Addendum 1 to Quality Assurance Project Plan

Evaluation of Cool Water Areas on the Lower Yakima River for Thermal Refuge Enhancement Design

June 2024
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COVER PHOTO: Confluence of Spring and Snipes Creeks in early November – fall Chinook salmon returning to spawn. PHOTO BY MATTHEW BISCHOF, Washington State Department of Agriculture.

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Evaluation of Cool Water Areas on the lower Yakima River for Thermal Refuge Enhancement Design

by Marcella Appel, Thomas Sexton, and Zac Zacavish

Published June 2024

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1.0 Table of Contents

Note: The numbered headings in this document correspond to the headings in the original QAPP. Only relevant sections are included here; therefore, some numbered headings may be missing.

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4.0 Project Description

The monitoring sites covered under this QAPP were identified using the 2018 thermal profile data results collected under a separately funded YBIP Grant Project (Gendaszek and others 2020), coupled with Forward Looking Infrared (FLIR) flights (Holroyd 1998; QSI 2020), and temperature data collected under previous grant work (WRYBIP-BentCD-00011; WRYBIP-BentCD-0004).

Multiple temperature loggers will be deployed at each of the four sites in late spring, so that the spatial variability of the cool water inputs can be further investigated. Temperature data will be collected and evaluated every 3-5 weeks in order to minimize data interruptions from sensor malfunction and to identify and replace lost or damaged equipment. Alongside temperature measurements, synoptic flow and specific conductivity will be monitored to better evaluate water conditions for migrating salmonids.

Riparian vegetation structure will be assessed at each site following Ecology's Watershed Health Monitoring (WHM) Program guidelines where the types of vegetation within each layer (the canopy, understory, and groundcover) are qualified. This will provide an assessment of shade potential and opportunities for improvements at the site. Snorkel surveys in the side channels will be used to directly detect fish presence in the cool water refuges and provide information about the usage of these sites by both anadromous and predatory fish species.

Fish assemblage surveys are set to be performed on three consecutive Wednesday evenings during three-week periods during June and/or August.

4.2 Project objectives

The specific project objectives updated in this addendum include:

- Collection of continuous measurements of temperature every 15 minutes at 4 sites previously identified for potential CWR enhancement from June – September in either 2023 or 2024.
- Measure fish presence at four selected CWR site side channels using snorkel surveys conducted on consecutive weeks during three-week periods in June and/or August.

4.3 Information needed and sources

BCD and project partners will conduct continuous temperature monitoring for at least one migration season during baseflow (June – early September) in 2023 or 2024. Multiple temperature loggers will be deployed in four potential CWR enhancement locations. We will also collect synoptic specific conductivity measurements every 5-6 weeks and measure cross-sectional flow up to three times during the monitoring period. Site specific conductivity data will be collected within each cool water location above the confluence with the mainstem Yakima River at the location of the deployed loggers. Data will also be collected from the mainstem Yakima River above the cool water influence, as feasible. Specific conductivity data for the mainstem

Yakima River is collected by USGS at multiple locations on the lower Yakima and available through NWIS. These data will be used as a comparison for the conductivity data collected at each cool water location and as a secondary data check, especially when flows in the Yakima are prohibitive to safely collect in stream measurements. Input of groundwater data is assumed if specific conductivity measurements in the cool water anomaly are higher than the mainstem Yakima River conductivity values.

4.4 Tasks required

The specific tasks updated in this addendum and required to complete this project include:

- Perform snorkel survey in June and/or August at the side-channels (not mainstem) at the 4 identified locations, pending water safety and clarity

5.0 Organization and Schedule

Table 2 shows the responsibilities of those who will be involved in this project.

Table 1. Organization of project staff and responsibilities.

Staff	Title	Responsibilities
Marcella Appel Benton Conservation District Phone: 509-786-6000	Lower Yakima River Project Manager	Clarifies scope of the project. Arranges and oversees agreement with Mid-Columbia Fisheries. Responsible for grant reporting and communication with Ecology. Oversees data review and EIM upload.
Thomas Sexton Benton Conservation District Phone: 509-786-6000	Resource Conservationist	Will provide technical coordination of field sampling; quality assurance, calibration and mobilizing of equipment. Supports data review, storage and EIM upload.
Zac Zacavish Mid-Columbia Fisheries Phone:	Project Manager/Fisheries Biologist	Perform snorkel surveys. Provide evaluation of the fish and riparian suitability of the sites for cool water refuge, technical coordination with BCD staff for field sampling, equipment deployment and field checks.
Chris Perra, LHG Yakama Nation Fisheries	Lower Yakima River Habitat Coordinator	Coordinates with BCD and Mid-Columbia Fisheries on evaluation and interpretation of the data, support data collection on Yakama Nation land, and provide technical assistance for field work.
Scott Tarbutton Washington Department of Ecology, Office of Columbia River Phone: 509-867-6534	Ecology OCR QAPP Coordinator	Provides initial review and feedback of QAPP, approves QAPP.
McKenna Murray Washington Department of Ecology, Office of Columbia River	Hydrogeologist	Coordination of QAPP development and finalization. Coordinate with project on completion of deliverables, timelines, and budget.

