

MARCELLUS SHALE AND ITS IMPACT ON ROUTE 6 IN PENNSYLVANIA

Abhinandan Bera

Proposal for Masters Capstone Project

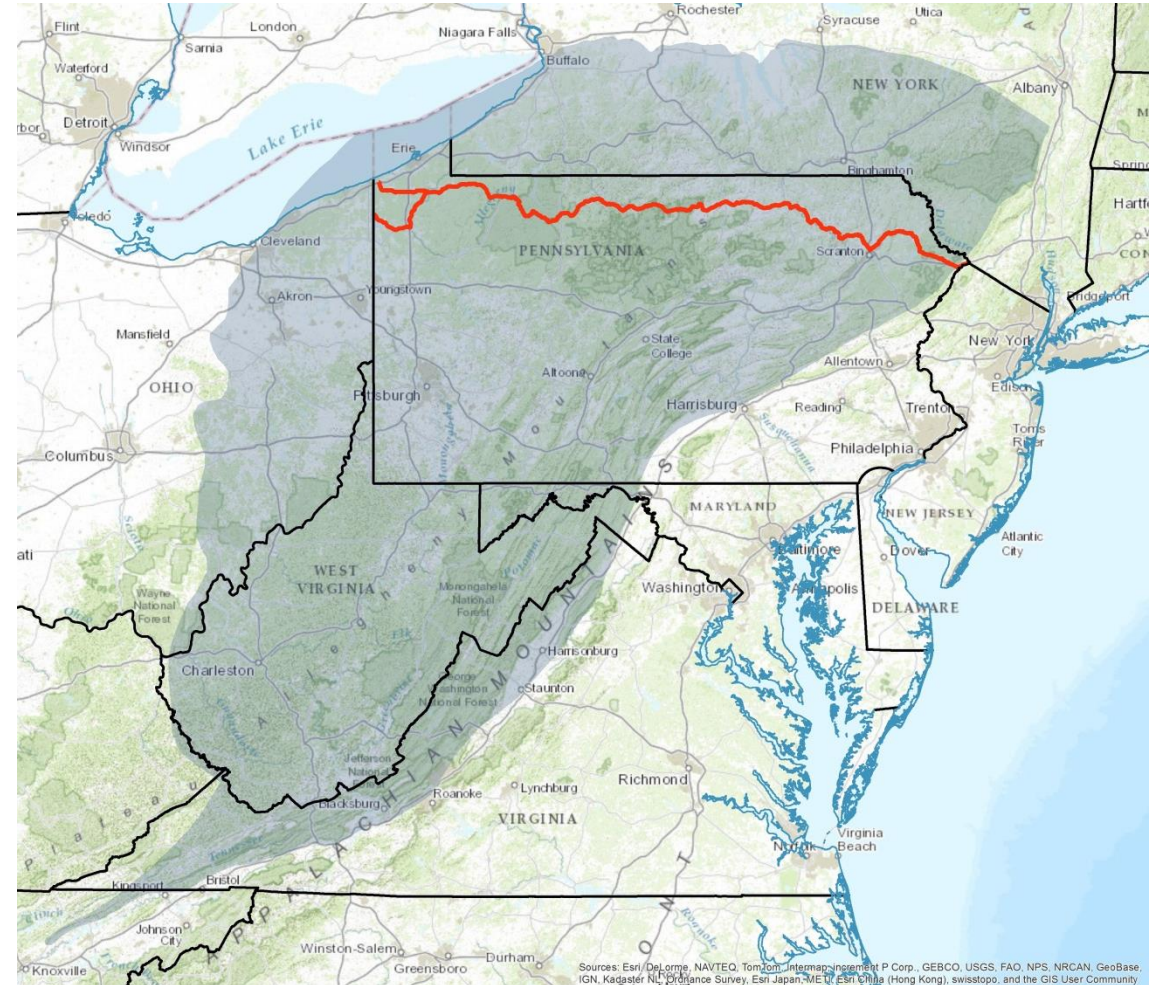
Department of Landscape Architecture | Pennsylvania State University

Marcellus Shale and Route 6

- About Marcellus Shale
- Marcellus Shale and Pennsylvania
- US Route 6 in Pennsylvania
- US Route 6 and Marcellus Shale: Spatial relations
- Examples of future product
- Method: Overlay analysis by mapping based on Geographic Information System (GIS).

