Application Name: South Fork Walla Walla River Base Flow Assessment

Application Number: 000-0000-18957

By: Walla Walla Basin Watershed Foundation

Offering Type: Open Solicitation

Application Type: Technical Assistance

OWEB Region: Mid Columbia
County: Umatilla
Coordinates: 45.87489,-117.986336

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Budget Summary:
OWEB Amount Requested: $24,982
Total Project Amount: $115,880

Administrative Information

Abstract

Provide an abstract statement for the project. Include the following information: 1) Identify the project location; 2) Briefly state the project need; 3) Describe the proposed work; 4) Identify project partners.

The South Fork Walla Walla River Baseflow Assessment will occur in the Middle and Upper HUC-6 subwatersheds in the Umatilla National Forest in the Blue Mountains.
The Walla Walla River is a groundwater-dependent system with summer base flows supplied, in large part, by springs emerging from basalt aquifers in the South Fork drainage. Climate science predicts changing precipitation and infiltration patterns in the Blue Mountains will reduce spring performance. Reduced summertime base flows will accentuate downstream low flow and high water temperature conditions documented as primary limiting factors for native fish species.
In order to protect and enhance upper watershed groundwater discharges to the Walla Walla River, we must first understand the status of the resource and the processes that govern spring production. Our goal is to sustain this ecosystem function throughout the predicted shifts in precipitation patterns rather than face the challenge of restoring it in 50 years when spring production has declined and the downstream conditions have been further degraded.
The proposed base flow assessment will include 1) LiDAR acquisition, 2) a field inventory to locate and characterize the springs in order to document baseline conditions, 3) creation of a hydrologic map of the project area. and 4) public outreach to promote water conservation efforts that support sustainable municipal supplies. Isotope results from a concurrent USGS study will furnish information about the timing of groundwater infiltration and relative time to discharge.
Results from this assessment will guide strategies for enhancing infiltration, protecting recharge zones, and other efforts to mitigate the anticipated reductions in spring performance due to climate change.

Project partners include the City of Milton-Freewater, USFS, OWRD, USGS, ODEQ, and BLM.

Location Information

What is the ownership of the project site(s)?

✓ *Public land (any lands owned by the Federal government, the State of Oregon, a city, county, district or municipal or public corporation in Oregon)*

What agency(ies) are involved?

United States Forest Service, Bureau of Land Management

❑ *Private (land owned by non-governmental entities)*

❑ *This grant will take place in more than one county.*

Permits

Other than the land-use form, do you need a permit, license or other regulatory approval of any of the proposed project activities?

● Yes
❍ No

For Details Go to Permit Page

I acknowledge that I am responsible for verifying applicable permits, licenses, and General Authorizations required for the project, and can update information at grant agreement execution.

✓*Yes*

Racial and Ethnic Impact Statement

Racial and Ethnic Impact Statement

❍ The proposed grant project policies or programs could have a disproportionate or unique POSITIVE impact on the following minority persons. (indicate all that apply)

❍ The proposed grant project policies or programs could have a disproportionate or unique NEGATIVE impact on the following minority persons. (indicate all that apply)

● The proposed grant project policies or programs WILL HAVE NO disproportionate or unique impact on minority persons.

Insurance Information

❑*Working with hazardous materials (not including materials used in the normal operation of equipment such as hydraulic fluid)*

❑*Earth moving work around the footprint of a drinking water well*

❑*Removal or alteration of structures that hold back water on land or instream including dams, levees, dikes, tidegates and other water control devices (this does not include temporary diversion dams used solely to divert water for irrigation)*

❑*Applicant's staff or volunteers are working with kids related to this project (DAS Risk assessment tool not required, additional insurance is required)*

❑*Applicant's staff are applying herbicides or pesticides (DAS Risk assessment tool not required, additional insurance is required)*

Additional Information

❑ *This project affects Sage-Grouse.*

Problem Statement

Describe the watershed problem this Technical Assistance Application seeks to address.

Summary

The Walla Walla River is a groundwater-dependent system with summer base flows provided, in large part, by springs emerging from basalt aquifers in the middle and upper subwatersheds of the South Fork Walla Walla River. Climate science suggests that changing precipitation and infiltration patterns in the Blue Mountains will reduce spring performance in the next few decades (Holofsky & Peterson, 2017). Reduced summertime base flows will accentuate the low flow and high water temperature conditions on the valley floor already documented as primary factors limiting successful populations of native fish.

