Headwater Streams & Wetlands are Critical for Sustaining Fish, Fisheries, & Ecosystem Services

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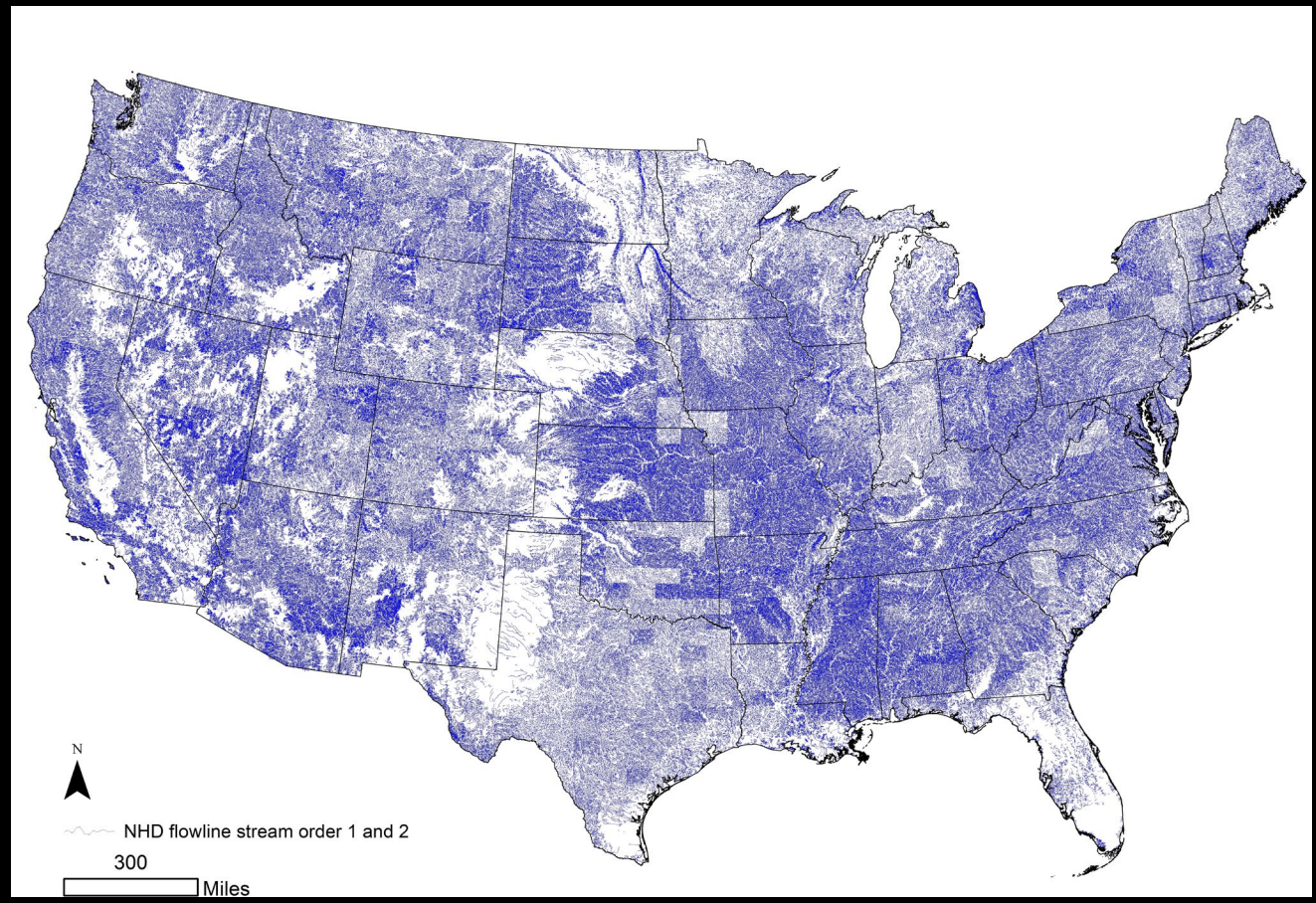
Importance of Headwater Streams

