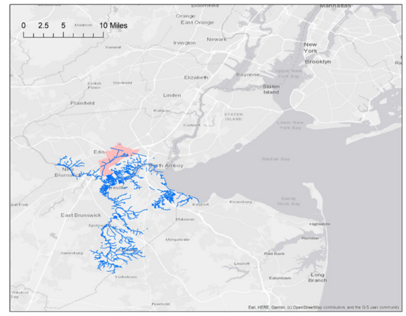
Aquatic Connectivity Through Climate-Ready Infrastructure

Mill Brook Subwatershed

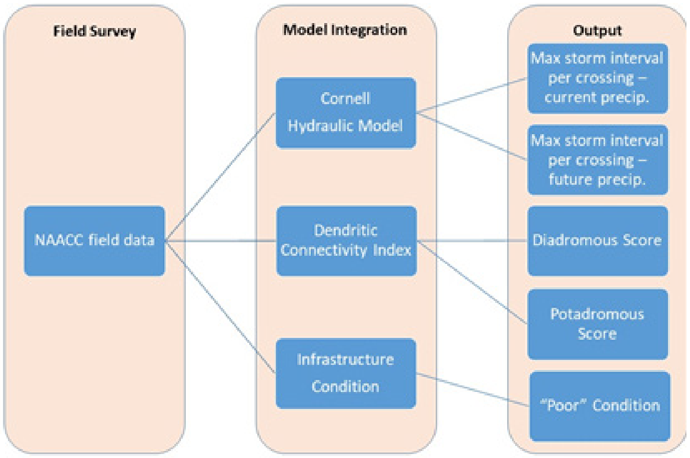


This assessment found five priority restoration projects in this subwatershed that will address aquatic connectivity, hydrologic capacity, and/or crossing condition. Mill Brook one of the larger streams in the area and appears to have good habitat value. Compared to other nearby watersheds, this watershed had many sightings of aquatic life during the NAACC assessments including fish, adult eels, and a large snapping turtle. The watershed is not very dendritic (branching), meaning that the barriers that do exist can be problematic for fish migration and are important to address. This watershed has many opportunities for restoration of crossing structures that address fish passage, capacity issues, and structural condition, in addition to the ones prioritized here.

Background

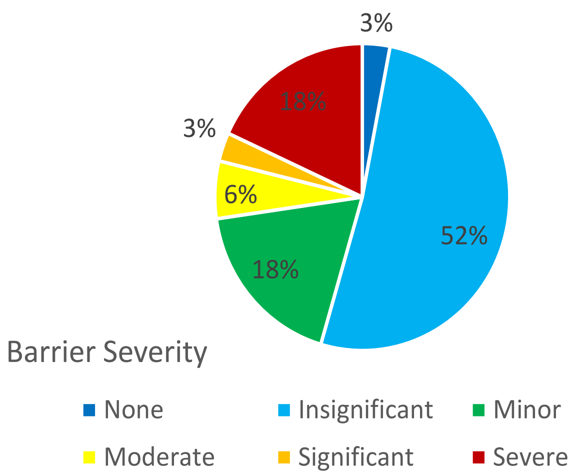
Aquatic connectivity is a key restoration goal for the New York – New Jersey Harbor & Estuary Program (HEP) and its partners because this connectivity is crucial for improving healthy aquatic ecosystems and managing severe storms and flooding caused by climate change. Recommendations for barrier removal were made based on the following assessments: the North Atlantic Aquatic Connectivity Collaborative (NAACC); dendritic connectivity; a culvert capacity model developed by Cornell University; and infrastructure condition. The assessment is being shared with stakeholders to advance planning and capital projects that will replace problematic road-stream crossings with climate-ready, connectivity-friendly versions.

This assessment was made possible by funding from the EPA Coastal Watershed Grant administered by Restore America's Estuaries, and in partnership with the Rutgers Raritan River Consortium.

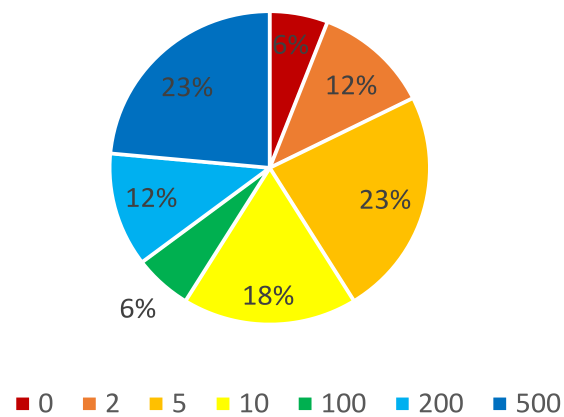


This diagram shows the evaluation process. First, field measurements are taken to estimate how well fish can pass through the culverts and bridges. Then that data is plugged into the Cornell model to estimate the size of the rain event the crossing can accommodate (as measured by the current projections of the 1-year to the 500-year storm events). Individual culverts were prioritized for passage for diadromous species (fish that migrate to the ocean for part of their life cycle), and potadromous species (fish that migrate to different parts of freshwater streams), using a dendritic connectivity index. Finally, crossings were prioritized that were in poor condition (falling apart).

