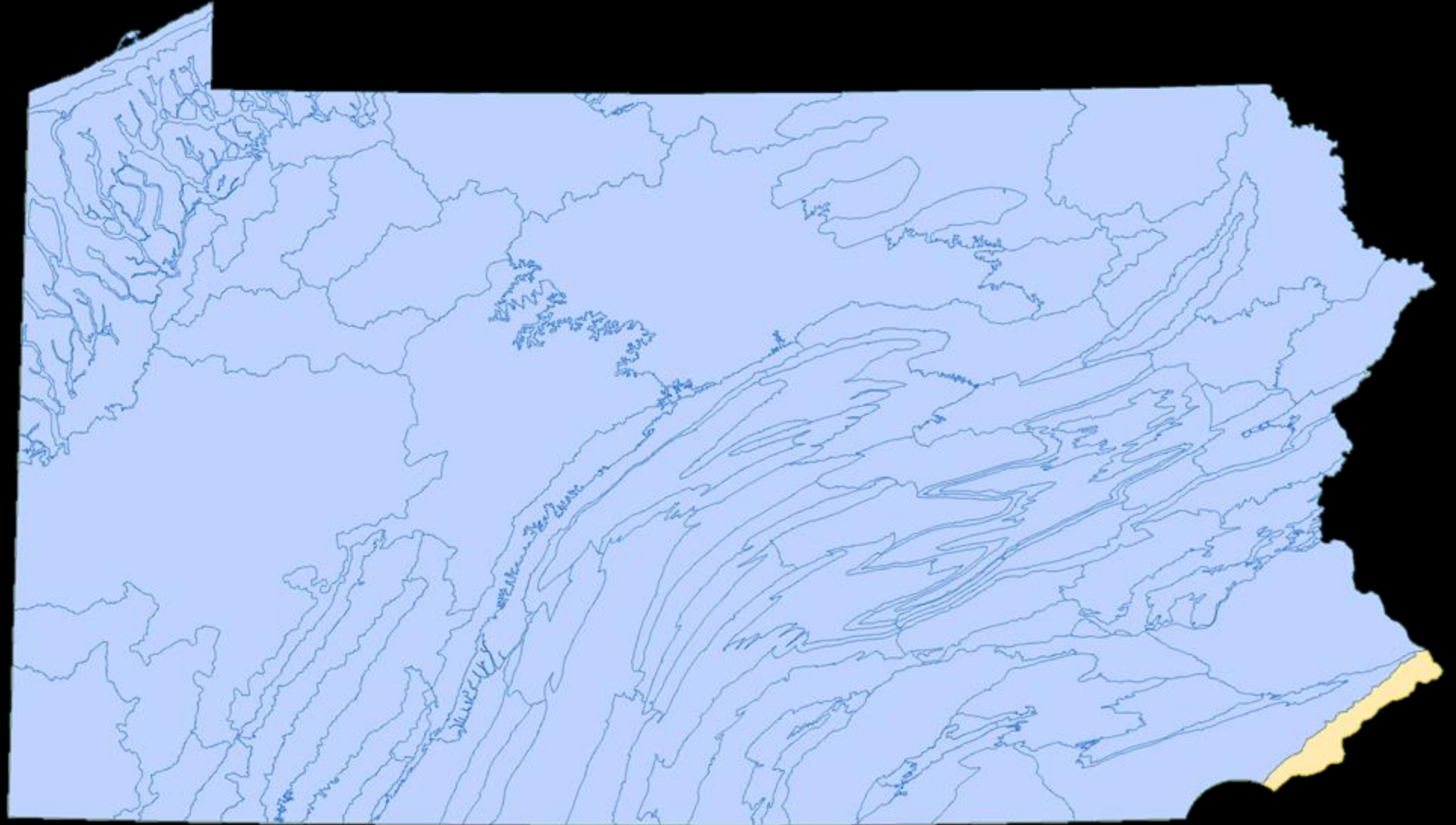
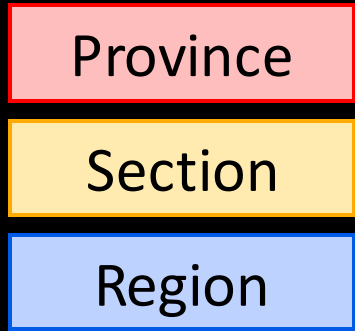
Landform Coverage