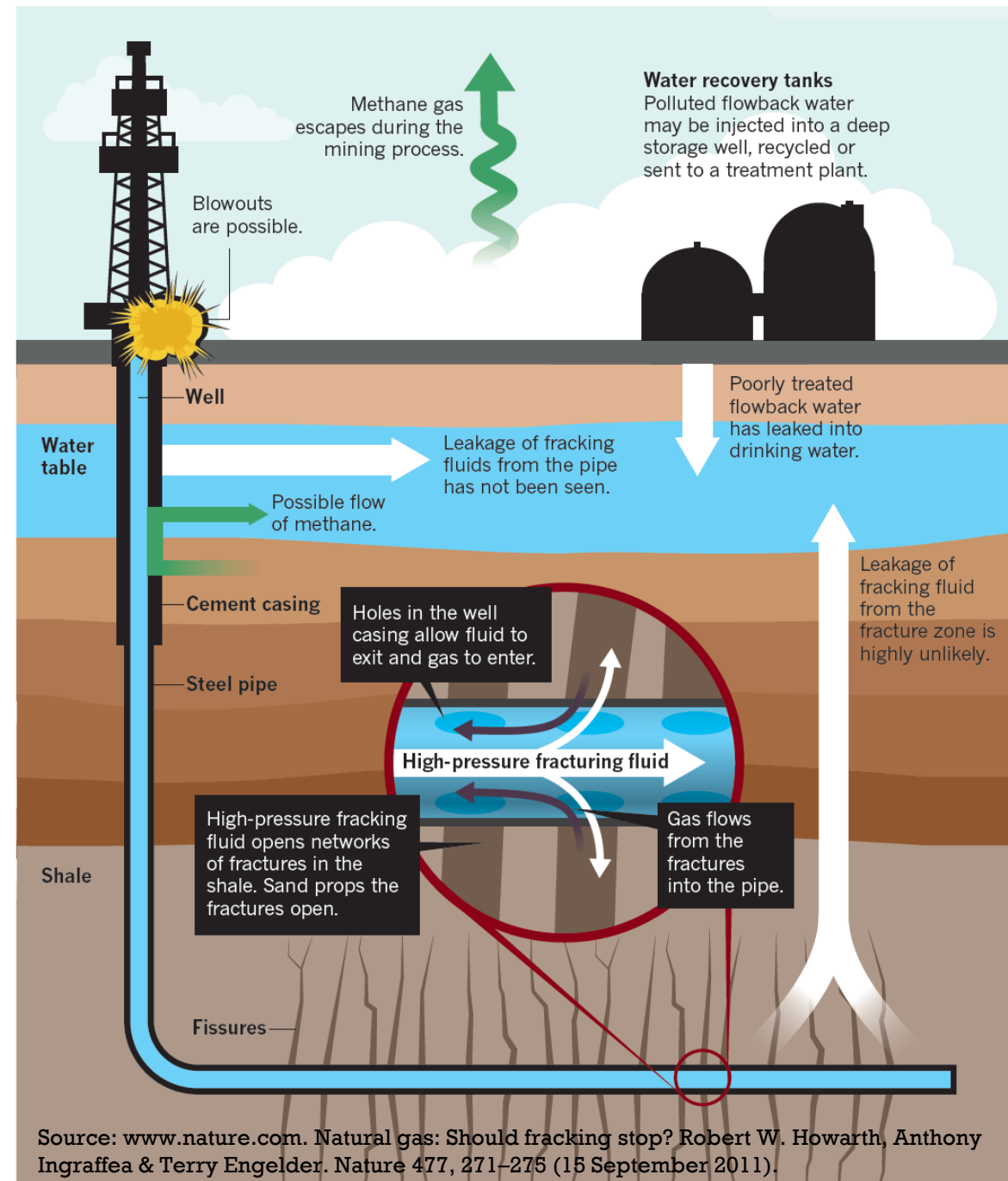
Marcellus Shale

- Discovered in 2007
- Extent: Pennsylvania, New York, Ohio and West Virginia
- Estimated reserve: 363 TCF
- Employment opportunities
- Economic development
- Urban development



Marcellus Shale

- Fracking/hydraulic fracturing
 - Use of fresh water
 - Production of waste water
 - Contamination of water
 - Distance traveled by fresh and waste water



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 - Damaged rural roads
 - Increased traffic volume
 - Changed traffic pattern
 - Reduced road safety



Source: Kristian Boose. 2011.



Source: The Penn State Marcellus Center for Outreach and Research.

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- Well pads and pipelines
 - Clearing of forests
 - Disruption of natural habitat
 - Disturbed ecological balance

Legend

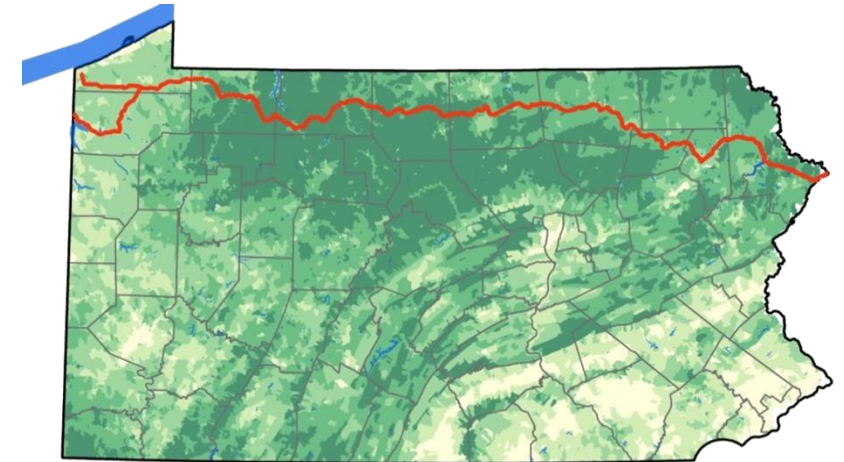
- Shale gas wells
- Shale gas pipelines
- US Route 6 in PA
- Major water bodies
- PA County Boundary

Percentage of forest

- 0 - 20 %
- 20 - 40 %
- 40 - 60 %
- 60 - 80 %
- 80 - 100 %



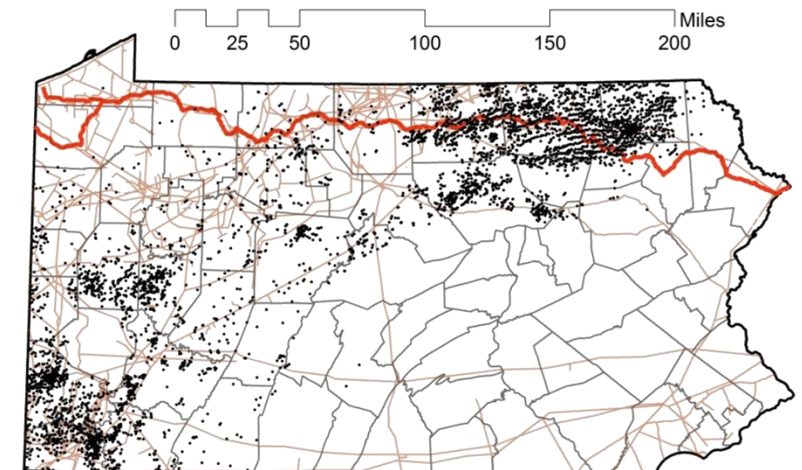
Source: USGS Report: Landscape Consequences of Natural Gas Extraction in Greene and Tioga Counties, Pennsylvania, 2004–2010.



