



What it all means:
Waters of the US on the
ground

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Background: Mapping WOTUS



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US Geological Survey (USGS) National Hydrography Dataset (NHD)

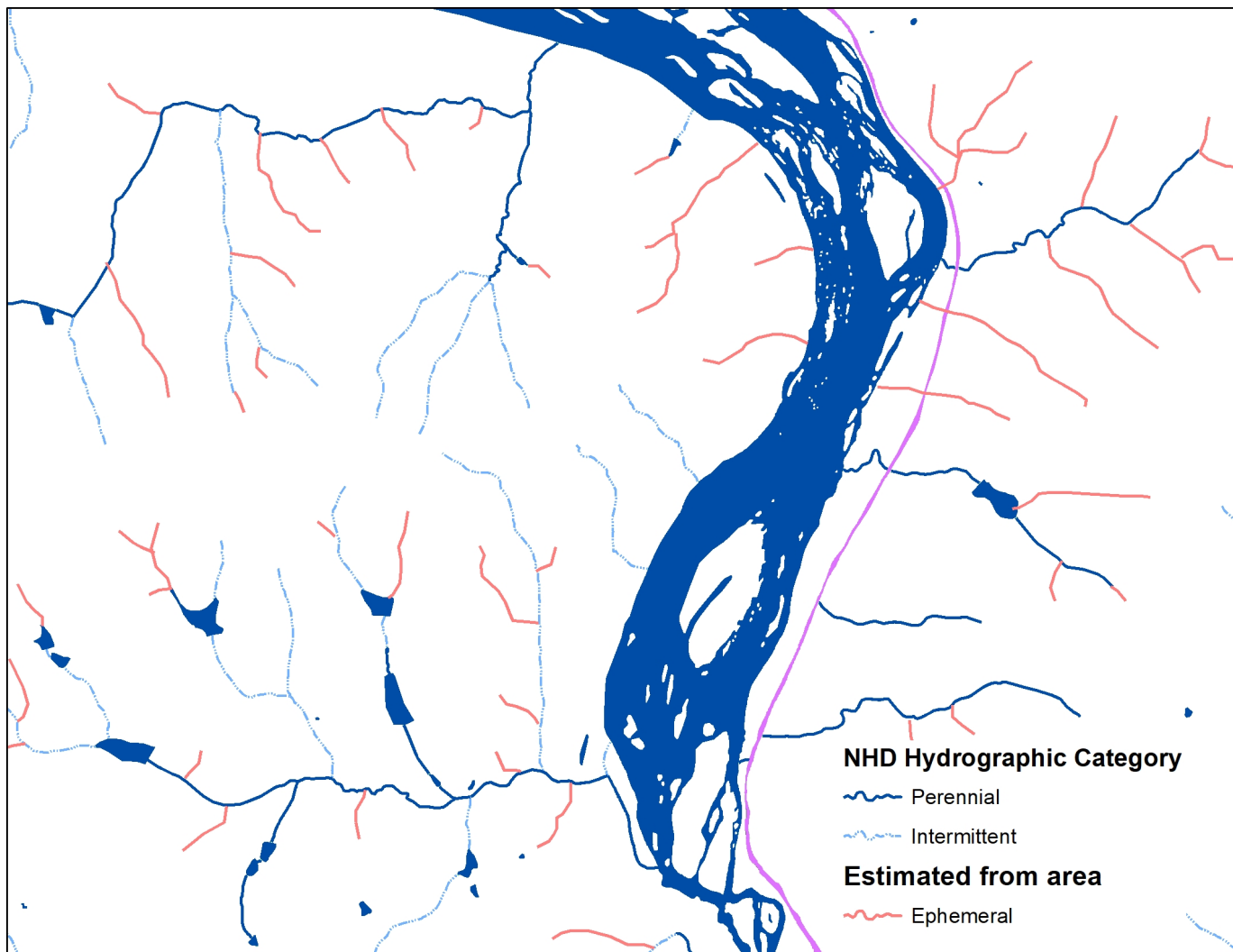
- Best available national map for describing pattern and location of streams and stream types