- *Headwater streams & wetlands - integral components of watersheds & surrounding systems*
- *Critical for biodiversity, fisheries, ecosystem functions, natural resource-based economies, human society & culture*
- *Headwaters include many ephemeral & intermittent streams & non-floodplain wetlands which may all lose protection under the proposed rule change*

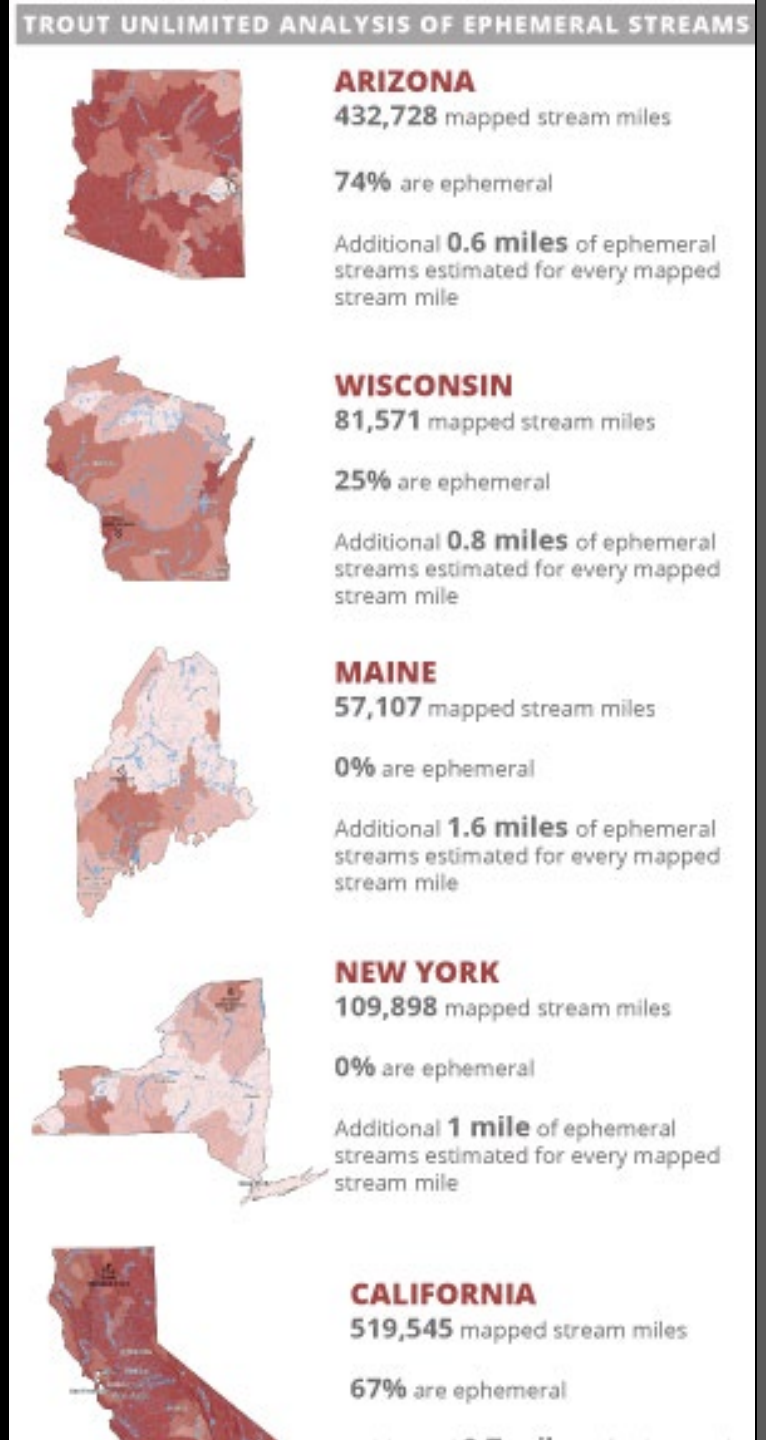
Headwaters

- Majority of global river networks (Datry et al. 2014)
- In US comprise 79% of river length & drain >70% of land area (Colvin et al. 2019)
- *Length likely underestimated*
- *Uneven efforts in mapping & permanence uncertainty & loss (see Colvin et al. 2019)*
- Supply clean water for 1/3 of US population (US EPA 2009)