Courtesy: Rick Hammond

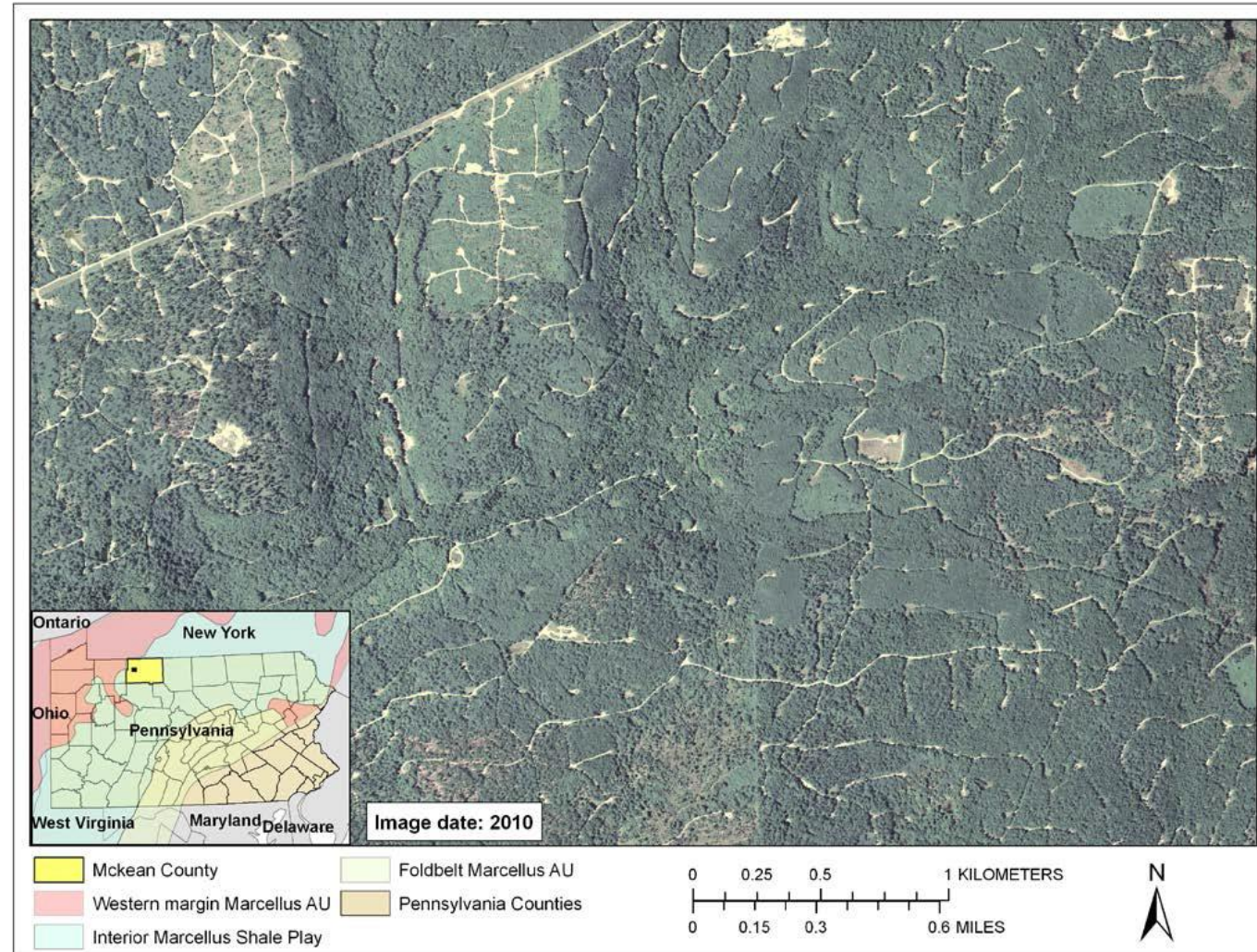


Photo: Noah Addis/Corbis. 2012.



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Source: USGS Report: Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004–2010.

