Implementing Priority Fish Habitat Restoration Projects of GLFC Lake Committees: Salmon River Trestle Pool Project

Quality Assurance Project Plan (QAPP)

February 1, 2023

NOAA Federal Award ID Number NA22NMF4630144

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SECTION 1: Problem Description and Background

1.1 Title & Approval Sheet

Implementing Priority Fish Habitat Restoration Projects of GLFC Lake Committees: Salmon River Trestle Pool Project

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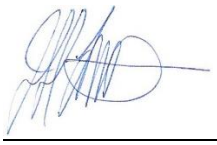
Approval:



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Program Manager, Great Lakes Fishery Commission

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NYSDEC Regional Supervisor

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Gian Dodici
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NOAA Federal Program Officer

Effective Date: 2/3/23

1.2 Table of Contents

Appendix D: State-Discharge data collection sheet

Appendix E: Invasive Species Control Permit Condition

Appendix F: Salmon River Trestle Pool Project - Workplan and Milestones

1.2 Distribution List

Personnel listed below will receive a copy of this Quality Assurance Project Plan (QAPP) and any revisions. The approved QAPP will be made promptly available to other interested parties.

Title, Organization	Contact Name	Phone Number, Email
Program Manager, GLFC	Jeff Tyson	734-649-2033 jtyson@glfc.org
Regional Supervisor, NYSDEC	Dan Bishop	607-753-3095 Daniel.bishop@dec.ny.gov
Fish and Wildlife Biologist, USFWS	Gian Dodici	607-753-9334 Gian_dodici@fws.gov
Technical Monitor, NOAA	Greer Harewood	734-545-6167 Greer.harewood@noaa.gov
Program Officer, NOAA	Rina Studds	301-427-8651 Rina.studds@noaa.gov

1.3 Project/Task Organization

Name	Agency/Organization	Roles and Responsibilities
Jeff Tyson	GLFC	Mr. Tyson is the primary contact for developing and distributing this QAPP. Mr. Tyson will work closely with project partners to implement each component of this QAPP and will serve as the project manager and primary contact for the overall project.
Dan Bishop	NYSDEC	Mr. Bishop will serve as the Project co-lead for implementing pre- and post-construction Tier 1 monitoring plan components and will serve as the QA manager.
Gian Dodici	USFWS	Mr. Dodici will serve as the Project co-lead for implementing pre- and post-construction Tier 1 monitoring plan components as well as, final design development and provision of construction oversight.
Greer Harewood	NOAA	Ms. Harewood will coordinate with the project partners to develop and review the monitoring guidelines set forth in this QAPP and offer technical guidance to help ensure that data collected through this project meets NOAA standards.

1.4 Problem Definition/Background

This project will continue work on restoring in-stream habitat for Atlantic salmon restoration at locations identified in the Lower Salmon River Restoration and Recreation Enhancement Plan. Specifically, the Salmon River Trestle Pool project will establish hydrologic reconnection between the Salmon River and its floodplain by removing an abandoned railroad central pier and the abutment on the south side of the river, install a grade control structure, and reestablish floodplain connection on the river left (south) bank, and implement instream habitat restoration and bank stabilization measures in the Trestle Pool project area. The project will complement similar restoration activities that have occurred upstream of the project site to address similar hydrologic impairments including floodplain connectivity and channel instability. Project success will be tracked through Tier 1 monitoring following NOAA guidance for hydrologic reconnection projects.

The purpose of collecting environmental data for this project is to verify whether or not the proposed remediations meet the target metrics for hydrologic reconnection at the project site and the data will be used to demonstrate the project goals were successfully met. Land elevation and water level data will be used to compare post-project monitoring metrics to pre-project metrics. In addition, georeferenced photo monitoring stations will be established at various sites in the project area to document changes made to the site.

1.5 Project/Task Description

Data Collection

<u>NOAA Tier 1 Hydrological Reconnection Monitoring</u>

This NOAA Tier 1 monitoring strategy (Appendix A) is designed to evaluate whether the restoration actions at the Salmon River Trestle Pool site were implemented as designed and that they provide a basic level of effectiveness. Specifically, monitoring will evaluate whether 1) there is effective hydraulic reconnection at the Trestle Pool site, and 2) the post-restoration channel geometries match the identified target metrics at the site. Actual target values for be determined once final engineering surveys and design are completed. Project designs at the site will be reviewed by NYSDEC, USFWS, GLFC, and NOAA prior to commencement of construction.

