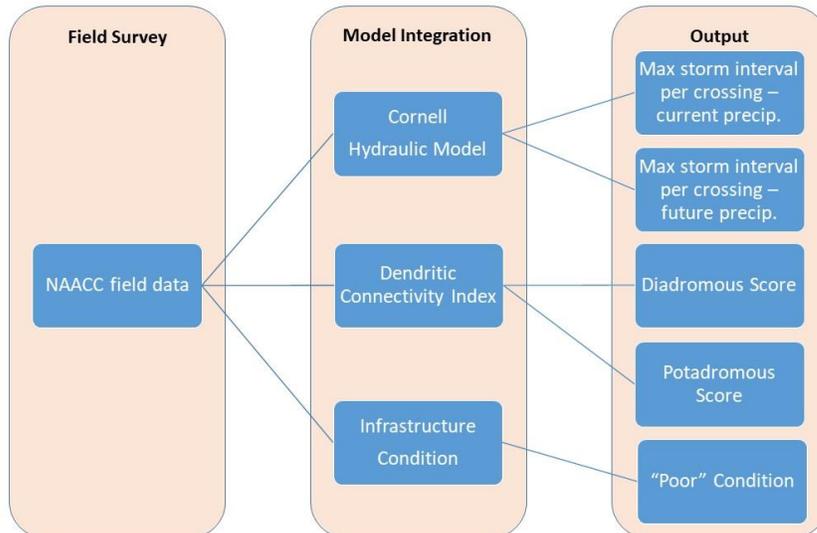


## Aquatic Connectivity Through Climate-Ready Infrastructure

### Great Swamp Subwatershed Fact Sheet

Aquatic connectivity is a key restoration goal for the New York – New Jersey Harbor & Estuary Program (HEP) and its partners. HEP chose to assess barriers in one subwatershed of the upper Passaic River and its tributaries in partnership with the Great Swamp Watershed Association. Recommendations for barrier removal were developed based on assessments developed by the North Atlantic Aquatic Connectivity Collaborative (NAACC), dendritic connectivity, hydraulic model results, and infrastructure condition. Individual culverts were classified related to estuarine (diadromous) and freshwater (potadromous) species passage and 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 return period). 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.

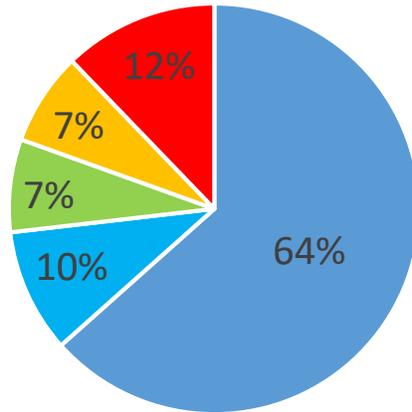
### Evaluation Process



### Summary

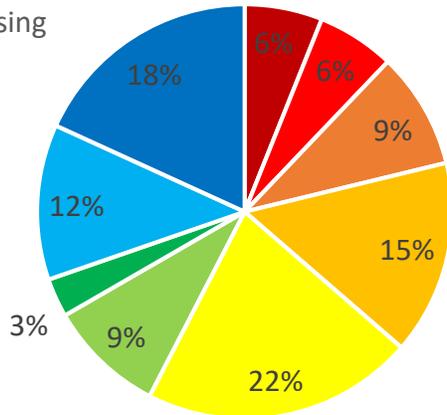
The six restoration projects proposed below will address either (or a combination of), aquatic connectivity, hydrologic capacity, and crossing condition. The assessment identified many road-stream crossings in this watershed that are problematic from a hydrologic perspective. The Cornell hydraulic model predicts that nearly half the crossings in the watershed cannot support even a 50-year storm event without road-topping or erosion. Even more crossings cannot accommodate the future precipitation estimates. The aquatic connectivity issues in this watershed stem not from the road-stream crossings (bridges and culverts) but the multitude of dams that support ponds on private properties. The dendritic connectivity analysis for both anadromous and potadromous fish suggest none of the road-stream crossings are a priority. Based on this same dendritic analysis, the highest priority dams are also proposed for restoration.

