

03 Tributary Connectivity and Barriers

Target Statement

By 2050, dams are removed and culverts are replaced at priority locations to allow free movement of fish and other animals in Hudson River tributaries. Removing dams and replacing barrier culverts supports healthy populations of recreational, commercial, and resident fish species, and helps restore clean water and native habitats. By 2030, 20 tributary dams will be removed, and 30 barrier culverts will be replaced to allow upstream movement of fish and other animals.

Summary

More than 90 tributaries deliver freshwater, sediment, nutrients and other organic material to the estuary in substantial quantities from the surrounding watershed. Historically, many of these same tributaries also provided habitat to a wide array of native, resident fish species but also spawning, nursery and adult habitat to several species of migratory fish species. Although there are several migratory fish species in the Hudson River, notably Atlantic and Short-nosed Sturgeon, Striped Bass and American Shad, access to tributaries is most critical to the life cycles of River Herring (Alewife and Blueback Herring) and American Eel. River Herring use tributaries for spawning areas while Eel reside in tributaries and out-migrate to the sea to spawn. Ensuring passage for these species from the estuary up to the first natural barrier is critical. There are more than 1600 dams, in various sizes and condition, and thousands of culverts scattered across all 90 Hudson River tributaries which significantly reduce available habitat for American Eel and other migratory species. Resident species, such as Brook Trout as well as other fish and wildlife, would also benefit from greater connectivity within tributary systems to improve habitat conditions, access to cold-water refugia, and genetic diversity.

However, with more intense precipitation events and the advancing age of dam infrastructure, the risk of dam failure and hazard potential for downstream residents and infrastructure are reasons to consider removal of obsolete dams. Undersized culverts also pose a danger for public safety. When flood waters are unable to pass through the road crossing, flow conditions can quickly undermine ("blow out") the roadway or lead to upstream flooding. Right-sized culverts allow flood waters and debris to flow under the crossing, increasing the resilience of the roadway and improving public safety.

Constraints to improving the connectivity of Hudson River tributaries are numerous, but two significant factors have been identified. Although resources are starting to organize around removals and retrofits, there isn't much precedent for dam removal activity in the region, and building the organizational expertise and capacity to execute these projects, at a meaningful scale, will take some time. A second factor is the possible presence of contaminants in the sediment deposited in the pools immediately upstream of the dams which contributes to uncertainty associated with the removal process, project costs and post-removal conditions. Leaving barriers in place should not be considered a long-term solution to controlling contamination, as these dams are often at increasing risk of failure with age, and have negative impacts on stream processes related to water quality, sediment transport, and habitat provisions.

Given the numerous dams and culverts, the challenge of restoring tributary connectivity is daunting, but certainly not insurmountable. To achieve desired outcomes, a clearly defined and engaged "community of practice" will need continued training and implementation resources. A removal strategy targeting significant barriers in tributaries with the best stream habitat could provide the best benefits for fish populations. Effectively addressing smaller opportunities as they arise is also not only prudent, but necessary. Additional considerations and expertise will need to be focused on the regulatory environment surrounding dam removal and retrofits as well as understanding and addressing the social challenges that such projects may experience in highly populated areas.