Although alluvial groundwater contributions to the Walla Walla River system on the valley floor have been documented, information about the role of upriver basalt inputs on the water budget is very limited, and baseline conditions are unknown. Walla Walla Basin Watershed Council (WWBWC) staff are currently conducting a fish habitat survey in the project area and have documented the locations of springs along the upper South Fork Walla Walla river corridor that contribute a significant proportion of flow. An initial review of available data indicated that the observed springs have not been previously documented or characterized. In order to protect and enhance upper watershed groundwater discharges to the Walla Walla River, we must first understand the status of the resource and the processes that govern spring production. Our goal is to sustain this essential ecosystem function throughout the predicted shifts in precipitation patterns rather than face the challenge of restoring it in 50 years when spring production has declined and the downstream conditions have been further degraded.

Climate Change Predictions

The mechanism of climate impacts is predicted as follows: Snowpack is the main source of groundwater recharge feeding the basalt aquifers of our region. Climate models predict a shift from snow-dominated to rain-dominated hydrologic regime, potentially impacting the rate of infiltration to the basalt aquifer, particularly in the mid elevations of the Blue Mountains (Dwire et al, 2018). Reduced infiltration is likely to reduce the quantity of spring inputs to the river. Summer base flows are anticipated to drop by 10-20% in the South Fork Walla Walla by 2080, severely compromising water supply for populations of native fish that are already struggling (Holofsky and Peterson, 2017).

Field studies also indicate that groundwater supply in the upper South Fork watershed will likely be impacted by climate patterns. In their Spring Inventory Report for the U.S. Forest Service, Johnson and Clifton (2008) suggest the low conductivity and low pH values measured in the springs could indicate their close proximity to the top of the infiltration zone. If the spring water has a relatively short residence time in the basalt aquifer before being discharged to the river, shifting precipitation regimes and reduced groundwater infiltration is likely to significantly impact groundwater supply and correspondingly instream flows and water temperature for threatened and culturally important fish populations and downstream uses.

Impacts to Threatened and Endangered Species

The Walla Walla River and its headwater tributaries are utilized by ESA-listed bull trout, mid-Columbia River steelhead, and reintroduced Spring Chinook Salmon. The Middle South Fork and Upper South Fork Walla Walla River subwatersheds are identified in the Umatilla National Forest Plan as key watersheds for ESA critical habitat for these species. While the upper watershed offers high quality habitat, conditions are less favorable downstream. Two major factors limiting the success of native fish species are a lack of in-stream water volume and high summertime water temperatures on the valley floor. Since the Walla Walla River is impaired for both summertime flow and water temperature, groundwater inputs during the dry season are an invaluable component of habitat function. As climate impacts reduce the rate of cool groundwater inputs upstream, the already inadequate downgradient river conditions will worsen.

An assessment of Walla Walla River source water is needed to protect and enhance an existing watershed function essential for improving conditions for struggling populations of native fish.

Does this project address one or both of the following:

✓*Habitat needs for one or more Endangered Species Act-listed species and/or species of concern*

✓*Concerns identified on 303(d) listed streams*

❑*No*

Project History

Continuation - Are you requesting funds to continue work on a project previously funded by OWEB?

❍ Yes

● No

Resubmit - Have you submitted, but were not awarded an OWEB application for this project before?

● Yes

❍ No

Provide OWEB Application Number

217-6070

Phased - Is proposed work in this application a phased technical assistance project?

❍ Yes

● No

Plans and Salmon

Is the proposed technical assistance activity(ies) identified in a local assessment or other plan?

● Yes

❍ No

List the name of the assessment or plan being implemented by this project. The description must include the purpose of the plan.

Walla Walla Subbasin Plan, Northwest Power and Conservation Council, 2004
Identifies limiting factors for steelhead, spring Chinook salmon and bull trout. The Plan classifies much of the Walla Walla River as Priority Restoration and Priority Protection Areas. The biological objectives include decreasing summer temperatures and increasing summer flows (Table 7-3, p.143) and calls for further habitat inventories to fill data gaps and evaluate progress toward objectives (p. 206).

Snake River Salmon Recovery Plan, June 2011.
Decreased base flows listed as one of the dominant limiting factors in the Walla Walla headwaters (p154). Increasing stream flow is one of six recovery strategies (p195).

Middle Columbia Steelhead ESA Recovery Plan, NMFS, 2009
Identifies limiting factors, habitat strategies and actions by region. Primary limiting factors listed for Walla Walla include high water temperature and low flow. The proposed project seeks to 1) protect and conserve high quality habitat and our results will guide 2) enhancement of hyporheic flows and spring inputs (p9-178).

Oregon Mid-Columbia Steelhead Recovery Plan, ODFW, 2010

Assigns risk ratings to steelhead populations and discusses limiting factors and threats. For Walla Walla summer steelhead, limiting factors included high water temperature and low flow.
Plan states that the Walla Walla EDT model lacks extensive empirical data and calls for collection of additional habitat data to improve future modeling efforts (p. 13-35).

