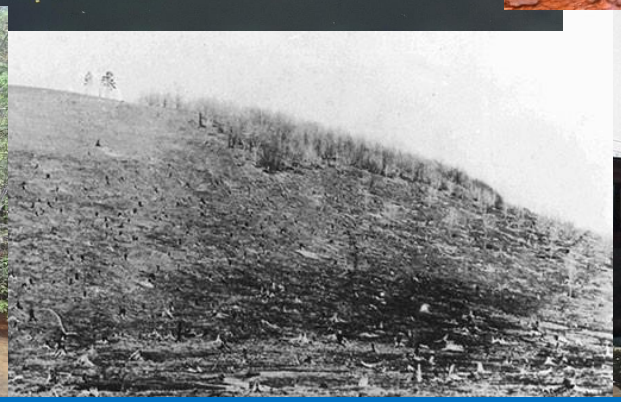
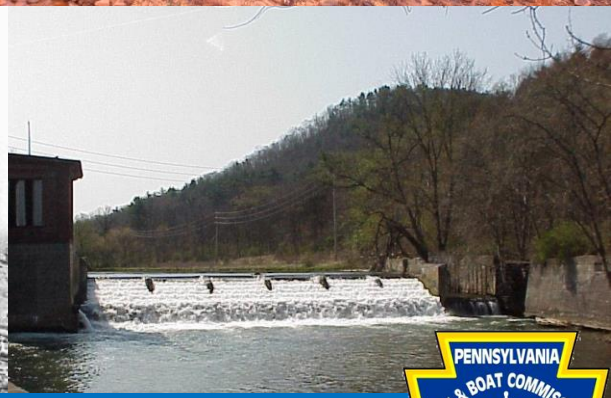
Aquatic Resource Impacts Due to Legacy Land and Water Use Practices

Ben Lorson, Pennsylvania Fish and Boat Commission

Statewide Water Resources Committee, 21 July 2021





The mission of the Fish & Boat Commission is to protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.

Presentation Overview

- PA Fish and Boat Commission (PFBC)
- Legacy impact examples
- Aquatic habitat fragmentation and acid mine drainage (AMD) impacts