But NHD under-maps stream networks

- 2x to 9x more streams (Fritz et al. 2013, Hamada et al. 2016)

Many approaches for identifying stream channels

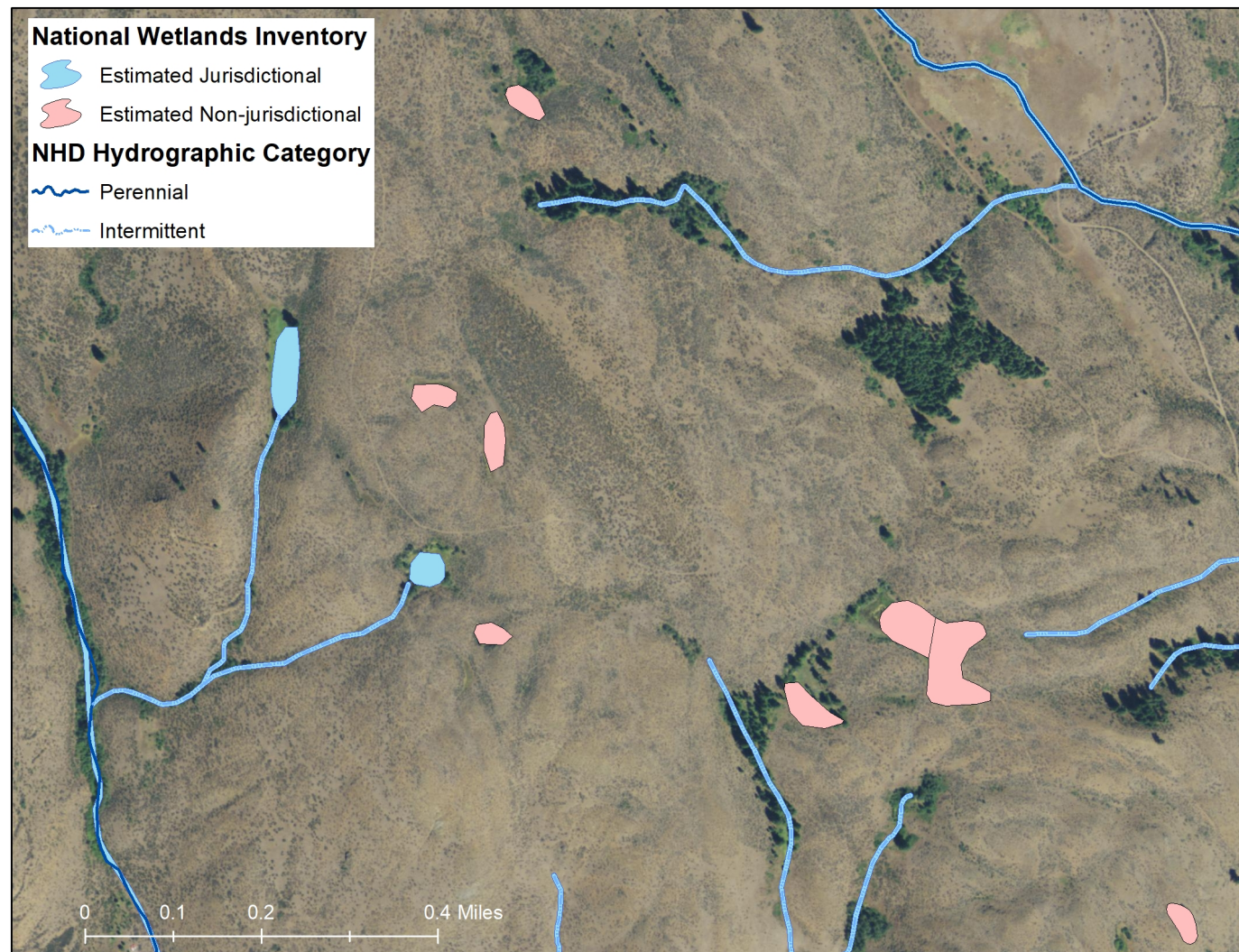
- Stream channel initiation with 2 ac. - 24 ac. watershed area (Montgomery and Foufoula-Georgiou 1993, Vandaele et al. 1996)