Mid-Columbia Recovery Unit Implementation Plan for Bull Trout, USFWS, 2015
Describes nearly pristine bull trout spawning habitat in the Walla Walla River headwaters (pC-5). The cold water spring inputs of the upper South Fork are an important contribution to this high functioning ecosystem. Our project will inventory the source waters providing critical bull trout habitat. Results will inform efforts to mitigate the downstream threats described in the plan including reduced flows, degraded water quality and increased water temperatures (p. C-12).

2008 Spring Inventory Report – Johnson and Clifton, Umatilla National Forest, OR
States the need to evaluate time-dependent groundwater patterns (p14).

Potential effects of climate change on riparian areas, wetlands, and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA – Dwire et al, USFS, 2018
Assessed climate change impacts and vulnerability of groundwater-dependent ecosystems in the Blue Mountains. Authors state that an understanding of groundwater resources is limited and additional inventories and protection of groundwater dependent ecosystems are needed to promote adaptation and resiliency (p51).

Changes toward earlier streamflow timing across western North America, Stewart et al, 2005 (Journal of Climate, Vol 18)
Shows that snowmelt-derived streamflow across Western North America has shifted 1-4 weeks earlier than in the 1950s. Adverse effects of this trend merit increased basin-specific assessments of climate impacts to water supplies (p1154).

Climate Change Vulnerability and Adaptation in the Blue Mountains Region, Holofsky and Peterson eds, USFS, 2017
Predicts climate change impacts and adaptation recommendations. Increased ambient temperatures will alter the timing and availability of water supply causing decreased summer low flows and increased water temperatures. Adaptations related to flow and temperature include protecting groundwater and springs to maintain summer base flows (pvii). Information about the role of groundwater in water budgets is needed to determine adaptive capacity of groundwater-dependent ecosystems (p257).

Will this project benefit salmon or steelhead?

● Yes
❍ No

✓Middle Columbia River - Steelhead
✓Middle Columbia River spring-run - Chinook Salmon

How will the resulting technical assistance project benefit salmon or steelhead or their habitat?

The Walla Walla River and its headwater streams have been identified as priority protection and restoration areas for Spring Chinook salmon and Middle Columbia River Steelhead populations. These species are limited by inadequate summer flows and high water temperatures in much of the Walla Walla Watershed (see references to watershed plans above). The proposed source water assessment will benefit salmon and steelhead by filling a data gap critical to 1) protecting the high quality Walla Walla headwaters habitat and 2) improving the impaired flow and water temperature conditions salmon and steehead encounter downstream. The data will be utilized in the Confederated Tribes of the Umatilla Indian Reservation's (CTUIR) basin wide assessment and restoration strategy to improve conditions for Middle Columbia River Summer Steelhead, Spring Chinook salmon, Bull trout, and Pacific lamprey.

Climate change predictions suggest that the natural infiltration to the basalt aquifer in the Blue Mountains will likely be reduced by shifting precipitation patterns. The proposed base flow assessment will include a collaboration with the U.S. Geological Survey (USGS) to characterize the age and infiltration rates of South Fork springs using stable isotope analysis. Results will allow basin partners to develop strategies for enhancing infiltration, protecting recharge zones, and other efforts to mitigate the anticipated reductions in spring performance due to climate change. Projects to enhance spring performance will benefit salmon and steelhead by improving summer flow rates and water temperatures.

Proposed Solution

Goal, Objectives, and Activities

State your project goal. A goal statement should articulate desired outcomes (the vision for desired future conditions) and the watershed benefit.

The goal of this base flow assessment is to protect and enhance a critical watershed function in advance of its predicted degradation by climate change impacts. Summertime base flows in our basin depend on the infiltration of precipitation in the Blue Mountains to fill the basalt aquifer and supply springs feeding the South Fork and consequently the mainstem Walla Walla River. Our base flow study will 1) locate and characterize previously undocumented springs discharging to the South Fork Walla Walla and its tributaries, 2) help determine the level of vulnerability of those springs to projected climate change impacts and 3) allow basin partners to begin developing strategies to maximize infiltration for sustainable summertime base flows, improving habitat conditions for native fish.

List specific and measurable objectives. Objectives support and refine the goal by breaking it down to steps for achieving the goal. (NOTE: If you quantify your objectives, ensure all numbers match the metrics listed in your selected habitat types.) Provide up to 7 objectives.

Objective #1

Objective

Obtain a permit from USFS

Describe the project activities. Activities explain how the objective will be implemented.

