



Photo: George Gress



Photo: George Gress



Photo: Nels Johnson



# Ecologically Important Areas

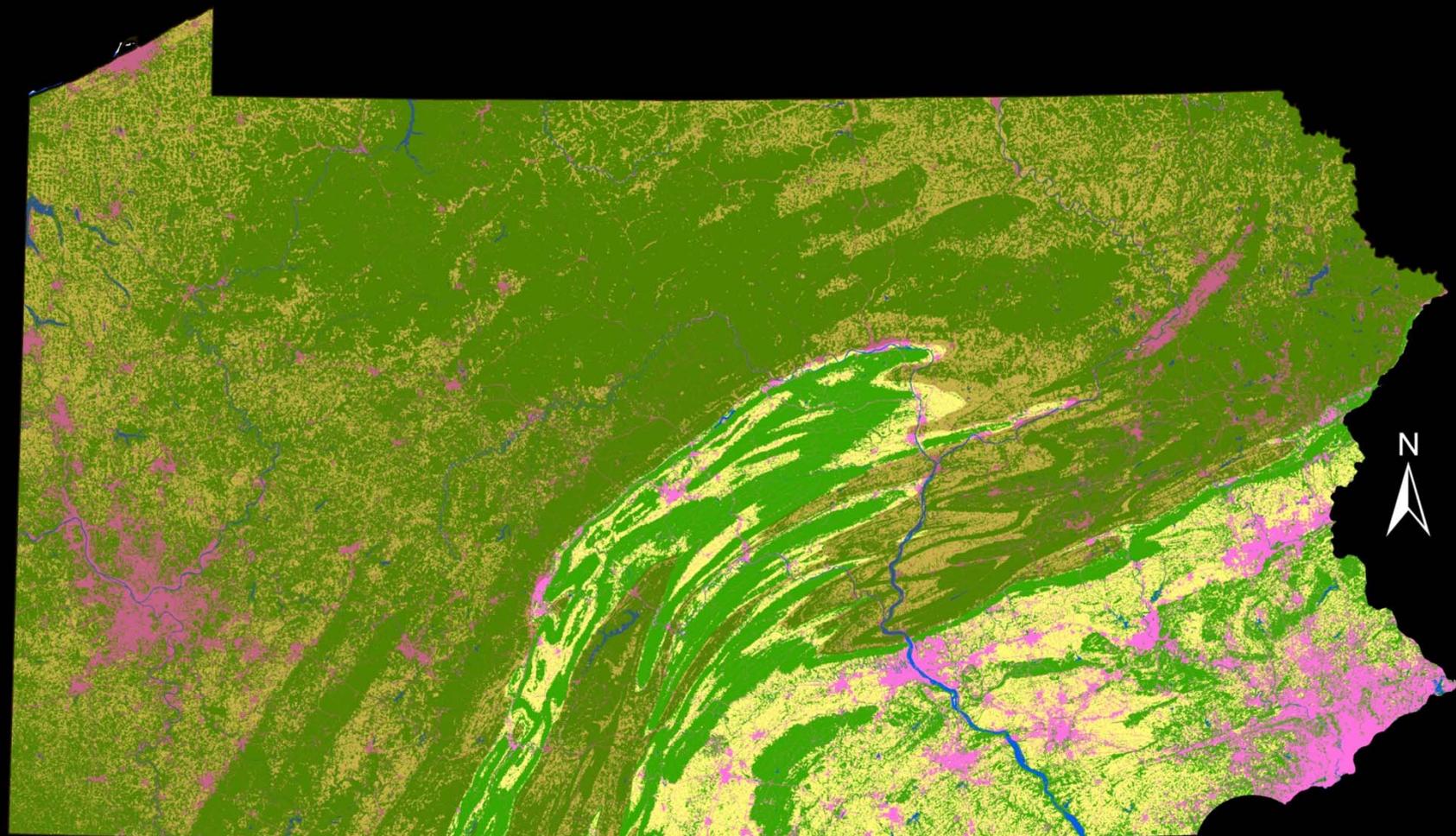
Pennsylvania Marcellus Shale Commission  
Public Health, Safety and Environmental  
Protection Work Group

June 7, 2011



# Pennsylvania's Ecological Character

Marcellus Play in Pennsylvania includes over 14 million acres of forest



Forest

Water

Agriculture

Development

0 25 50  
Miles

# Pennsylvania's Ecological Character

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- Pennsylvania is known for its ecological character
- Pennsylvania's ecological character centers on its forests
- Pennsylvania forests are home to many wildlife and plant species requiring interior forest conditions only found in large tracts of contiguous habitat and are thus considered ecologically important
- Additional management and site planning activities are needed to ensure that the ecological character of Ecologically Important Areas is maintained for future generations.