Background: Mapping WOTUS

US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI)

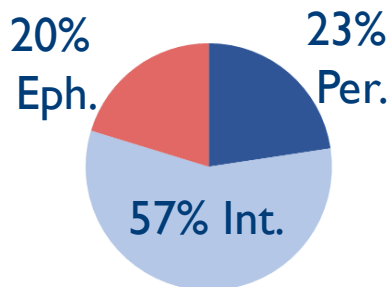
- Best available national map for describing location of wetlands



National Patterns of Stream Type

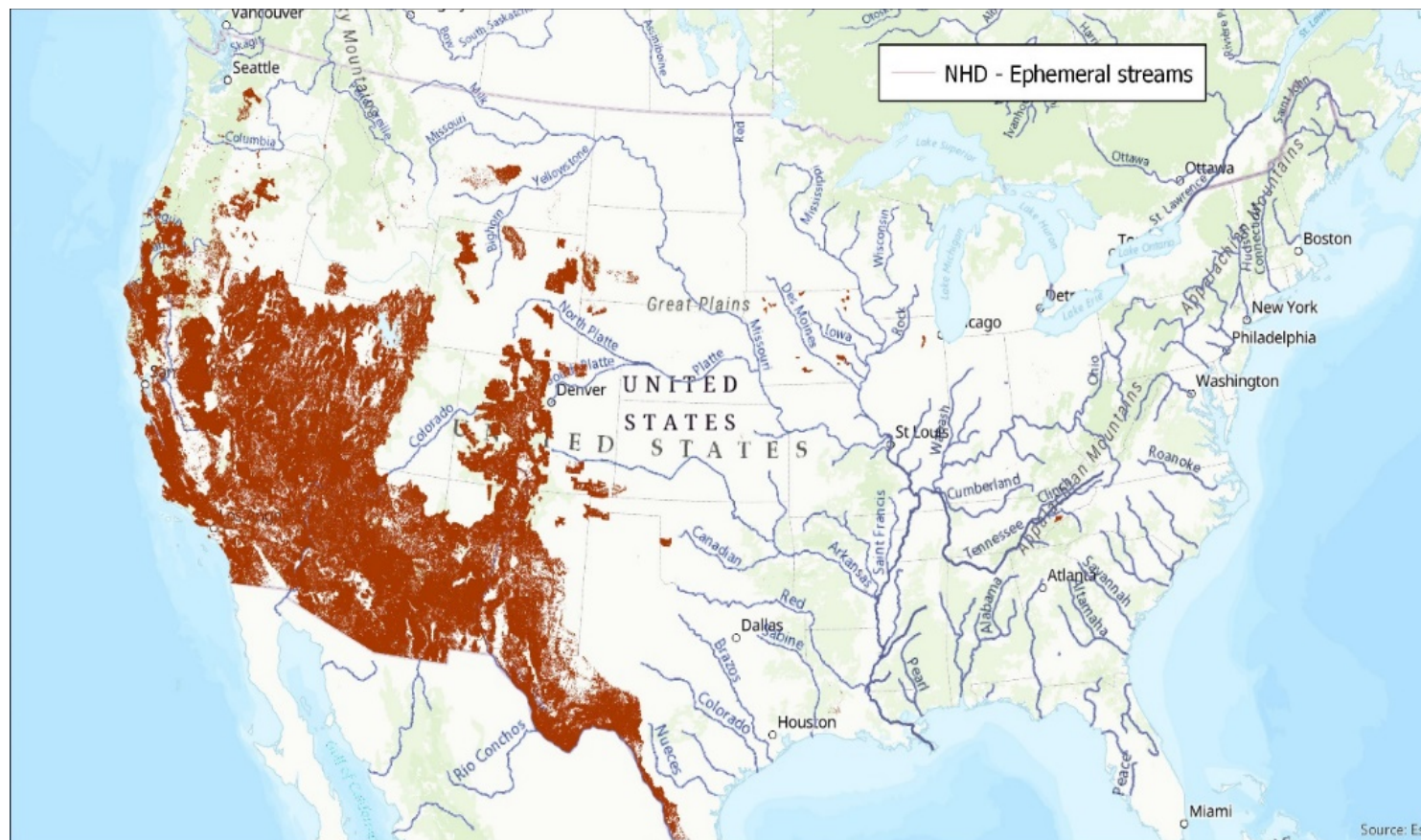
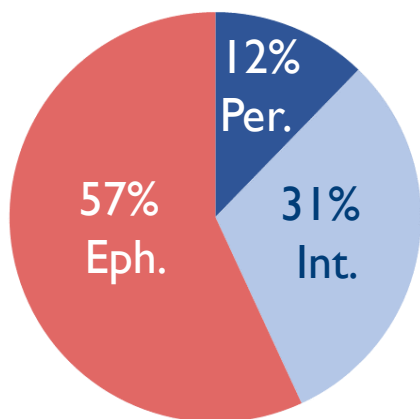