Obtain a special uses permit from the Walla Walla Ranger District to:
-Conduct a a springs inventory by following the USFS Groundwater-Dependent Ecosystems: Level 1 Inventory Field Guide, Inventory Methods of Assessment and Planning
-Collect water samples for stable isotope analysis
-Conduct a LiDAR flight of the Middle and Upper South Fork Walla Walla River Subwatersheds

Objective #2

Objective

LiDAR Acquisition for the Upper and Middle South Fork Walla Walla River HUC-6 units

Describe the project activities. Activities explain how the objective will be implemented.

Request bids and subcontract LiDAR data acquisition by a qualified contractor.
Funding for the LiDAR flight have been requested in an application to the Bonneville Power Administration (BPA).
US Forest Service Regional Office Geospatial staff will assist with LiDAR data post-processing, product development and redistribution.
Currently the project area is outside of any Oregon LiDAR Consortium project development areas. The WWBWC will notify the Oregon LiDAR Consortium prior and post flight to ensure that the dataset is incorporated into the state dataset.

LiDAR Acquisition for the Upper and Middle South Fork Walla Walla River HUC-6 units
-Near-Infrared (NIR), leaf-on, and pulse density at 8 pulses/m2. Pulse density consistent with the USGS PL1 specifications
-Key deliverables
1. Noise filtered and classified full point cloud
2. 1-m raster bare earth Digital Terrain Model (DTM)
3. 1-m raster intensity image

The resulting LiDAR data will be analyzed to produce high resolution imagery of the project area (Upper and Middle South Fork Walla Walla River HUC-6 units) used to locate and map potential springs and streams. The locations will then be verified with a field visit, and springs will be characterized using the USFS spring survey protocol. WWBWC staff have observed several currently undocumented springs and tributaries in the South Fork River corridor, but we suspect the presence of numerous others throughout the Middle and Upper South Fork drainage basins. The high resolution imagery will be used to analyze the entire drainage area of the two HUCs in order to greatly increase the efficiency of identifying source water inputs in the project area.

Objective #3

Objective

Document locations and characteristics of springs and perennial streams in the Middle and Upper South Fork Walla Walla River subwatersheds

Describe the project activities. Activities explain how the objective will be implemented.

The USFS is the primary landowner and watershed manager. Umatilla National Forest staff will assist with 1) training for groundwater dependent ecosystem surveys, 2) field data collection, and 3) required clearances/permits.

A list of all known and possible springs and tributaries in the project area will be developed using 1) historical data, available maps and previously documented sites and 2) analysis of the high-resolution LiDAR outputs. All sites will then be visited to document location, extent, and characteristics.
Field staff will characterize the springs in the project area using the USFS Groundwater-Dependent Ecosystems: Level I Inventory Field Guide, Inventory Methods for Assessment and Planning
United States Department of Agriculture (2012). Gen. Tech. Report WO-86, March 2012 (see document link on Reference page)
These USFS methods are intended to document the location, size, and basic characteristics of ecosystems where groundwater emerges on the ground surface (springs and groundwater-dependent wetlands). The following

information will be collected: spring type, geologic structure type, soil types, vegetation, flow rate and pattern, water quality (specific conductance, pH, and dissolved oxygen), disturbance and water use. This field inventory will occur between July and October in order to ensure comparability with existing inventory data collected in 1979 and 2008.

The completed field inventory will enable creation of a hydrologic map documenting source water inputs to the South Fork Walla Walla River in the project area - see Objective 4.

Objective #4

Objective

Produce hydrologic map of the Middle and Upper South Fork Walla Walla River subwatersheds

Describe the project activities. Activities explain how the objective will be implemented.

Use field inventory data, LiDAR, and GIS feature data to develop a hydrologic map of the project area, including mapping the extent of perennial and intermittent streams, seeps, springs, wetland areas, and try to identify recharge areas. ArGIS will be used in conjunction with ArcGIS Hydro tools to create a geodatabase of geographic information that will document the current conditions of springs that provide the summer base flow in the South Fork and Walla Walla Rivers.
The hydrologic map will include the entire drainage area of the Middle and Upper South Fork Walla Walla River HUC-6 subwatershed units.

Objective #5

Objective

Collect water samples for stable isotope and tritium analysis by USGS

Describe the project activities. Activities explain how the objective will be implemented.

Groundwater contributions in the upper watershed are a significant component of Walla Walla River baseflows, providing cool, clean water to the system. In order to develop strategies to protect and enhance upper watershed groundwater discharges to the Walla Walla River, more information is needed regarding the mechanisms of recharge and groundwater travel times. Geochemical analysis can help describe that natural recharge process.

USGS is currently conducting a Walla Walla Basin groundwater study to better understand the basin's hydrogeologic system and support management and protection of water resources (https://www.usgs.gov/centers/wa-water/science/walla-walla-groundwater). The scope includes water analysis for stable isotopes and tritium in order to learn when spring water infiltrated and its residence time in the basalt aquifer.