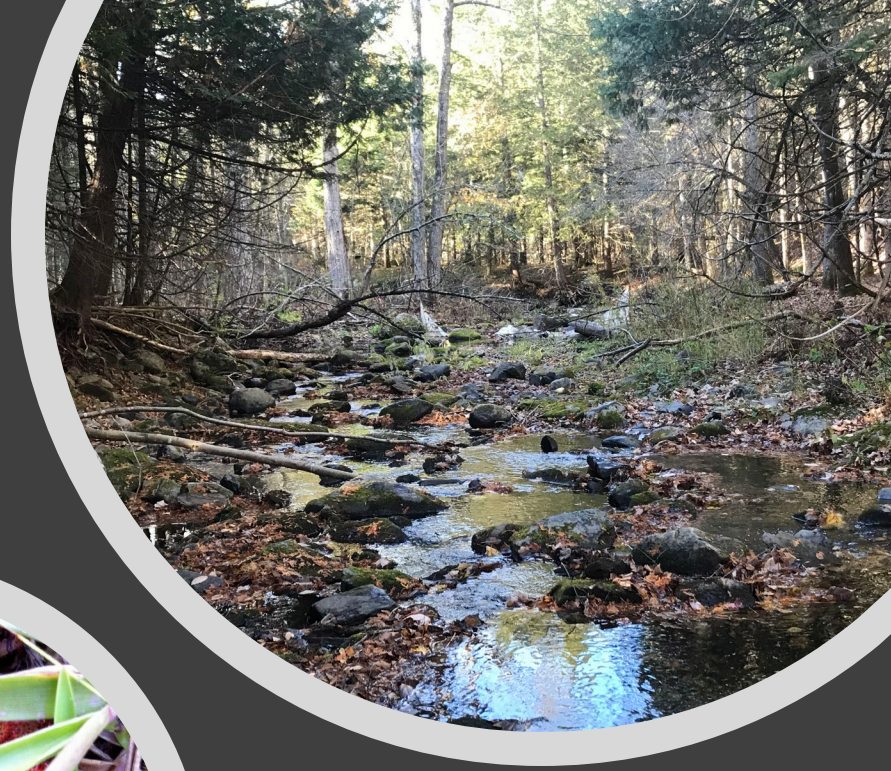
Underestimate of Ephemeral Streams

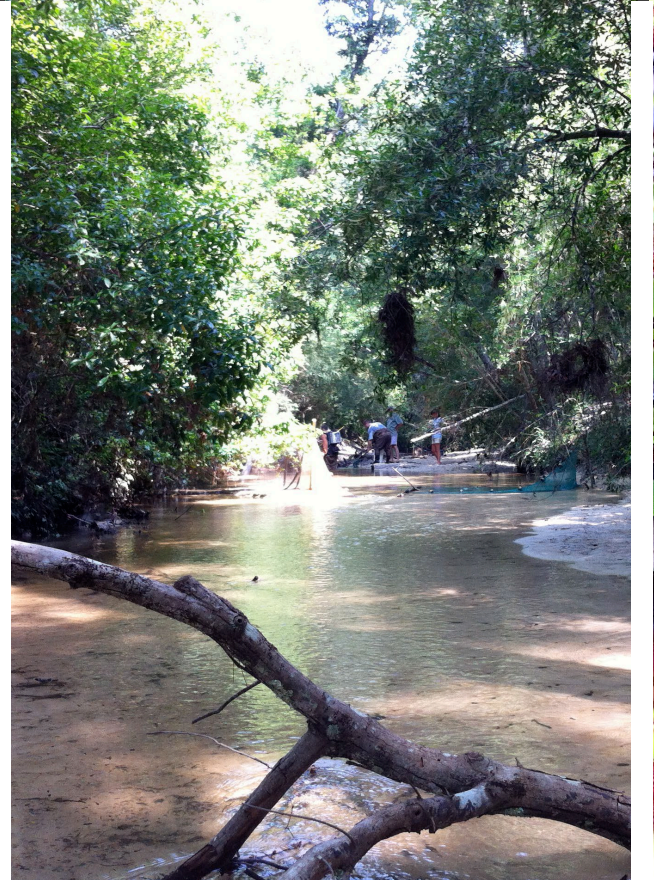
- New Trout Unlimited analysis estimates on average for every 1 mile of mapped stream another 1.5 miles of ephemeral streams exists unmapped
- *Current estimates underrepresent ephemeral streams*
- *False conclusions that few streams will be impacted by the new rule*
- Regionally variable
- Majority of Arizona streams
- 0 in some states – Such as Maine the ‘Stronghold’ for Brook Trout