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# Development of Ecologically Important Areas

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- Goals:
  - To provide a set of Ecologically Important Areas where additional voluntary management or site planning activities are needed to maintain current conditions
  - To recommend pre-planning/Landscape Approach for Marcellus Natural Gas development within Ecologically Important Areas to avoid conflicts
  - To support recommendations for siting and management of Marcellus Shale Natural Gas development included in DCNR Bureau of Forestry's presentation to the Marcellus Shale Commission

# Development of Ecologically Important Areas

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- Approach:
  - To define Ecologically Important Areas using concepts understood by planners and developers
  - To use publically available information to identify Ecologically Important Areas

# Development of Ecologically Important Areas

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- Ecologically Important Areas in Pennsylvania are:
  - Watersheds containing Exceptional Value (EV) and High Quality (HQ) streams
  - Biological Diversity Areas (BDAs) of exceptional and high significance

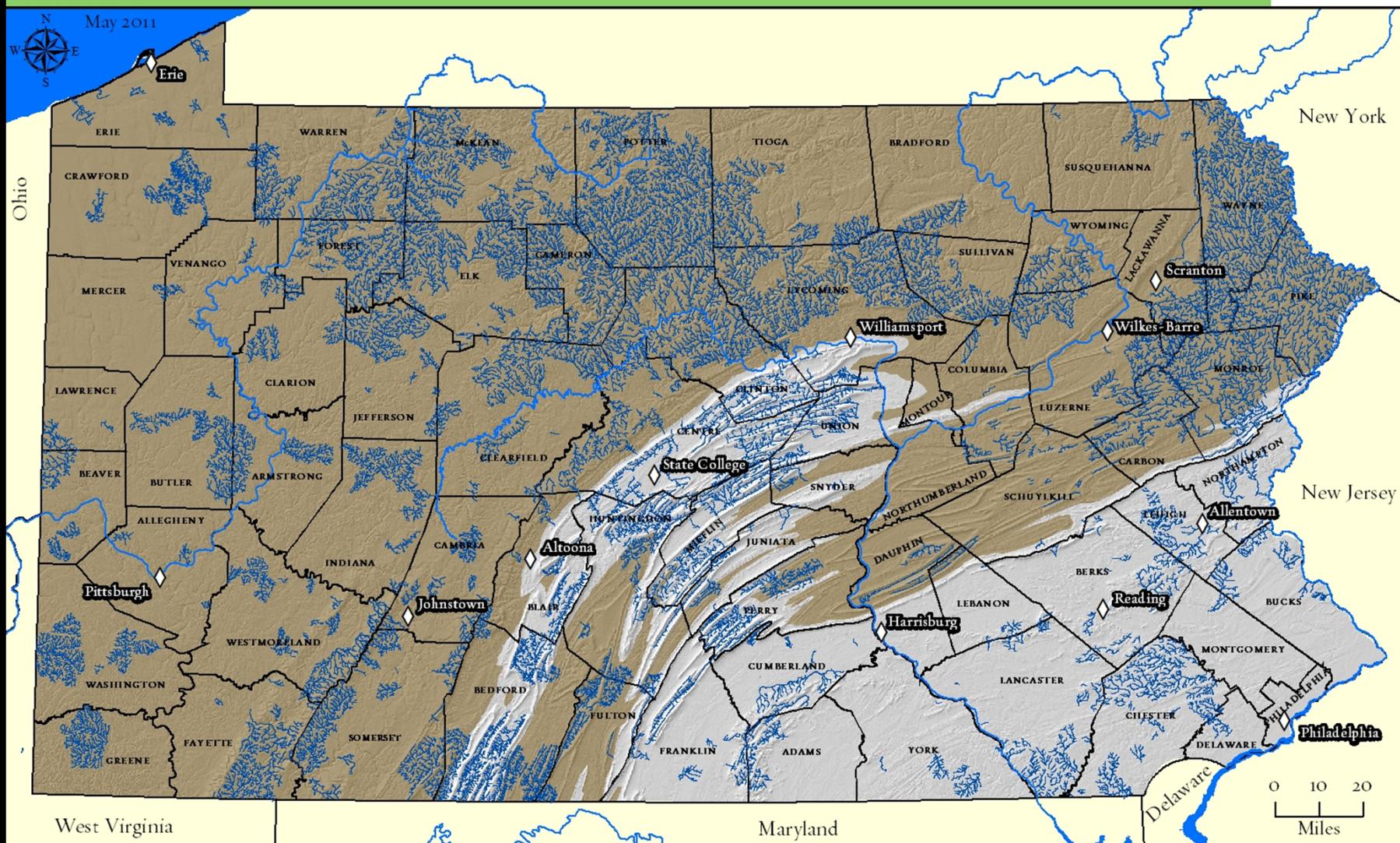
# Development of Ecologically Important Areas

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- Exceptional Value (EV) and High Quality (HQ) streams are recognized as important aquatic resources for their habitat quality, biological condition, and recreational potential
- BDAs provide context for rare species and unique habitat locations and are represented in PA Natural Heritage Program's County Natural Heritage Inventories
- Both data sets are available online



## ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



~~~~ Exceptional Value & High Quality Streams

## Marcellus Shale in Pennsylvania

Data Sources: EV/HQ streams are from the PA-DEP; Marcellus Shale boundaries are approximated from bedrock geology types (ages) from USGS data.



# Ecologically Important Areas - Watersheds

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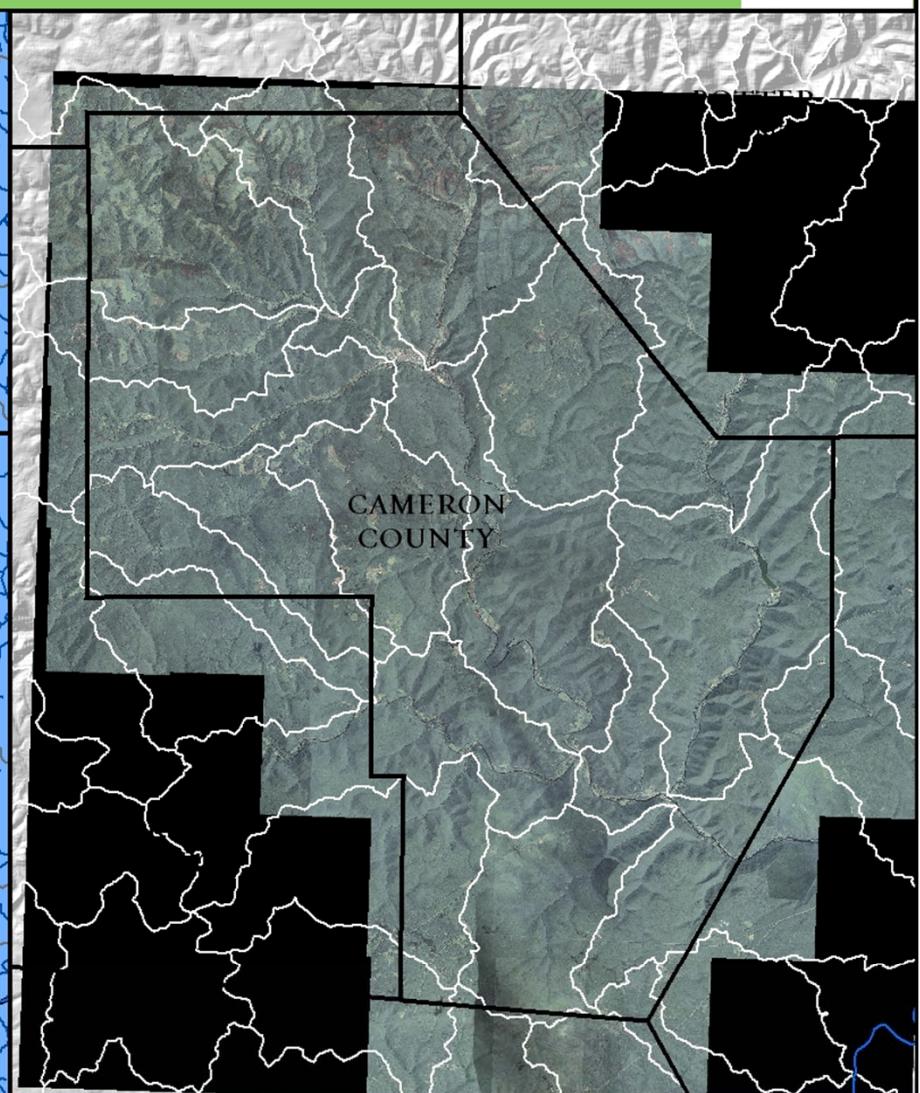
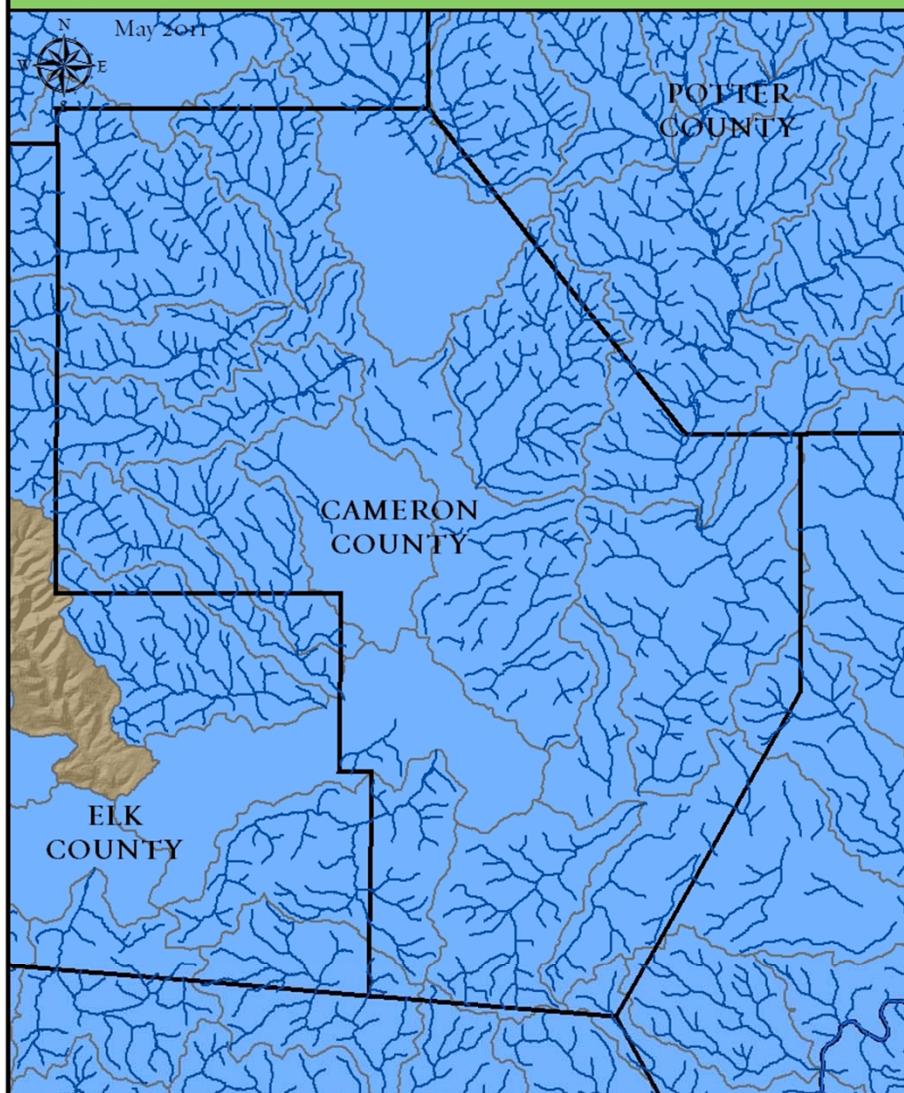
- Expanded from EV/HQ streams to provide landscape context for streams and incorporate ecosystem factors that contribute to the quality of the land and water
  - Percent forest cover
  - Amount impervious surface
  - Amount of forest fragmentation
  - others



Old Growth Hemlock Forest  
Photo: WPC

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# ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