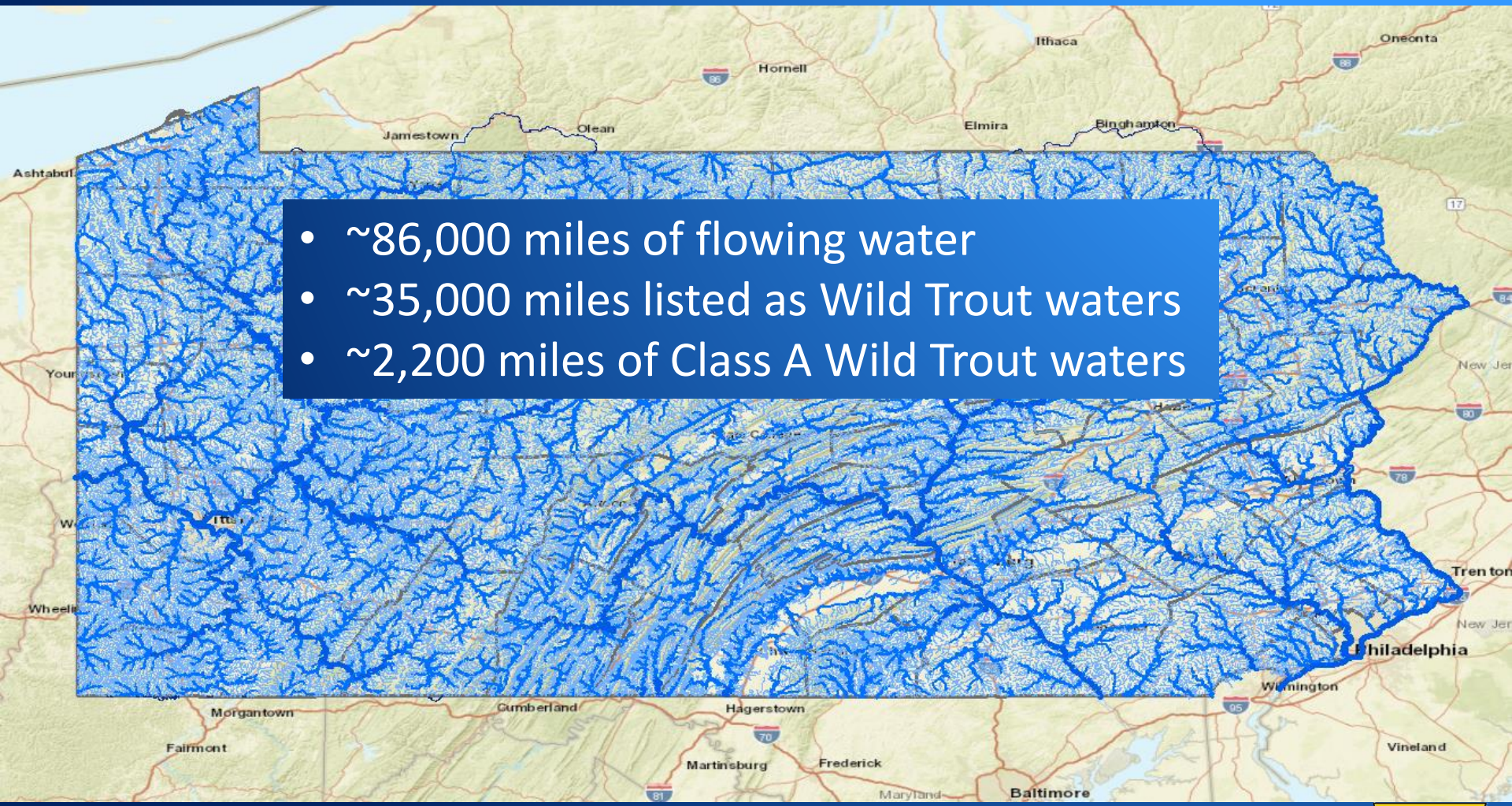
PA Fish and Boat Commission

- *The mission of the PA Fish & Boat Commission is to protect, conserve and enhance the Commonwealth's aquatic resources and provide fishing and boating opportunities.*
- Does not operate from the State General Fund
- Fisheries Management, Habitat Management, Environmental Services

Also -

- Hatcheries
- Law Enforcement & Boating
- Outreach & Education
- Property Services
- Engineering – Const./Maint.

PA stream network



- ~86,000 miles of flowing water
- ~35,000 miles listed as Wild Trout waters
- ~2,200 miles of Class A Wild Trout waters

Status of PA Waters

- Past land use practices have severely degraded our aquatic resources
- Recovery is ongoing via natural processes
- Also correcting legacy impacts actively via human intervention
- Many waters still have a way to go
- We also need to continue preventing further degradation to our healthy resources.

How does this relate to the State Water Plan????

- Water Quantity
- Water Quality
- Connected Healthy Habitat
- Fish and other aquatic organisms need all three to thrive
- We need to meet human demands of our available water resources while ensuring sufficient quantity and quality of water and enough connected healthy habitat to support our aquatic biota

Logging

- Sedimentation
- Splash dams/log drives
- Rail systems

Credit: Pittsburgh City Paper

Log Rafts in the Susquehanna River at Lock Haven, Pa.

Credit: Wikimedia Commons

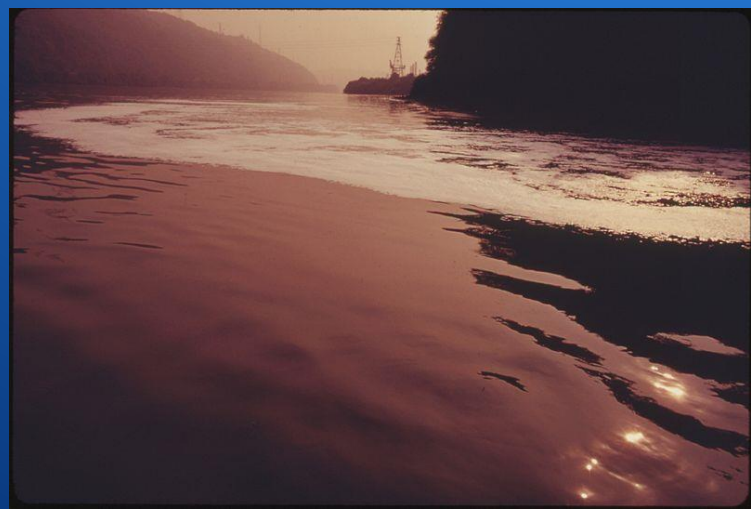
Agriculture

- Nutrients/sedimentation
- Habitat degradation
- Dams/legacy sediment

Credit: www.stacker.com

Water Supply/Discharges

- Sewage discharges, industrial uses, power plants, tanneries, etc.
- Waterways historically viewed as dumping grounds
- Water quantity + water quality impacts



Mining/Resource Extraction

- Coal mining, oil & gas, aggregate, etc.
- Extractive process and getting product to market
- AMD, coal refuse piles, dams, canals, pipelines, etc.