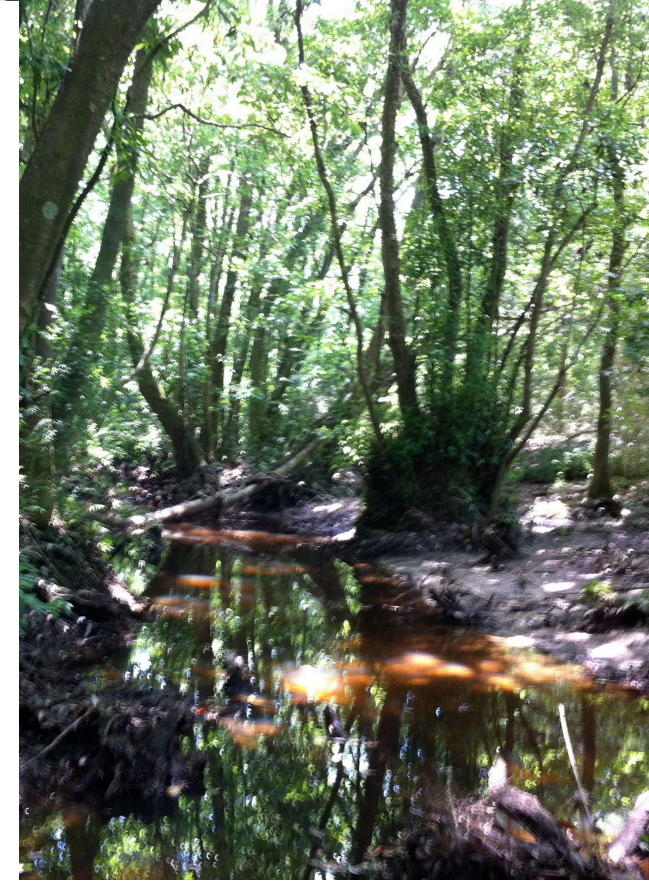


Headwaters

- Headwater streams & wetlands outside of floodplains collectively “headwaters”
- Inherent complexity of natural systems – regionally diverse
- Provide habitat distinct from (& necessary for!) larger downstream systems
- Wetlands outside of floodplains occupy 6.59 million hectares (Lane and D’Amico 2016)
- Collectively the size of the state of West Virginia
- Wetland loss – up to 85% in Midwest (Dahl 1990)



