



Pennsylvania

**Department of Conservation  
and Natural Resources**

# Towards Watershed Level Monitoring Protocols

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Watershed Scale Trail and Habitat Improvements on the Michaux State Forest

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Michaux State Forest

# Big Ideas

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1. Engineering resilience, *not sustainability*, is critical to maintaining diversity and function of watersheds

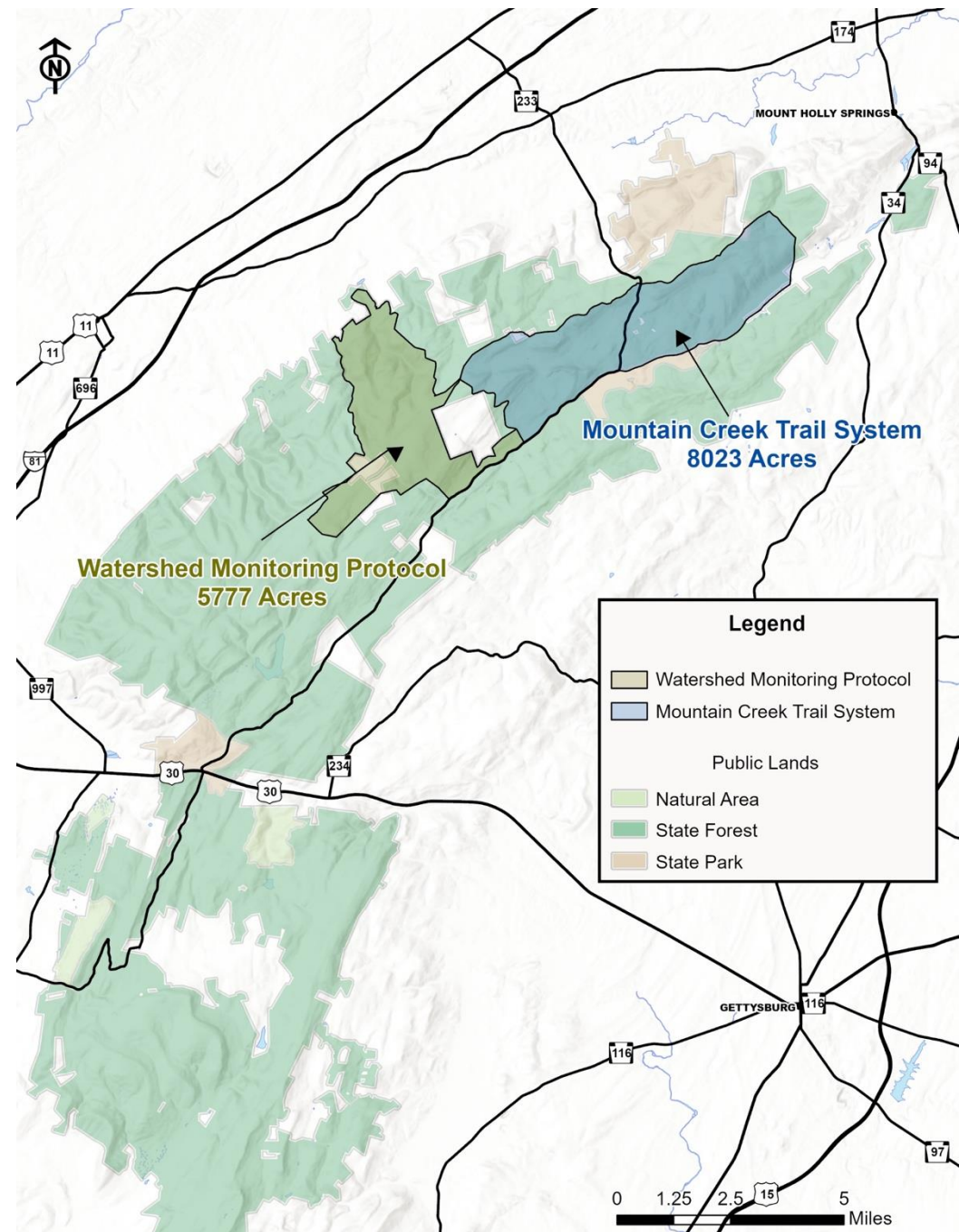
2. Maintaining diversity and function of watersheds, *particularly upper tributaries*, is core to public trust in land managers

3. The resilience of our monitoring needs to match the resilience of our management to inform our decision making and balancing of competing interests