Recreational Use Loss Values (RULV)

- Basic model:

Model Inputs

Miles of Stream Impairment	X	Projected Resource Use	X	Angler Use Data	=	Estimated Recreational Use Loss Value
Derived from ↓		↓		↓		
2020 PA DEP Integrated Water Quality Report 303(d) list		25 PA Code § 93.9 – Designated water quality uses		PFBC angler survey data		

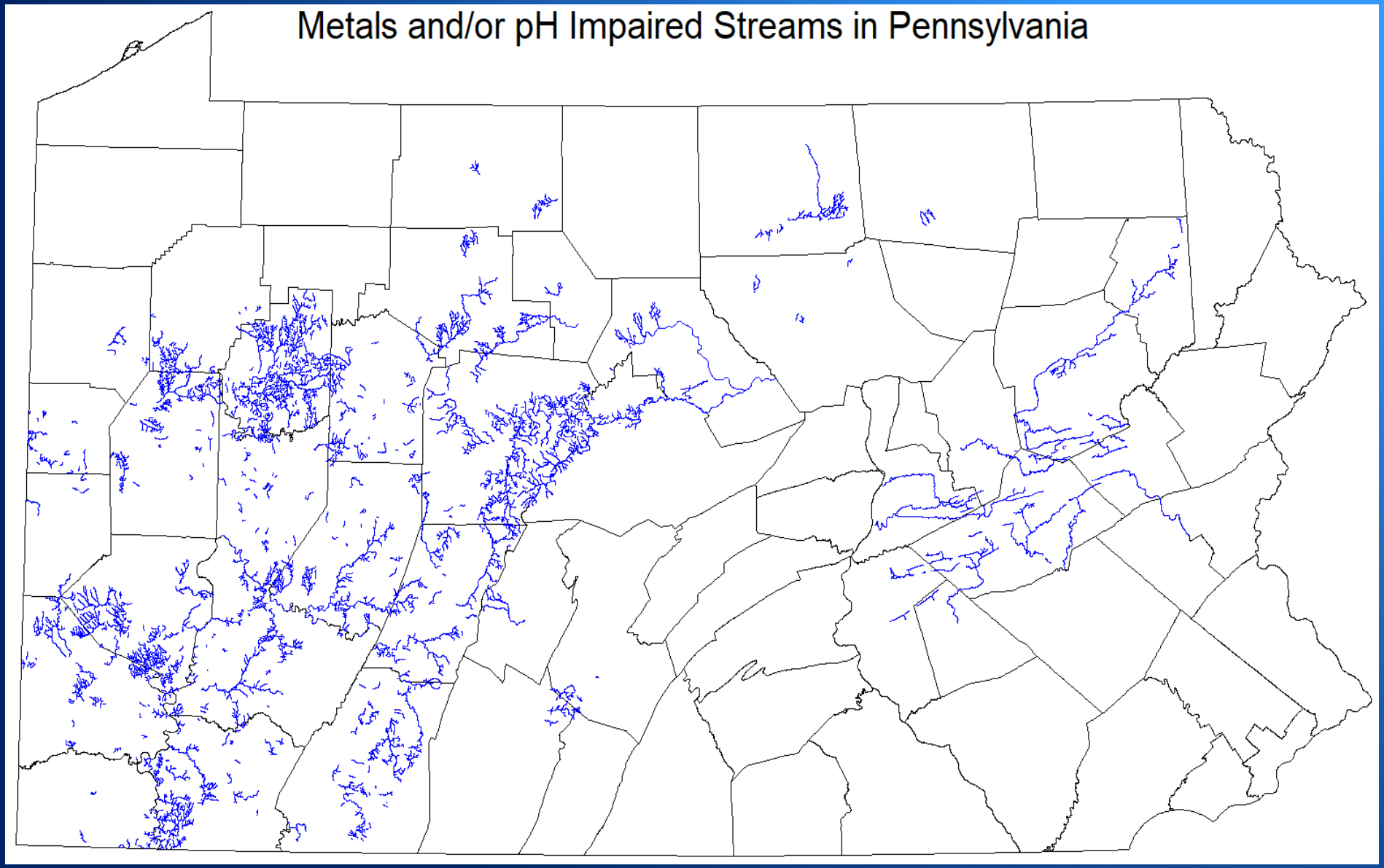
AMD Stream Impairment

All 303(d) stream impairments in Commonwealth (25,468 mi)

AMD impairments to aquatic life (5,559 mi)

AMD impairments to aquatic life by metals and/or pH (5,166 mi)

Miles of Stream Impairment - AMD



Input: Projected Resource Use

Chp. 93 protection classes correlated to recreational angling

Projected Resource Use	Mileage
Cold Water Fishes	3078
Trout Stocking	532
Warm Water Fishes	1556

Input: Angler Use Data

- PFBC angler use data used to estimate expenditures for different types of angling

	Trips/mi/yr (low)	Trips/mi/yr (mean)	Trips/mi/yr (high)	Expenditures/Trip (adjusted to 2020)
Wild trout angling	21	29	40	$61.06
Stocked trout angling	346	404	471	$82.25
Warm water angling	56	63	70	$63.45

Results: Recreational Use Loss Values

- Two different approaches - all impaired streams in a watershed vs. only the named streams in a watershed
- $19 M ($16 M - $23 M)
- $29 M ($24 M - $35 M)