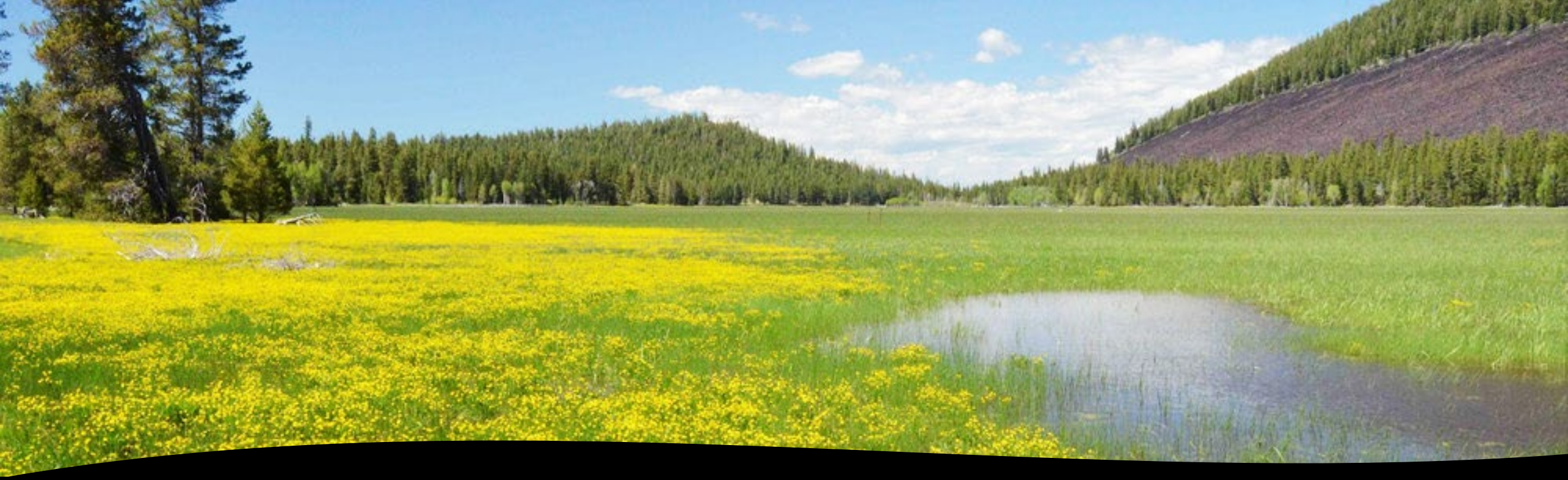


Headwater Diversity – Coastal Plains

Upper Midwest - Prairie Potholes

Figure 2. Aerial view of glacially formed, depressional wetlands of the Prairie Pothole Region. Credit: J. Ringleman, Ducks Unlimited, OCPO7-Fig37 PPR, www.usgcrp.gov

Photo Credit Jim Ringelman



Playa Lakes & Vernal Pools

- Seasonal wetlands of West & East Coasts, Midwest
- Wet/Dry cycles, Flora & Fauna adapted to survive dry conditions & complete life cycle in short wet ’window’
- EPA estimates >90% of California vernal pools already lost
- Photo Credit: Klamath Falls News

Headwaters Support Ecosystems

- Perform ecological functions: biological, geochemical, physical
- Provide habitat & resources for endemic & downstream fishes & aquatic organisms
- Fuel surrounding food webs
- Contribute to nutrient cycling
- Deliver water, sediments, organic material such as woody debris to downstream systems
- Enhance flood protection
- *Provide $15.7 Trillion USD per year in ecosystem services for conterminous US & Hawaii (Creed 2017)*

Arid Regions

- Ephemeral streams up to 96% of some stream systems (Meyer et al. 2003)
- Critical for maintaining these aquatic systems
- Death Valley Pupfish spawn during spring flows in Death Valley National Park, CA
- Later take refuge in headwater pools
- Up to 31 rare & endangered fish species inhabit headwaters or springs in Nevada, Utah, California