Province

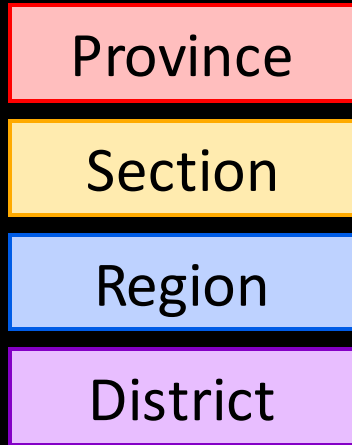
Section



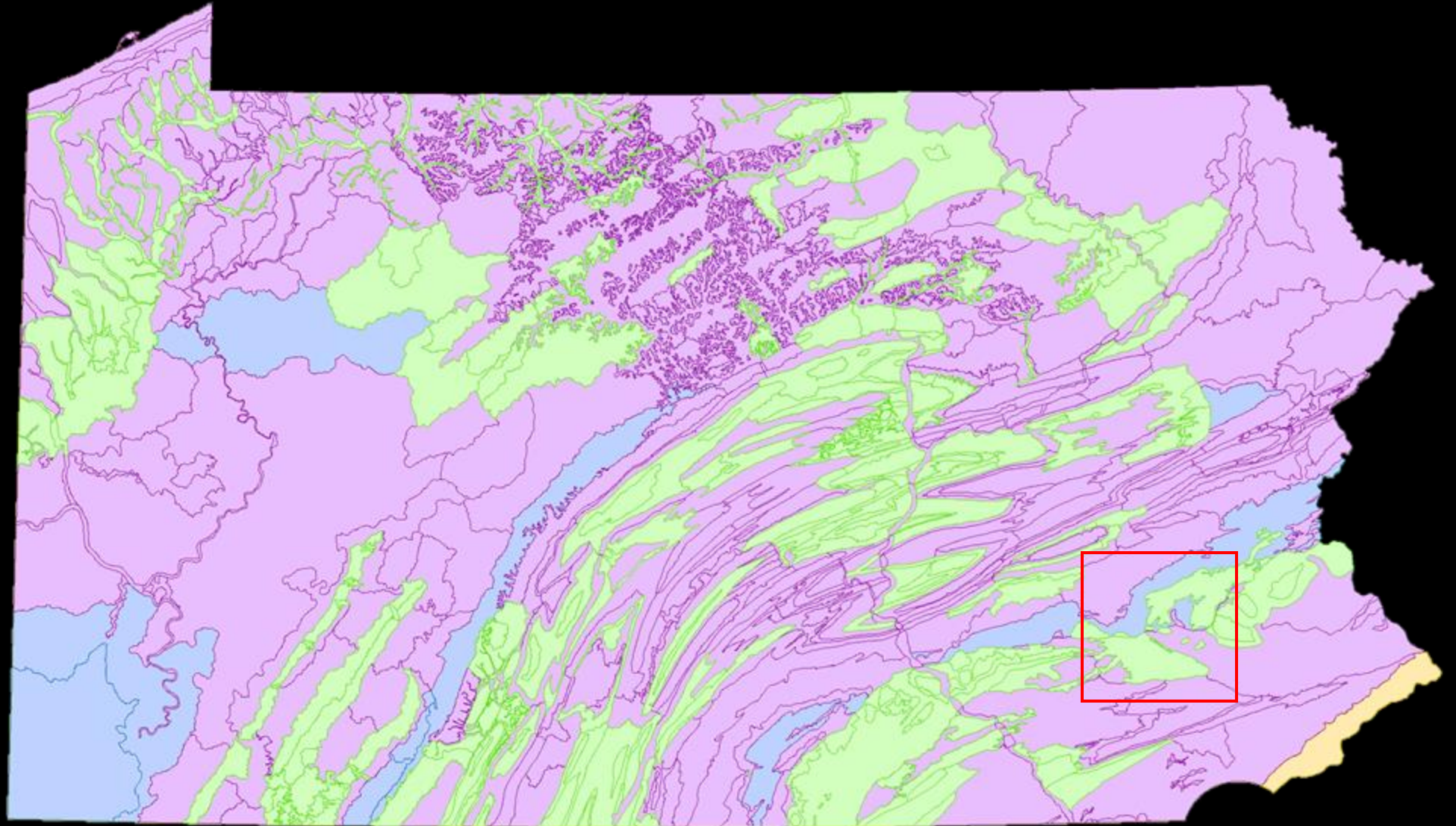
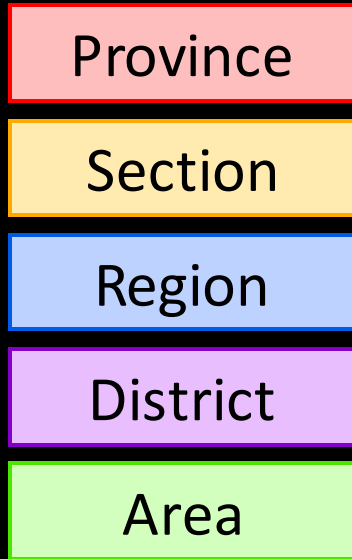
Landform Coverage