Aquatic Connectivity Results



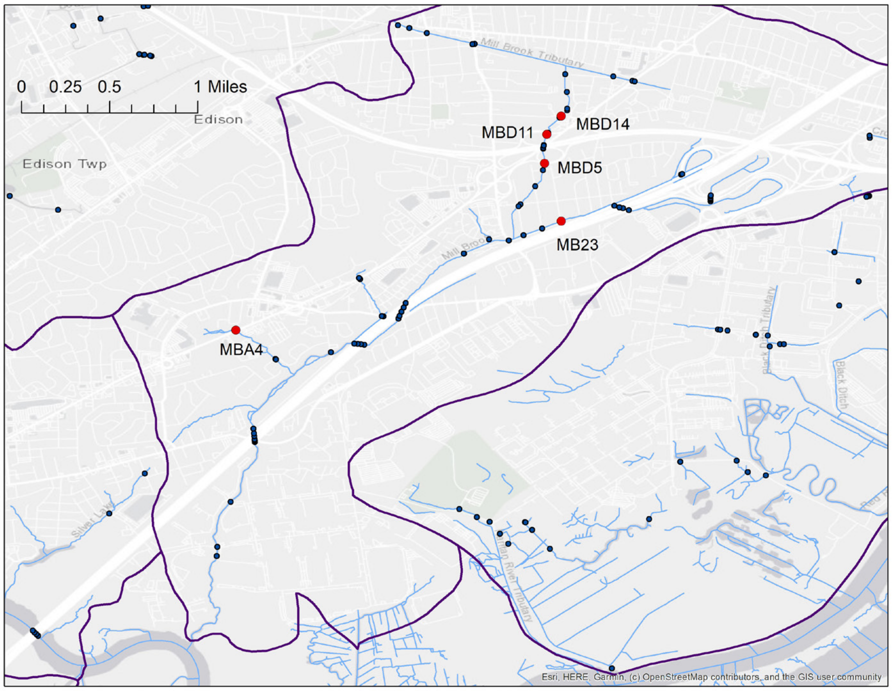
Capacity Model Results



Aquatic connectivity in this watershed is good overall with most of the problematic barriers occurring in the upstream reaches of the watershed. This may allow for diadromous fish migration, as evidenced by the presence of mature eels in this stream. There are still a good portion of the crossings with severe barriers, however, many of which are good candidates for restoration. Removing those barriers would enhance the habitat value for the wildlife already utilizing it.

This chart shows the maximum storm interval (e.g. 10-year storm event) that the structures can accommodate without flows overtopping the road or causing erosion. The model used current precipitation scenarios, which are expected to increase. Roughly half of the crossings in this subwatershed were not able to be modeled because of wide widths (>25 ft are not included in the model) or other issues. The ones with wide widths likely do not have capacity issues. However, of the crossings that were able to be modeled, more than half of them are severely undersized, shown in the yellow to red in the graph above.

Restoration Projects



All projects are located in Edison, NJ.

1. Mill Brook 23 (@ Dorothy Ave.) is the most important barrier to fish migration in the watershed and affects both potadromous and diadromous fish. This bridge has an outlet drop of over a foot, followed by a cascade, that effectively stop all aquatic passage. The bridge is also showing signs of wear including exposed metal and crumbling concrete.

PHOTOS: NY/NJ HEP

2. Mill Brook Tributary D11 (@ Rt. 1 exit ramp) is an undersized bridge that has a concrete bottom where the streambed has eroded on both the inlet and outlet sides, thus the crossing is slightly perched, has a slight outlet drop, and large pools at both the inlet and outlet side. This erosion may be due to the undersized nature of the structure. All of these factors contribute to less likelihood of fish passage for potadromous fish.

3. Mill Brook Tributary A4 (@ Hwy. 1) is a small culvert on a small tributary of Mill Brook. It has a large outlet drop that is a full barrier for aquatic passage for both anadromous and potadromous fish.

PHOTOS: NY/NJ HEP

4. Mill Brook Tributary D5 (@Rt. 1 exit ramp) has similar issues to MBD11 just upstream, though not quite as severe. This crossing is undersized and can only accommodate a 10-year storm event. The concrete bottom of this box bridge is slightly higher than the surrounding riverbed leading the inside of the structure to be shallow and with faster velocities, which is problematic for fish.

5. Mill Brook Tributary D14 (@ Orchard Ave.) is a small bridge furher up in the watershed. It is fine for fish passage but is severely undersized and is falling apart.