Land Elevation Survey Methods

A pre-construction land elevation survey will be conducted including cross-sections of structures, channels, wetlands, and floodplains, which will inform final project design. USFWS NYFO and NYSDEC will establish six (6) monumented cross-section transects at the project site in order to document pre- and post-project site topography (Figure 1). Channel cross-section elevation surveys, referenced to bankfull elevation at the upstream site (j-hook location), downstream site (grade control structure), trestle pool/abutment site and other transects will be surveyed into a known elevation benchmark and referenced to a standard geodetic datum or the International Great Lakes Datum (IGLD).

Figure 1. Proposed locations of monumented cross section transects.

The as-built survey (i.e. post-construction land elevation data collection) will be conducted at the same six monumented cross-section transects following completion of construction. 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. As-built drawings will be surveyed into a known elevation benchmark and referenced to a standard geodetic datum or the IGLD. As-builts will be conducted by the project team and will be provided to the GLFC per the Data Management Plan.

Water Level Methods

We will develop a stage-discharge model to predict water levels at the project site based on the discharge at the USGS gage in Pineville, NY (04250200, **43.5311944, -76.0376944**), and NYSDEC have installed one staff gage on the north side abutment at the project site (Harrelson et al. 1994).

Figure 2. Staff gage installed at the Salmon River Trestle Pool project site.

The Pineville gage is downstream of the project site, but no major water inputs exist between the project site and the gage. We will record staff gage readings at the project site and concurrent discharge at the Pineville gage over a wide range of flow conditions, at least bi-weekly and opportunistically during peak flows to capture the full range of flows. We will build a regression model using least-squares linear regression methodology which predicts the water level at the project site (stage) based upon the discharge at the Pineville gage. We will also record the discharge at the Lighthouse Hill Reservoir, **43.523945, -75.970143**), which is located above the project site and evaluate the utility of these data as a secondary predictor.

Photographic Monitoring Methods

In addition to the Land Elevation and Water Level Methods, we will establish photo monitoring stations and take photographs of the entire project area pre-, during, five days post-construction and seven months post-construction at the six monumented cross-section sites. 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 following a channel forming flow and 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 website.

Annual Operating, Maintenance, and Liability Costs

The site incurred no annual O&M costs prior to the project. Post-construction O&M costs are not expected given performance of other projects in the area. Post-construction annual O&M costs will be estimated based on project design once the design has been sufficiently completed. If needed, estimated post-construction modifications/ adaptive management will also be included in this cost.

Public Safety

Due to the nature of this project Public Safety will not be monitored.

Community Enhancement

Due to the nature of this project Community Enhancement will not be measured.

Personnel

All environmental data collection and project monitoring will be overseen and reviewed by the Program Manager, in concert with the Regional Supervisor and Fish and Wildlife Biologist. Monitoring will be implemented by a combination of NYSDEC, USFWS, or by a third-party qualified contractor in accordance with this QAPP. Land elevation survey data, including the as-built survey, will be conducted by USFWS staff trained in geomorphic survey field techniques described in Harrelson et al 1994 and Natural Channel Design (Wildland Hydrology Level 1-4). Land elevation surveys will be supervised by Mr. Dodici who helps teach USFWS provided training[1] in Stream Assessment and monitoring and has over 20

[1] River Assessment and Monitoring & River Morphology and Applications - Wildland Hydrology Level 1 & 2 respectively - and Stream Habitat Measurement Techniques – USFWS course.

years of habitat restoration experience, including recent work conducting geomorphic surveys on the East Branch AuSable River in Essex County and on different reaches of the Salmon River in Altmar, NY.

Equipment

Engineering surveys will be conducted with commonly used and accepted equipment, instrumentation, and supplies:

- Total station and/or surveyor's level
- Stadia rods and receivers
- Tape measures
- Data forms (on water-resistant paper or electronic data entry) and writing utensils for both land elevation and water level methodologies
- Longitudinal profile data forms (Appendix B)
- Cross-section data forms (Appendix C)
- Staff gage (0.1' increments)
- Stage-discharge data forms (Appendix D)
- Field notebook for qualitative comments and notes/QA/QC
- GPS device x2 with extra batteries
- Digital camera x2 with extra batteries or access to charger
- Personal safety equipment; high-visibility vests and hard hats for each person on site
- First aid kit(s)
- Compass for determining bearing/orientation for photographic evidence
- Waders

Photographic monitoring will be conducted with retail-grade digital cameras, batteries, and memory cards (if needed).