The US Route 6

And Pennsylvania

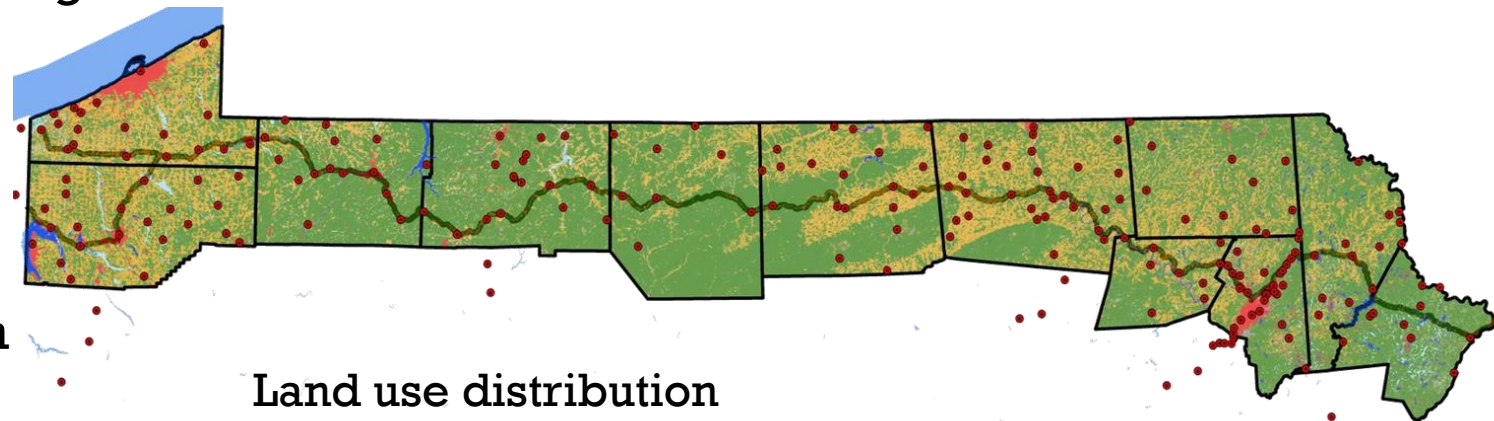
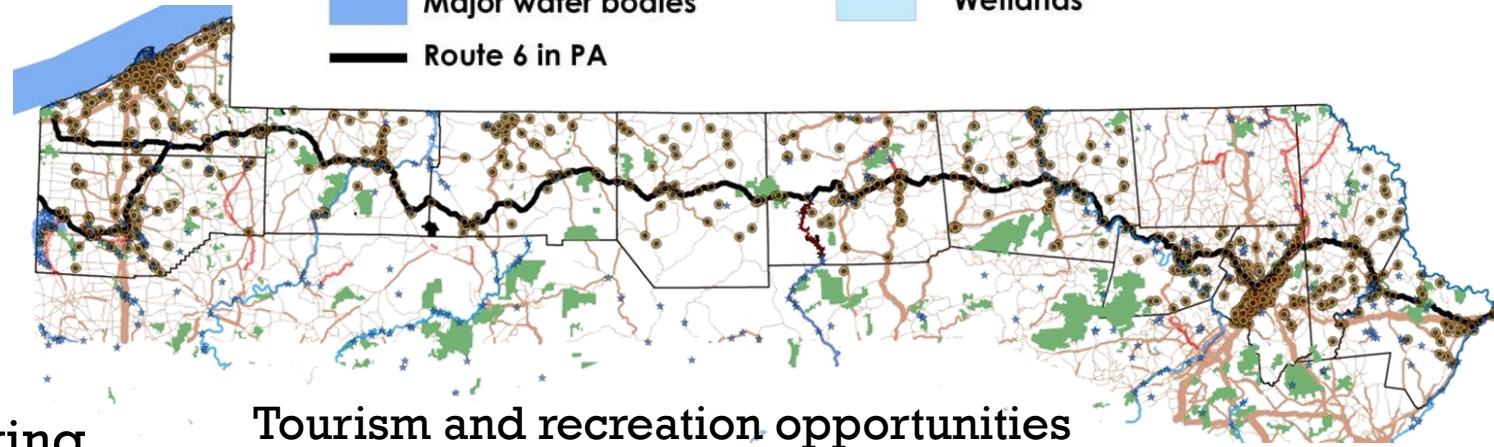
- Historic significance
- Transit connectivity
- Community
- Tourism and recreation
 - State game lands: Hunting
 - Water trails: canoeing, kayaking
 - Rail trails: hiking, biking...
 - Streams: fishing
 - Road trips
 - Fall color tourism
 - Economic development from tourism

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Legend

- | | | | |
|---|---------------------------|---|-------------------|
| ★ | Water access points | ● | Town centers |
| ● | Tourism oriented services | ■ | Urban development |
| — | Water trails | ■ | Agricultural land |
| — | Rail trails | ■ | Forests |
| ■ | State game lands | ■ | Wetlands |
| ■ | Major water bodies | | |
| — | Route 6 in PA | | |



The US Route 6 And Pennsylvania

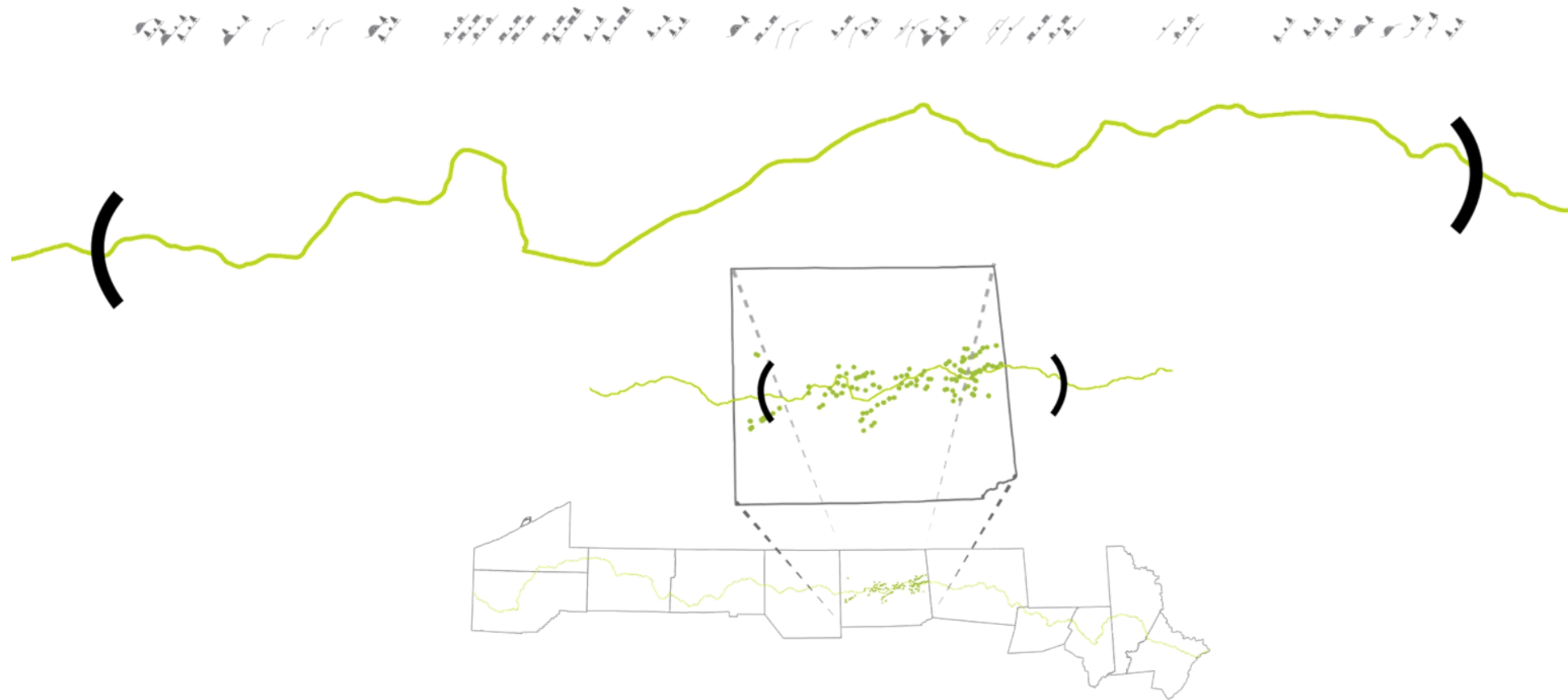
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www.paroute6.com