QAPP: Quality Assurance Project Plan
NEP: National Estuary Program
WQX: Water Quality Exchange

5.4 Proposed project schedule

Table 3 lists key activities, due dates, and lead staff for this project.

Table 2. Schedule for completing field work

Task	Due date	Lead staff
Collection of data and field checks	June – September 2023 and 2024	Thomas Sexton BCD
Collection of fish survey data	June and/or August 2024	Zac Zacavish Mid-Columbia Fisheries
Data Processing, Data QA/QC and EIM Upload	November – March, 2023-2025	Thomas Sexton BCD
Quarterly PRPR reports	Quarterly from 2023 through 2026	Marcella Appel BCD
Collaborative Summary Report	December 2026	Marcella Appel BCD

6.0 Quality Objectives

6.1 Data quality objectives

The primary data quality objective (DQO) for this project is to collect continuous temperature data at 4 cool water locations on the lower Yakima River (site descriptions provided in Section 7.0) from June through September. Observations of likelihood for fish usage at each site will be determined in June and/or August to help identify possible fish at the four cool water refuge locations. Qualitative observations will be made of the riparian vegetation structure assessment by a qualified plant biologist familiar with local desert upland and riparian vegetation. Additionally, periodic measurements of specific conductivity and flow will be collected at the sites to help evaluate suitability for cool water enhancement projects. The data collected should be of sufficient quality and quantity to support decision making in the selection of 1-2 sites for further concept level design. Ground-truth data for an additional 8 – 12 cool water monitoring sites will be collected, with data of sufficient quality to confirm with certainty the presence of a cool water influence. This study will use previously developed methods that meet the measurement quality objectives (MQOs) described below and are comparable to previous study results.

6.2.2 Targets for comparability, representativeness, and completeness

6.2.2.2 Representativeness

Making consistent repeated measurements during snorkel surveys will be made by defining the areas to be surveyed. The outermost edge of the unit will be defined as the boundary that the unit shares with the mainstem Yakima River. Since each unit is discretely identifiable as a confluence site, side channel terminus, or pool location; each of the sites is only flanked by the Yakima on one side. Starting at the outermost edge, the snorkel surveyor proceeds on an upstream transect line orienting with the mainstem Yakima. The perimeter transect line was established based upon thermal profile of the feature and extends at least 50m beyond the feature.

Within the thermal unit, there will be two transects established based upon the feature. Based upon the features characteristics, established transect lines are set to best survey each site without jeopardizing re-counts, minimizing disturbances, and ensuring repeatability. In confluence sites, locations and survey lines will be set to best observe fish (i.e. pools, bends, banks). Some instances may require additional upstream monitoring or modification to original survey line, this could include lost/gained a connection with the mainstem Yakima. Regardless of the snorkel surveyors present, the area observed will be calculated based on survey line length and estimated visibility. This will ensure that correlations in fish encountered can be compared between and among sites. Best effort will be made to survey approximately the same area of each site through each survey period. Below is locations and diagrams of how survey lines may look in these discrete unit locations.

Decreased visibility may lead to increased survey transects to ensure area observed remains consistent, however it should be noted when this occurs.

7.0 Study Design

The study area is located in WRIA 37 (Lower Yakima). BCD staff will collect continuous water temperature data at 4 locations along the lower Yakima River from June – September from RM 93 to RM 42. Snorkel surveys will be completed twice weekly for three consecutive weeks in June and/or August. Additionally, synoptic sampling for specific conductance will take place every 5-6 weeks at each logger location. Cross-sectional flow measurements will be collected three times at each site in the spring, summer, and fall above the confluence of the cool water influence and the mainstem Yakima. Riparian vegetation structure assessments will describe habitat conditions within the riparian area. Lastly, water temperatures will be collected from 8 – 12 newly identified sites by 2020 TIR imaging – these sites will have synoptic temperature measurements collected with a handheld temperature sensor and the corresponding GPS locations will be logged.

7.2 Field data collection

7.2.1.2 Snorkel Monitoring Evaluation

Snorkel surveys will be conducted within side channels or low flow inputs to the Yakima River in June and/or August when deemed safe. Corresponding collection of temperature data will be captured in order to better characterize the conditions across each transect per each site and flow data will also be evaluated on the days of the surveys, as feasible. Collection of temperature data will be performed with a handheld Digi-sense data logging thermistor lowered into the water to determine temperature. Simultaneous collection of latitude and longitude will be determined using a Garmin GPSMAP 64s handheld GPS to geographically identify the measurements of water temperature. This collection will be cross referenced with georeferenced aerial photos on a tablet to ensure location data appropriately saved. This method also allows for quick geospatial transport into ArcGIS.

7.2.2 Ground-Truth of Newly Identified Cool Water Locations – Sampling location and frequency

To develop a repository of future cool water refuge enhancement project sites, BCD Staff will visit cool water anomalies in the summer of 2024 as identified in the 2020 TIR flights, that have not been previously identified by either thermal profiling work, or the 1997 TIR Images. The 2020 TIR flights identified additional cool water anomalies that had not previously been identified through project work, either due to shifts in the alluvial floodplain, greater sensitivity of 2020 TIR flight data over the 1997 TIR flight images, or cool water anomalies were in areas that the boats could not access during profiling floats. All of the TIR 2020 temperature anomalies (known and unknown) are shown in Figure 11.