~~~~ Exceptional Value (EV) & High Quality (HQ) Streams

~~~~ EV & HQ Watersheds (HUC 12)

Data Sources: EV/HQ streams are from the PA Department of Environmental Protection

0 2 4  
Miles



# Ecologically Important Areas - Watersheds

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- Watersheds are convenient units of the landscape that include important land-based habitats as well as water-based habitats
- Water quality can be linked to the quality of the forests and wetlands in the watershed
- Watersheds provide context for the ecological values that contribute to the maintenance of the quality of the water
- High degree of overlap between TNC-WPC Priority Forest and EV/HQ watersheds, as well as other significant conservation areas

# Ecologically Important Areas - Watersheds

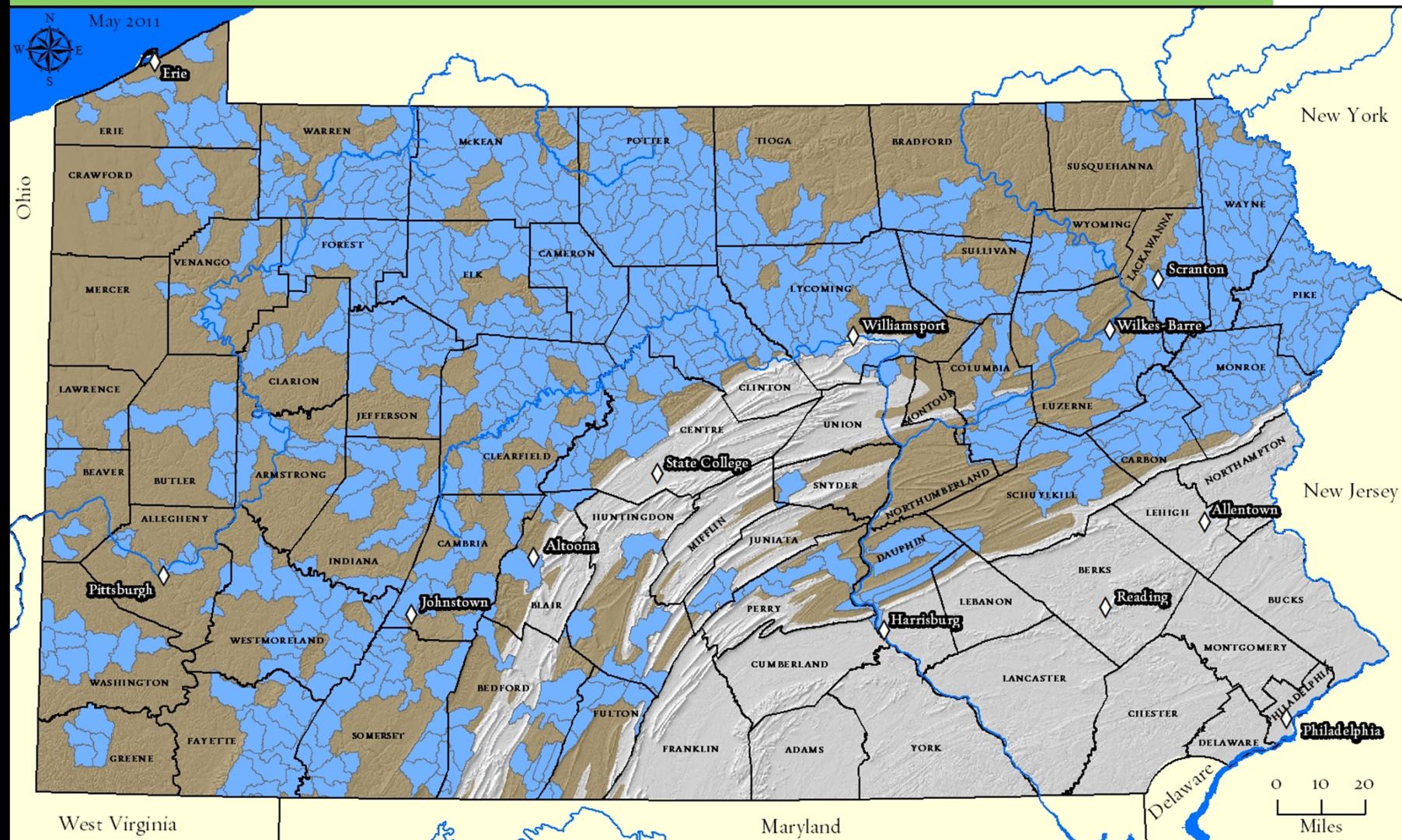
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- Higher conservation measures in EV/HQ watersheds will protect and maintain the quality of Pennsylvania's:
  - Streams and wetlands
  - Rare plant and animal species
  - Un-fragmented forest habitats
  - State parks and state natural areas
  - Drinking water sources
  - Ecosystem services
  - Hunting and fishing areas
  - Other recreational opportunities