The US Route 6 And Pennsylvania

HISTORIC ROUTE 6
TIOGA COUNTY
THE EXPERIENCE



Courtesy: Kathryn Nguyen and Kevin Gavaghan,
Dept. of Landscape Architecture, Penn State

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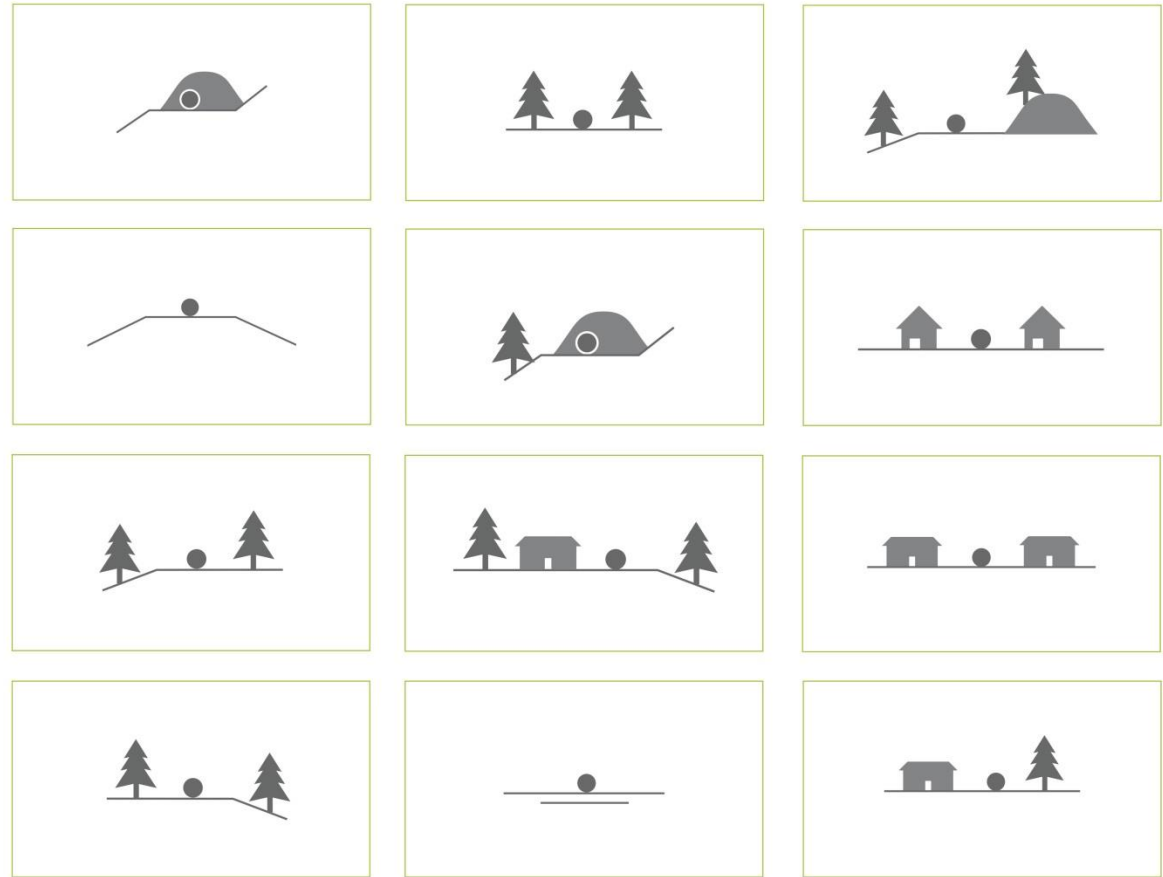
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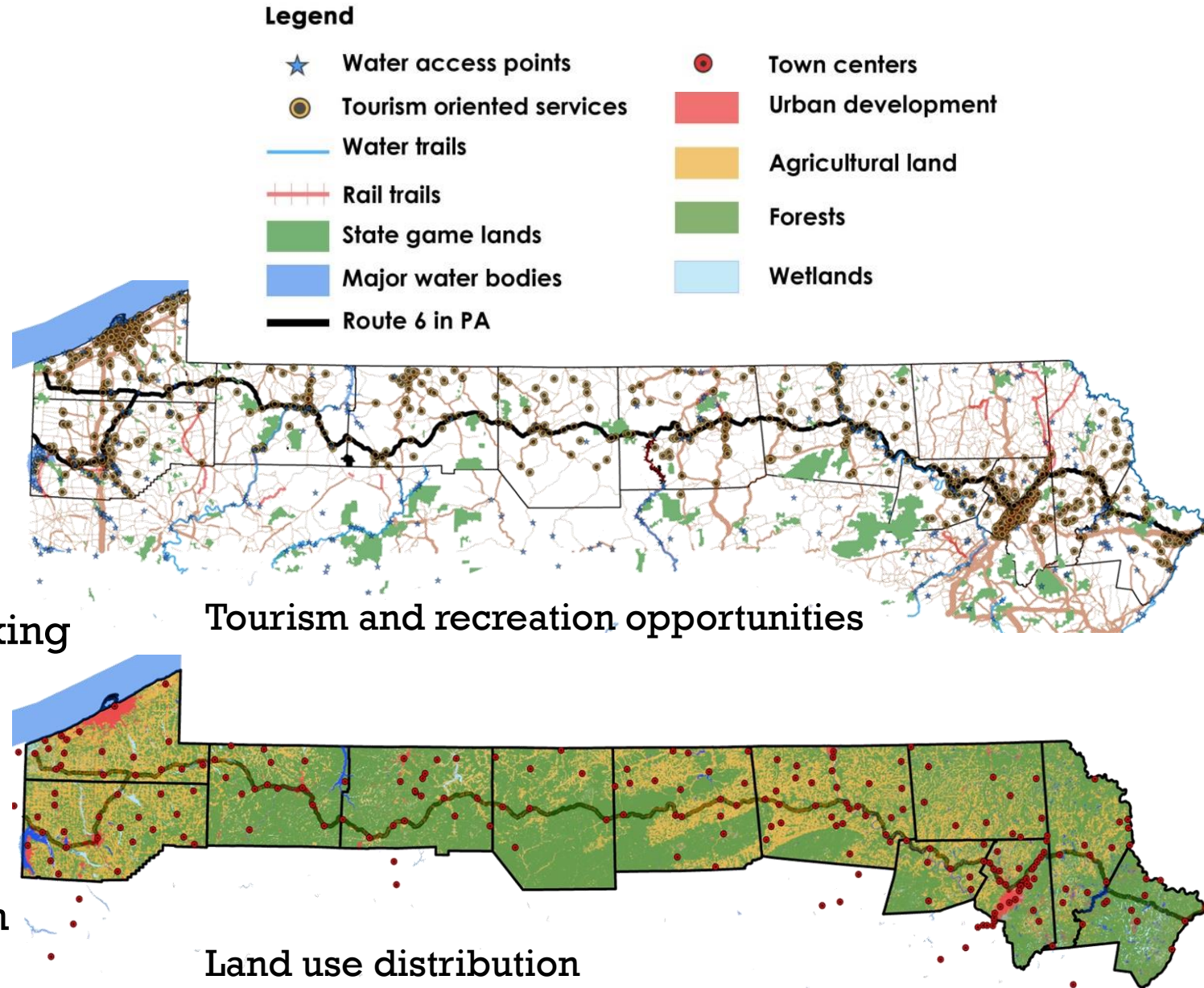