All monitoring and personal equipment (e.g., waders) will be thoroughly cleaned and disinfected between each use to minimize the risk of spreading invasive species (Appendix E). All equipment will be tested for functionality between uses, calibrated according to the manufacturer's guidelines, and repaired/replaced when necessary to ensure the most accurate measurements possible.

Work Schedule

The work schedule will generally follow the milestones denoted in the Gantt chart (Appendix F).

Data Entry

- Data entry will be completed within 30 days of collecting field monitoring data. This will entail entering the survey, stage, and discharge data into spreadsheet databases (e.g., Microsoft Excel).
- Data will be checked by the NYSDEC/USFWS staff for completeness and quality within this 30-day period as outlined in subsequent sections of this QAPP.
- If the data quality does not meet the quality criteria applicable monitoring tasks will be repeated.

SECTION 2: Data Collection and Quality Standards

2.1 Field Data Collection Requirements

The sampling design consists of methods, equipment, and timeframes specific to demonstrating that the Salmon River Trestle Pool site and floodplain were returned to their natural hydrologic conditions following long-standing confinement by the railroad trestle. Pre-construction data will be collected at the project site to verify the site modifications and stream channel were constructed as designed and to document the extent of floodplain reconnection during a range of documented discharges. A total station or level and a stadia rod with a receiver will be used to measure the dimensions and elevations at the monumented cross-section stations. Stage-discharge data will be collected by NYSDEC/USFWS trained staff. The data will then be uploaded to software such as AutoCAD to develop cross-sections and longitudinal profiles from which to develop the final design plans and specifications and to demonstrate floodplain reconnection at various discharges. Measurements will be made with comparable equipment and methods following construction to verify the post-construction dimensions and elevations. All engineering field data will be collected by USFWS/NYFO trained staff and technicians. Post-construction as-built surveys will be conducted using the same techniques as pre-construction data collection to compare to design targets. Other equipment needs were listed previously (see Equipment Section on Page 8 of this QAPP).

Sampling Frequency and Schedule

Task	Location	Frequency	Personnel	Timeframe
Pre-construction stage-discharge data collection	3 gage stations (Project site, Lighthouse Hill & USGS Pineville)	Bi-weekly and opportunistically	NYSDEC and/or USFWS staff	October 2022 – June 2023
Pre-construction land elevation survey	6 monumented cross-sections	Once	NYSDEC and/or USFWS staff or a qualified contractor	March 2023 – June 2023
Pre-construction & implementation photographic evidence	6 monumented cross-sections	Once pre-construction, once during construction	NYSDEC and/or USFWS staff	March 2023 – June 2023
Post-construction land elevation survey (as-built)	As-built at 6 monumented cross-sections	Once	NYSDEC and/or USFWS staff or a qualified contractor	Sept 2023-October 2023
Post-construction stage-discharge data collection	3 gage stations (Project site, Lighthouse Hill & USGS Pineville)	Bi-weekly and opportunistically	NYSDEC and/or USFWS staff	September 2023 – March 2024
Post-construction photographic evidence	6 monumented cross sections	Five days and seven months post-construction	NYSDEC and/or USFWS staff	September 2023 – March 2024

Stage-discharge data

Data collection for stage-discharge model development will began in October 2022 and occur bi-weekly through March 2024, approximately eight months after restoration is completed, which shall allow time for the stream channel to respond to the restoration and allow for a range of stage-discharge values to

be collected at the project site. Additional stage-discharge data values will be collected opportunistically to capture a range of both high and low flow events at the site, as needed.

Land elevation data & as-built survey

Pre-construction surveying tasks at the six monumented channel cross-section transects will be carried out in a single session and completed prior to commencing any on-the-ground restoration activities. The pre-construction monitoring will be conducted during "normal" flow conditions (i.e., not during a flood event) and be conducted to inform final project design, to occur between March and June 2023, depending upon flow conditions. As built surveys will be completed within two months of project completion. To the greatest extent possible, as-built surveys will be conducted under flow conditions similar to those of the pre-construction monitoring.

Monitoring photos

Photographic documentation will commence in March 2023 and occur at pre-, during, and post-construction intervals through March 2024 to capture site response.

Sampling Methods

Land Elevation Survey Methods

The pre- and post-construction survey at the Salmon River Trestle Pool site will be conducted using a total station or level and stadia rod with receiver (Harrelson et al. 1994). The total station or level will be situated at as many stations (i.e., turning points) as necessary along the stream channel at the six monumented cross-section transects to establish a clear sight line with the stadia rod and receiver. All stations will be geo-referenced among one another with a known or otherwise established base elevation. Monumented cross-section transects will span perpendicular to the stream channel. At each transect, the channel's bed elevation, water surface elevation, and width will be measured to the nearest 0.01 foot by holding the stadia rod vertically and adjusting its height until the receiver completes its communication with total station or level. The measurements will be recorded electronically or on paper, then uploaded or entered into computer software such as AutoCAD to calculate cross-sectional areas of each transect and create a longitudinal profile for the channel that will show pre- and post-construction channel configurations.