- NHD: ~ 6,500,000 total stream miles



- ~ 5,500,000 additional unmapped ephemeral stream miles

- Combined: ~ 12,000,000 total stream miles

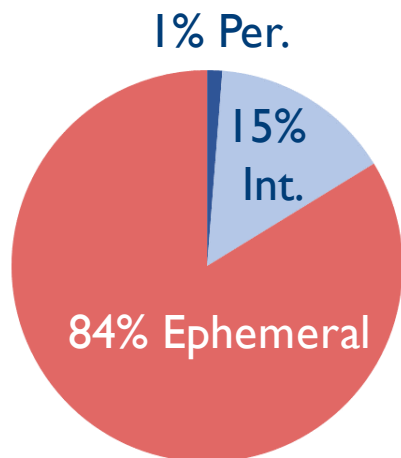


EPA estimates underrepresent ephemeral streams which leads to false conclusion that few streams will be impacted by the proposed rule.

State Patterns of Stream Type: Arizona

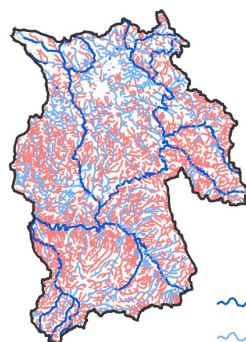
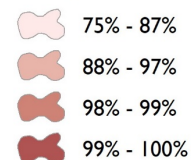