**NAACC Results**  
 ("Passability" for fish)  
 45 Crossings



- Insignificant barrier
- Minor barrier
- Moderate barrier
- Severe barrier
- Significant barrier

**Hydraulic Model Results**  
 (Max storm interval the crossing  
 can accommodate)  
 33 Crossings



- 1
- 2
- 5
- 10
- 25
- 50
- 100
- 200
- 500

## Great Swamp Barrier Restoration Recommendations

1. Osbourne Pond Dam – This is the first barrier on the Passaic River in the subwatershed and thus the most important for increasing anadromous fish habitat. Removing this barrier would open up ~1.5 miles of new habitat upstream. As the dam is unlikely to be removed, a fish passage could be considered.
2. Van Dorans Mill Pond Dam – This is the most significant barrier in the watershed for the ability for potadromous fish to swim up and downstream. Removing this barrier would allow fish to swim along a 7-mile section of stream without major barrier. Restoration for this crossing could also include the creation of a side channel through adjacent wooded wetlands.
3. Indian Grave Tributary D1 – This tiny culvert is impassible to aquatic life because of an outlet drop. It is also in poor condition with a breakage in the middle that may lead to seepage under and around the pipe.
4. Indian Grave Brook 12.5 – This small culvert connects a small private pond to the main channel of Indian Grave Brook. This crossing scored poorly for both connectivity and can only accommodate a 1-year storm event, so may regularly flood the road. Ideally, this restoration would also address the nearby section of Indian Grave Brook where it runs directly adjacent to the road.
5. Indian Grave Tributary B4, B5, B1 - This is a series of three small crossings right next to each other; one of them on a road and two on private driveways. IGB4 is the most problematic because it can only accommodate a 5-year storm event and has a bad passability score. Restoring connectivity through IGB4 would open up nearly a mile of upstream habitat for aquatic life. Additionally, just upstream between IGB5 and IGB1 the stream bottom, including the crossings themselves, has been paved (concrete with cobbles), which is ecologically problematic in an otherwise nice stretch of stream.
6. Childs Road Tributary 3 – This crossing includes an older-looking arch structure at the inlet that midway through the crossing changes to a round concrete culvert. The condition of the crossing is poor and there is a large drop at the outlet that completely cuts off all aquatic connectivity.





1. Osborne Pond Dam – the first barrier to entering this watershed



2. Google satellite image of Van Dorans Mill Pond Dam



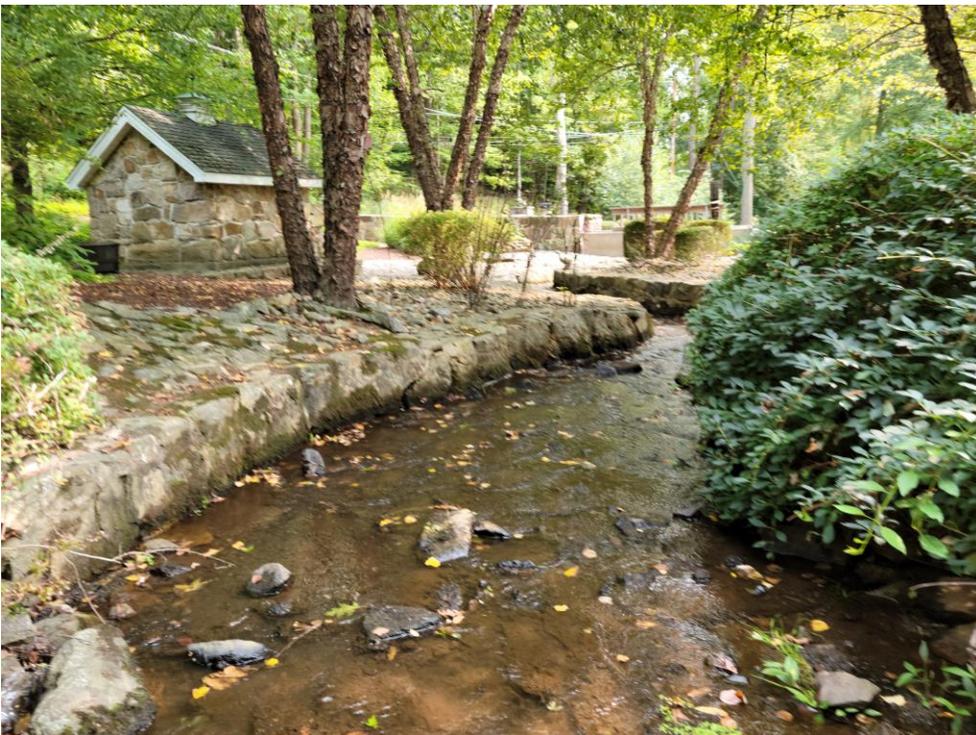
*3. Passaic tributary D1 outlet*



*4. Indian Grave Brook 12.5 outlet*



5. IGB4 outlet



5. Artificial stream bottom between IGB5 and IGB1



6. Inside of CR3 – you can see the change midway from stone arch to concrete culvert