Water Level Methods

Water level and stage-discharge data collection will be conducted by NYSDEC/USFWS staff. Staff will visit the Trestle Pool site twice per month to record date, time, and water levels to the nearest tenth of a foot from the staff gage and opportunistically as high and low flow events occur. NYSDEC/USFWS staff will also download the corresponding date/time discharge data from the USGS Pineville (https://waterdata.usgs.gov/monitoring-location/04250200/#parameterCode=00065&period=P7D) and the Lighthouse Hill Reservoir (https://www.safewaters.com/facility/lighthouse-hill) stations. Substantial tributaries (i.e. Beaverdam Brook and Orwell Brook) enter the river between Lighthouse Hill and the project site. Reservoir levels and releases at Lighthouse Hill are actively managed, and therefore not as reflective of precipitation or snow melt runoff. As such, the Pineville gage is anticipated to be the best predictor of discharge at the project site and Lighthouse Hill will serve as a secondary data source. All discharge and stage data will be entered into a stage-discharge spreadsheet within 30 days of collecting

the data and both Pineville and Lighthouse Hill Reservoir discharges will be used in a least squares linear regression model to predict stage at the Trestle Pool site.

Photographic Monitoring Methods

The photographic monitoring will be conducted with a Nikon Coolpix AW120, or similar point-and-shoot camera. NYSDEC/USFWS staff who will visit the site pre-, during, and post-construction and take photographs at the six monumented transects from the same georeferenced location and orientation (bearing and elevation). All photographs will be taken during daylight hours. Photo metadata will be noted at the time of data collection using a field form. Photo metadata will include photo number, date/time, photo monument location/coordinates, orientation (bearing, elevation), photographer/field staff and other relevant information to ensure consistency across the data collection period. The batteries and memory card for each camera will be checked for full operation and storage at the onset of monitoring. The cameras will be inspected and maintained during their periods of use, with the batteries and memory cards being changed, as necessary. All photographs will be transferred to external hard drives at the NYSDEC Cortland office. The photographs and relevant metadata (e.g. location, date/time, orientation) will then be collated in a MS PowerPoint or equivalent software to produce a photo log of the restoration activity.

2.2 Quality Objectives and Criteria for Measurement Data

The project for which the data are being collected will restore hydrologic connection at the Trestle Pool project site. Data will be of sufficient quality to:

- Provide land elevation measurements that support final engineering design for the project, demonstrate that the project was built as designed, and provide for evidence of hydrologic reconnection to the floodplain at the project site.
- Provide water level data at the site based upon discharges at a downstream (USGS Pineville gage station) and upstream (Lighthouse Hill Reservoir discharge record) locations. A stage-discharge model will be developed for the Trestle Pool site which, when coupled with the land elevation measurements, will provide evidence of floodplain inundation at various Salmon River discharge levels.
- Provide photographic evidence pre-, during, and post-restoration. Monitoring photos in combination with the stage-discharge model developed above will show floodplain inundation extent throughout the project area at various discharge levels. Photos are also intended to generally capture restoration measures being installed at the project site.

Hydrologic restoration is the primary implementation monitoring metric that the data will address, as referenced in the approved Tier 1 Monitoring Plan (Appendix A). Because there are no formal targets for comparing pre- and post-restoration hydrographs, the three measurements will be used to provide weight of evidence that indicates progress towards the project's overall goals.

Precision and Accuracy: For land elevation methods, the total station or level, and stadia rod and receiver are anticipated to function normally and therefore produce precise and accurate data. Any indication of erroneous measurements (e.g., excessively higher or lower elevations compared to previous measurements) will immediately be corrected by the survey crew following methods described in Harrelson et al. (1994) per Section 3.2 of this QAPP. For water level methods, USFWS/NYSDEC staff

will collect stage information at the Trestle Pool site in tenths of a foot. Staff will have easy access to the stage gage for measurement. Discharge estimates at Pineville and Lighthouse Hill Reservoir will be will be downloaded from USGS and Brookfield Renewable Property websites, respectively, and are subject to each organization's QA/QC protocols (Turnipseed and Sauer 2010, Sauer and Turnipseed, 2010). Outliers will be identified through visual approaches (e.g. residual plots, scatterplots) and/or other analytical methods (e.g. studentized residuals, Cooks Distance) and will be compared to other stage/discharge measurements from the Salmon River for verification. Studentized residual values >3.0 will be considered outliers and evaluated based upon methods described in Section 3.2. Photographs will be taken by staff at the georeferenced locations and same orientation pre-, during, and post-construction for the duration of the project. Precision and accuracy are therefore not applicable.