- Combined: ~ 693,000 total stream miles

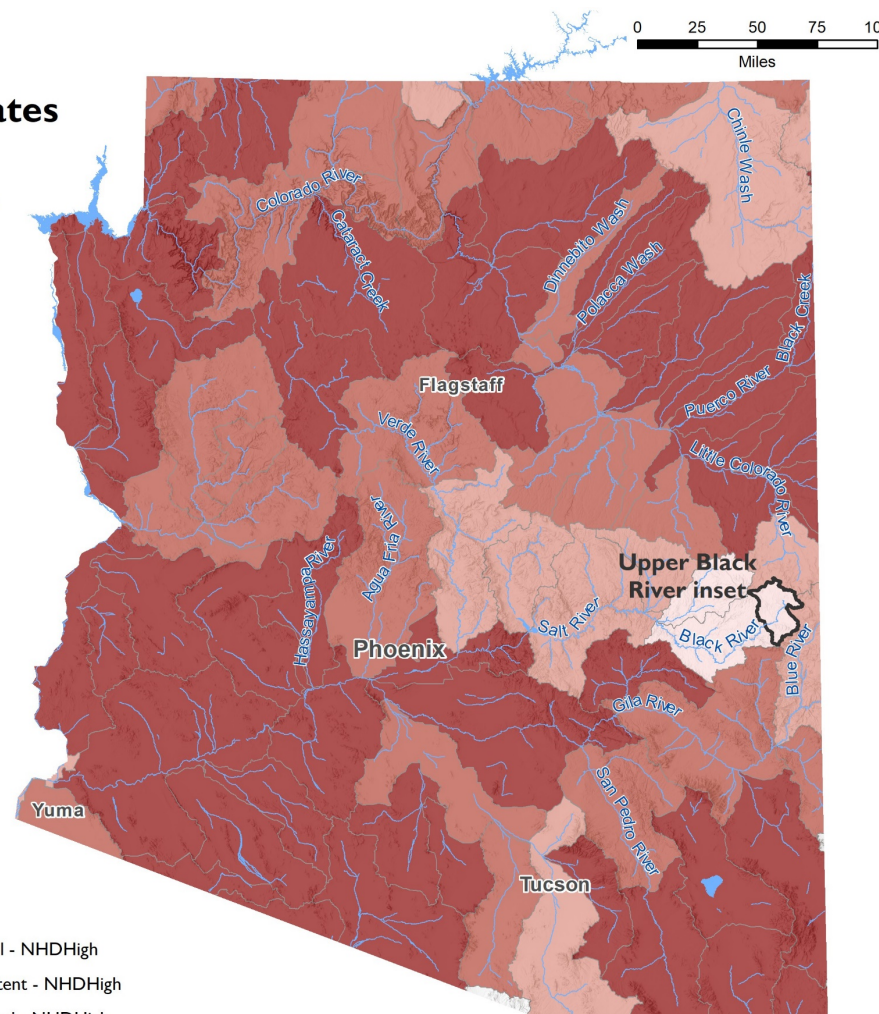
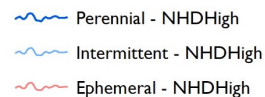