Based on a shared goal to characterize basalt groundwater contributions in the upper watershed, WWBWC will partner with USGS to maximize the water sampling efforts for their groundwater study within the project area of our proposed source water assessment. WWBWC field staff will assist with collection of spring and tributary samples in this remote area of the watershed. The USGS Water Science Center will process the samples, analyze and publish the results at the conclusion of their study. This partnership will 1) allow USGS to broaden the sample area of their study and 2) provide WWBWC and basin partners with information allowing us to begin describing the vulnerability of Walla Walla River source water to climate impacts and develop appropriate mitigation strategies.

Objective #6

Objective

Summarize findings and provide base flow assessment results to project partners and interested parties

Describe the project activities. Activities explain how the objective will be implemented.

Summarize results and present to a technical team of interested parties including the USFS, OWRD, City of Milton-Freewater, Confederated Tribes of the Umatilla Indian Reservation, irrigation districts, ODFW, and others. The work group will evaluate the need for next steps and/or a project plan to mitigate the impacts of climate change on Walla Walla River base flows.

Objective #7

Objective

Community Outreach

Describe the project activities. Activities explain how the objective will be implemented.

As part of Milton-Freewater's in-kind contribution to the proposed base flow assessment project, City staff will develop and distribute information about the status of source water for the City of Milton-Freewater, municipal treatment and distribution system, regional groundwater declines and conservation opportunities. Methods of distribution will include the City's website, printed newsletter that is mailed to over 2300 water account holders, and social media posts.

List the major project activities and time schedule estimated for completing the technical assistance project and the future restoration project.

Element	Description	Start Date	End Date
Permitting	Obtain special uses permit from USFS	8/2020	9/2020
LiDAR aquisition	USFS regional geospacial staff will subcontract the LiDAR flight, will post-process the data, and provide to WWBWC	9/2020	8/2021
Field Inventory of Source Waters	Document and characterize springs and tributaries within the Middle and Upper South Fork Walla Walla River subwatersheds	7/2021	9/2022
Hydrologic Map	Use ArcGIS to map the locations and extent of springs, wetlands, and tributaries in the Middle and Upper South Fork Walla Walla River subwatersheds	10/2021	10/2022
Collect water samples for isotope analysis	Coordinate with USGS and OWRD to collect samples from springs and tributaries within the project area to be sampled for stable isotopes and tritium.	7/2021	9/2022
Summarize findings and share results with project partners	Produce a summary of findings and convene interested parties to share source water inventory results and evaluate need for next steps	9/2022	11/2022
Community Outreach	Develop and distribute outreach materials to the Milton-Freewater community about water sources, quality, and conservation opportunities	10/2020	10/2022

Element	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Permitting										
LiDAR aquisition										
Field Inventory of Source Waters										
Hydrologic Map										
Collect water samples for isotope analysis										
Summarize findings and share results with project partners										
Community Outreach										

Technical Assistance Type

What type of technical assistance do you need in support of future voluntary restoration actions? (choose one)

❍ *Technical Design and Engineering*

● *Resource Assessment and Planning -- Details will follow.*

Resource Assessment and Planning

Select all of the technical assistance activities you will be doing.

❑ **Planning Activities**

✓ **Assessments/Surveys**

Select all the actions you propose to implement to address the problem.

- ❑ *Instream assessments/surveys*
- ✓ *Habitat assessments/surveys*
  - *Select all of the habitat assessment/survey activities to be conducted.*
    - ❑ *Riparian condition*
    - ❑ *Road condition/inventory*
    - ❑ *Upland habitat conditions*
    - ✓ *Wetland habitat conditions*
      - ✓ *Size*
      - ✓ *Vegetation composition*
      - ❑ *Vegetation density*
      - ✓ *Vegetation characteristics*
      - ✓ *Vegetation extent*
    - ❑ *Estuarine/nearshore habitat conditions*
    - ❑ *Invasive species*
    - ✓ *Other habitat assessments/surveys*
      - ✓ *Conducting LiDAR surveys*
      - ❑ *Landscape Mapping*
      - ❑ *Floodplain mapping*
      - ❑ *Forest inventories*

Estimated acres of habitat to be assessed/surveyed.

35482

Data Management

Describe how the data will be managed.

Field inventory data will be collected from July to October to ensure comparability with historical data. Field staff will use Rite in the Rain datasheets and field tablets to populate electronic spreadsheets. Scans and electronic duplicates will be made at the end of each field day to limit data losses.

Compatible data types (flow, water temperature, specific conductance, pH, others) will be uploaded into an Aquatic Informatics AQUARIUS data management system.