- Values are based on an annual basis
- Predicts angler generated revenue if fishery is restored
- List of RULV estimates provided as technical guidance by PFBC upon request

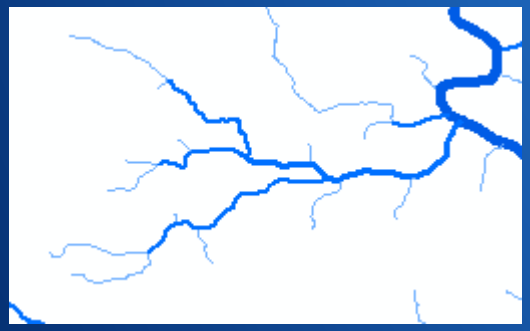
http://2020.treatminewater.com/presentations/

Aquatic Connectivity – Transportation networks

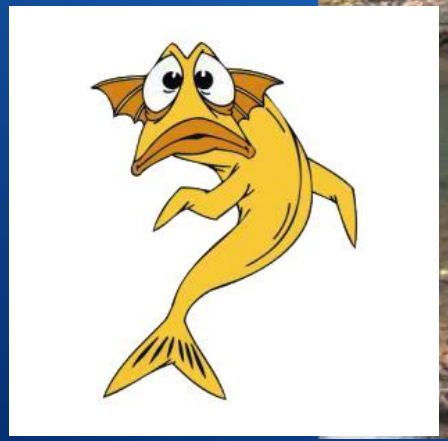
- Waterways = impediments to human travel
- Roads = can be impediments to aquatic travel
- Historical perspective: get people and goods over the water
- Current perspective: get people over the water while maintaining physical, chemical and biological connectivity under the road
- Waterways also used as transportation network → Dams

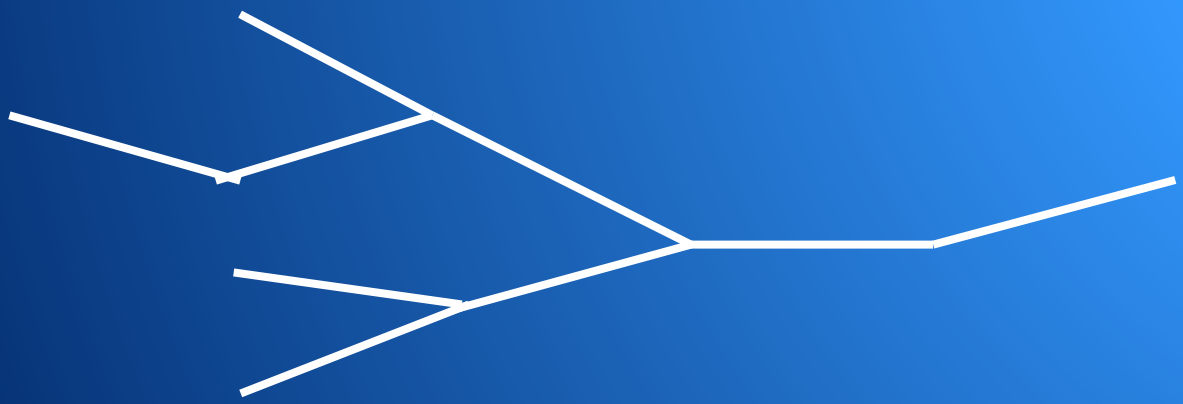
Why is fish passage important??