Representativeness, Comparability, and Sensitivity: Total stations or levels and stadia rods with receivers are commonly used and accepted equipment from which to measure stream channel dimensions. Measurement points will be made directly at the six monumented transects at the project location. Stage measurements will be made at the project site and should be representative, comparable through time, and sensitive. The project team expects that the USGS Pineville gage station will provide the most sensitive and representative estimate of discharge for use in developing the stage-discharge model for reasons described in Section 2.1 above and in Appendix A. Manual staff gage measurements will be taken following the same procedure described in Section 2.1 using standard methods and metrics. As such, staff gage measurements will be comparable to each other over time. Photographs will be taken by NYSDEC/USFWS staff at the six monumented transects throughout the duration of the project, following the same procedure each time (per Section 2.1), and using cameras of sufficient resolution to ensure photographic evidence will be representative, comparable, and sensitive.

Completeness: All surveys are expected to be completed in the prescribed timeframes. Complete data sets will be those with sufficient measurements (100% (land elevation), 80% (stage-discharge), and 100% (photographic), respectively) to design the project and verify the project was built as designed. Additionally, for the stage-discharge model development, the record will be considered complete if the observations of stage and discharge cover the Q90-Q10 range of discharges during the previous 5-year period on the Salmon River. The Q90 value indicates the amount of flow in the stream that was equaled or exceeded by annual daily mean stream flow (Q) ninety percent (90%) of the time in the 5-year period. The Q10 value indicates the amount of flow in the stream that was equaled or exceeded by annual daily mean stream flow (Q) ten percent (10%) of the time in the 5-year period. The photograph monitoring record will be deemed complete if there is a complete record at each of the six monumented cross-sections pre-, during, and post-construction.

2.3 Instrument/Equipment Testing, Inspection, and Maintenance

The data objectives will be met through standardized methods and repeated use of properly functioning and calibrated equipment. Instrumentation will be inspected and calibrated daily before each use and cleaned as necessary. See below for specific methods for each data type/equipment/etc:

- Land elevation surveys: - the total station or level and stadia rod and receiver will be used according to manufacturer's specifications and guidelines, starting with turning the units on and allowing any self-calibration procedures to run as designed. Once on, the equipment will be repeatedly used for each data point. Prior to conducting each survey the total station will be

calibrated and checked to ensure positioning accuracy by checking the instrument on a known point. Additionally, the equipment operator will confirm the instrument is ready for use in accordance to the manufacturer's specifications and guidelines and document completion of the QA/QC procedure in the field notebook. Loss of battery power is the only anticipated potential interruption to the surveys, and any occurrence will be remedied by changing the batteries. If the instrument is unable to be calibrated/meet performance measures according to the equipment specifications the equipment will be replaced with comparable equipment, again following manufacturer's specifications and guidelines prior to use.

- For stage-discharge measurements, the staff gage at the Trestle Pool project site will be inspected each time a stage reading is recorded and re-installed if damaged.
- The digital cameras will be inspected and maintained during their periods of use; the batteries and memory cards will be changed, as necessary.

SECTION 3: Data Management and Reporting

3.1 Data Handling/Storage

All land elevation and water-level/stage-discharge survey data will be recorded immediately upon collection, either on paper or electronic forms, as noted in the approved NOAA Tier 1 Monitoring Plan dated November 3, 2022 (Appendix A). If data are collected on paper forms it will be transcribed to computer software such as MS Excel, proofed for transcription errors, and corrected as necessary by the individuals who collected the data and the Regional Supervisor and/or the Fish and Wildlife Biologist. The data will then be uploaded to respective analytical programs and databases. Analyses will be conducted using MS Excel, Program R, or other comparable analytical software. Paper data sheets will be retained in the NYSDEC/USFWS files. Engineering data will be compiled and analyzed using AutoCAD or comparable software to develop design plans and verify as-built conditions at the project site. All data will be shared with the Great Lakes Fishery Commission for its publicly accessible projects data management plan. NYSDEC and USFWS will oversee all data handling and storage and will prepare any summary reports, which will include the following NOAA disclaimer:

> "These data and related items of information have not been formally disseminated by NOAA and do not represent any agency determination, view, or policy."

