NOAA-GLFC Regional Partnership Grant
Fish Creek Phase 4 Project

Monitoring and Data Management Plan

Monitoring Plan

Project Goals and Objectives

This project leverages partnerships and experience gained from three previous phases of targeted fish habitat improvement, bluff stabilization, and upland runoff attenuation on North Fish Creek, a Class 1 trout stream draining to Lake Superior in Bayfield Co., WI. Phase 4 will continue and enhance efforts to implement science-informed recommendations to reduce excess sedimentation, the primary non-point source pollution issue affecting aquatic and fish habitat within Wisconsin tributaries draining to Lake Superior and address issues resulting from historic flooding in Fish Creek in 2018. The Phase 4 project will save an estimated 4,800 tons of sediment annually from entering the creek and ultimately Chequamegon Bay, Lake Superior and protect and enhance fish habitat along 1,400 feet of riparian corridor directly impacted by the project and over 16 miles of riparian corridor downstream to Lake Superior. The project will also provide hydrologic modification aimed at reducing the erosive power of flood peaks via floodplain reconnection along approximately 3,400 feet of riparian corridor by implementing in-stream restoration elements. Additionally, for upland "Slow the Flow" restoration elements agricultural runoff attenuation practices will be implemented to slow the flow of runoff from approximately 1,000 acres draining to erosional reaches of the stream. Agricultural runoff attenuation practices will include a range of practices adhering to NRCS Technical Guide Standards, including: 1) Access Road Standard 560, 2) Critical Area Planting Standard 342, 3) Fence Standard 382, 4) Grade Stabilization Standard 410, 5) Heavy Use Area Protection Standard 561, 6) Nutrient Management Standard 590, 7) Roof Runoff Structure Standard 558, 8) Roofs and Covers Standard 367, 9) Shoreland Habitat Standard 643a, 10) Stream Crossing Standard 578, 11) Streambank and Shoreline Protection Standard 580, 12) Waste Facility Closure Standard 360, 13) Water & Sediment Control Basin Standard 638, 14) Well Water Standard 642, 15) Watering Facility Standard 614, 16) Well Decommissioning Standard 351, and 17) Wetland Restoration Standard 657. Upon landowner permission, one or more of the above agricultural runoff attenuation practices will be implemented. All elements of the proposed project directly address the Lake Superior Committee environmental priority to address hydrological modifications that impact Brook Trout production on south shore tributaries in Wisconsin's portion of Lake Superior.

The purpose of collecting environmental data for this project is to verify whether the proposed remediations meet the target metrics for hydrologic reconnection at the project site. The data will be used to demonstrate the project goals were successfully met. Topographic data will be used to compare post-project monitoring metrics to pre-project metrics and fish community composition will be assessed through standardized surveys. In addition, georeferenced photo monitoring stations will be established at various sites in the project area to document changes made to the site.

Implementation Monitoring Metrics

Pre-Construction Survey (in-stream restoration elements) Methods

For in-stream restoration elements, Fish Creek Restoration LLC (FCR) will utilize Bayfield County Land Records Department (BCLRD) LiDAR data from 2026 to establish pre-construction topography, and select stream cross sections will be surveyed and compared to the LiDAR at temporary control points using Real Time Kinematic (RTK) Global Navigation Satellite Systems (GNSS) to check the LiDAR grades and elevations. Survey data will be collected by staff with experience in operating GNSS survey equipment and developing topographic base maps. Data collection will take place during leaf-off conditions with no snow or ice cover, to maximize satellite coverage and allow for topographic features to be observed. FCR staff will review LiDAR data before commencing the survey to understand the general site topography, and in general, cross sections will be surveyed to define topography with section spacing equal to or less than the channel width or less than the height of the valley walls or berms. Utilities and infrastructure will also be surveyed.

Pre-Construction Survey (upland "Slow the Flow" elements) Methods

For upland "Slow the Flow" elements, pre-construction topographic data at ~200 points will be collected by Bayfield County Land and Water Conservation Department (BCLWCD) using the RTK-GNSS survey methods described above at each restoration site. BCLWCD staff will review land elevation survey data prior to advancing a recommended project type and design.

