# Aquatic Connectivity Through Climate-Ready Infrastructure

Cheesequake Subwatershed

This assessment found four priority restoration projects in this subwatershed that will address aquatic connectivity, hydrologic capacity, and/or crossing condition. The Cheesequake subwatershed consists of the Cheesequake marsh complex, most of which is managed as Cheesequake State Park, and several small tidally influenced streams to east that connect directly to Raritan Bay. In this watershed, there is not only an opportunity to improve fish passage and flooding issues, but several of the crossing structures seem also to limit the upland migration of salt marsh wetlands, a necessary process to retain these vital ecosystems as sea levels rise.
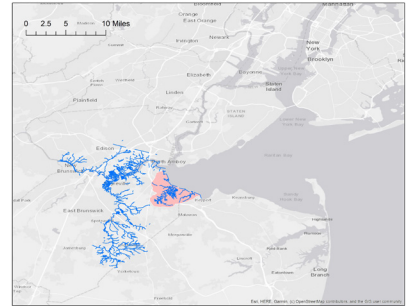
Background

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.

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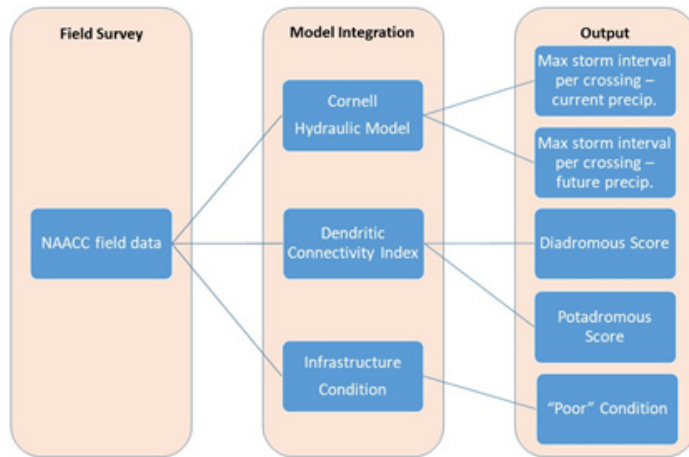
This diagram shows the evaluation process. First, field measurements are taken to estimate how well fish can pass through the culverts and bridges. Then that data is plugged into the Cornell model to estimate the size of the rain event the crossing can accommodate (as measured by the current projections 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

Aquatic connectivity is good within Cheesequake State Park, which likely already provides nursery habitat. The tidal creeks to the east (Marquis, Long Neck/Whale) have more barriers to fish passage and opportunities for restoration. These barriers are important because for many it is the first barrier from the ocean for fish that migrate as part of their life cycle. There were several issues in this watershed with accessibility to both sides of the crossing structures for field assessment due to highly trafficked roads, railroads and fencing.
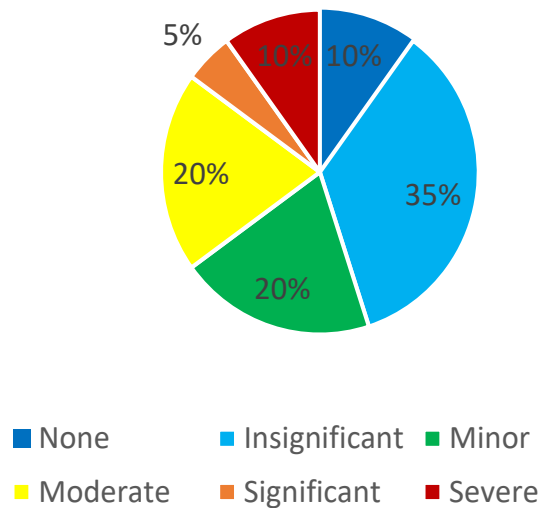
Capacity Model Results

Most of the crossings in this subwatershed were not able to be modeled for hydraulic capacity issues because of wide widths (>25 ft are not included in the model), or complex crossing configurations, such as crossings that consisted of both culverts and bridges. However, several of the furthest downstream barriers did appear to be almost entirely submerged at high tide and Rt. 35, which runs through this watershed, is known for common flooding issues. Four of the crossings were able to be modeled, two of which could accommodate 500-yr. storm events, and two of which are severely undersized and described further below. Generally, roadways should be designed to accommodate at least a 50-year storm event.