# Areas of Interest & Competing Objectives

1. Mutually opposing objectives amongst taxa
2. Diverging objectives based on nuanced target conditions in otherwise similar settings
3. Providing recreation opportunities in high-value ecological areas
4. Implementing modeling results and public feedback





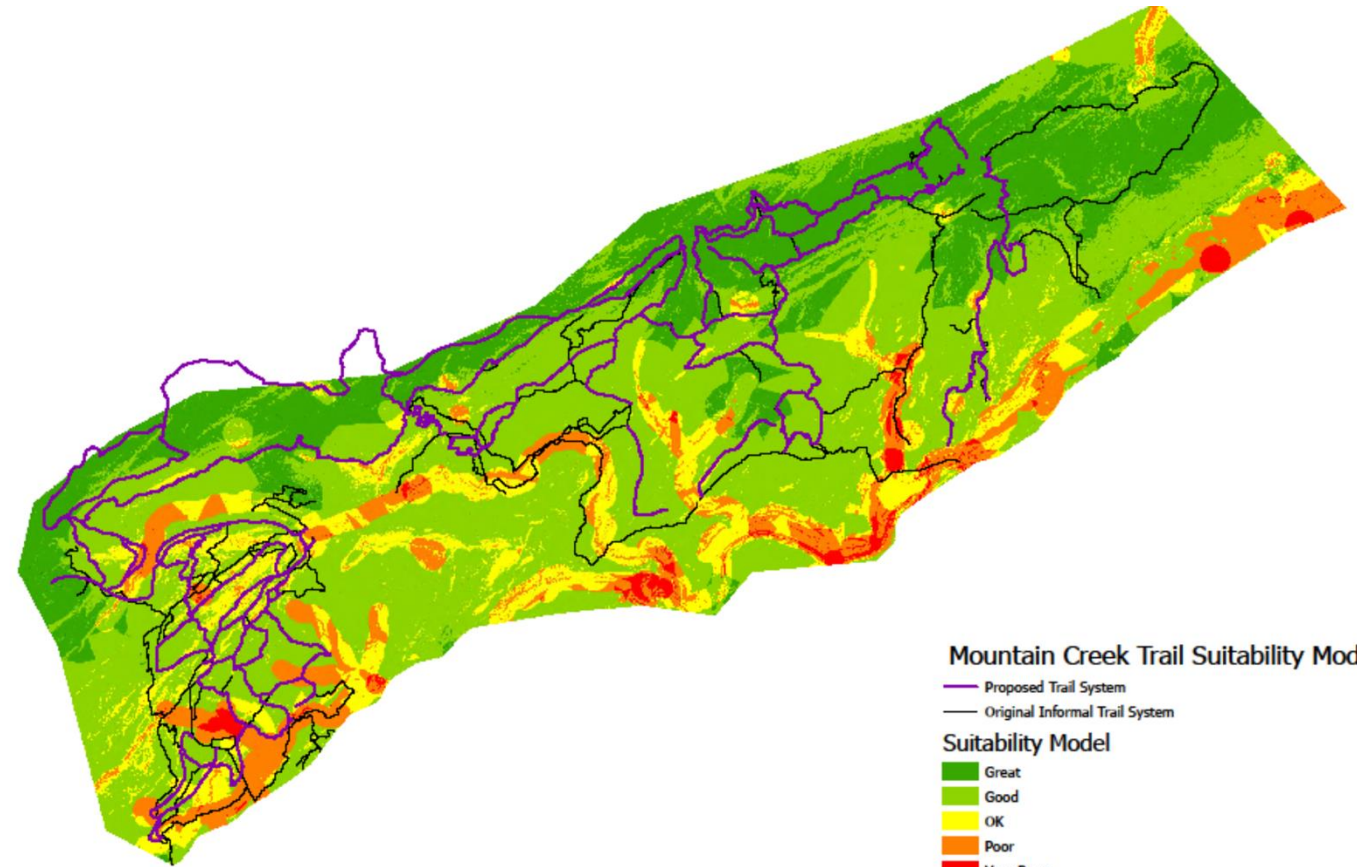
# Mountain Creek Trail System

- Initial Inventory
  - Analysis
- Public Participation
- Implementation

# Mountain Creek Trail System



- 125 miles of unplanned and dynamic trails
- Inventory of system
- Development of trail suitability model
  - Minimize ecological impacts
  - Increase accessibility and ease of maintenance
  - Maximize distance from private inholdings and campsites