Post-Construction (as-built) Survey (in-stream restoration elements) Methods

The as-built survey (i.e. post-construction topographic survey) will be conducted using drone-based LiDAR. An M300 drone unit with L2 LiDAR sensor will be used to collect topographic survey information by Bayfield County Land Records Department (BCLRD) with one of three licensed pilots and in compliance with FAA regulations and local/state/federal regulations for drone operation. Flights will be 20-30 minutes in length from an altitude of approximately 250 feet. The flight path will generally be parallel to the stream channel, with multiple passes overlapping at least 20% of the coverage areas. All takeoff and landing locations will be on public lands, public road rights of way, or with the permission of the private landowner. Temporary control points will be surveyed using the above detailed RTK/GNSS equipment to verify elevations from the LiDAR drone flights. Resulting land elevations will be determined during the as-built post-construction survey and compared to the design target values and values calculated from pre-construction channel cross-section land elevation survey data and adjustments to log and rock structures will be noted. As-builts will be conducted by the project team and will be provided to the GLFC per the Data Management Plan.

Post-Construction (as-built) Survey (upland "Slow the Flow" elements) Methods

For upland "Slow the Flow" elements, post-construction topographic data will be collected by BCLWCD using the RTK-GNSS survey methods described above at ~20 points at each restoration site. Bayfield County Land and Water Conservation Department staff will add these elevations into the plan view/drawings in the construction plan. As-builts will be conducted by the project team and will be provided to the GLFC per the Data Management Plan.

Topographic Schedule:

Pre-construction topographic surveys will be completed to support final design and monitoring once the QAPP is approved. The expected completion date for the pre-construction topographic surveys for the in-stream restoration element is December 2026. The expected completion date for the pre-construction topographic surveys for the upland "Slow the Flow" sites will be

completed as landowners are identified for the agricultural runoff attenuation projects. The post-construction as-built surveys will be conducted within 60 days of completion of construction (structures installed and earthwork complete). Construction is expected to be complete by September 30, 2028.

Metric Target:

Post-construction targets for topography calculated from design plans will be compared pre- and post-construction to develop evidence of inundation at the project site during peak flows.

Photographic Monitoring Methods

In addition to the Topographic Survey methods, we will establish up to 10 photo monitoring stations for the in-stream restoration elements of the project and photographs will be taken of the entire project area pre-, during, five days post-construction and seven months post-construction at the established stations. At upland "Slow the Flow" sites, a single photo documentation station will be established, and photographs will be taken pre-, during, five days post-construction and seven months post-construction. Photo monitoring locations will be georeferenced and photos will be taken from the same coordinates and at the same orientation pre-, during, and post-construction to allow for comparison of changes to the project site to document post-construction conditions and used to produce a PowerPoint presentation with photo documentation. Monitoring photographs are not a Tier 1 monitoring requirement but will be provided to meet the Outreach and Communication Special Award Condition for this NOAA award and will be provided on the GLFC data management website.

Fish Community Composition Assessment Methods

Burke Center staff and Wisconsin DNR have conducted electrofishing surveys upstream, downstream, and within the proposed restoration site reach prior to the restoration project development. Therefore, the data already exist. The electrofishing surveys by Burke Center staff were conducted to determine presence/absence of coldwater species such as Brook Trout relative to the restoration project. Conversely, Wisconsin DNR's surveys have been conducted as part of its long-term trend and rotational stream fishery survey network that dates back to the 1970s. Some stations exist within North Fish Creek and neighboring Pine Creek that include data for fish species composition, size structure, and relative abundance. Similar upstream and downstream surveys will be conducted following the conclusion of the project. The pre- and post-project data will be compared to determine the extent of any changes in species composition, size structure (i.e., length-frequency), and relative abundance potentially influenced by the project.

Schedule:

Fish surveys will be conducted in late summer or early fall, following the project's substantial completion, and additional surveys may be conducted, if necessary in late summer or early fall in subsequent years. This is well-after the anticipated approval of the Project's QAPP.

Metric Target:

Increased downstream and upstream presence, size structure, and relative abundance of cold-water fish species such as Brook Trout.

