

AQUATIC CONNECTIVITY IN THE HUDSON RIVER ESTUARY WATERSHED

Identifying Barriers to Organisms and Hazards to Communities

Summer 2015

What is Aquatic Connectivity?

Streams are linear habitats for aquatic and semi-aquatic species such as American eel, herring, stream salamanders and macro-invertebrates. If road crossings of streams are not designed to allow passage they can disconnect these habitats, fragmenting streams into small pieces and preventing organisms from accessing critical habitats (Figure 1). This is a common problem, and New York is estimated to have 1.2 million road/stream crossings.



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.

Risks

Poorly designed and undersized culverts can be significant barriers to aquatic organisms and flooding hazards to communities during storms. Culverts can become clogged with debris or become overwhelmed with water during high flows, leading to road flooding, stream bank erosion, or even washout of the whole road.

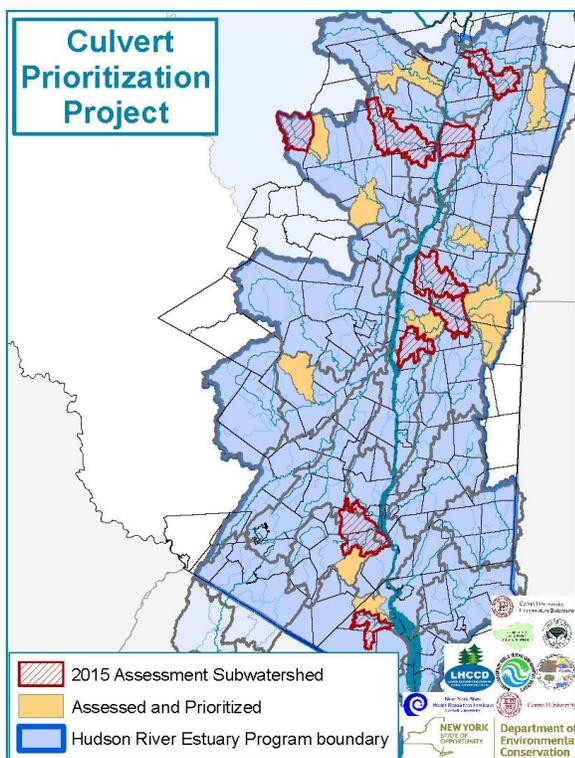


Figure 2: Culvert assessments have been conducted in eleven subwatersheds, with nine more underway.

Culvert Prioritization Project

Helping municipalities prioritize culverts that need to be upgraded will benefit both aquatic organisms and the safety of our communities. Statewide, the NYSDEC, with a focus by the Hudson River Estuary Program, NYS Water Resources Institute at Cornell University, Soil and Water Conservation Districts, Cornell Cooperative Extension, and interested county and local partners are working to reconnect tributaries by identifying problem culverts. This work identifies and prioritizes impassable and undersized crossings. Observers use the North Atlantic Aquatic Connectivity Collaborative's (NAACC) stream assessment protocol to rank culverts for their level of aquatic organism passage. Road crossings with unnatural stream bottoms, culverts with an outlet

perch that forms an unnatural drop to the stream, and other conditions are often significant barriers to aquatic organisms. Hydrologists from Cornell University model each crossing for the maximum storm

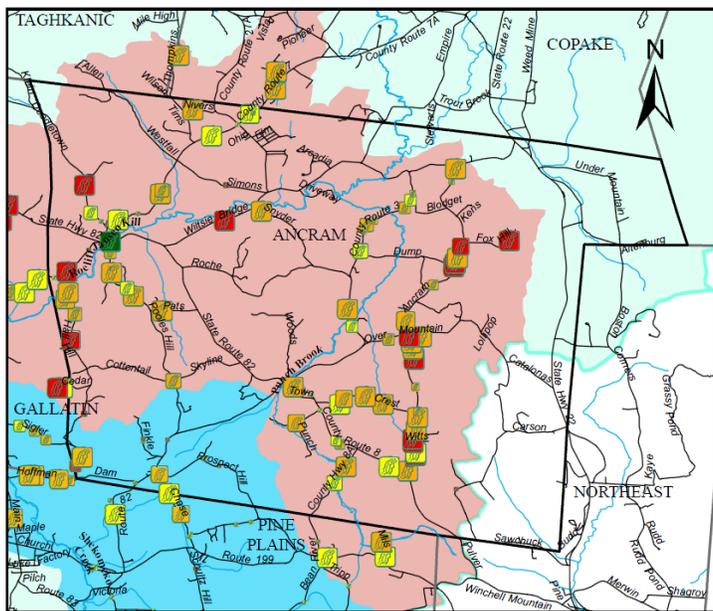


Figure 3: Local partners receive a summary map of all road crossings surveyed. Red icons represent culverts that are significant barriers to organisms and the largest icons identify culverts that cannot pass the flow expected from a two-year storm.

interval (return period) that a road/stream crossing could pass without failing. The project results in recommendations that highlight those locations that are impassable to organisms, are a risk to communities during flooding and are more likely to pose economic burdens from failing.

Results

The project prepares interested communities to apply for transportation, resiliency, and ecological funding sources to replace impassable, undersized culverts with fully passable, properly sized culverts.

From 2013-2014 over 1300 culverts were assessed and prioritized (Figures 2 and 3). An interactive map of these sites may be found on the Aquatic Connectivity page at

the NYS Water Resources Institute website (<http://wri.cals.cornell.edu/hudson-river-estuary/watershed-management>). In 2015, the project will assess culverts in nine additional subwatersheds within the Estuary watershed.

The results of the project are shared with partners interested in improving both their infrastructure and the ecology of streams used by local and migratory fish (Figure 4). 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 of upgrading. Grants are available through the Estuary Program and other state grant programs.

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Figure 4: American eels, shown here in their glass eel form, migrate from the ocean up the Hudson River, and far up into connected tributaries.