Waters of the United States Arizona

% intermittent/ephemeral streams
NHD High Resolution



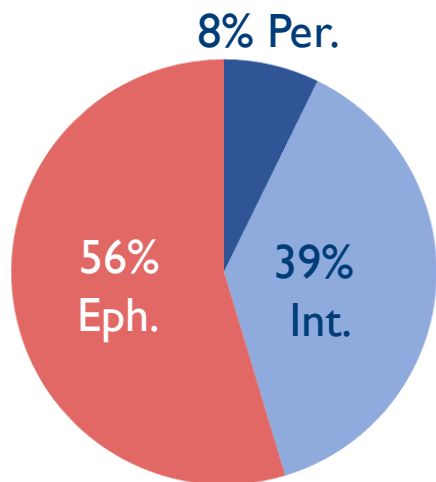
Upper Black River



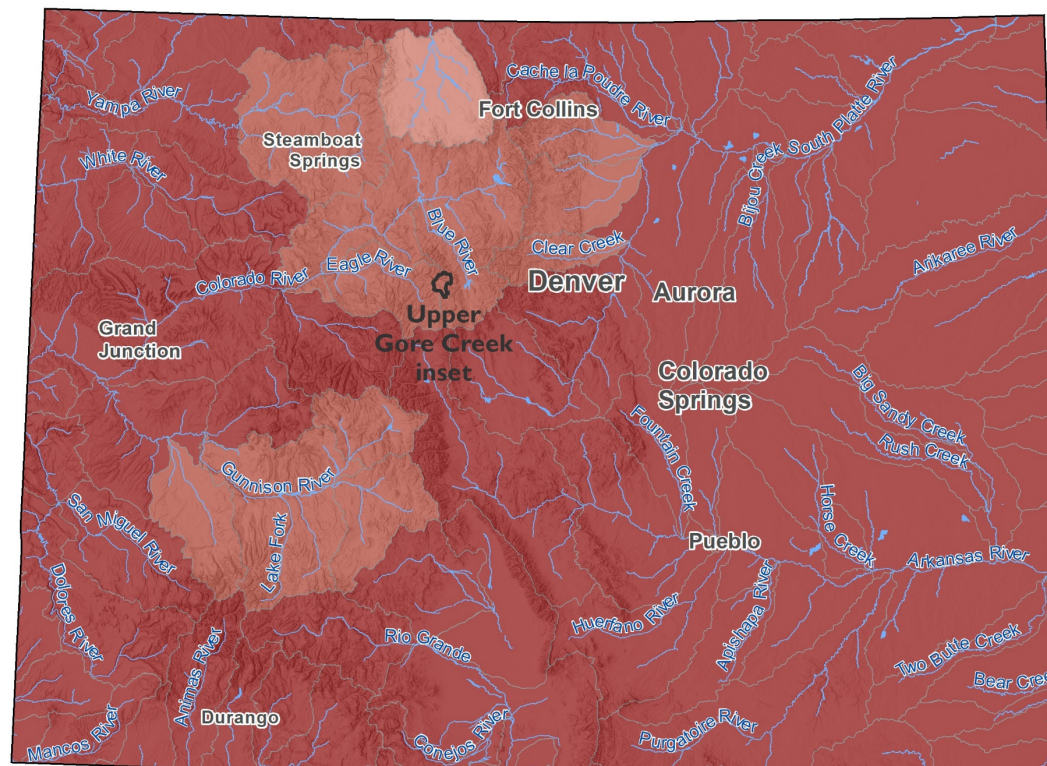
State Patterns of Stream Type: Colorado



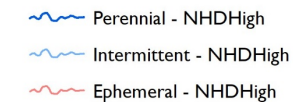
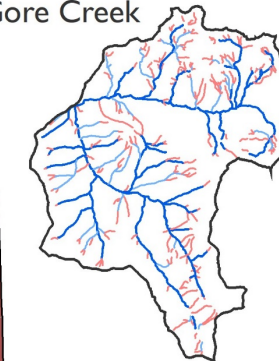
- Combined: ~ 636,000 total stream miles



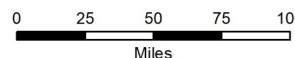
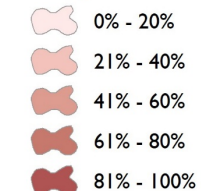
**Waters of the United States
Colorado**



Upper
Gore Creek



**% intermittent/ephemeral streams
NHD High Resolution**



Patterns of Wetland Type: Cottonwood River, MN



- Nationally: 16.9 million acres estimated to lose protection
- Cottonwood River, MI: 57,371 total acres wetlands

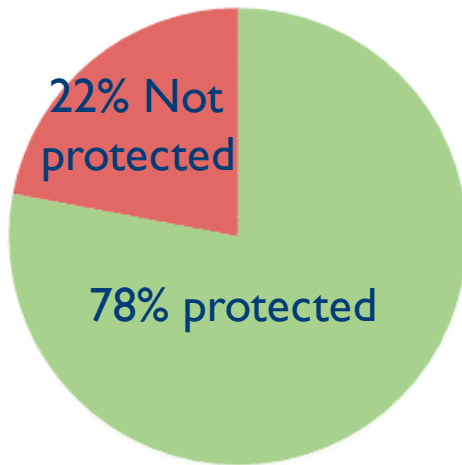
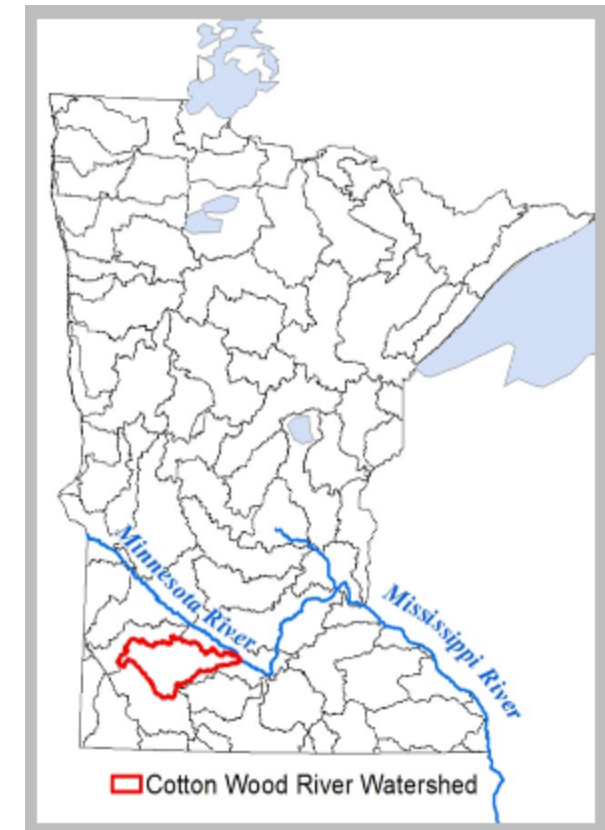