Purple Fringeless Orchid  
Photo: Chris Tracey

# ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



Exceptional Value & High Quality Watersheds (HUC 12) within Marcellus Play



Marcellus Shale in Pennsylvania

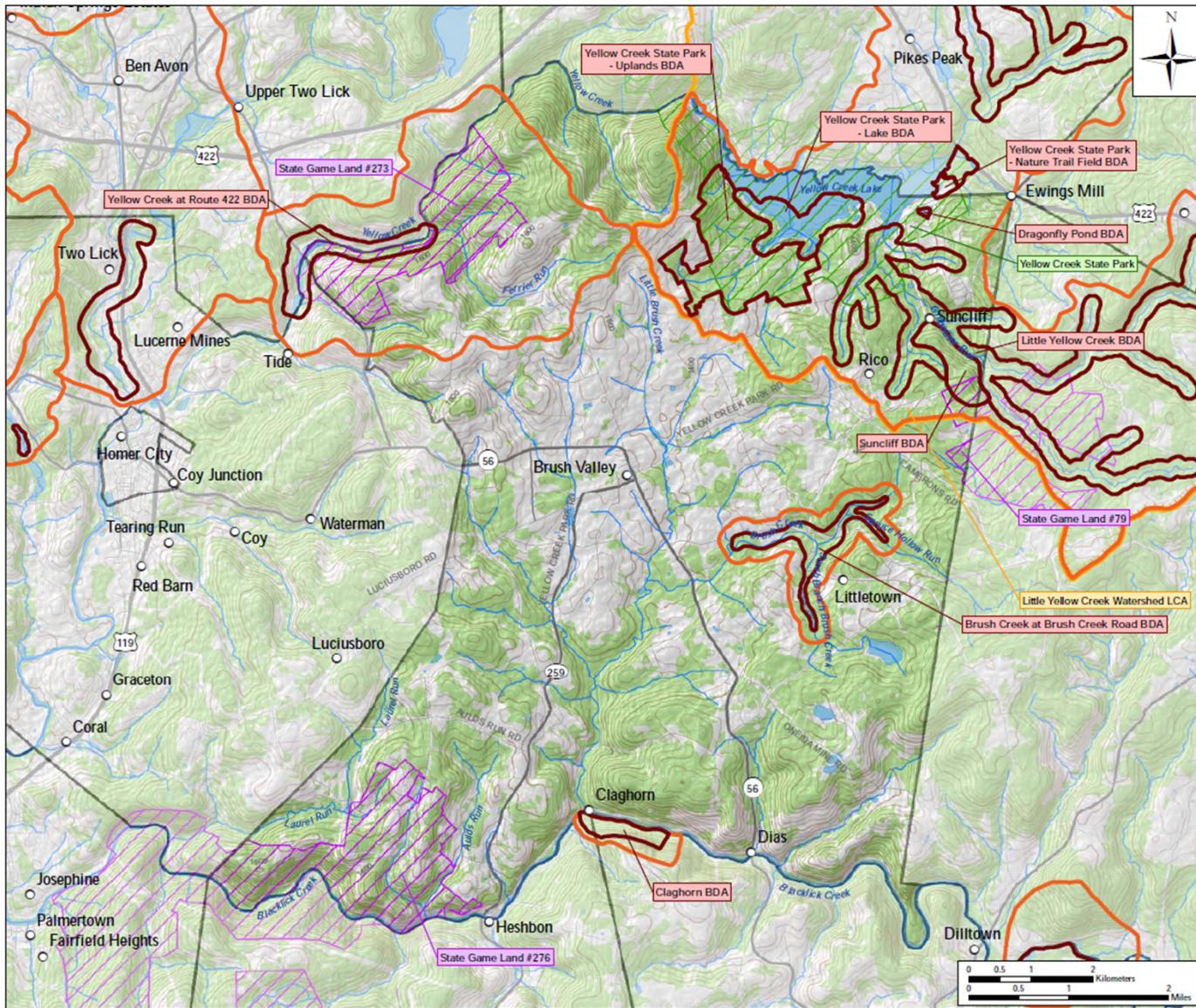
Data Sources: EV/HQ streams are from the PA-DEP; Marcellus Shale boundaries are approximated from bedrock geology types (ages) from USGS data.

# Ecologically Important Areas – Biodiversity

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- In addition to EV/HQ watersheds, we have included priority Biological Diversity Areas (BDAs) as ecologically important areas in Pennsylvania
- Including BDAs is necessary as EV/HQ watersheds do not include all known locations of rare plants, animals, and important habitats

# Ecologically Important Areas – Biodiversity



Indiana County  
Natural Heritage Inventory  
Brush Valley Township

## Biological Diversity Areas

## **Brush Creek at Brush Creek Road BDA**

## Claghorn BDA Dragonfly Pond BDA

## Dragonfly Pond BDA Little Yellow Creek BDA

Suncliff BDA

## Yellow Creek at Route 422 BDA Yellow Creek State Park - Lake BDA

## **Yellow Creek State Park - Nature Trail**

Yellow Creek State Park - Uplands BDA

Landscape Conservation Areas  