Landform Coverage

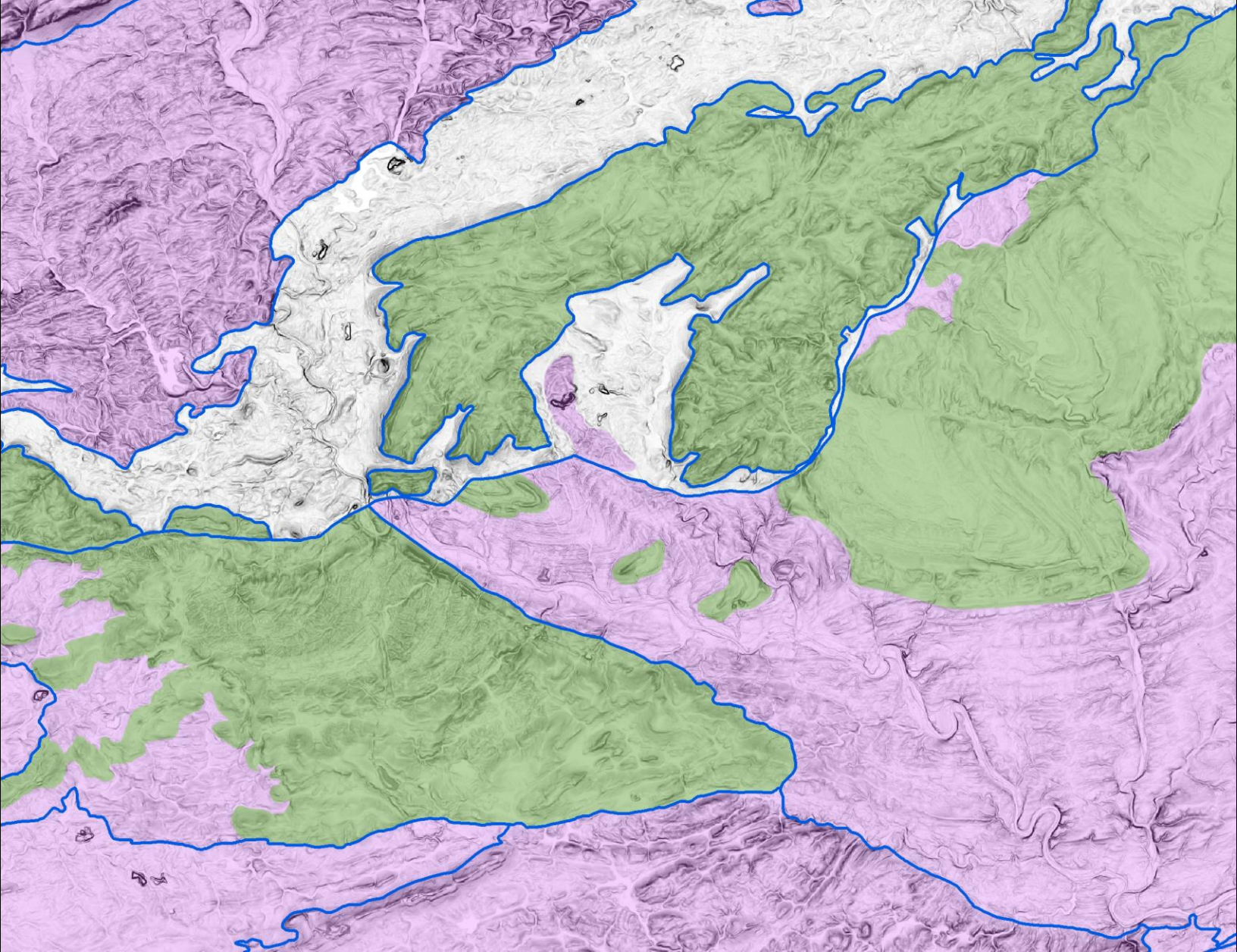


Landform Coverage



Landform Coverage

- Region
- District
- Area



Landform Attributes

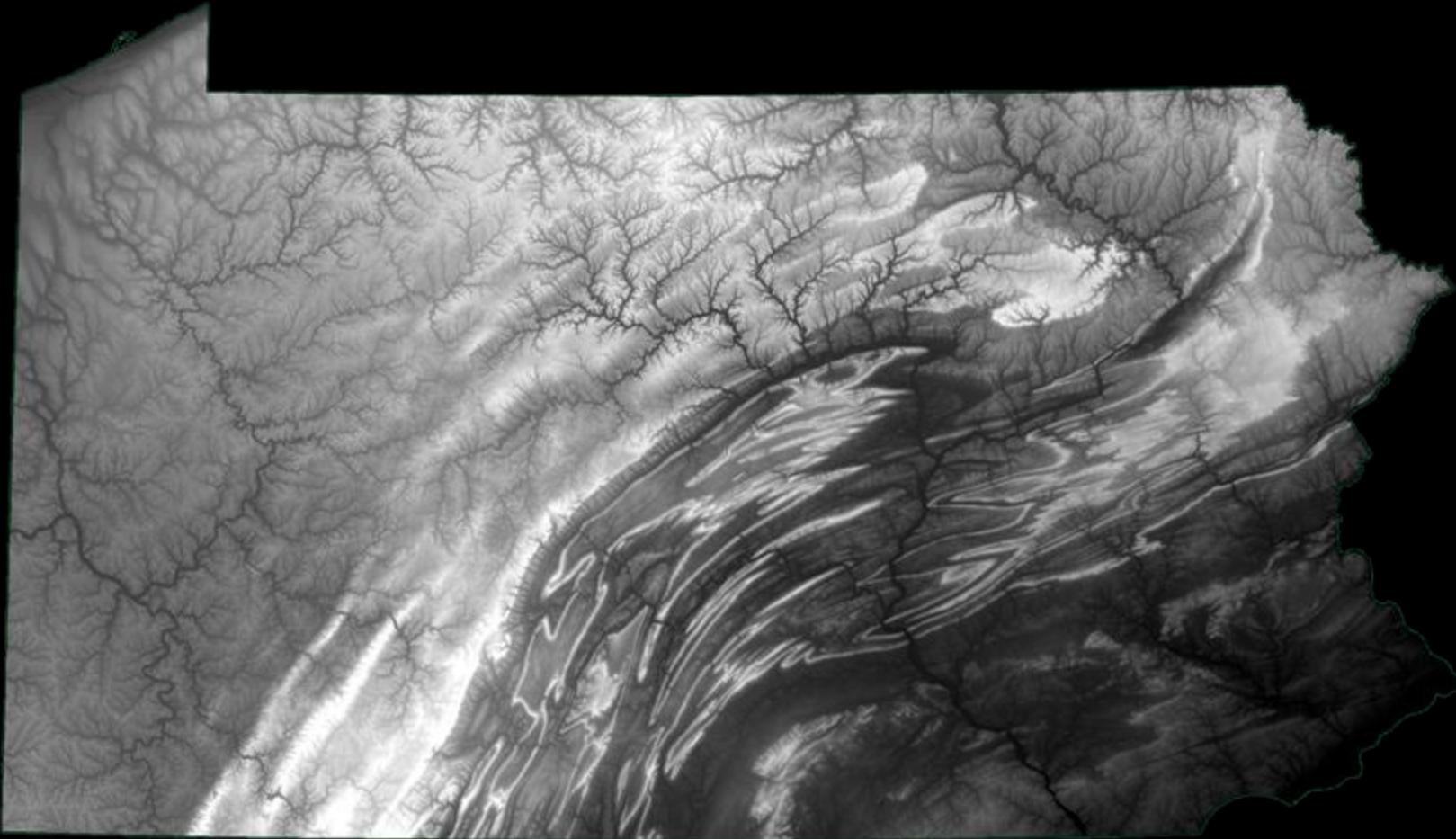
- **Unique ID**
 - Ex: Abington Hills
- **Physiographic Number**
 - Ex: 02-05-03-02-00
- **Boundaries**
 - Ex: Arbitrary at base of change in slope.
- **Dominant Topographic Form**
 - Ex: Low knobby hills, shallow valleys
- **Drainage Pattern**
 - Ex: Angulate
- **Local Relief**
 - Ex: Low to moderate
- **Geologic Structure**
 - Ex: Anticline, rocks with low to moderate dips.
- **Geologic Formation**
 - Ex: Catskill Fm
- **Rock Type**
 - Ex: Sandstone, siltstone, shale, red and gray rocks
- **Surficial Material**
 - Ex: Glacial till
- **Land Cover**
 - From National Land Cover Dataset.