3.2 Data Review, Validation & Verification

NYSDEC/USFWS's contractors for project construction will review, validate, and verify all data immediately at the time of collection, while producing the final design drawings for the project site and as-built drawings, and after all data collection has ceased. Final designs will be reviewed and stamped by a licensed professional engineer. Any inconsistencies (e.g., variable stream bed elevations) will either be corrected or rejected from use in the design and as-built drawings. The Project co-leads will instruct the contractor(s) to collect additional data, if necessary. USFWS and NYSDEC staff will also examine the initial design drawings (e.g., 30%) for any inconsistencies in the drawings that could be attributed to the data, at which time will communicate the inconsistencies to the contractor(s). USFWS and NYSDEC staff will review, validate, and verify all stage-discharge data collection prior to developing the stage-discharge models. Outliers will be identified through visual approaches (e.g. residual plots, scatterplots) and/or other analytical methods (e.g. studentized residuals, Cooks Distance) and will be compared to

other stage/discharge measurements from the Salmon River for verification. If a studentized residual value is > 3.0 or the Cook's Distance identifies data points as outliers, the stage-discharge data will be reviewed, and if inconsistent with other stage/discharge measurements in the system, the data point will be rejected. All errors will be corrected or rejected based on communications with the individuals who collected and entered the data. The Project co-leads will review the photographic record for any inconsistencies, particularly for absent or out-of-sequence photographs or photographs that are not taken from the same location and bearing, that do not produce the desired record. Any inconsistencies will be discussed with staff who maintained the cameras and processed the photographs and photographs will be rejected if inconsistent with location and bearings established during pre-construction photographs.

3.3 Validation & Verification Methods

All data will be validated and verified by contractor(s) and the Regional Supervisor and/or the Fish and Wildlife Biologist by written confirmation with contractors and survey personnel that:

- the data were collected with instrumentation and equipment specific to the measurement tasks, such as total station, stadia rod with receiver, surveyor's tape measures, cameras as verified through field notebooks. Information will be reviewed by the Regional Supervisor or Fish and Wildlife Biologist for validation and verification;
- the data were recorded on paper or electronic forms specific to the measurement tasks. Information will be reviewed by the Regional Supervisor or Fish and Wildlife Biologist for validation and verification;
- erroneous land elevation data were corrected prior to use or rejected based upon Harrelson et al. (1994);
- erroneous stage-discharge data were corrected prior to use or rejected; stage-discharge data will be validated and verified by methods detailed in Section 3.2 by the Regional Supervisor or the Fish and Wildlife Biologist;
- the photographs showing the project site at the six monumented transects from the same bearing will be cross compared to the metadata to ensure accuracy and consistency by the Regional Supervisor or the Fish and Wildlife Biologist; and
- the data were compiled for submission to the Great Lakes Fishery Commission.

3.4 Reconciliation with User Requirements

The Regional Supervisor and Fish and Wildlife Biologist will reconcile the data by screening the field data sheets (paper and electronic forms) and as-built drawings for errors based upon methods described in Section 3.2. The Regional Supervisor and Fish and Wildlife Biologist will discuss with contractors any errors or inconsistencies to determine whether to retain or reject the data and request modifications to the project design and as-built drawings. All data are expected to be fully usable to demonstrate the channel was hydrologically reconnected to its floodplain at the project site. Reconciliation will be completed within six months of data acquisition.

3.5 Documentation & Records

All data will be retained indefinitely by contractor(s) and USFWS/NYSDEC. The Regional Supervisor and Fish and Wildlife Biologist will write a report that describes the types of data collected and any respective errors and corrections. The report will also comment on any problems encountered during data collection, review, and analysis. The report will be retained in electronic files by USFWS/NYSDEC and shared with GLFC and NOAA staff. All data will also be compiled by USFWS/NYSDEC, retained in USFWS/NYSDEC's Project files, and shared with GLFC for its publicly accessible project data management plan. Data included in the project data management plan page will include raw land elevation data pre- and post-construction, 30% and 100% design plans, as-built surveys, stage-discharge data for Pineville and Lighthouse Hill Reservoir gage stations, as well as stage data for the Trestle Pool site.

Section 4

4.1 References

Harrelson, C.C., Rawlins, C.L., and Potyondy, J.P. 1994. Stream channel reference sites: an illustrated guide to field techniques. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Sauer, V.B., and Turnipseed, D.P., 2010' Stage measurement at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A7, 45 p. (Also available at http://pubs.usgs.gov/tm/tm3-a7/.)