U.S. Fish & Wildlife Service

## Landscape Conservation Areas

Little Yellow Creek Watershed LCA

## Public Land

State Game Land #79  
State Game Land #79

**State Game Land #213  
State Game Land #276**

## State Game Land #270 Yellow Creek State Park

1000 J. POLYMER SCIENCE: PART A



## Legend

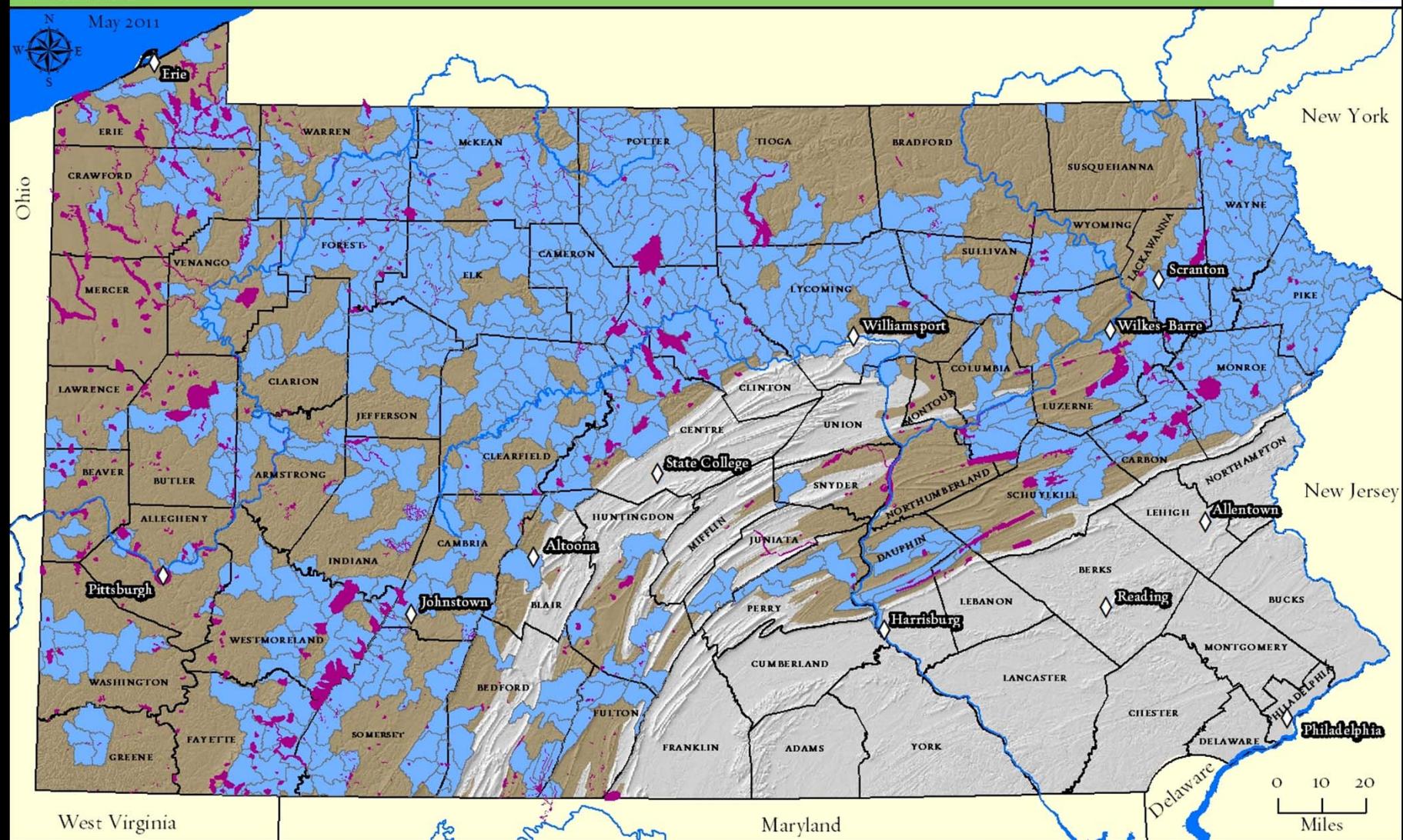
Biological Diversity Area (BDA)



Parque Natural de la Sierra de Guadarrama

- PA Bureau of Forestry
- PA Game Commission
- National Wetland Inventory
- Streams
- 40 Ft. Contour Line

# ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



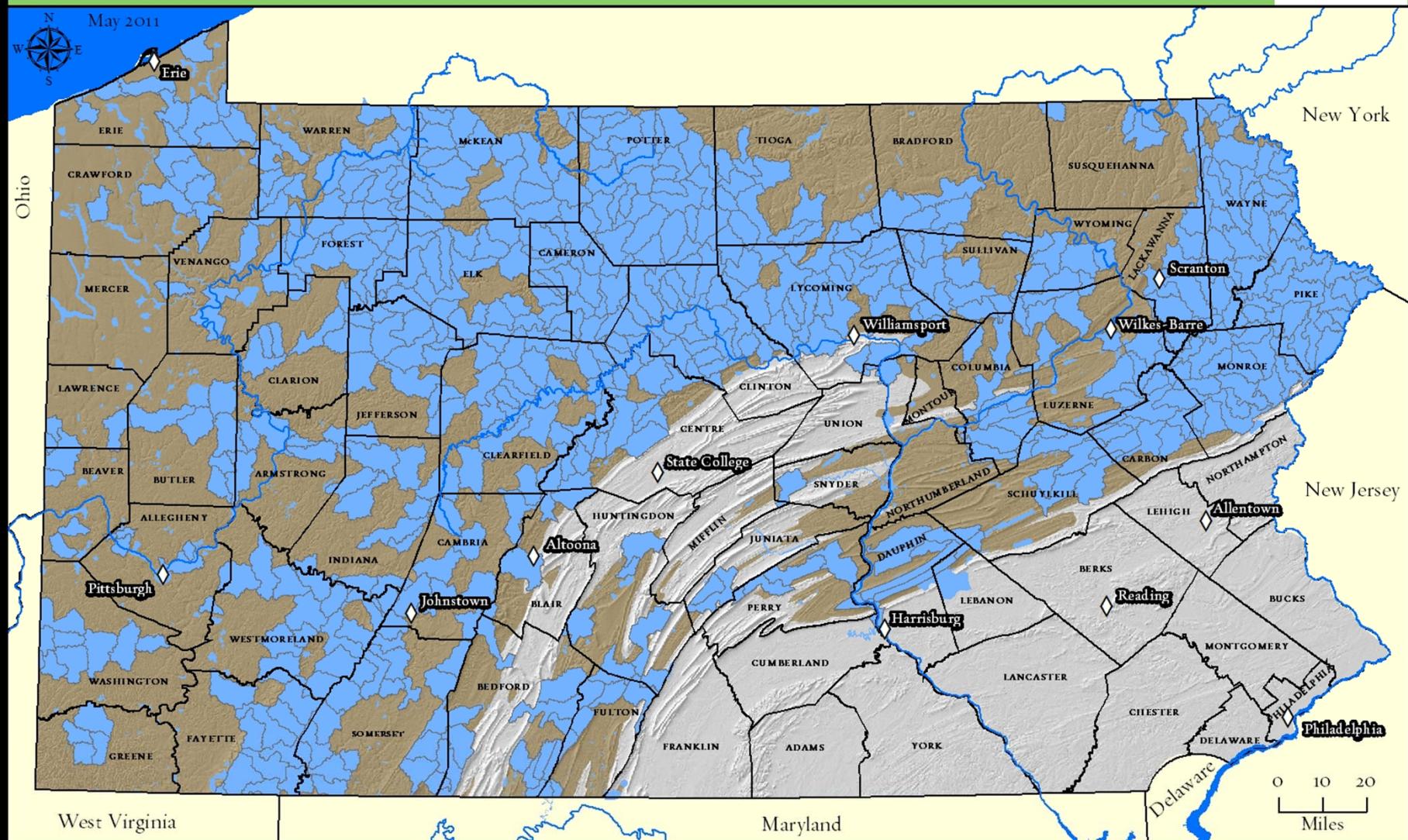
Exceptional Value & High Quality Watersheds (HUC 12) within Marcellus Play

Priority Core Biological Diversity Areas (BDAs) within Marcellus Play

Marcellus Shale in Pennsylvania

Data Sources: EV/HQ streams are from the PA-DEP; BDAs are from the PA Natural Heritage Program; Marcellus Shale boundaries are from USGS

# ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



Ecologically Important Areas (EV/HQ Watersheds & BDAs) within Marcellus Play



Marcellus Shale in Pennsylvania

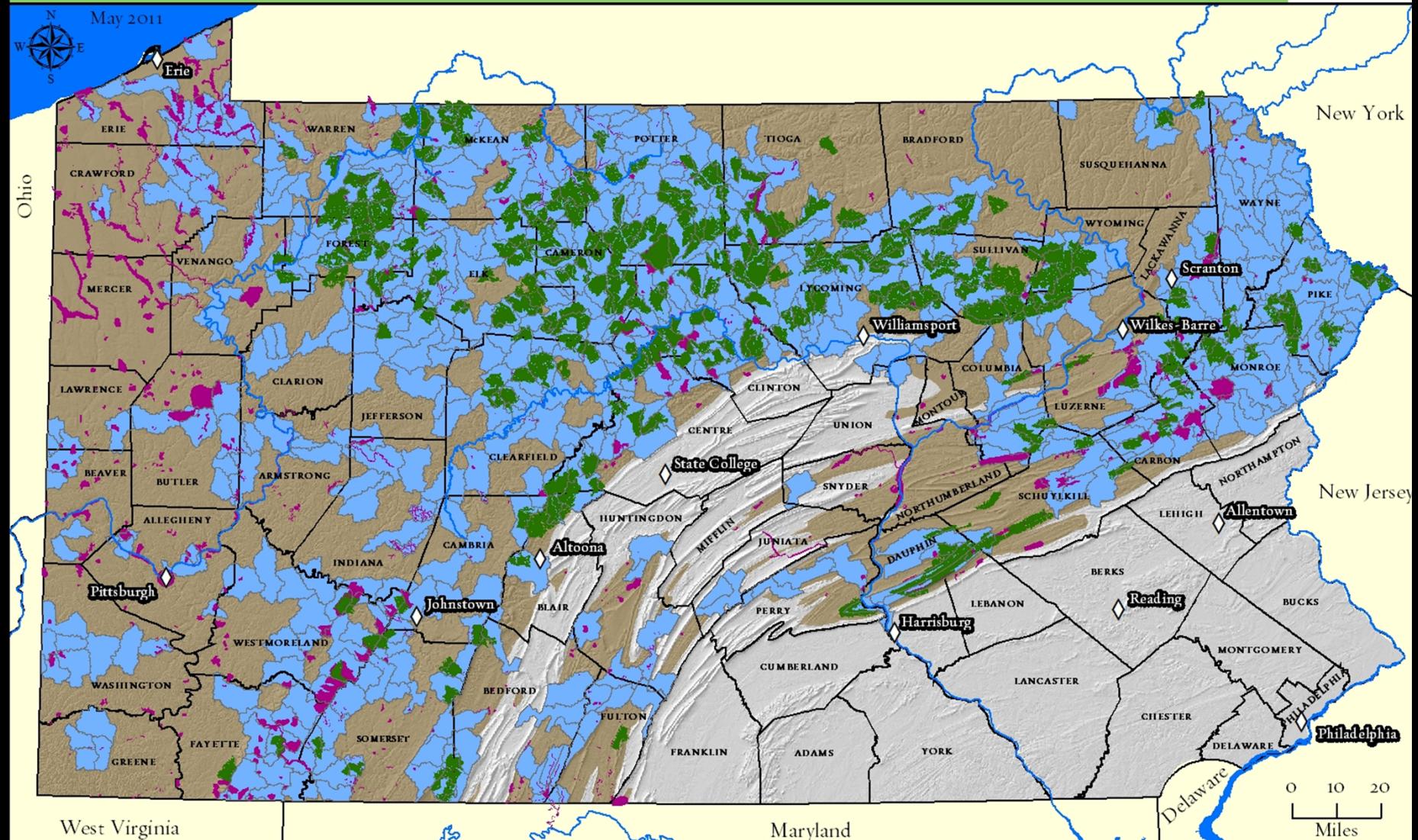
Data Sources: EV/HQ streams are from the PA-DEP; BDAs are from the PA Natural Heritage Program; Marcellus Shale boundaries are from USGS.