Landform Attributes

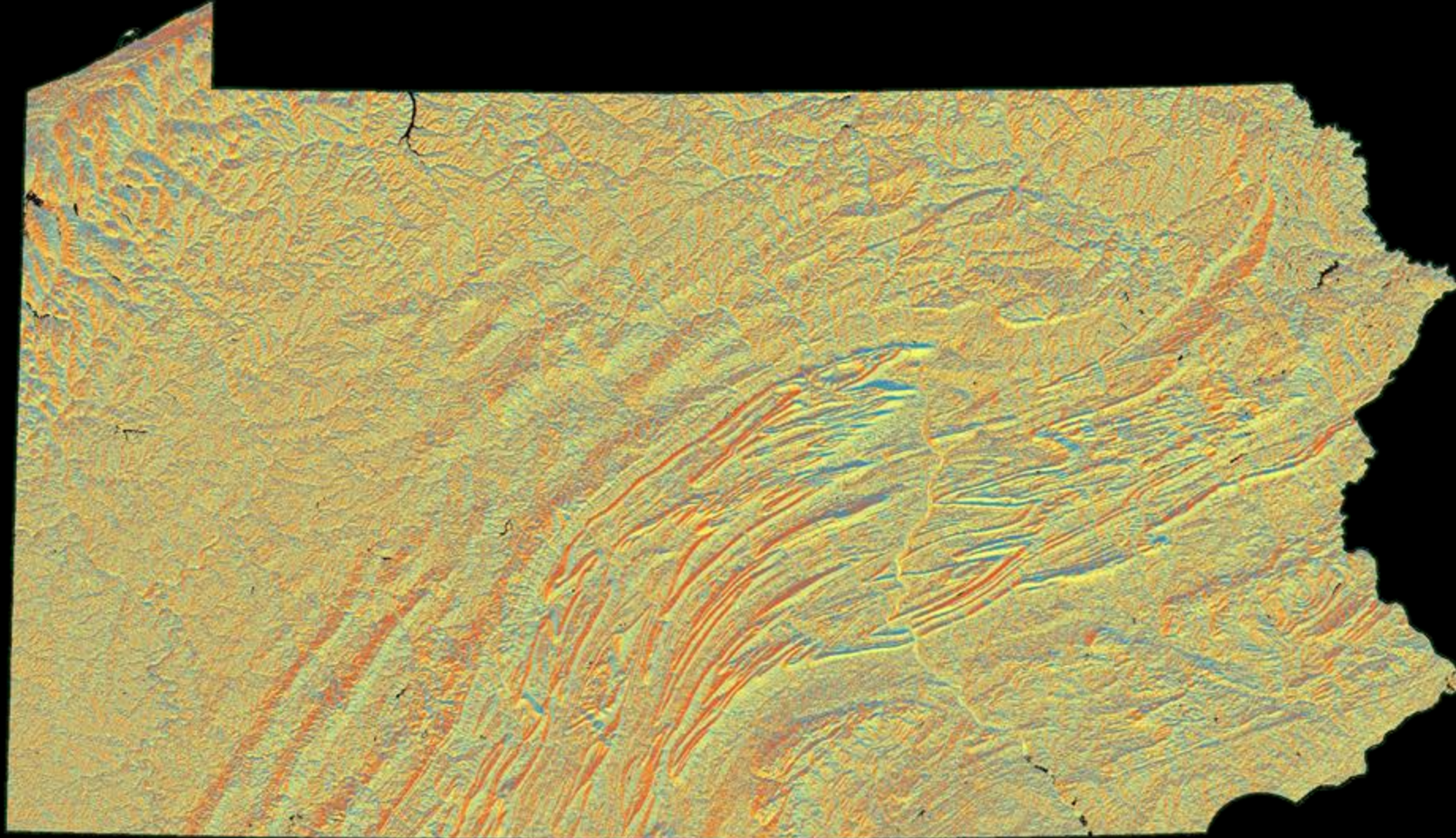
Along came PAMAP...

...making possible additional spatial analyses:

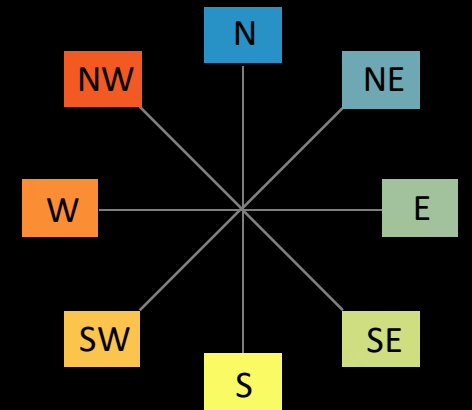
- Elevation
- Slope
- Aspect



Landform Attributes

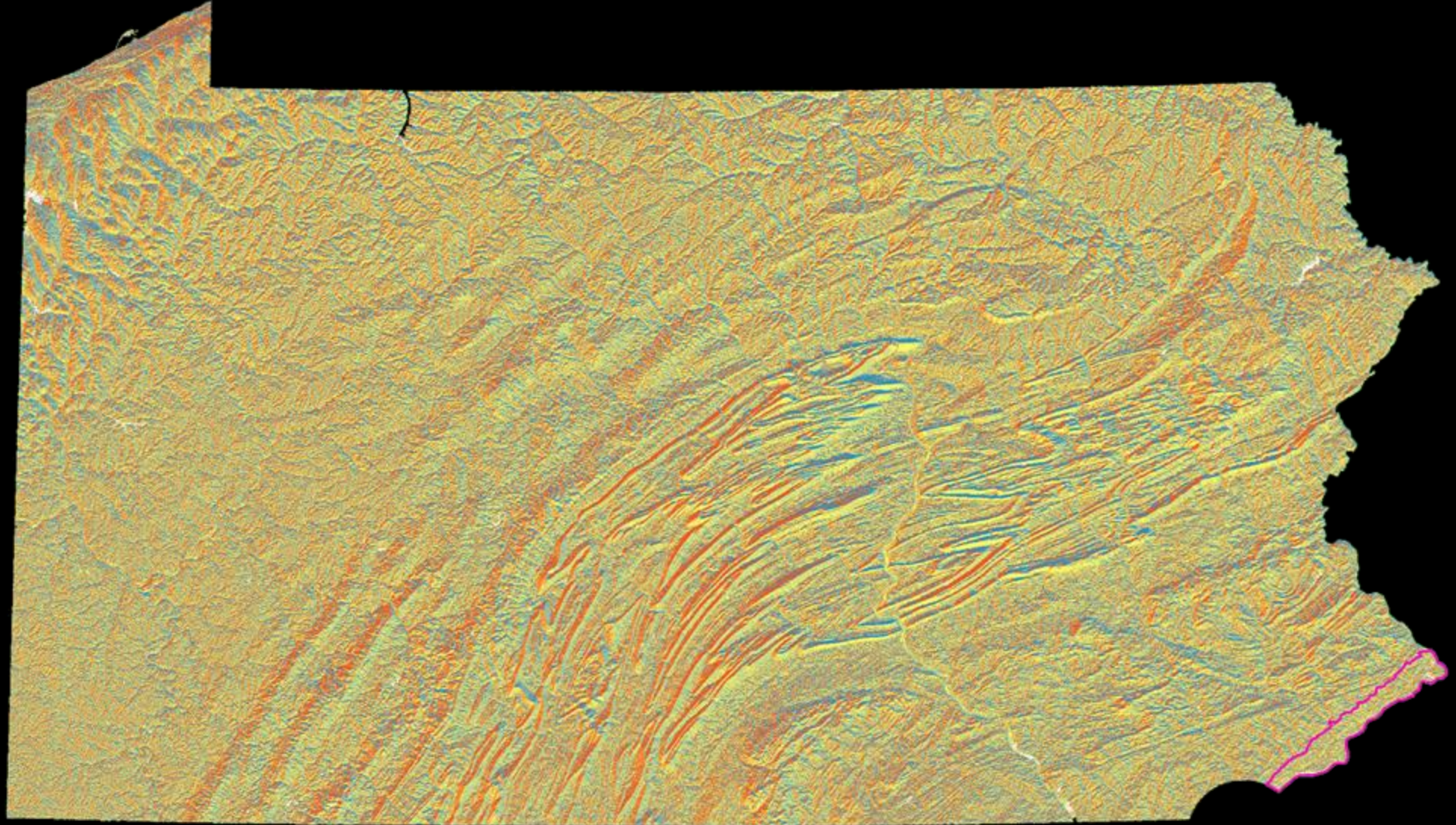


Aspect identifies the downslope direction of the maximum rate of change in value from each cell to its neighbors. It can be thought of as slope direction.



Landform Attributes

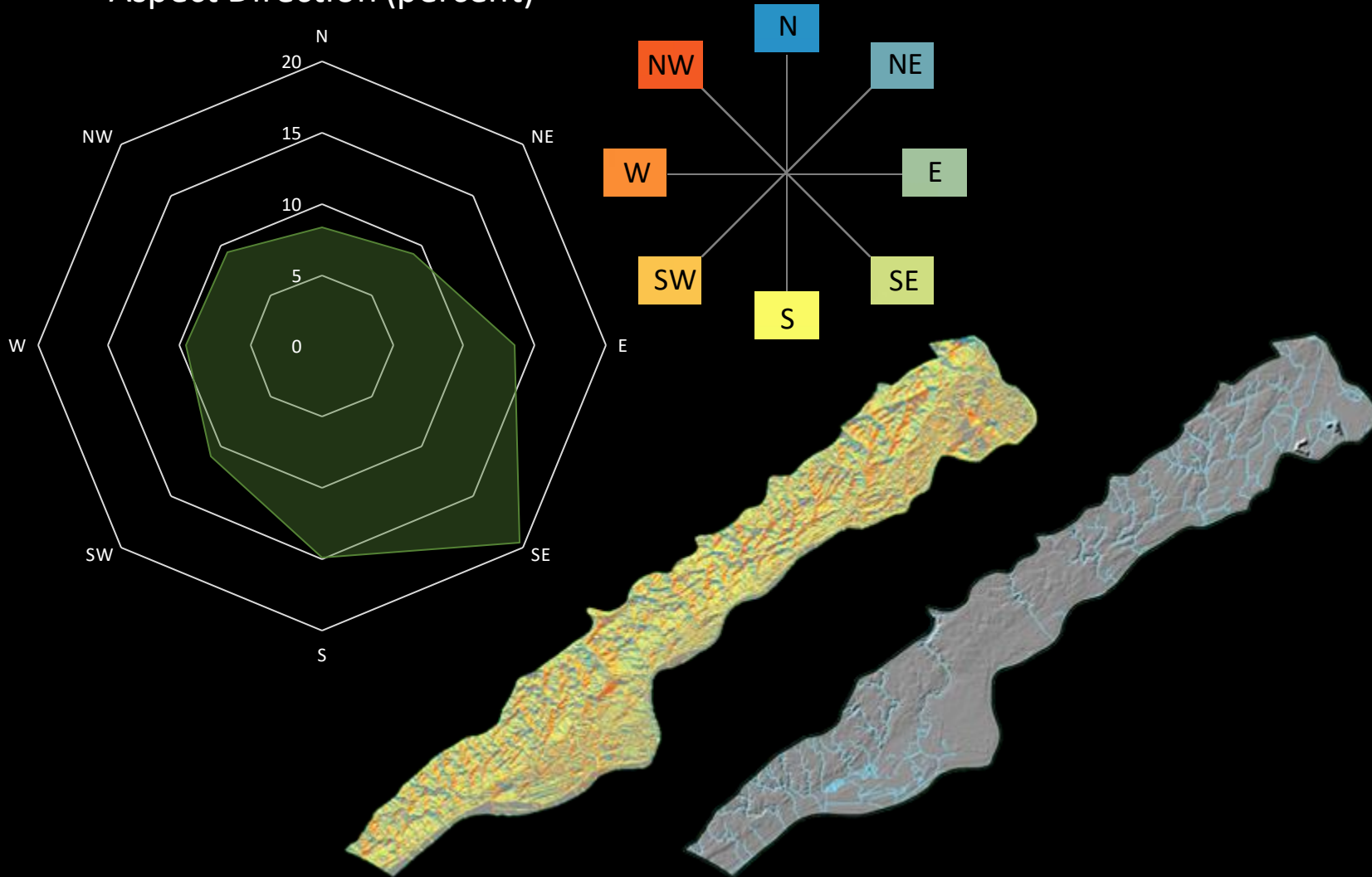
Atlantic Coastal Plain (06-00-00-00-00)