- Fish live in a linear world

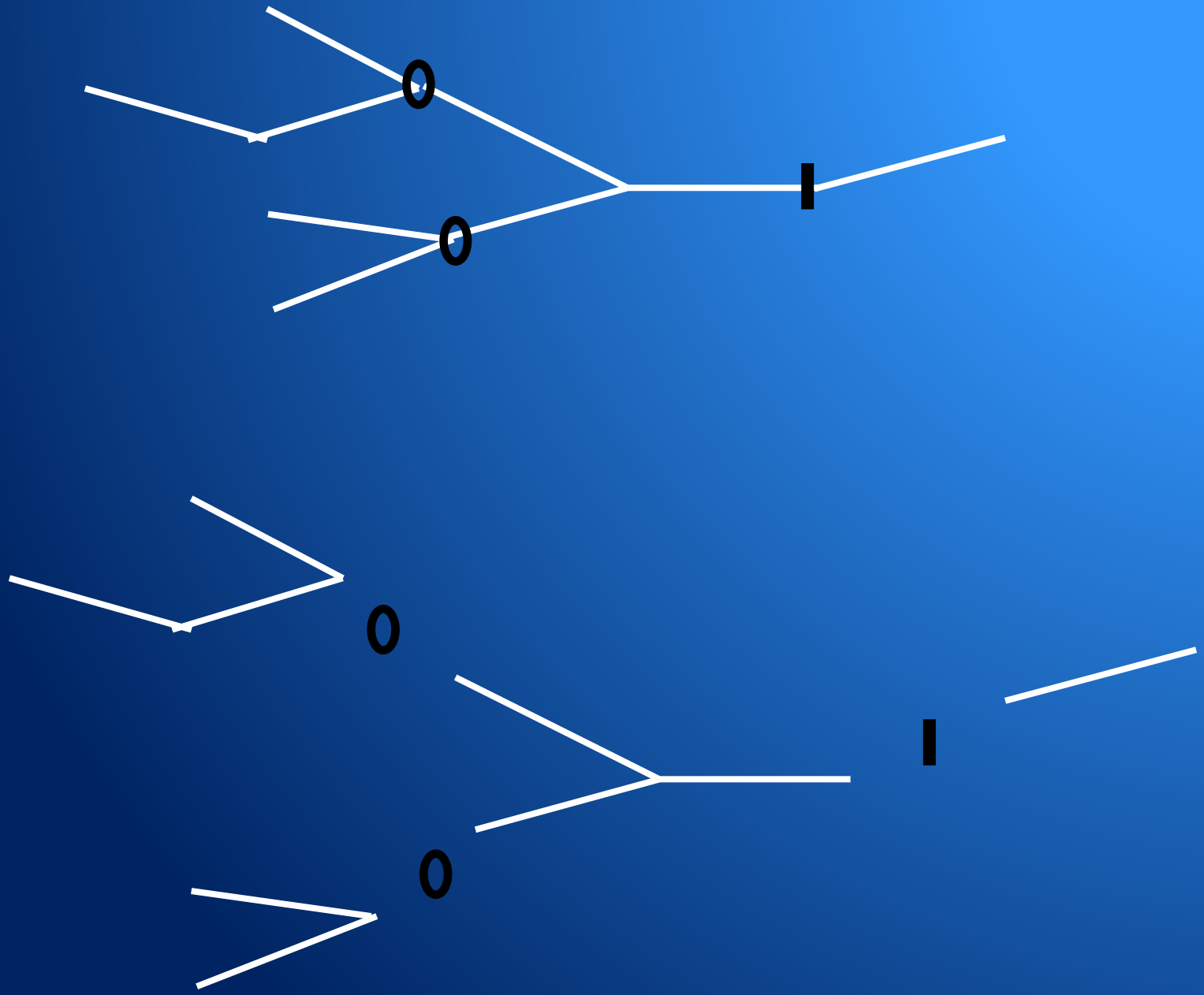


- Inability to deviate from aquatic corridor





- Fish move to satisfy various life history needs:
  - Spawning
  - Seasonal habitat – winter vs. summer, floods, droughts
  - Escape competitive or predatory pressure
  - WQ issues – temp, pH, DO, pollution