Estimated Cost:
Year 1 –

- $17,500 - Pre-construction topographic surveys, archeology and plant surveys, and photographic equipment installation (Consultant and project team)
- $0 for fish community composition assessments conducted previously

Year 3 –

- $20,000 – Post-construction land elevation surveys and as-built surveys
- $7,500 for fish community composition assessments

Operation and Maintenance Costs

Method:

- Pre-construction – No annual O&M costs are incurred at this site.
- Post-construction – Annual O&M costs will be estimated based on project design and scope and if there are modifications needed post-construction.

Schedule:
Post-construction O&M costs will be calculated based on design once the design has been sufficiently completed and will be estimated as needed.

Metric Target:
No O&M costs post-construction.

Public Safety

No public safety concerns are expected with this project given there are no state, county, or township roads on the project site and the project will occur on State property or privately owned property, with landowner permission.

Data Management Plan

The Fish Creek Phase 4 project will generate environmental data and information, including survey data, digital photographs, and operation, and maintenance information. These data and information will be used to support project design and evaluate project outcomes by comparing post-construction data with design targets and pre- and post-construction data. Environmental data will be made available on the Great Lakes Fishery Commission website (http://www.glfc.org/fish-habitat-protection-and-improvement.php) and will be updated as new information is received. All future sub-awardees not identified in this plan will have this data sharing plan as a condition of their contract acceptance. Any additional data sharing stipulations for future sub-awardees may be outlined at that time and described in their contract.

Environmental Data

The following are the kinds of environmental data we plan to collect, with costs incurred included in the above Monitoring Planning estimates:

- **Pre-construction survey data**
  Pre-construction topographic surveys will be conducted to support design and document existing channel floodplain, and valley edge geometry. Cross sections of the channel will document underwater grades (not captured by LiDAR), bed substrate composition, and sediment deposits. The survey will also include a longitudinal profile of the bed, water surface, sediment deposits, and terrace elevations, extending within the project reach and several thousand feet upstream and downstream from the project site. Pre-construction topographic survey data will be made available on the GLFC website and will be updated as new information is received.

  Pre-construction land surveys will be conducted to support design and document existing topography, structures, wetlands and floodplains for the upland "Slow the Flow" elements when identified. Pre-construction land elevation survey data will be made available on the GLFC website and will be updated as new information is received.

- **Post-construction survey data**
  Post-construction as-built surveys and topographic data will be collected using LiDAR methods described above and compared to design plans for the in-stream elements. Additionally, post-construction as-built surveys and topographic data will include post-restoration topography for each practice implemented for the upland "Slow the Flow" element of the project. As built surveys and topographic data will be available on the GLFC website and will be updated as new information is received.

- **Photo Monitoring**
  Station photographs of the entire project area (In-stream restoration and upland "Slow the Flow" elements) will be captured pre-, during, and post-construction at georeferenced locations. A PowerPoint presentation with photo documentation will also be available on the GLFC website and will be updated as new information is received. The habitat monitoring photos are not a Tier 1 monitoring requirement but will be provided to meet the Outreach and Communication Special Award Condition for this NOAA award.

- **Fish Community Composition Assessment**
  Surveys will be conducted upstream, downstream, and within the project reach at similar locations to pre-construction surveys. The pre- and post-construction surveys will be compared to determine the extent of any changes in species composition, size structure (i.e. length frequency), and relative abundance potentially influenced by the project. Burke Center staff will continue using standard electrofishing gear to document parameters such as presence/absence of coldwater species such as Brook Trout, species composition, size structure, and relative abundance. Wisconsin DNR anticipates continuing its surveys at the North Fish Creek and Pine Creek stations, also using standard electrofishing gear and documenting fish species composition, size structure, and relative abundance after identifying, measuring (total length),

and enumerating all fish. A summary of pre- and post-construction fish community composition will be included on the GLFC website.

Progress Reports

Tier 1 data and derived information will also be shared on a semi-annual basis as part of the NOAA progress reporting system.

Other

Details regarding how data will be collected, including sampling frequency and collection methodologies, the standards to be used for data/metadata format and content, including a quality control process; and the approximate total volume of data to be collected will be developed for the QAPP and updated in the Monitoring plan and Data Management Plan once the QAPP is complete.

All survey data will be retained and managed by the respective contractor(s) and Burke Center/BCLWCD/WDNR staff in paper and electronic files, and the respective equipment and supplies used to collect the data will be retained in the offices and storage facilities operated by contractors and Burke Center/BCLWCD/WDNR staff.