Restoration Projects
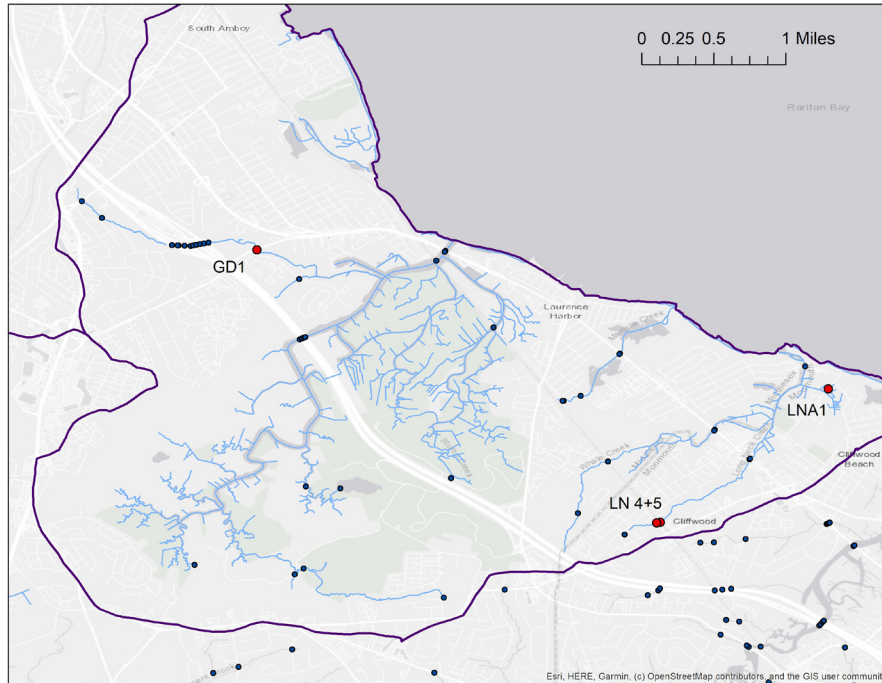
GD1 is located in Sayreville, NJ. The other projects are in Aberdeen Township. .

1.   Long Neck A1 (@ Lakeshore Drive) is a series of five small plastic culverts in poor condition. The crossing can only accommodate a 2-year storm event and likely already experiences flooding. The crossing limits most aquatic passage and also appears to be a barrier to salt marsh migration further up the tributary. This crossing has also been identified as problematic by Monmouth County as part of their new Coastal Resilience Plan that outlines a conceptual restoration and resilience project at Long Neck/Whale Creek.

2.   GD1 (@ Lorrain Ave) is the first barrier on a tributary that runs into Cheesequake Marsh from the west. This crossing is severely undersized and can only accommodate a 25-year storm event. There is also a drop and large pool at the inlet of this structure that likely ends most passage upstream at this first barrier for anadromous fish.

3.   Long Neck 4 (@ railroad) was not able to be assessed because it is fully blocked by debris to the extent that we could not find the crossing structure. It is possible that this structure is in good condition and adequately sized but as of now, aquatic connectivity is non-existent and intensive maintenance is needed as well as an evaluation of the causes of such a severe block-age.

4.   Long Neck 5 (@ trail behind Midland Park) is a small culvert under a paved path just upstream of the railroad crossing. This crossing is in poor condition and has been severely blocked by debris which has led to an inlet drop affecting aquatic connectivity. Maintenance is needed.