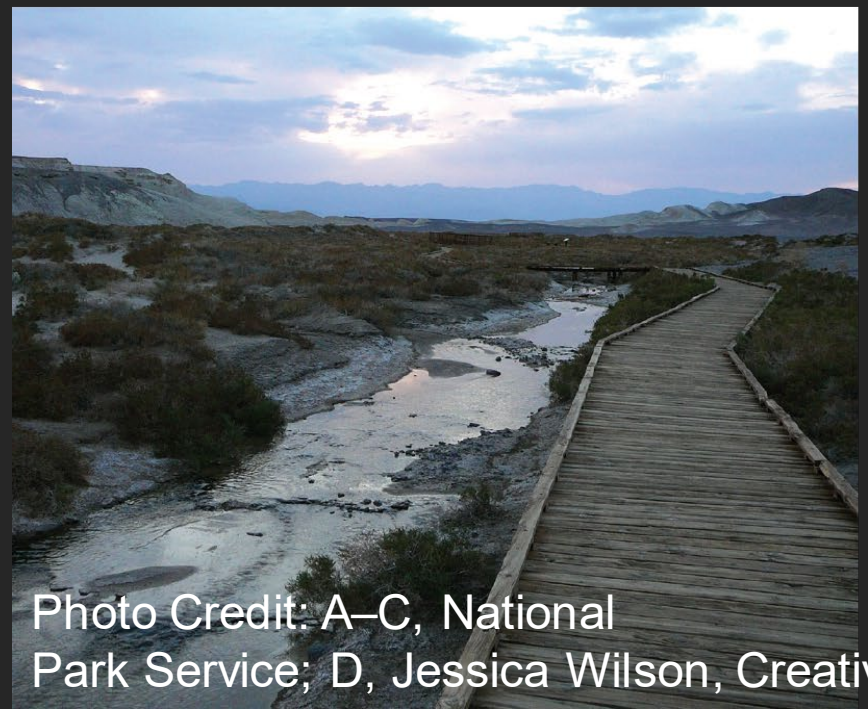


Photo Credit: A–C, National Park Service; D, Jessica Wilson, Creative Commons.

Headwaters Support Imperiled Species

- Habitat loss & pollution primary causes of aquatic biota extinction
- Endangered Alabama Cavefish & Threatened Ozark Cavefish occupy caves supplied by intermittent streams as well as seeps & sinkholes (Graening et al. 2010, USFWS 2017)
- Federally listed Coho & Chinook Salmon juveniles occupy headwater tributaries & seasonal floodplain wetlands during winter

Federally Endangered Atlantic Salmon

- Early summer, adults migrate up rivers & streams hold in deep cool, oxygenated pools
- Eggs, larvae, & juveniles need these conditions & clean gravel for growth & survival
- Recovery may require reestablishing other headwater dependent diadromous species - Alewives - important prey
- $60 million spent on Maine dam removals (Photo Credit NOAA)
- *Rule changes that exclude intermittent headwaters in the PNW & NE would allow pollution & habitat destruction & further risk extirpation of salmon*

Economic Impact

- Commercial & recreational fisheries contributed over $208 billion in economic impact & 1.62 million jobs in 2015 (NMFS 2015)
- Bristol Bay AK Fishery provides $1.5 Billion annually (BBNC 2017)
- Nationally, trout anglers spent $3.5 billion, supported >100 thousand jobs in 2006 (USFWS 2014)
- Maine eel fishery contributed $20 million in 2018 (Whittle 2018)

Headwaters are Culturally Significant

- Cultural values of headwaters - diverse & clearly expressed in nature-based tourism, aesthetic values, recreational fishing
- River Herring migrate from ocean to spawn in Maine headwaters - resource with cultural importance for Passamoquoddy
- Wild salmonids central roles in creation & migration narratives of Native peoples & present in prayers, visions, & diets
- *National Tribal Water Council Feb. Fact Sheet on rule changes – "Excluding certain waters from the definition would very likely have detrimental impacts for tribes & tribal waters"*
- *Colombia River Inter-Tribal Fish Commission "Without salmon returning to our rivers & streams, we would cease to be Indian people."*

Conclusions

- *Vast majority of US lotic systems are headwaters*
- Much of these - intermittent & ephemeral, face degradation if proposed WOTUS rules take effect & federal protection is lost
- Ecologically distinct off channel wetlands occupy an area of a mid sized US State & will likely lose federal protection
- Headwaters - enormous contributions to biodiversity, economically important fisheries, & high cultural value
- *Federal protection of these streams & wetlands has benefit & continues to be necessary*

No Omega without Alpha, No end without a beginning, No Mighty River without the Tiny Stream

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