All field data sheets will be scanned and stored digitally on the WWBWC's RAID system. Additionally, all field data sheets will be cataloged in a project folder at the WWBWC office.

Geospatial data will be contained in a project file geodatabase, which will be available at the end of the project. Geospatial data will be managed using ESRI ArcGIS.

Describe how the data will be analyzed and used to inform future voluntary restoration activities.

-LiDAR data will be post-processed by USFS regional geospacial staff and analyzed using ArcGIS software to produce high-resolution images and identify areas for field inventory.
-Spring inventory data will be evaluated by comparing results with with the 1979 and 2008 USFS survey results. The Umatilla National Forest hydrologist will assist with data analysis and summarizing results.
-Isotope data will be analyzed by USGS staff from the Oregon Water Science Center.

In order to craft sustainable water management strategies and improve the limiting factors for our threatened and endangered aquatic species, Walla Walla basin partners need to know about the status of the year-round sources of Walla Walla River water. Our study results will be used to characterize the sources of Walla Walla River base flows and determine their vulnerability to projected climate impacts in the Blue Mountains. Isotope data obtained from the springs will identify the approximate time of groundwater infiltration and time to discharge. Our findings will help us develop projects such as upland ponds to maximize infiltration and mitigate for the groundwater impacts likely to result from projected changes in precipitation patterns.

Study results will be provided to the CTUIR to inform their basin wide restoration strategy to restore watershed function and address habitat conditions limiting successful populations of threatened aquatic species.

Explain how the data will be collected. The description should include information on the sampling design.

LiDAR data will be collected by a qualified subcontractor using the following parameters:
-Near-Infrared (NIR), leaf-on, and pulse density at 8 pulses/m2. Pulse density consistent with the USGS PL1 specifications
-Key deliverables
1. Noise filtered and classified full point cloud
2. 1-m raster bare earth Digital Terrain Model (DTM)
3. 1-m raster intensity image

For the field inventory, WWBWC will follow the methods described in Groundwater-Dependent Ecosystems: Level I Inventory Field Guide, Inventory Methods for Assessment and Planning (USFS Gen. Tech. Report WO-86a - document link available on Reference page). This approach will allow us to
1. Document the locations and extent of groundwater sources within the project area
2. Characterize the groundwater dependent ecosystems identified. For each spring/wetland, the following data will be obtained: spring type, geologic structure type, soil types, vegetation, flow rate and pattern, water quality (specific conductance, pH, and dissolved oxygen), disturbance and water use.
3. Ensure comparability to existing data.

Each site will be visited one time during the project period in order to establish baseline conditions. Resulting knowledge of current basalt groundwater inputs to the South Fork will allow for comparisons, trend analysis and project effectiveness monitoring in the future.
Flow measurements will be collected using the methods described in Appendix 10 of the USFS survey protocols for spring inventories. We have equipment for volumetric meaurements, wading measurements with a current meter, and the use of a portable calibrated weir plate. Wading measurements will follow the flow monitoring methods described in WWBWC's 2018 Standard Operating Procedures V1.3 (http://wwbwc.org/images/Monitoring/SOP/WWBWC_SOP.pdf).

Stable isotope and tritium data will be processed by USGS following their standard operating procedures. WWBWC will assist with sample collection according to established protocols to ensure data quality. Specific locations and timing of sample collection will be determined after further consultation with USGS and OWRD staff.

Describe the partners engaged in the project, and how communication will occur between the partners.

The USFS is the primary land manager of the upper Walla Walla Watershed, and WWBWC has been coordinating with the Walla Walla Ranger District's forest hydrologist on project development. The Walla Walla District Ranger has submitted a letter of support. USFS regional staff have agreed to assist with LiDAR processing and field inventory training.

WWBWC has been coordinating with City of Milton-Freewater public works staff on project development and community outreach planning. The City Council voted to partner with WWBWC to assess source water conditions, and the City Manager has submitted a letter of support. City staff have agreed to assist with outreach to municipal water users to encourage water conservation.

The Oregon Department of Environmental Quality has granted funds to support the project because it addresses impairments described in the Walla Walla water temperature TMDL. Flow and water temperature are closely linked in our basin, and any changes to base flows and groundwater inputs will have a direct impact on water temperatures. ODEQ grant money will fund staff time for the field inventory.

WWBWC is working with team lead for the USGS groundwater study, Hank Johnson of the USGS Oregon Water Science Center and OWRD hydrologist Jen Woody to develop a sampling plan that will achieve our shared goals.

An application has been submitted to BPA to request funding for the LiDAR flight and staff time for field work and mapping.