Photo: Saint Mary's University of Minnesota



Safeguards matter



- Ephemeral stream channels are present in all states, but drastically underestimated, likely 20 – 75% of all stream miles.
- Non-floodplain wetlands estimated to total 16.9 million acres, but often provide disproportionate amounts of services – flood control, water quality, habitat.
- Activities on the ground all impact ephemeral streams and isolated wetlands, potentially affecting the function of these features for fish and wildlife, increasing risk of flood, threatening drinking water supply, and transmitting impacts downstream.



Increased Risks: Pipelines

- Proposed 400 mile natural gas pipeline in VA, WV connecting production in Appalachians with consumers on Eastern Seaboard
- Potential impacts: sedimentation and spill during construction and operation (Entrekin et al. 2011, Weltman-Fahs and Taylor 2013)

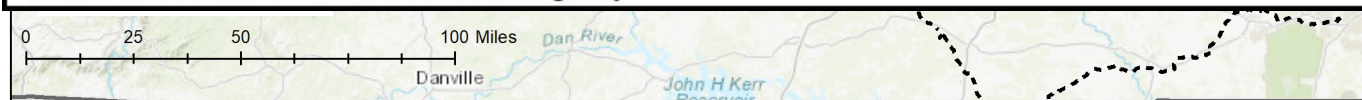


Photos: Mountain Valley Watch, Rick Webb, TU



Note: Taken April 27 at site of Rover Tuscarawas HDD spill in Stark County, OH.