event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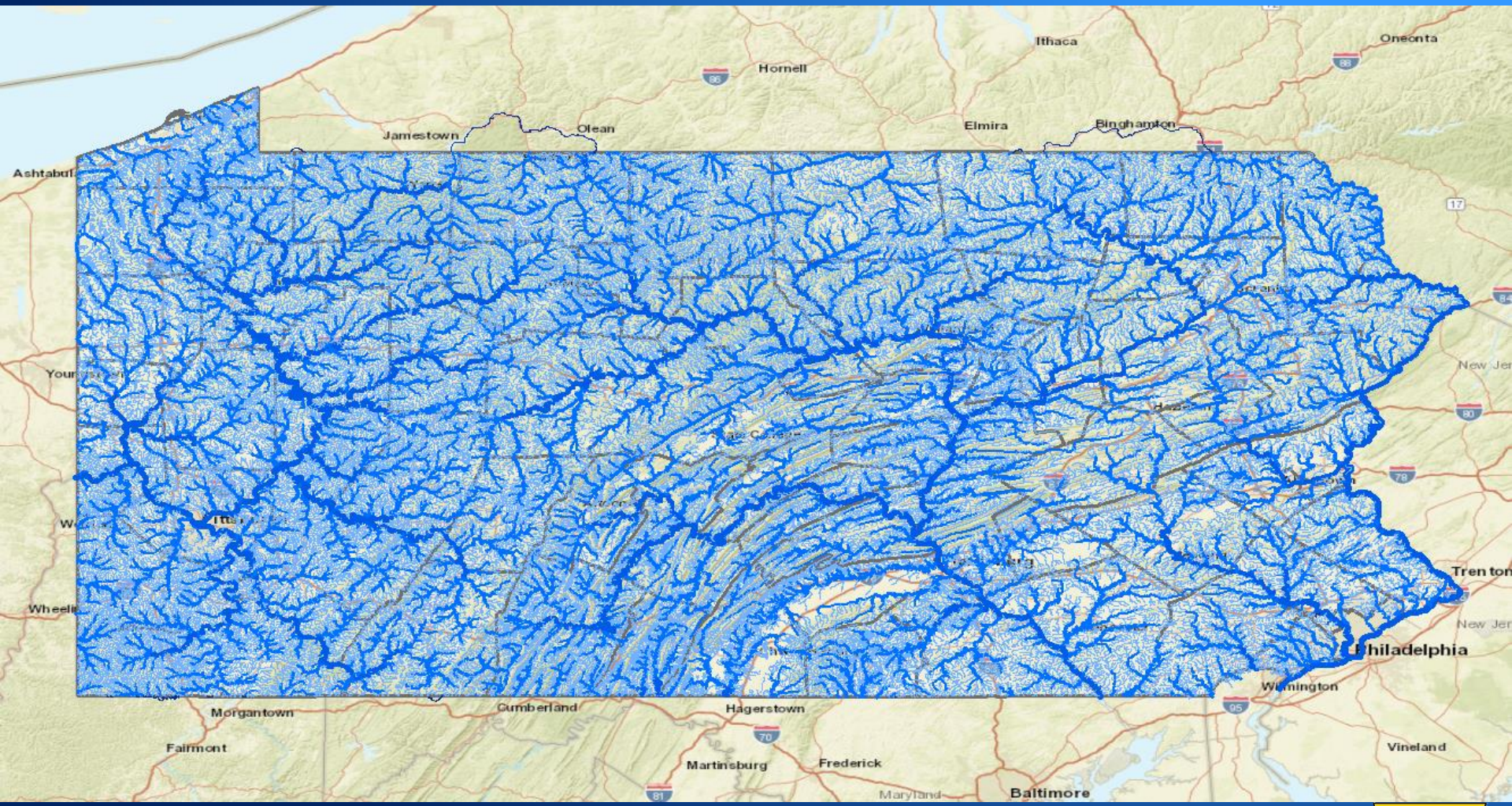
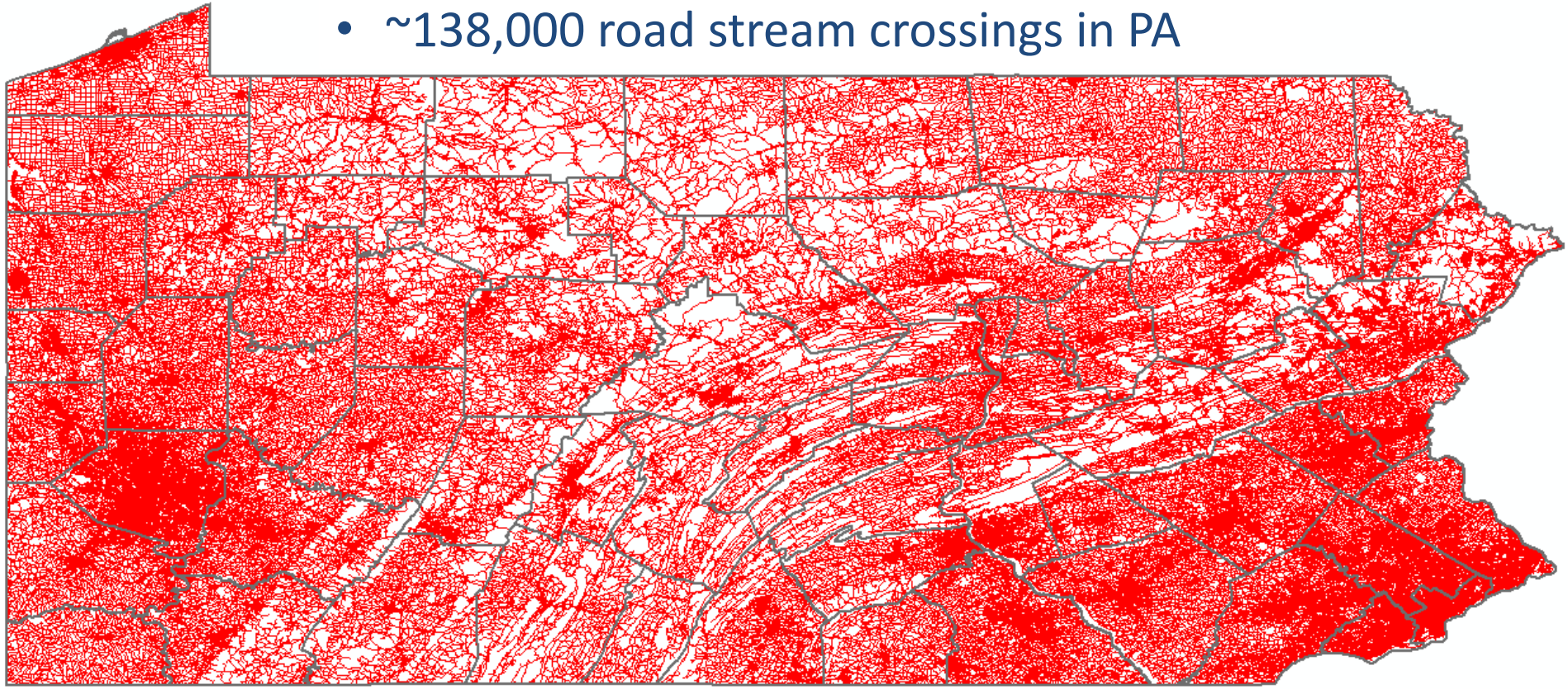
- Fragmentation → Compartmentalization
  - fish seek best available habitat rather than optimal habitat
  - Can lead to a lack of genetic diversity
- Connectivity → Resiliency
  - Maintain genetic diversity, occupy best habitat, move to deal with stressors, dispersal

