

White River Culvert Replacement: NOAA Tier 1 Monitoring Plan
June 16, 2021

Project Goals and Objectives

The goal for this project is the removal of four perched-plugged-undersized road-stream culverts that will be replaced to restore and to enhance fish passage in the White River watershed. The replacement of three culverts in Swifton Creek (at 144th Ave, Buchanan Road, and Pierce Road) will open up over 3 miles of instream habitat, improving connectivity of fish populations upstream and downstream of the road-stream crossing. Replacement of the culvert in Cushman Creek at Roosevelt Road will open up 1.3 miles of instream habitat. We hypothesize that these four road-stream crossings impeded connectivity of fish populations upstream and downstream of the crossings. Successes of these culvert replacements will be evaluated through assessment of site-passability, presence of target fish species and changes in the composition of the fish assemblage, operating and maintenance costs, and public safety.

Implementation Monitoring Metrics

Site-passability

Method:

An as-built survey of the entire site will be conducted post-removal and used to compute the following measurements:

- Channel width will be measured by taking the average of at least three measurements of the wetted channel width immediately upstream and downstream of the road-stream crossing in the area where fish are sampled (*Pre- and post-construction*)
- Channel slope
 - Average channel slope will be measured by a longitudinal profile from just upstream of the barrier influence (head of impoundment) to just downstream of its influence (below scour pool) (*Pre- and post-construction*)
 - Areas of maximum channel slope will be identified visually from plotted longitudinal profiles and computed for channel distances greater than 5-10 feet. Significant changes over a distance of <5 ft will be assessed as jump heights. (*Pre-and post-construction*)
- Maximum jump height will be identified as the largest abrupt discontinuity in channel slope over a distance of <5 feet in the longitudinal profile. (*Pre- and post-construction*)

Schedule: Pre-construction surveys have occurred as part of the design process and will be used to compute pre-construction channel widths, slope, and maximum jump height as described above. Post-construction targets for these metrics can be calculated from 100% design. Post-construction surveys to document as-built conditions will be conducted as soon as possible after removal.

Metric Target: Targets will be based on 100% designs and are as follows: average channel width = 14.45 ft, channel slope = 1.08%, maximum jump height - no abrupt discontinuities are anticipated

Presence of target fish species

Method:

- Backpack electrofishing surveys will be conducted upstream and downstream of road-stream crossings to characterize the fish assemblage. Fish sampling will be done following Procedure 51 (i.e., standard protocol of the Michigan Department of Energy, Great Lakes, and Energy for sampling fish in wadable streams). The recommendation for reach length for sampling is

100 ft for small (width <10 ft) streams, 300 ft for moderate (width: 10-30 ft), and 5-10 channel widths for large streams (>30 ft). All fish captured will be identified to species and measured for total length.

- *Pre-construction* – In addition to conducting a fish survey upstream and downstream of the road-stream crossing to establish baseline conditions, a description of the completeness of the barrier (road-stream culvert) will be provided. The description will include water velocity, depth, and width measurements at the upstream and downstream ends of the culvert, the height the culvert is perched above the stream surface (downstream only), and pictures of the downstream and upstream ends of the culvert.
- *Post-construction* – A fish survey will be conducted upstream and downstream of the road-stream crossing to assess how the fish assemblage upstream of the barrier changes following culvert replacement.

Schedule: Fish surveys will be completed between 1 June and 30 September during periods when discharge is stable and at low/moderate levels. Pre-construction fish surveys will be conducted in 2022 and post-construction fish surveys will be conducted in 2023.

Metric Target: Compare how relative abundance of fish species (i.e., number of a fish species/total catch) upstream and downstream of the road-stream crossing changes between pre-construction and post-construction sampling. Our focus will be on coldwater fish species such as Brook Trout (*Salvelinus fontinalis*). However, pre-construction fish surveys will provide important information about what fish species are present in the stream reach.

Operating and maintenance costs

Method:

- *Pre-construction* – Calculation of expected average annual operating, maintenance, and liability costs over the next five years if current road stream crossings remain in place, including periodic costs like inspections.
- *Post-construction* – Calculation of expected average annual operating, maintenance, and liability costs over the next five years with current road stream crossings removed.

Schedule: One-time, immediately post-removal

Metric Target: Reduction or elimination of O&M costs

Public Safety

Method:

- *Pre-construction* – Description of the safety hazards caused by the barrier and how they will be eliminated or diminished through removal, including role as an attractive nuisance, fall risk, structural deficiencies, and risk of failure/flooding.
- *Post-construction* – Confirmation that public safety hazards have been eliminated.

Schedule: One-time, immediately post-removal

Metric Target: Reduction or elimination of public safety hazard

Note: Community enhancement is suggested as a metric for barrier removal projects but is not applicable at this site, as it is private and not publicly accessible.