# Ecologically Important Areas - Results

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- Ecologically Important Areas Include:
  - Acres = 11.68 million acres
  - Streams = 35,132 miles (EV/HQ = 20,618 miles)
  - Forests = 9.1 million acres
  - Majority of large contiguous forest habitat in PA
    - 1.4 million acres of TNC-WPC Priority Forest Patches
    - 86% of the total acreage of Priority Forest Patches in the Marcellus (66% statewide)
- Land Cover
  - 78% natural cover
  - 13% agricultural cover
  - 7% developed cover

# ECOLOGICALLY IMPORTANT AREAS IN PENNSYLVANIA



Exceptional Value & High Quality Watersheds (HUC 12)

Priority Core Biological Diversity Areas

Core Forest Patches

Marcellus Shale in Pennsylvania

Data Sources: EV/HQ streams are from the PA-DEP; BDAs are from the PA Natural Heritage Program; Marcellus Shale boundaries are from USGS

# Ecologically Important Areas - Results

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- Ecologically Important Areas Include:
  - 52 counties; ranging from 6.5% to 100% of land area
  - % of Area within Major Basins (within Marcellus Play):
    - Delaware = 1.58 million acres (95% of basin within Marcellus)
    - Chesapeake = 5.25 million acres (57% of basin within Marcellus)
    - Ohio = 4.71 million acres (47% of basin within Marcellus)
  - State Lands:
    - 1.53 million acres of State Forest lands (on 18 State Forest Districts)
    - 927,000 acres of State Game Lands (on 219 State Game Lands)
    - 177,000 acres of State Parks (on 72 State Parks)

# Recommendations

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## Landscape Level

- Pre-planning process
  - Identifies proposed locations of well pads and all anticipated ancillary infrastructure, pipelines, tailings pits and flowback ponds
  - Identifies key ecological attributes: floodplains, wetlands, streams, rare plants and animals, and other significant habitats
  - Identifies siting or management alternatives to avoid and minimize potential conflicts



Buttermilk Falls  
Photo: Greg Funka

# Recommendations

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## Site Level

- Developer should avoid, minimize, and mitigate impacts associated with site development as presented to the Marcellus Shale Commission by the PA Bureau of Forestry



Timber Rattlesnake  
Photo: Ryan Miller



Rock Outcrop  
Photo: Chris Tracey

# Ecologically Important Areas



Baughman Rock  
Photo: Paul Wiegman