Turnipseed, D.P., and Sauer, V.B., 2010. Discharge measurements at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A8, 87 p. (Also available at *http://pubs.usgs.gov/tm/tm3-a8/*.)

Appendix A:

NOAA-GLFC Regional Partnership Grant
Salmon River, NY Trestle Pool Project

Monitoring and Data Management Plan

Monitoring Plan

Project Goals and Objectives

This project will continue work on restoring in-stream habitat for Atlantic salmon restoration at locations identified in the Lower Salmon River Restoration and Recreation Enhancement Plan. Specifically, the Salmon River Trestle Pool project will establish hydrologic reconnection between the Salmon River and its floodplain by removing an abandoned railroad central pier and the south abutment, reestablish floodplain connection on the river left (south) bank and implement instream habitat restoration and bank stabilization measures in the Trestle Pool. The project will complement similar restoration activities that have occurred upstream of the project site to address similar hydrologic impairments including floodplain connectivity and channel instability. Project success will be tracked through Tier 1 monitoring following NOAA guidance. Monitoring metrics outlined below will be compiled in a QAPP for approval prior to commencing data collection efforts.

Implementation Monitoring Metrics

Hydrologic Reconnection

Land Elevation Methods:

A pre-construction land elevation survey will be conducted including cross-sections of structures, channels, wetlands, and floodplains, which will inform final project design. USFWS NYFO and NYSDEC will establish six (6) monumented cross-sections at the project site in order to document pre-and post-project site topography (Figure 1). Channel cross-section elevation surveys, referenced to bankfull elevation at the upstream site (j-hook location), downstream site (grade control structure), trestle pool/abutment site and other transects will be surveyed into a known elevation benchmark and referenced to a standard geodetic datum or the International Great Lakes Datum (IGLD).

Figure 1. Proposed locations of monumented cross sections.

A post-construction survey will be conducted with the as-built survey following completion of the installation of structures, earthwork, and reseeding at the same six (6) monumented cross-sections. Resulting land elevations will be determined from 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 at six (6) monumented cross-sections surveyed pre-restoration. As-built drawings will be surveyed into a known elevation benchmark and referenced to a standard geodetic datum or the IGLD. As-builts will be contracted out (or be provided by USFWS NYFO) and will be provided to the GLFC per the Data Management Plan.

Water Level Methods:
We will develop a stage-discharge model to predict water levels at the project site based on the discharge at the USGS gage in Pineville, NY (04250200, 43.5311944, -76.0376944), and install one staff gage on the north side abutment at the project site. The Pineville gage is downstream of the project site, but no major water inputs exist between the project site and the gage. We will record staff gage readings at the project site and concurrent discharge at the Pineville gage over a wide range of flow conditions. We will build a regression model which predicts the water level at the project site based upon the discharge at the Pineville gage. We will also record the discharge at the Lighthouse Hill Reservoir 43.523945, -75.970143), which is located above the project site and evaluate the utility of these data as a secondary predictor. Substantial tributaries (i.e. Beaverdam Brook and Orwell Brook) enter the river between Lighthouse Hill and the project site, but the releases at Lighthouse Hill are often dictated by reservoir levels and therefore are not as reflective of precipitation or snow melt runoff levels. For example, the reservoir is lowered prior to snow melt to capture it for later use. As a result, the releases at Lighthouse Hill are much lower than the amount of water coming into the reservoir. The inputs between the reservoir and the project (i.e., the tributaries and direct runoff) are not affected by this. The same holds true for large rain events when the reservoir is low enough to capture them. Conversely, the baseflows released at Lighthouse Hill often exceeds input to the reservoir when conditions are dry and alternate inputs are relatively low at these times. These reasons combined is why we expect the USGS gage at Pineville to be the best predictor of the flow levels at the project site but the Lighthouse Hill releases may also prove to be useful.

In addition to the Land Elevation and Water Level Methods, we will establish photo monitoring stations and take photographs of the entire project area pre-, during, and post-construction at georeferenced locations. We will also document post-construction conditions following a channel forming flow and produce a PowerPoint presentation with photo documentation. This, as well as stage-discharge model results (pre- and post-construction) will be provided to the GLFC per the Data Management Plan.