PA stream network



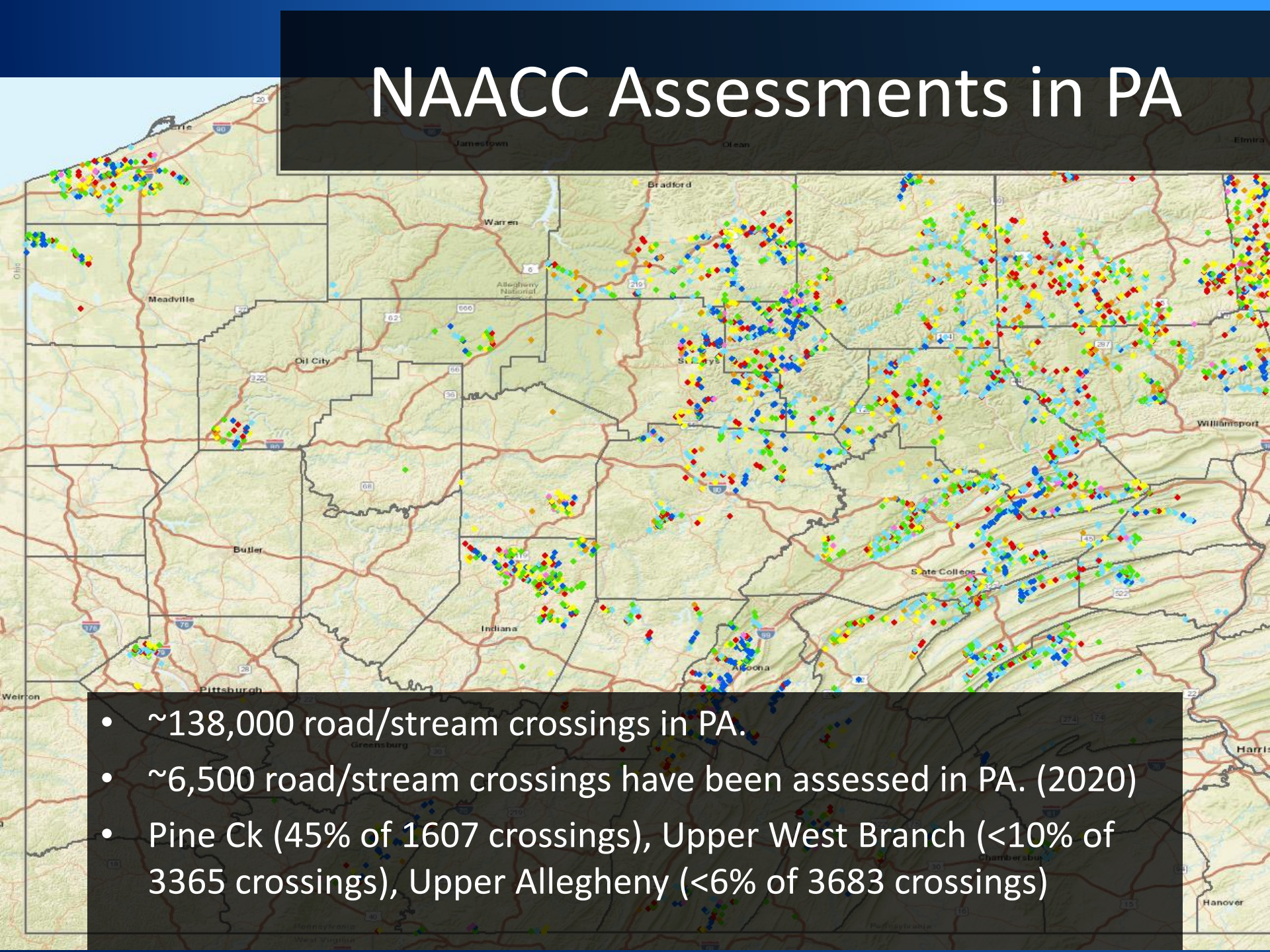
PA Road Network

- ~138,000 road stream crossings in PA



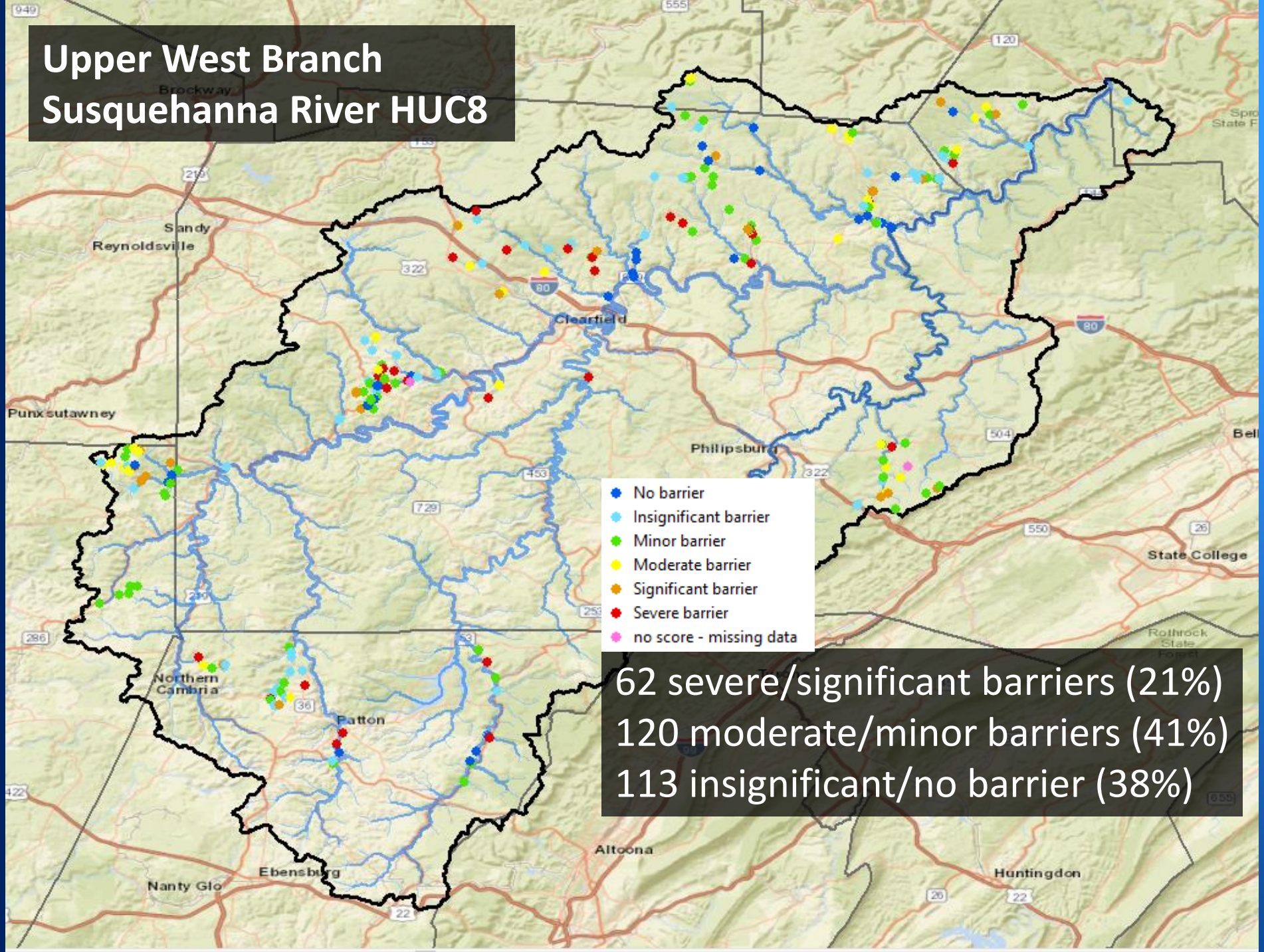

Jump barriers
Depth barriers
Velocity barriers

NAACC Assessments in PA



- ~138,000 road/stream crossings in PA.
- ~6,500 road/stream crossings have been assessed in PA. (2020)
- Pine Ck (45% of 1607 crossings), Upper West Branch (<10% of 3365 crossings), Upper Allegheny (<6% of 3683 crossings)

Upper West Branch Susquehanna River HUC8



62 severe/significant barriers (21%)
120 moderate/minor barriers (41%)
113 insignificant/no barrier (38%)

How is PFBC involved in AOP

- Maximizing linear nature of our flowing systems
  - Permit review
  - Project facilitation
  - Sharing data to help guide decision making
  - Various technical and policy committees
  - Participation in statewide dam removal program

Summary

- We all need to continue to work towards restoring degraded waters from legacy impacts
- At the same time, we need to continue to work to prevent further degradation to our waters
- Water quantity + water quality + connected healthy habitat

Questions?

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