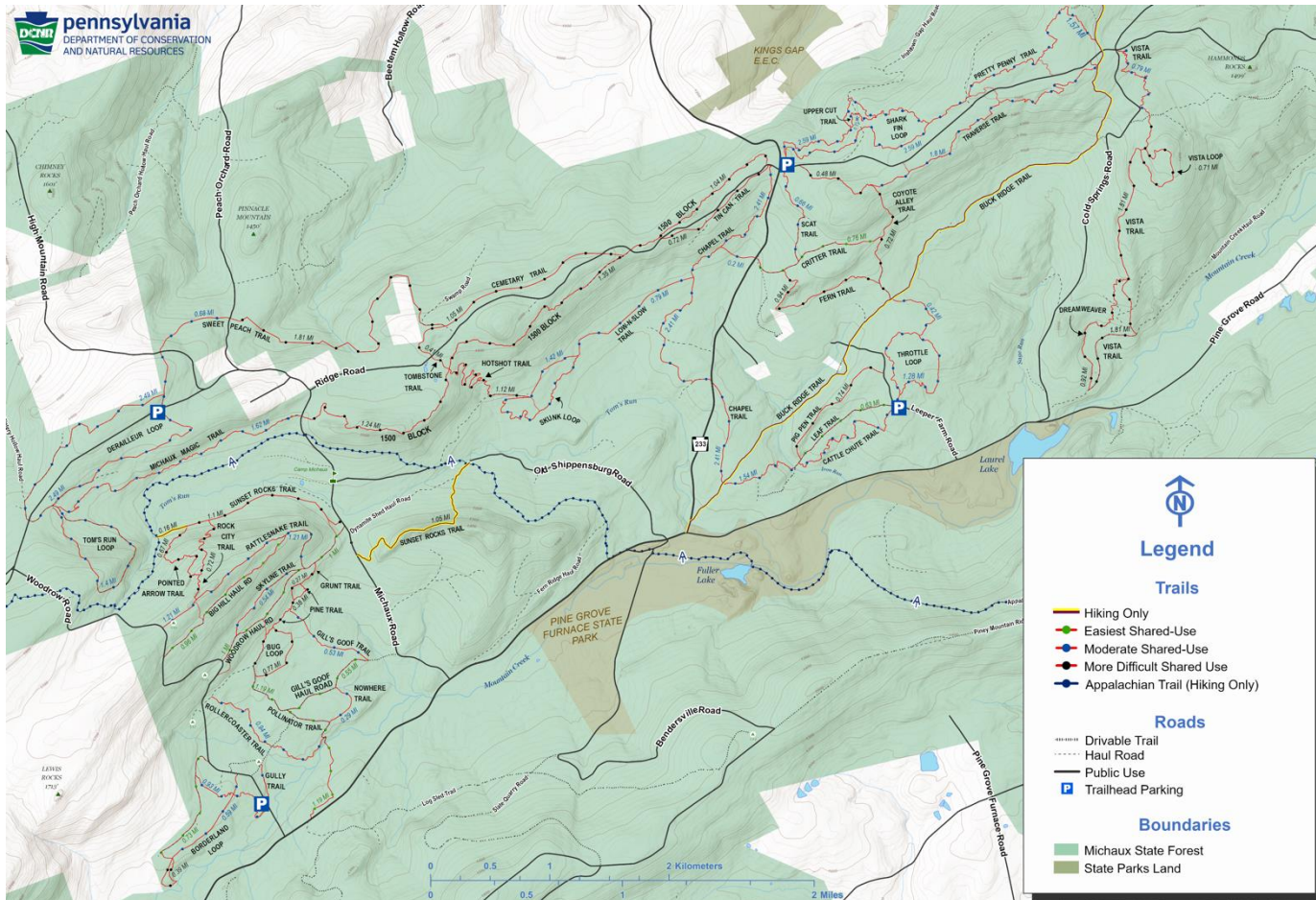
Mountain Creek Trail Suitability Model

- Proposed Trail System
- Original Informal Trail System

### Suitability Model

- Great
- Good
- OK
- Poor
- Very Poor

# Mountain Creek Trail System



- Public comment and meetings
  - Use of Social Pin Point
- On-the-ground implementation
  - Signage & Kiosks
  - Parking lots
- Movement towards violation enforcement



# Watershed Monitoring Protocol

- Aquatic and Terrestrial Habitat Improvement
  - Paired Tributary Ecological Monitoring

***\*Funding for monitoring and implementation from NFWF Chesapeake WILD Grant to American Bird Conservancy and Partners\****