Source: Ohio Environmental Protection Agency

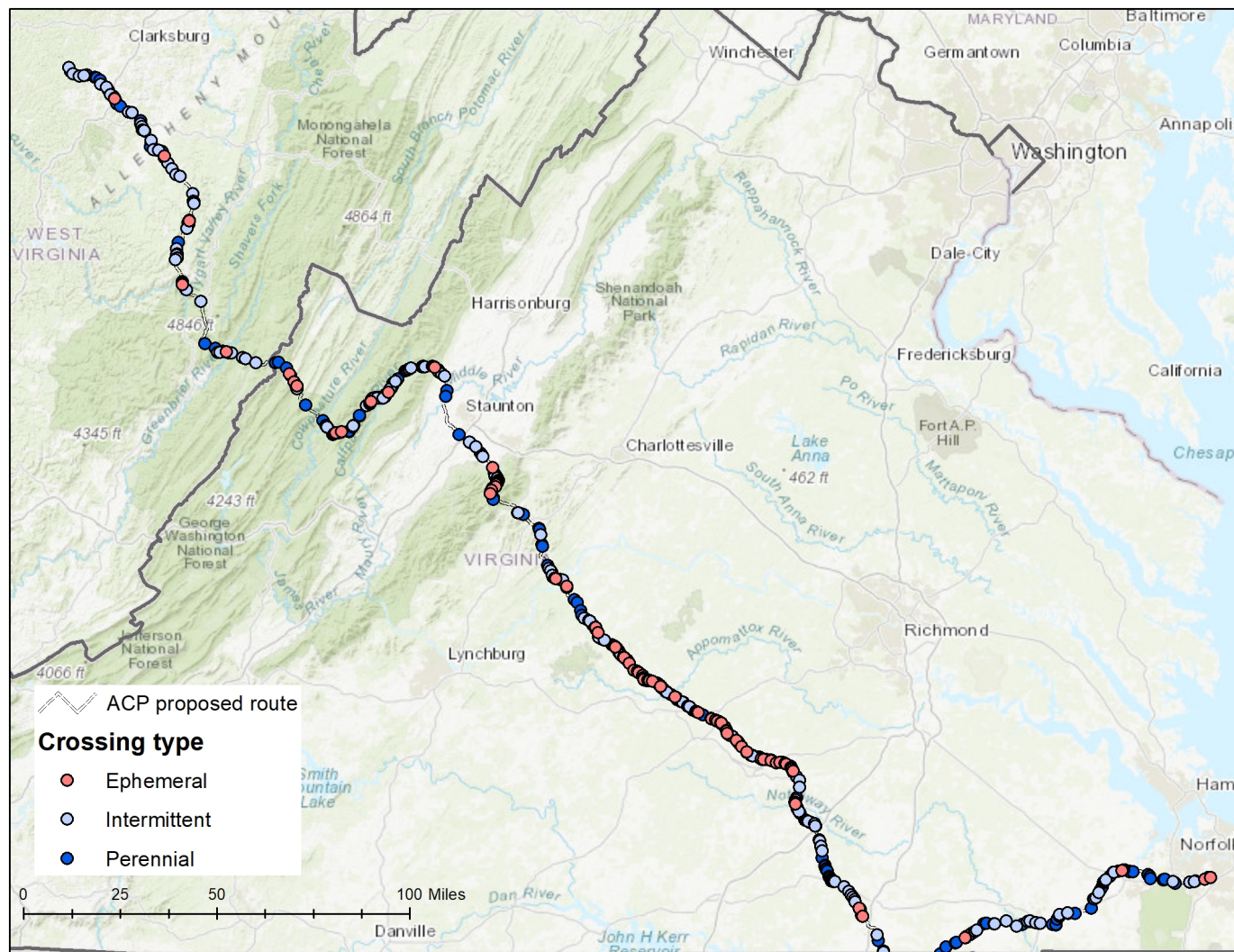
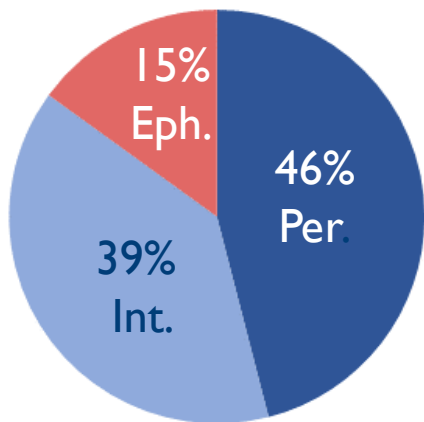


Increased Risks: Pipelines



Stream crossings within 65 feet of proposed pipeline centerline from field surveys:

- **553 total stream crossings** in VA, WV
- Additional crossings associated with access roads and other infrastructure



Increased Risks: Pipelines



Downstream resources from intermittent and ephemeral crossings:

- 177 miles brook trout habitat
- Chesapeake Bay fisheries
- Surface drinking water intakes
- Recreation and downstream communities: Staunton, Lynchburg, Richmond, Washington, Norfolk



Increased Risks: Transmission Lines

- Field surveys identify **181 stream crossings** along proposed transmission line (Canada to Kennebec R.) - **18% ephemeral, 47% intermittent**
- “Regardless of type, these streams provide critical linkages to downstream resources for many species, including wild brook trout” - ME Dept. Inland Fisheries
- **120 isolated wetlands**



Increased Risks: Oil and Gas Development

- Jonah Field, WY road densities can be as high as 8 mi/mi².
- **Up to 3 stream crossings per mile road**
- Downstream fisheries on Green River



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- Non-floodplain wetlands estimated to total 16.9 million acres, but often provide disproportionate amounts of services – flood control, water quality, habitat.
- Activities on the ground all impact ephemeral streams and isolated wetlands, potentially affecting the function of these features for fish and wildlife, increasing risk of flood, threatening drinking water supply, and transmitting impacts downstream.
- Projects not prohibited; Permitting helps to avoid, minimize, and mitigate risk.

