2026 CEAM Spring Conference

# Collaborative partnerships to achieve community flood resilience when replacing ageing culverts.

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# Safety and Community Resilience are Core Goals Across Agencies

Mission of Maryland DNR : The Maryland Department of Natural Resources leads the state toward a resilient future by using data, partnerships, and an innovative spirit to improve ecological, social, and economic outcomes for all communities.

For DNR - a major goal of flood resilience work is creating opportunities to meet community needs and natural resource management goals simultaneously

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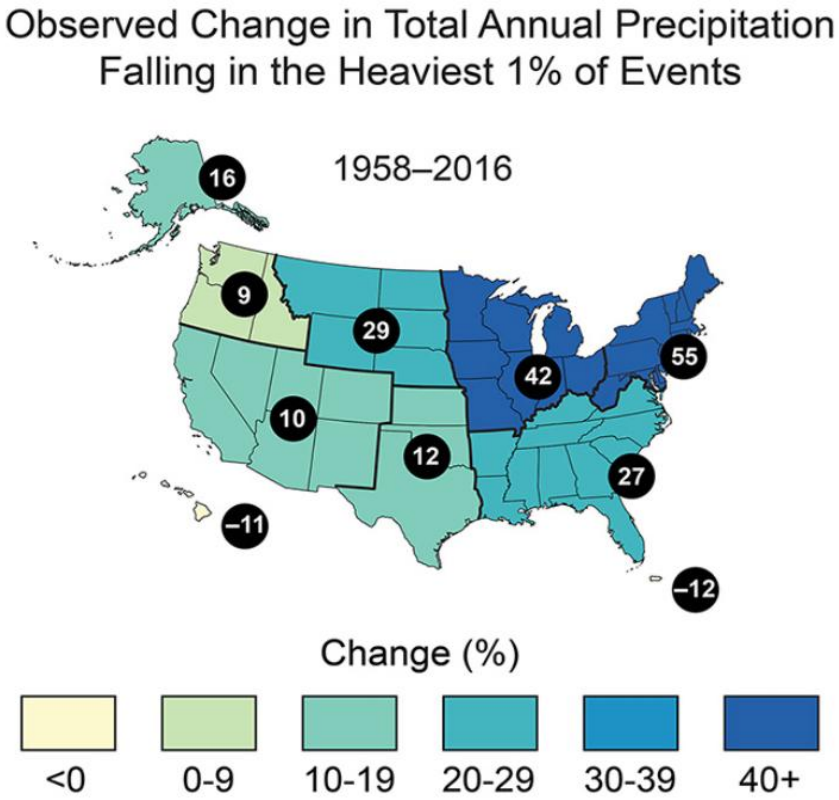


ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Online Publication: Water infrastructure engineers confront an uncertain, changing climate - Jones et al., 2025

…respondents representing private engineering firms, academia, and municipalities, among others — responded to the survey and indicated that they are indeed modifying their historical planning and design practices to account for more extreme climate conditions.

*Increasing recognition that floods pose a growing risk to local communities and municipal infrastructure*

# Saliency following recent events


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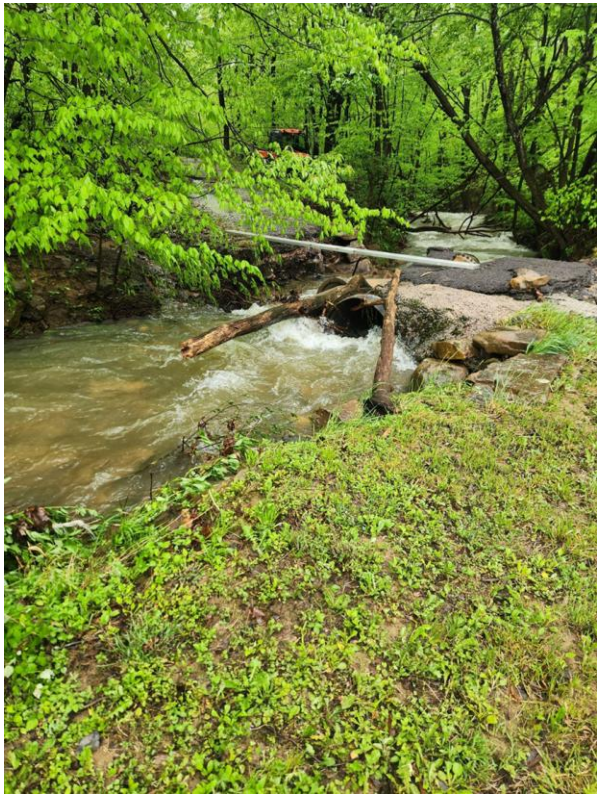
# What practical steps can be taken to reduce flood risk?