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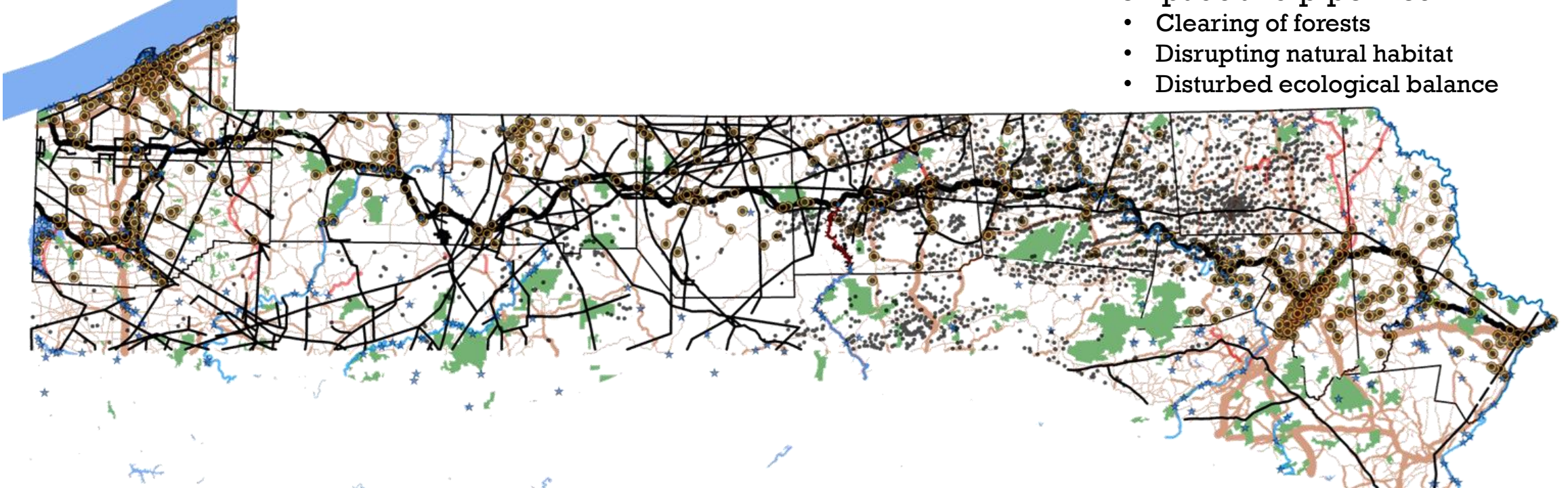
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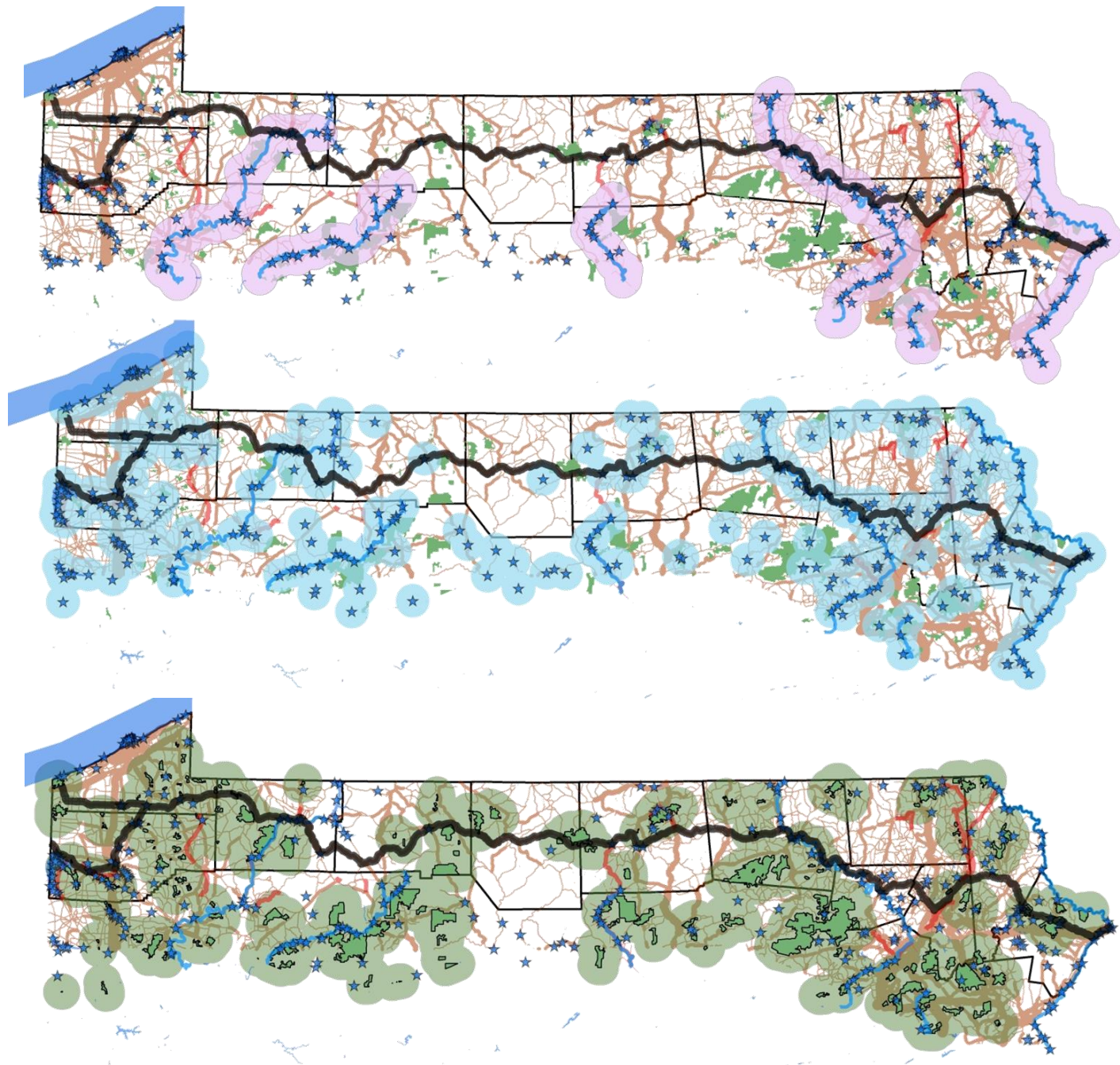
The US Route 6