Other interested parties include the Walla Walla River Irrigation District, BLM, CTUIR.

Communication will occur via email and conference calls. Results and findings will be provided in a meeting of project partners and interested parties.

Complementary Activities

Describe other planning, assessment, or restoration activities occurring within the area where you are collecting data.

1. The CTUIR is currently working on a watershed-scale habitat assessment and action plan for reducing limiting factors by restoring ecological processes in the mainstem Walla Walla River and headwater tributaries.

2. WWBWC is currently conducting a fish habitat survey of the Walla Walla River and headwater tributaries that includes the Middle and Upper South Fork subwatersheds.

3. Since 2014, basin partners have undertaken a Walla Walla Basin-wide Instream Flow Enhancement Study to identify and evaluate strategies to increase stream flows in the Walla Walla River.
Specifically, the flow enhancement study intends to:
-Improve Walla Walla River stream flows to support harvestable populations of native fish species;
-Ensure no net loss for water right holders leaving all, or a portion, of their Walla Walla River and tributary water rights in stream for fish;
-Identify and prioritize actions to achieve stream flow targets;
-Complete feasibility analyses of actions;
-Complete initial engineering designs of high priority actions;
-Identify how to solve the cross-boundary flow protection dilemma; and
-If funds allow, implement one or more actions.

4. USGS is currently conducting a 5 year transboundary study of the groundwater system in the Walla Walla River Basin to inform planning and water management decisions at a basin-wide scale.

5. CTUIR and USGS are currently partnering on an isotope/age-tracer study for the upper Umatilla Basin. Results will describe the geographic stable isotope distribution for that area which they expect will be largely similar to the upper Walla Walla basin.

Describe how this Technical Assistance Application complements those activities.

The results and findings from this base flow assessment will be provided to the CTUIR to inform their basin-wide restoration strategy.

Findings related to upper Walla Walla watershed hydraulic processes will add to data collected by USGS for their basin hydrology study.

Our results will also inform the Instream Flow Enhancement Study. An understanding of water supplies for the Walla Walla River is critical to the success of this effort. The project alternatives being evaluated by basin partners have been developed assuming a steady source of Walla Walla River base flows. Knowledge of the status and vulnerability of the the river's source water will aid technical teams as they plan for sustainable instream flows.

Conditions documented for the WWBWC's fish habitat assessment are likely to change as flow conditions change. A clearer understanding of source water status and trends is vital as we join basin partners and state agencies to protect existing ecosystem functions and reduce limiting habitat factors for species of concern in the Walla Walla watershed.

Acres of habitat encompassed by this technical assistance planning project.

35482

Miles of stream encompassed by this technical assistance planning project.

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Wrap-Up

Outcomes

Describe how the proposed technical assistance activities will address the watershed problem identified in the Problem Statement.

Climate science suggests that changing precipitation and infiltration patterns in the Blue Mountains will reduce spring performance. The Walla Walla River is a groundwater-dependent system fed, in large part, by springs emerging from basalt aquifers in the middle and upper subwatersheds of the South Fork Walla Walla River. Reduced summertime base flows will bring a cascade of deleterious habitat impacts for native fish species. In order to protect and enhance upper watershed groundwater discharges to the Walla Walla River, we first must understand the status of the resource and mechanisms of the groundwater recharge process.

The proposed base flow assessment seeks to locate and characterize the springs and tributaries in order to evaluate their vulnerability to climate changes and begin developing a strategy to protect them. Protecting them now is more viable than restoring them in 50 years when spring production has dropped off and the damage has been done.

Our base flow assessment will include LiDAR acquisition and a field inventory to locate and characterize the springs. Results from the USGS study will furnish information about the timing of groundwater infiltration and relative time to discharge. Public outreach to the downgradient community about the status of water sources will promote water conservation efforts that support sustainable municipal supplies.

Understanding the status of groundwater sources supplying Walla Walla River base flows will allow basin partners to develop projects and strategies to promote climate resilience and protect and enhance aquatic habitat.

Project Management

List the key participants, their roles, and qualifications relevant to the technical assistance activities.