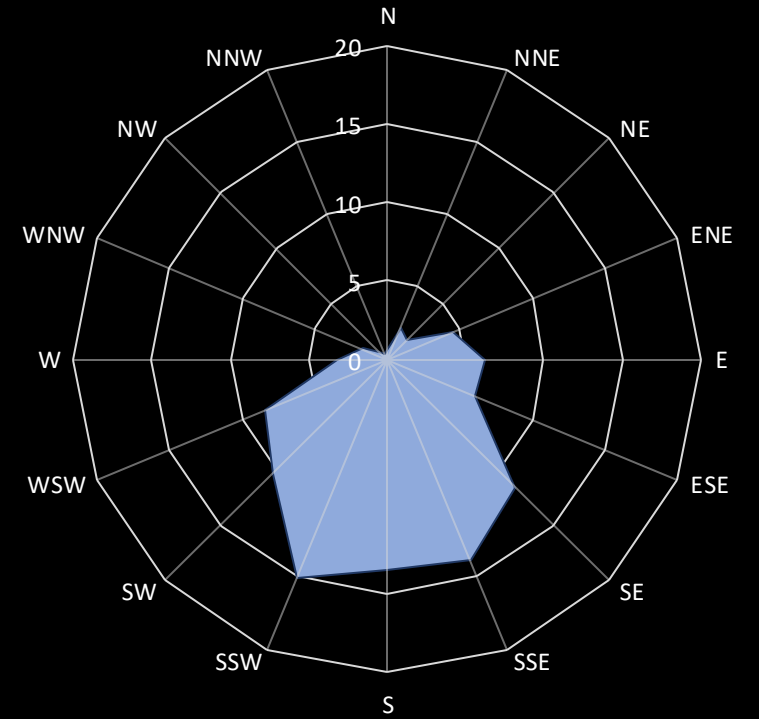
Landform Attributes

Atlantic Coastal Plain (06-00-00-00-00)

Aspect Direction (percent)

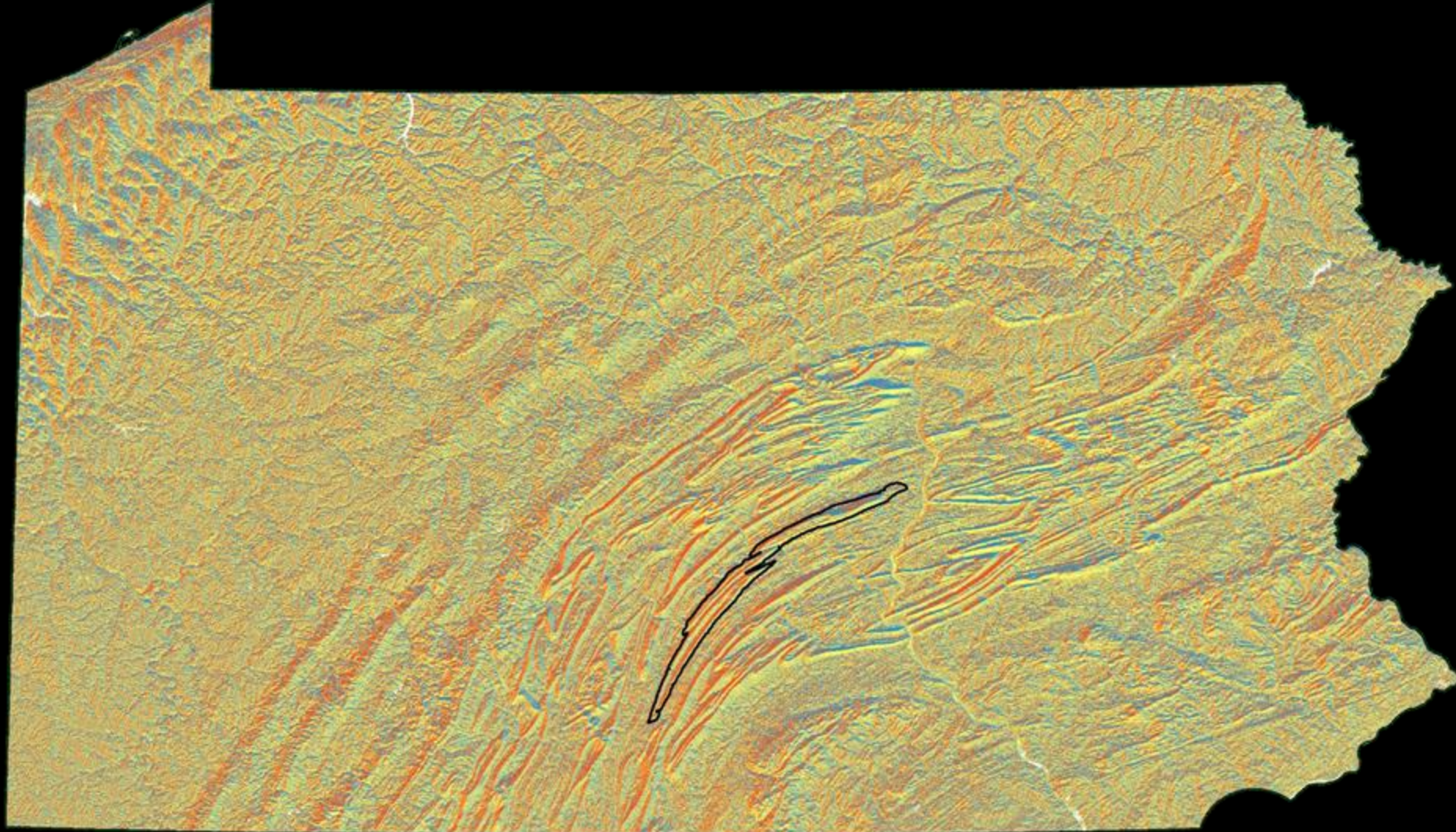


Percent Distribution of Stream Direction (straight-line distance)