# Habitat Improvement

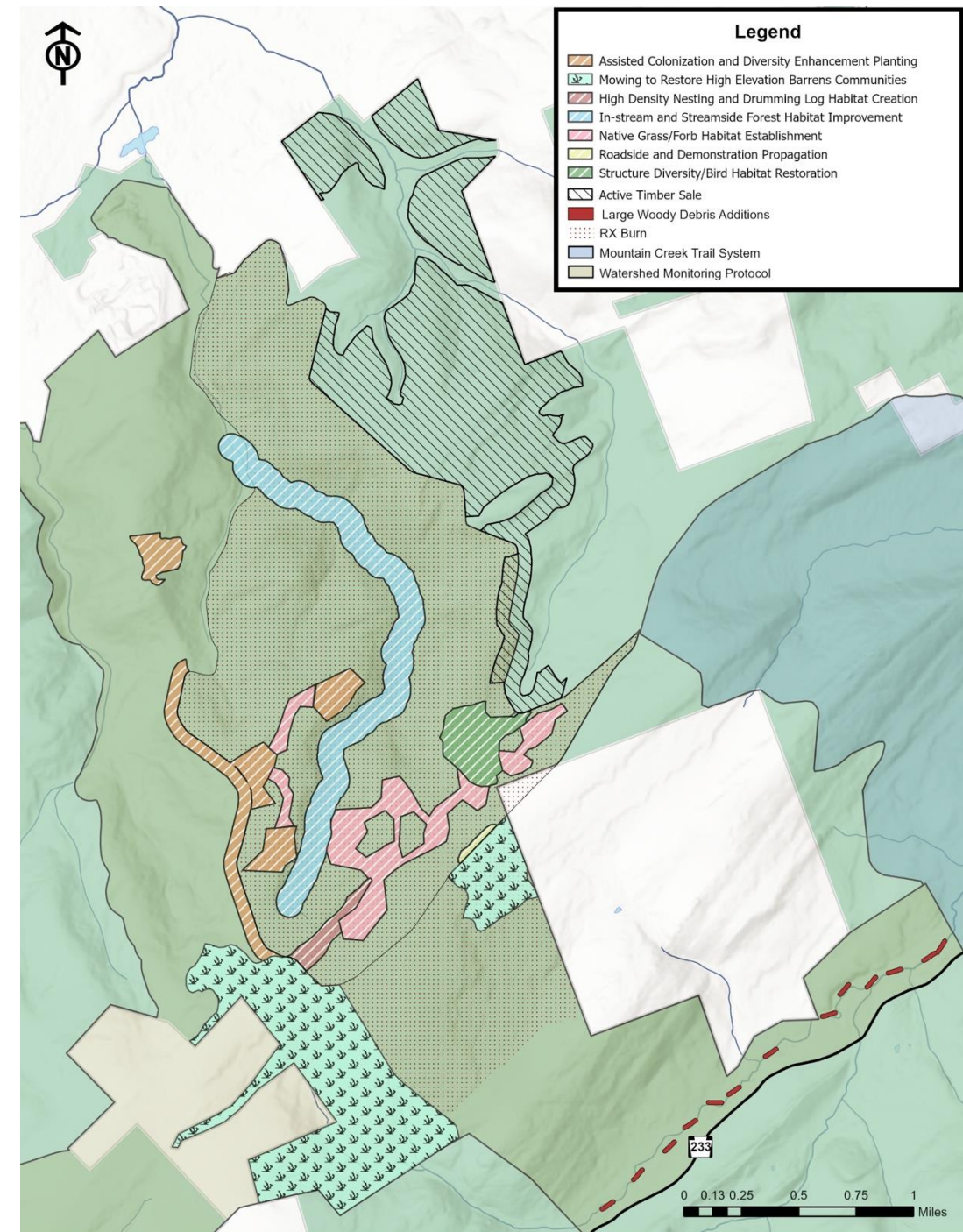
## *Prior*

- Dead Woman's Hollow RX Burn
- Hairy Springs RX Burn
- LWD additions on Dead Womans Hollow



## *During*

- Forestry Mowing
- LWD additions on Hairy Springs
- Plantings



# Ecological Monitoring

## ***Paired sampling***

- eDNA
- ARUs
- Traditional Macroinvertebrate

## ***Dead Woman's Hollow and Mountain Creek***

- LWD additions prior

## ***Stromes Hollow***

- Control

## ***Hairy Springs***

- LWD to be added

