

Identifying Barriers to Organisms and Hazards to Communities

Road Stream Crossings

Poorly designed and undersized culverts are barriers to aquatic organisms and hazards to communities during storms. Streams are linear habitats for aquatic and semi-aquatic species such as American eel, herring, stream salamanders and macro-invertebrates. Road crossings can fragment streams into small pieces, preventing organisms from accessing critical habitats. Studies have found that about two-thirds of crossings are not fully passable to aquatic organisms, and New York is estimated to have 1.2 million road/stream crossings. In addition to blocking aquatic organisms, culverts may be infrastructure liabilities and flooding hazards for communities. Due to landscape changes from development and increased rainfall amounts during large storms, many culverts are too small to pass the amount of water they need to.



Figure 1: Culverts such as this one constrict the natural flow of the stream and contain no natural streambed substrate. Perched culverts such as this one fragment stream habitats.

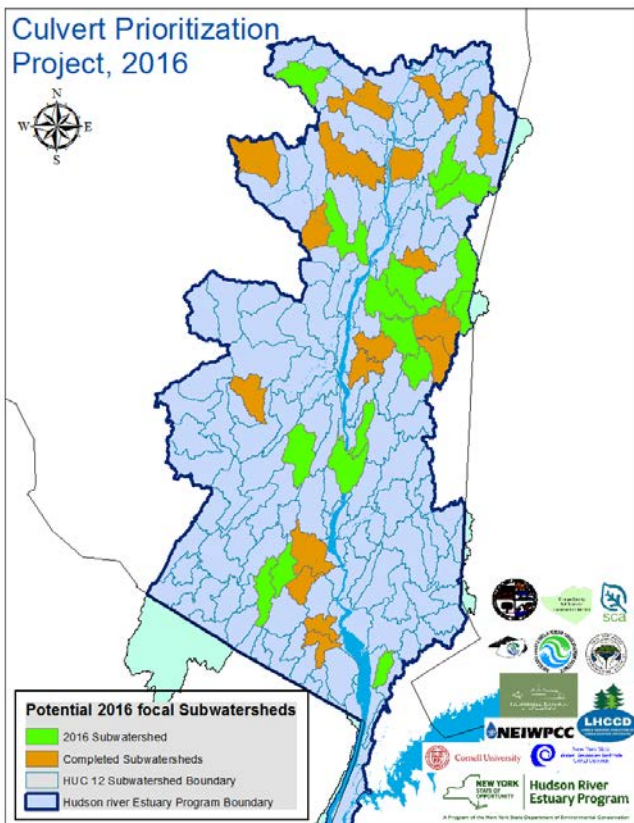


Figure 2: Culvert assessments have been conducted in seventeen subwatersheds, with sixteen more underway.

During storms, undersized and/or improperly installed culverts can become clogged with debris or overwhelmed, leading to road flooding, stream bank erosion, or even washout of the whole road.

Municipalities receive help prioritizing culverts that need to be upgraded, benefitting both aquatic organisms and communities' bottom lines.

The NYSDEC Hudson River Estuary Program, other NYSDEC branches, Soil and Water Conservation Districts, and interested county and local partners are working to reconnect tributaries within the Estuary watershed by field surveying culverts and bridges, identifying and prioritizing the impassable and undersized crossings. Field observers use the North Atlantic Aquatic Connectivity Collaborative's (NAACC) stream passability protocol to rate culverts for the ease of access for aquatic and riparian species. Road crossings with unnatural stream bottoms, a perch where a culvert adds an unnatural step to the stream, and other conditions are often barriers to organisms.

Hydrologists from Cornell University model each crossing for the maximum storm interval (return period) the crossing could pass without spilling over the road. The project results in

ecological and economic information-replacing failed culverts is a financial burden to the community and also disrupts essential services such as hospital access during flood events. **The project connects interested communities with funding sources to replace impassable, undersized culverts with fully passable, properly sized culverts.**

Work Completed So Far

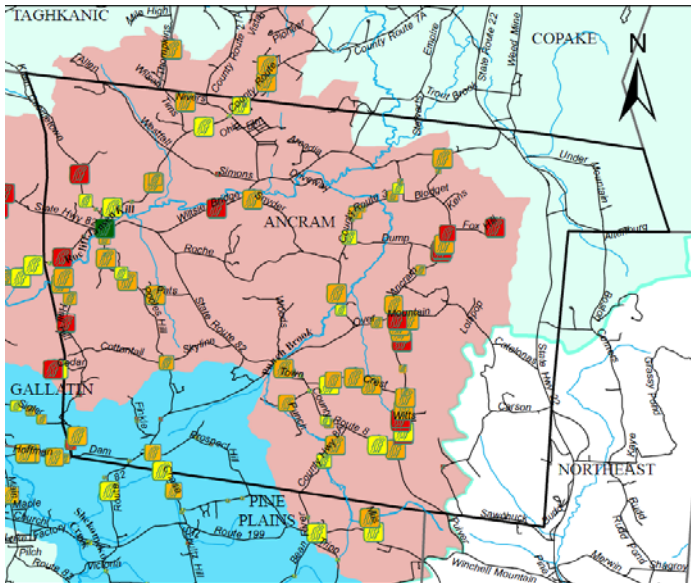


Figure 3: Local partners such as the Town of Ancram receive a summary map of all road crossings surveyed. Red icons represent culverts that are significant barriers to organisms and the largest icons identify culverts that cannot pass the flow expected from a two-

Foot From 2013-2015 over 2100 culverts in sixteen focal subwatersheds were assessed and prioritized for their passability for aquatic organisms and their capacity to pass storm flows (Figure 2). Detailed information and pictures on each crossing are available through the NAACC’s database (streamcontinuity.org). An interactive map of these sites may be found on the Aquatic Connectivity page at the New York State Water Resources Institute at Cornell University website (<http://wri.cals.cornell.edu/hudson-river-estuary/watershed-management>). In 2016 the project will potentially assess culverts in fourteen additional subwatersheds within the Estuary watershed. These assessments will be done by Estuary Program and DEC staff as well as partners in County Soil and Water Conservation Districts and university partners. **The results of the project are shared with municipalities and counties interested in both improving their infrastructure and stream habitat for local and migratory fish.** This information is intended for use as a coarse scale prioritization and to introduce partners to the impacts of improper crossings, the benefit

of passable and properly sized culverts, and sources of funding to mitigate the costs. Grants are available through the Estuary Program and other state grant programs.

Future Directions

The end results of this project will give a clear idea of where barriers are and how they fragment stream habitat. An interactive Google Mapper of all known aquatic barriers is available at the Cornell WRI aquatic connectivity webpage (<https://wri.cals.cornell.edu/hudson-river-estuary/watershed-management/aquatic-connectivity-and-barrier-removal-culvert-dams>). The Estuary Program is working with partners to fix problem crossings. Interested potential partners such as municipalities, universities or watershed alliances are encouraged to contact Andrew Meyer.

CONTACT INFORMATION

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KEY POINTS

Project has assessed over 2100 crossings

- 50% of these are barriers to aquatic organisms
- 60% undersized
- Problems are more pronounced for locally owned roads