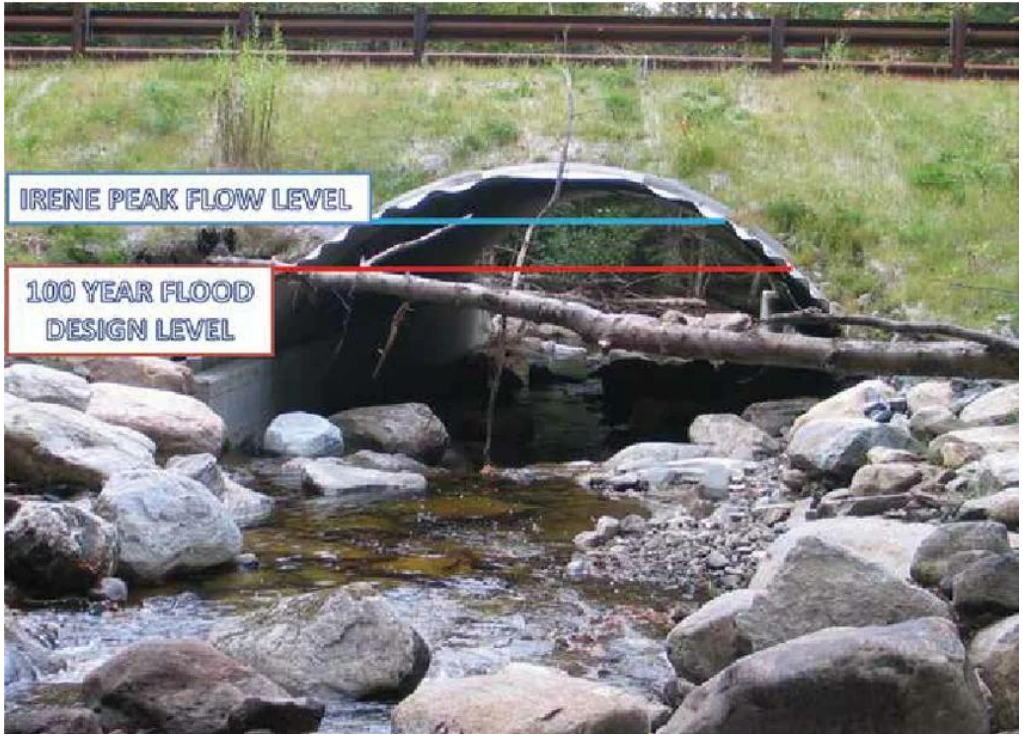
Target Road Infrastructure Upgrades to Address Known Pinch Points that Contribute to Flood Risk

# Culverts as Pinch Points

- Hydraulic design approaches / in-kind replacements commonly result in structures with limited capacity (2-10-year storm versus 100 plus)
- Creates potential for clogging by woody debris
- Can increase risk of property damage when homes are located adjacent to stream crossings



# Bigger is Better




- Increased flow capacity
- Reduces clogging and failures
- Provides fish passage

# Connected Stream Systems Are Integral to the Life Cycle of Migratory Fish Species

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# Hurdles to Adoption

- Increase in project length and required technical capacity related to design and permitting
- Upfront design and structural costs higher than in-kind replacements
- O'Shaughnessy et al., 2016 - Cost Benefit Analysis

"found that in nearly half of all cases remediation with ecological design culverts was more cost effective than maintaining hydraulic culverts and that it is most cost effective on small streams compared to larger ones. We also found that higher upfront replacement costs for ecological design culverts are overcome by their lifetime fiscal benefits."

# Framework to address technical capacity and funding needs - **Partnership is Key**

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- Because of nexus with fish passage/habitat improvement, technical expertise available through conservation partners like **Trout Unlimited**
- Funding mechanisms exist in both the infrastructure and environmental space for achieving flood resilience outcomes
- Examples include: USFWS National Fish Passage Program; NFWF Chesapeake Bay Stewardship Program, USDOT BUILD program
- Many funders require matching contributions
- Equipment and in house construction crews act as valuable match source

# 2024 - Shallmar Road Pilot Project - Partners GC DPW, Trout Unlimited

# Temporary Bypass

# Construction

# Completed Project

# Planned Flood Resiliency Efforts 2026

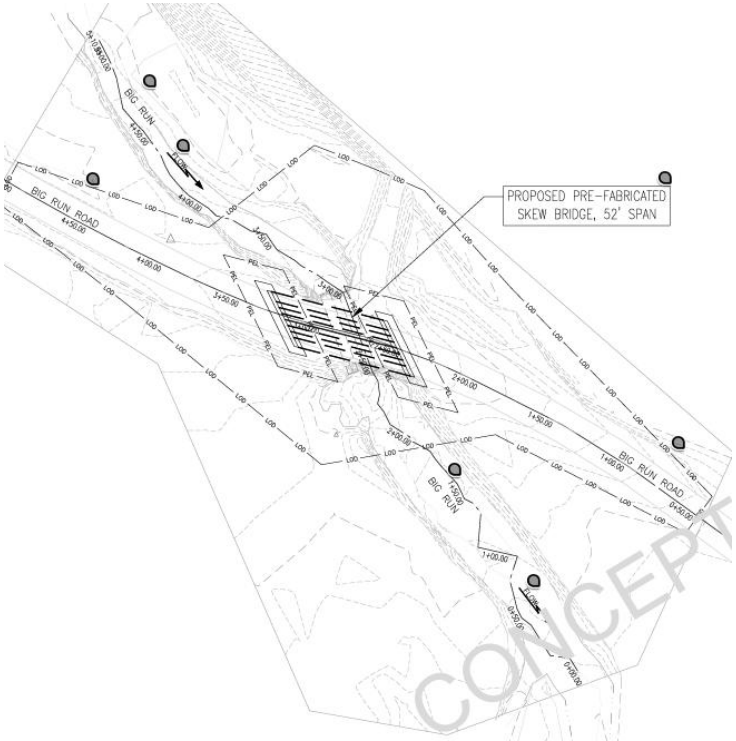
Garrett County DPW Partnership:

1) Big Run Rd @ Big Run - Two failing culverts (~12-foot total span) with a skewed rolled girder bridge (~50-foot span).
2) Savage River Road @ Bear Pen Run - Undersized culvert (~ 6-foot total span ) to be replaced with 41-foot box beam bridge.
3) MDNR assisted GC DPW in submitting a $1.5 million competitive grant application to USDOT BUILD to design 6 flood resilient crossings

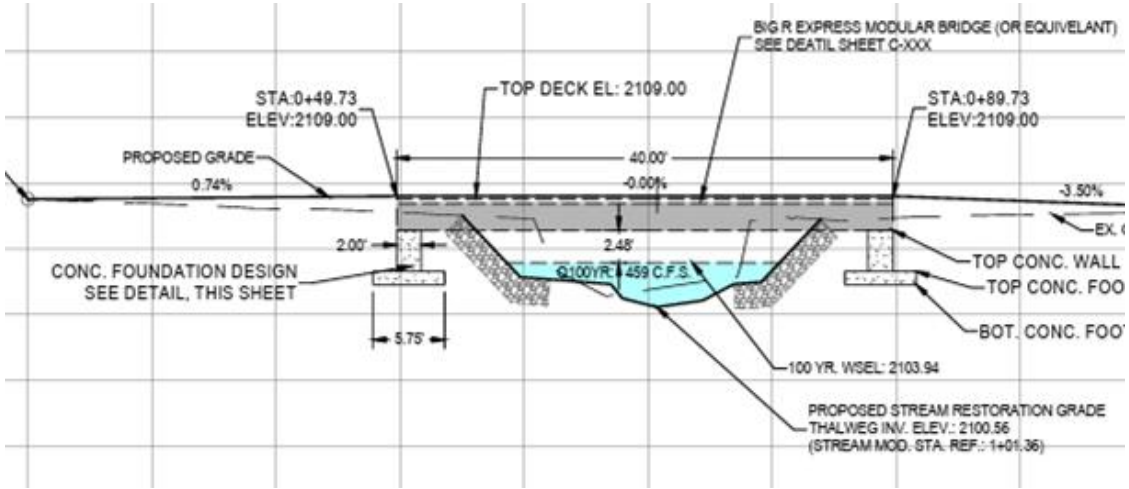
Additional Community Partnerships:

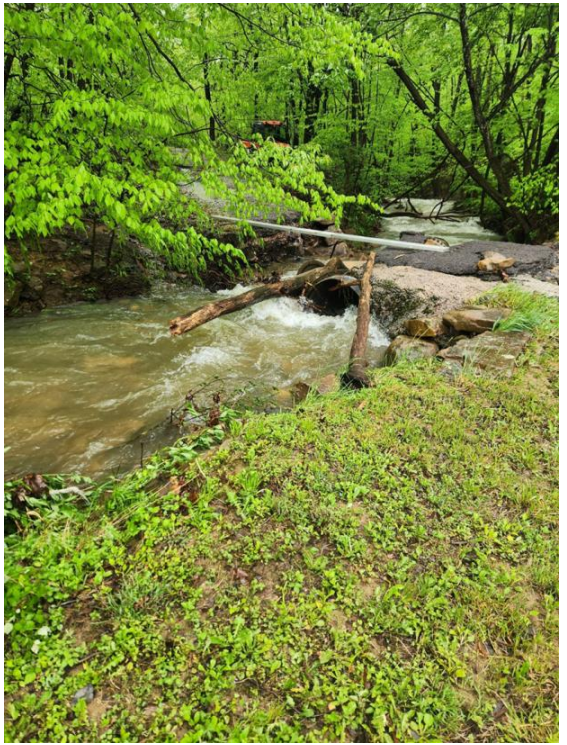
- Winebrenner Run @ Midlothian Water Supply (Allegany County) - Two failed culverts to be replaced with 40-foot bridge

# Big Run Road @ Big Run



# Winebrenner Run @ Midlothian Water Supply



# Where to Next?

- A likely problem for County DPW's is the sheer number of ageing culverts in need of replacement (scale of problem versus technical/funding capacity)

- Funding mechanisms in the environmental space are often tied to species specific habitats and are highly competitive

- With increased recognition of the risk of flooding - conversations are needed with relevant decision makers to develop reliable funding mechanisms focused on collective achievement of flood resilience and aquatic habitat goals

# Thank You

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