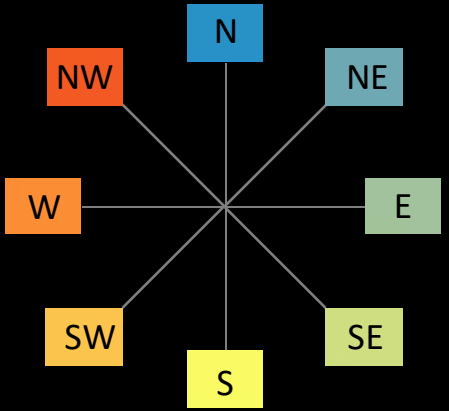
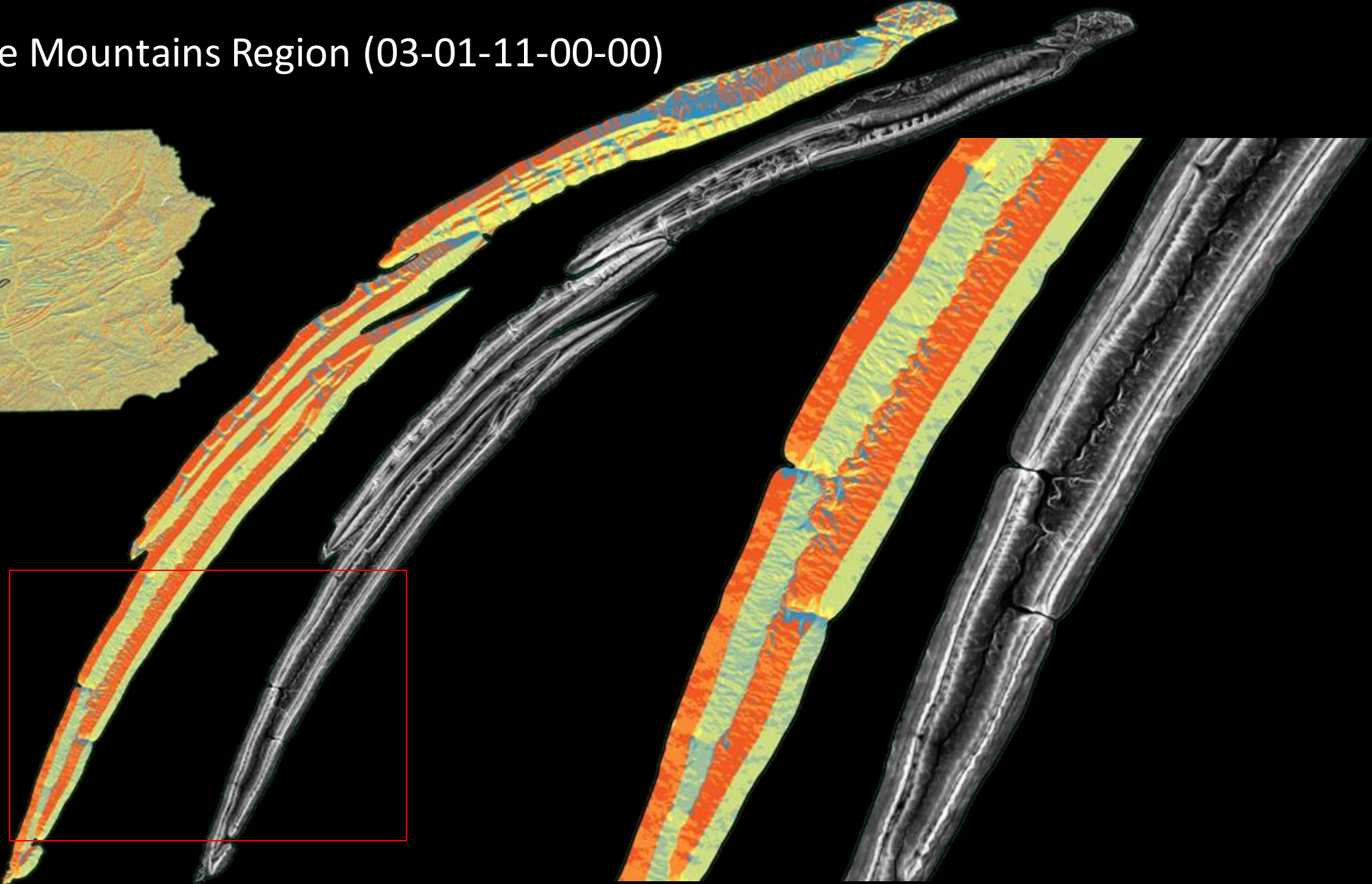
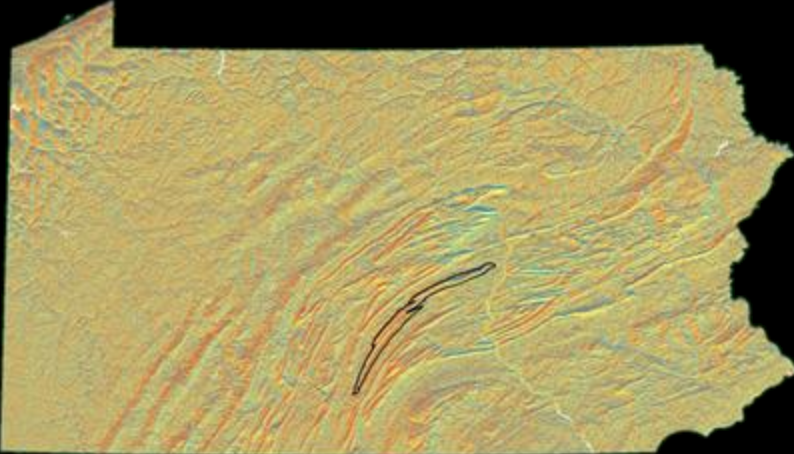
Landform Attributes

Backlog-Shade-Blue Mountains Region (03-01-11-00-00)



Landform Attributes

Backlog-Shade-Blue Mountains Region (03-01-11-00-00)