And Marcellus Shale

- Using GIS-based mapping to identify:
 - Ecologically important areas
 - Natural habitats
 - Locations most popular for tourism and recreational purposes
 - Communities that may possibly be impacted
 - How socio-economic balance may be at risk in these locations
- And, propose:
 - Design and planning guidelines to support sustainable development of the industry
 - Protect the natural environment and ecological balance
 - Reclamation prospects for any impacted landscapes

The US Route 6 Assets

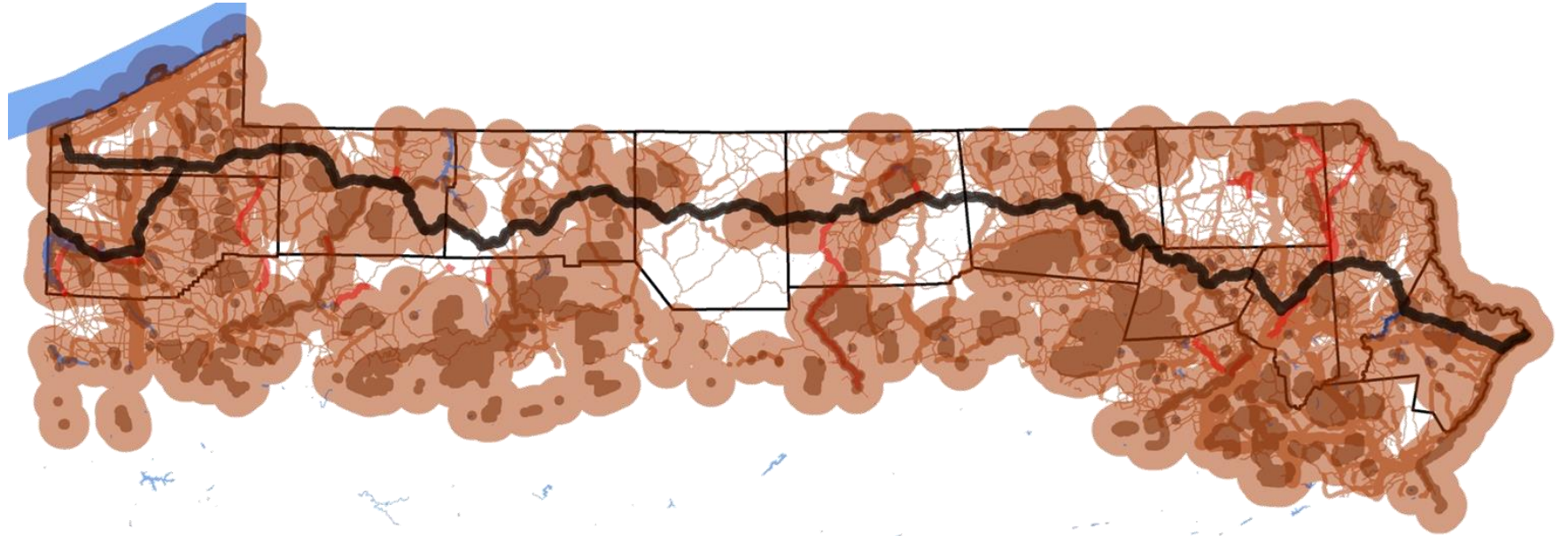
- Water Trails
- Water Access Points
- State game lands