Schedule:
Pre-construction land elevation surveys will be completed to support final design and monitoring once the grant funds are awarded and the QAPP is approved. The expected completion date for the pre-construction surveys is June 30, 2023. The post-construction as-built survey will be conducted within 60 days of completion of construction (structures installed and earthwork complete). Construction is expected to be complete by August 31, 2023. Pre-construction water level data will be collected from October, 2022-June 2023 to ensure capture of peak flows at the project site. Post-construction water

level data will be collected from September, 2023-March, 2024 to ensure capture of peak flows at the project site to capture evidence that the new flooding regime is in line with the project's overall goals.

Land Elevation and Water Level Metric Target:
Post-construction targets for land elevation will be calculated from design plans and stage-discharge will be compared pre- and post-construction to develop evidence of inundation at project site during peak flows.

Estimated Cost:
Year 1 – $10,000 Pre/Post-construction water level surveys and photographic equipment installation (Consultant/project team)
$20,000 post-construction as-built surveys (Consultant/project team)

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 if there are modifications needed post-construction. Post-construction O&M costs are not expected given performance of other projects in the area.

Schedule:
Post-construction O&M costs will be calculated based on design once the design has been sufficiently completed but O&M costs are not expected for the project.

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

Data Management Plan

The Salmon River Trestle Pool 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-construction data. Environmental data will be made available on Great Lakes Fishery Commission website (www.glfc.org) and will be updated as new information is received. All future sub-awardees not identified in this plan will have as a condition of their contract acceptance of this data sharing plan. Any additional data sharing stipulations for future sub-awardees may be outlined at that time and described in their contract.

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

Pre-construction survey data- A pre-construction survey will be conducted to support design and document existing channel slopes, channel width, flow rate, and land elevations including cross sections of structures, channels, wetlands and floodplains. The survey will include a longitudinal profile of the bed and water surface at the j-hook, grade control structure, and trestle pool/abutment locations including the structures; channel cross-sections referenced to bankfull elevation flagged by the Engineer will be collected at six (6) monumented cross sections. Pre-construction land elevation survey data will be made available on the GLFC website and will be updated as new information is received.

As built: surveys and topographic data will include post-restoration channel width, channel depth, land elevations, and the floodplain surface. As built surveys and topographic data will be available on the GLFC website and will be updated as new information is received.

The stage-discharge model to predict water levels at the project site based on the discharge at the USGS gage in Pineville, NY (04250200), discharge at the Lighthouse Hill Reservoir, and predicted water levels at the project site will be available on the GLFC website and will be updated as new information is received. Additionally, photo monitoring station photographs of the entire project area 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.

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.

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 NYSDEC/USFWS 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 NYSDEC/USFWS Fisheries staff. The Regional Supervisor and Fish and Wildlife Biologist will compile and share all data with the Great Lakes Fishery Commission for its publicly accessible data management plan.

Appendix B: Longitudinal Profile data collection sheet

SURVEY DATA ⟹ **LONGITUDINAL PROFILE 1**

SITE: Date:

Location:

Party / Notes: HUC:

	Distance, Point, or	Back-Sight	Height of Instru-ment	Thalweg		Water Surface		Bankfull		Low Bank HI		NOTES
				Fore-Sight	Elevation	Fore-Sight	Elevation	Fore-Sight	Elevation	Fore-Sight	Elevation	e.g. Riffle Run Pool Glide
	STATION	BS	HI	FS	Elev.	FS	Elev.	FS	Elev.	FS	Elev.	
	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	
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2												
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Appendix C: Channel Cross-Section data collection sheet

SURVEY DATA ⟹ **CROSS - SECTION** 1

SITE: Date:

Location:

Party / Notes: HUC:

Item	Distance, Point, or STATION ft	Back-Sight B S ft	Height of Instrument H I ft	Fore-Sight F S ft	Elevation ft	REMARKS / COMMENTS / NOTES
1						
2						
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Appendix D: Stage-Discharge data collection sheet

Date	Time	Trestle_gage	Pineville_gage	Pineville_discharge	LHH_discharge

Appendix E: Invasive Species Control Permit Condition

Prevent Introduction of Invasive Plant Species - To prevent the unintentional introduction or spread of invasive species, the permittee must ensure that all construction equipment is cleaned of mud, seeds, vegetation and other debris before entering and before leaving any approved construction areas. Materials removed during the cleaning process will be collected, contained in plastic bags or put into a covered conveyance vehicle and disposed at a Regulated Landfill, or the materials must be otherwise rendered incapable of any growth or reproduction. Fill materials must come from a source that is free of invasive plant species.

Appendix F: Salmon River Trestle Pool Project - Workplan and Milestones