Landform Attributes

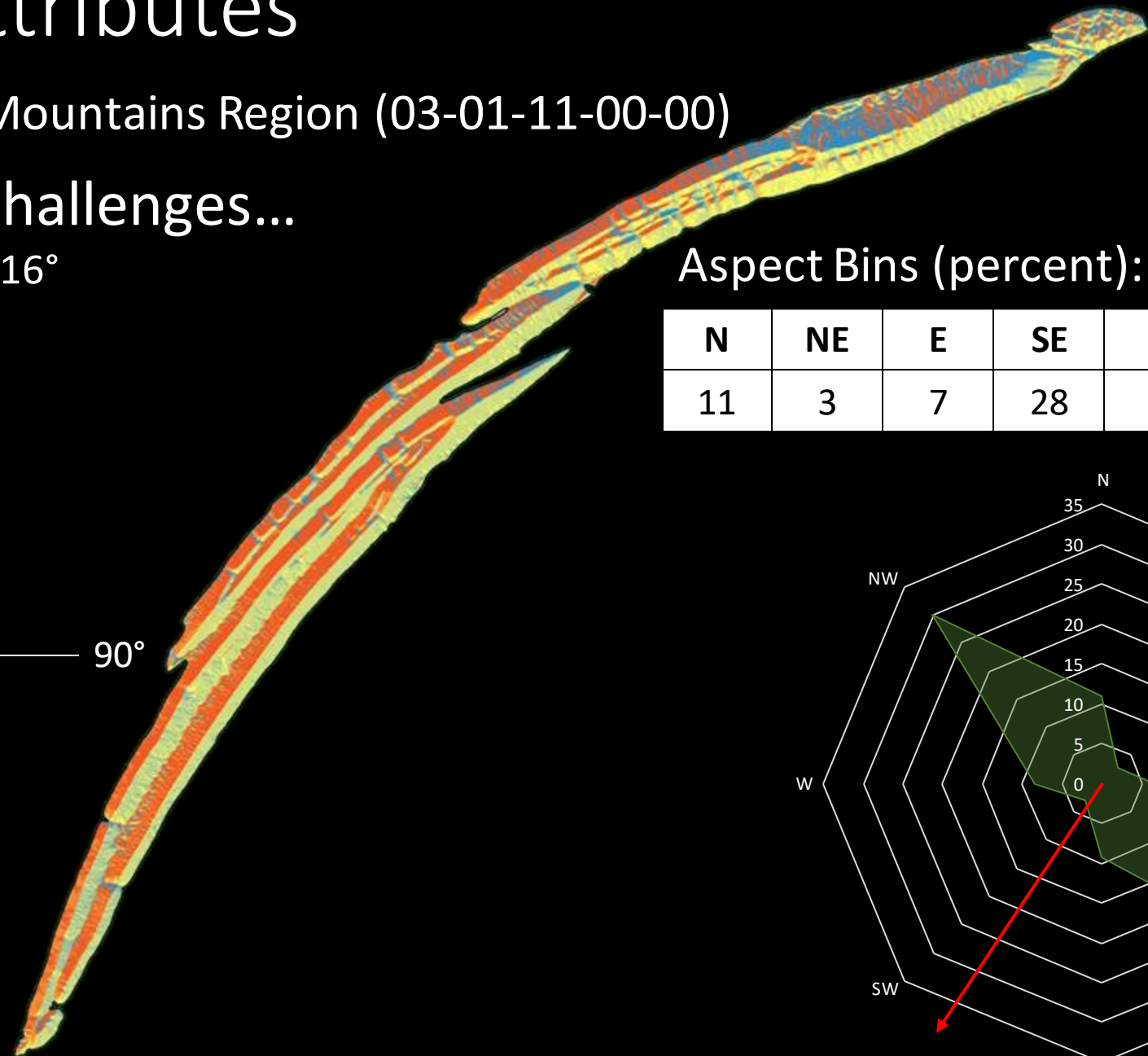
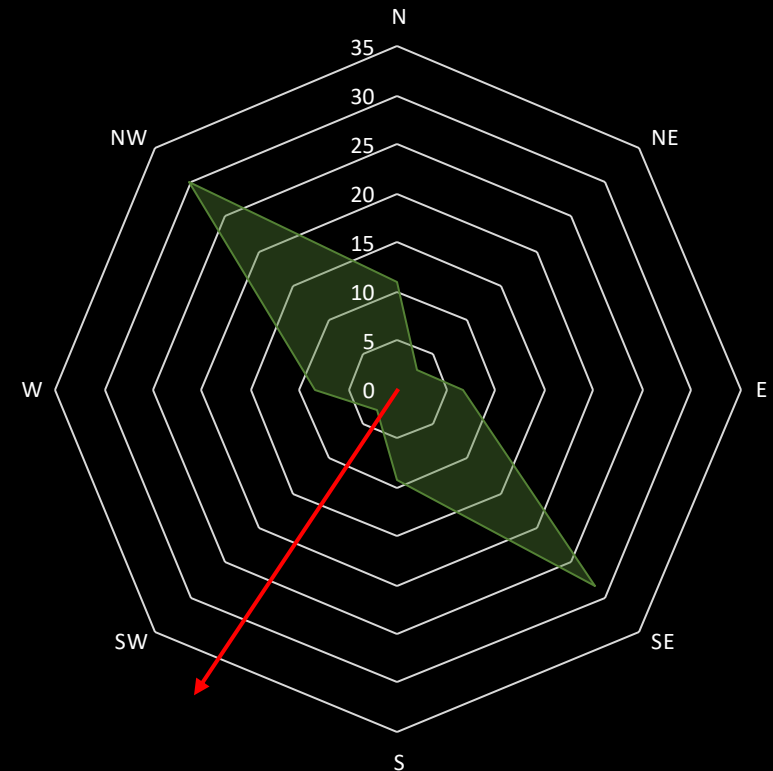
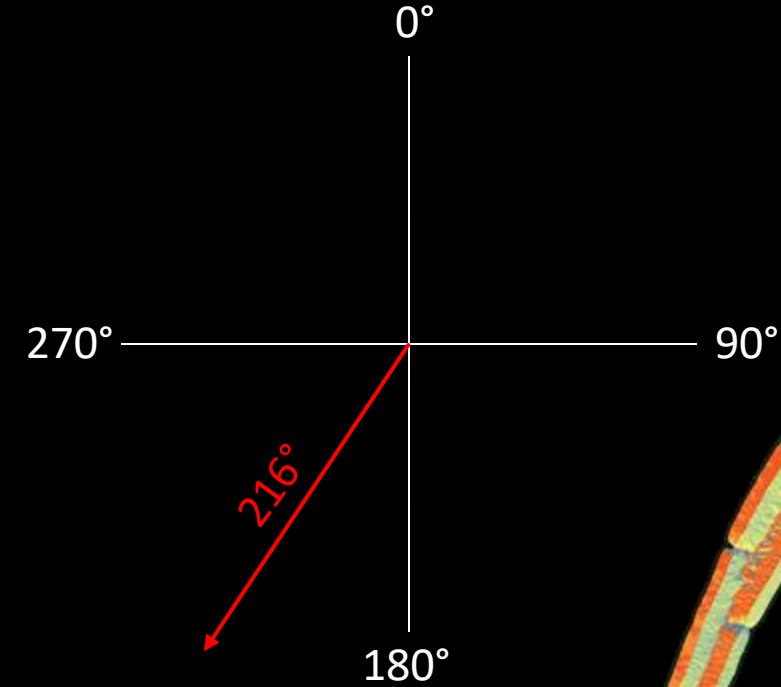
Backlog-Shade-Blue Mountains Region (03-01-11-00-00)

New tech, new challenges...

- Average Aspect: 216°

Aspect Bins (percent):

N	NE	E	SE	S	SW	W	NW
11	3	7	28	9	3	8	30



Landform Attributes

Backlog-Shade-Blue Mountains Region (03-01-11-00-00)