The US Route 6

Assets

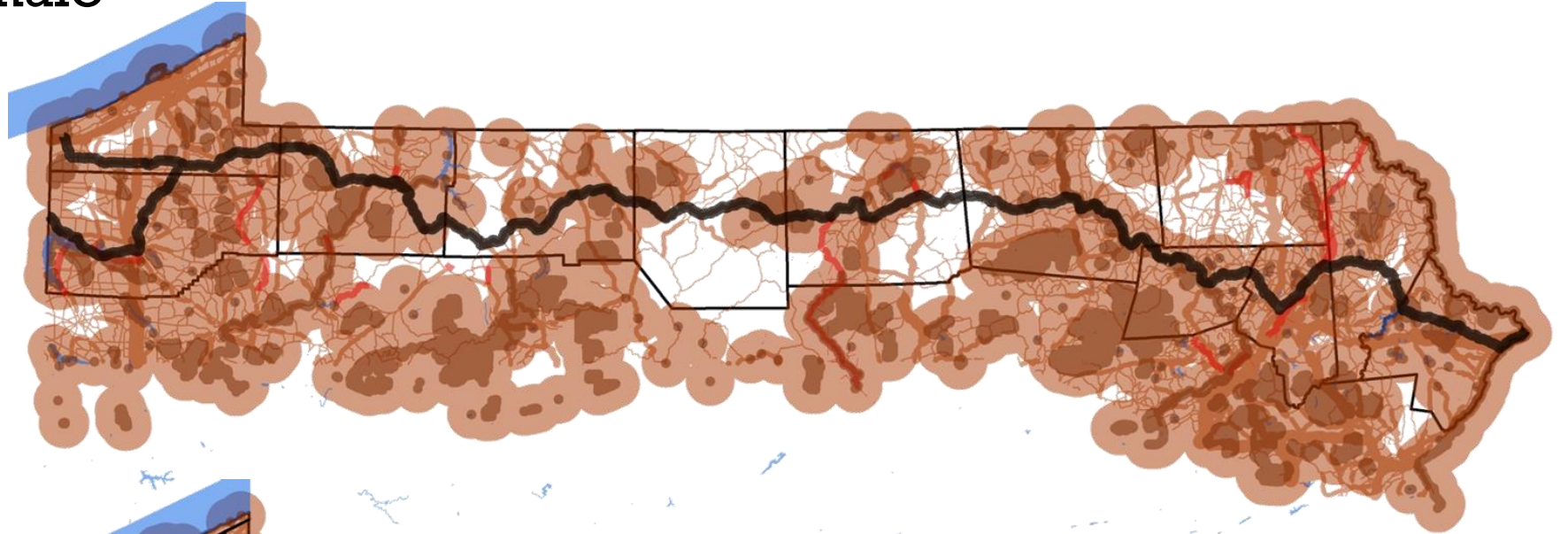
- All assets



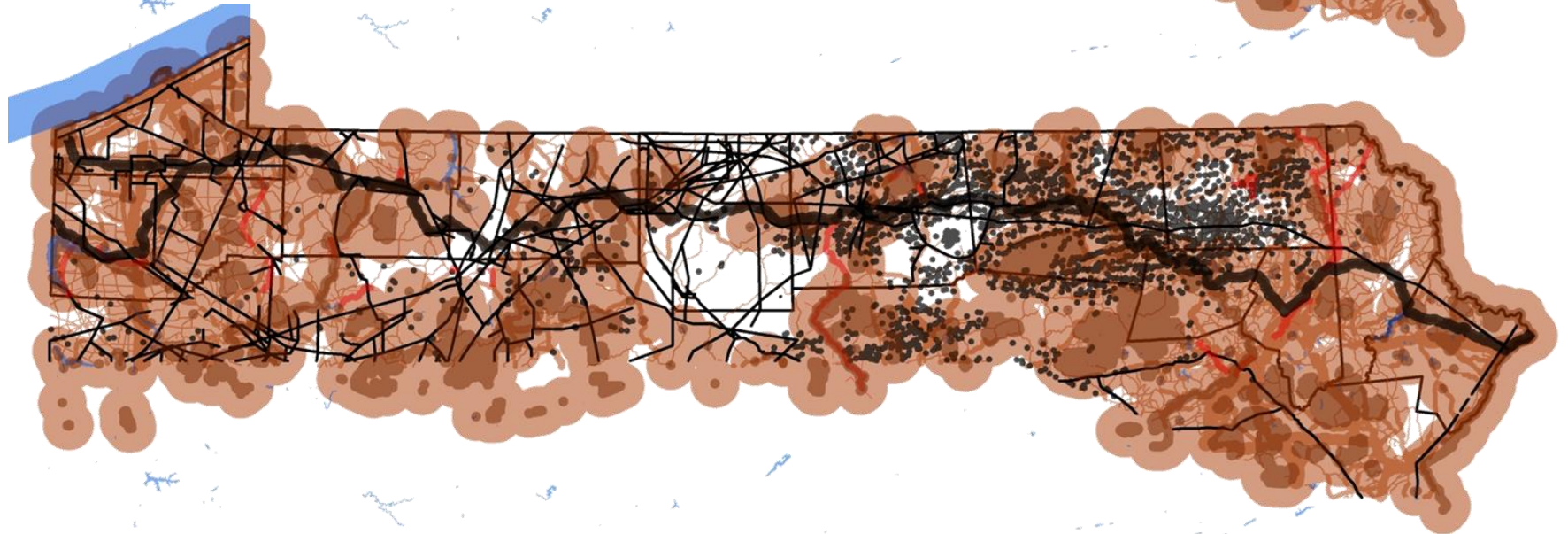
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- Marcellus Shale



Acknowledgement

- Professor Brian Orland, Distinguished Professor
 - Dept. of Landscape Architecture, Penn State
- Dr. Tim Murtha, Associate Professor
 - Dept. of Landscape Architecture, Penn State
- Lacey Goldberg, Rick Hammond, Chris Frey, Kevin and Katie
 - Dept. of Landscape Architecture, Penn State

Thank you!