Role	Name	Affiliation	Qualifications	Email	Phone
Project design, data collection, GIS analysis	Troy Baker	WWBWC Monitoring and GIS Program Manager	BS in Natural Science and extensive GIS training. Troy has managed WWBWC monitoring projects for more than 15 years. He co-led the Council's 2018 Couse Creek Watershed Assessment, and has over 15 years experience in forest health projects.	troy.baker@wwbwc.org	(541) 938-2170 Ext.104
Project design, data collection and processing	Tara Patten	WWBWC Watershed Technician	MS in Science, Biology. 12 years experience with water resources: riparian restoration, public outreach, collecting, analyzing and reporting surface and groundwater data, and habitat assessment	tara.patten@wwbwc.org	(541) 938-2170 Ext.107

Project Management	Wendy Harris	WWBWC Operations Manager	Wendy has over 9 years of experience overseeing the fiscal activities of the WWBWC. She provides project management oversight, project funding management and helps with outreach/education efforts.	wendy.harris@wwbwc.org	(541) 938-2170 Ext.103
Project design, technical guidance, data collection	Zig Napkora	Hydrologist, Umatilla National Forest, Walla Walla Ranger District	MS Environmental pollution Control, 30 years professional hydrology experience with the public and private sectors. Extensive experience with geomorphic analysis and stream, riparian-wetland, and spring inventories and monitoring.	zigmund.napkora@usda.gov	(509) 522-6285
Project design, data collection, community outreach	Steven Patten	Public Works Technician, City of Milton-Freewater	MS in Science, Biology. City liaison for water planning and conservation. Steve's 11 years of experience in water resources includes five years developing managed aquifer recharge projects for the Walla Walla basin.	steven.patten@milton-freewater-or.gov	(541) 938-8274

Budget

Item	Unit Type	Unit Number	Unit Cost	OWEB Funds	External Cash	External In-Kind	Total Costs
Salaries, Wages and Benefits							
Monitoring & GIS Program Manager	Hours	545	$62.30	$9,345	$24,609	$0	$33,954
Operations Manager	Hours	125	$42.72	$1,068	$4,272	$0	$5,340
Executive Director	Hours	80	$68.50	$0	$5,480	$0	$5,480
Watershed Technician I	Hours	600	$28.19	$7,048	$9,866	$0	$16,914
Watershed Technician II	Hours	202	$26.41	$2,641	$2,694	$0	$5,335
Office Manager	Hours	25	$37.40	$935 *	$0	$0	$935
			Category Sub-total	$21,037	$46,921	$0	$67,958
Contracted Services							
LiDAR Flight	Each	1	$30,000.00	$0	$30,000	$0	$30,000
LiDAR Processing	Each	1	$8,000.00	$0	$0	$8,000	$8,000
USFS Field Assistant	Each	200	$20.00	$0 *	$0	$4,000	$4,000
			Category Sub-total	$0	$30,000	$12,000	$42,000
Travel							
Mileage	Miles	1600	$0.58	$920	$0	$0	$920
			Category Sub-total	$920	$0	$0	$920
Materials and Supplies							
Sp conductance calibration solution	Each	3	$17.46	$53	$0	$0	$53
Insulated Waders	Each	4	$75.00	$300	$0	$0	$300
pH probe	Each	2	$305.00	$305	$305	$0	$610
pH calibration solutions	Each	5	$18.53	$56	$37	$0	$93
DO sensor cap	Each	2	$109.25	$109 *	$110	$0	$219
Batteries	Each	2	$25.00	$25	$25	$0	$50
Onset Hobo Thermistors	Each	10	$150.00	$0	$1,500	$0	$1,500
			Category Sub-total	$848	$1,977	$0	$2,825
Equipment							
			$0	$0	$0	$0	$0
			Category Sub-total	$0	$0	$0	$0
Other							
			$0	$0	$0	$0	$0
			Category Sub-total	$0	$0	$0	$0
			Modified Total Direct Cost Amounts	$22,805	$78,898	$12,000	$113,703
Indirect Costs							
Federally Accepted 'de minimis' Indirect Cost Rate (up to 10%)		10%			Indirect Cost Total: $2,177		
			Total	$24,982	$78,898	$12,000	$115,880

* = OWEB funds excluded from indirect.

If the budget includes unusually high costs and/or rates, provide justification for those costs and/or rates.

If the budget identifies a contingency amount for specific line item(s) within the Contracted Services and Materials and Supplies budget categories, explain the specific reasons a contingency is needed for each line item. Contingencies are line-item specific and cannot be used for other costs.

Funding and Match

Fund Sources and Amounts

Organization Type	Name	Source Note	Contribution Type	Amount	Description	Status
Federal	Bonneville Power Administration	BPA 2020/2021	Cash	$78,898	BPA 2020-21	Pending
Federal	US Forest Service		In-Kind - Labor	$12,000	Training, field work, permits	Pending
Fund Source Cash Total	**$78,898**		**Fund Source In-Kind Total**	**$12,000**		

Match

Contribution Source-Type: Description	Amount
Bonneville Power Administration-Cash: BPA 2020-21	$78,898
US Forest Service-In-Kind - Labor: Training, field work, permits	$0
Match Total	**$78,898**

Do match funding sources have any restrictions on how funds are used, timelines or other limitations that would impact the portion of the project proposed for OWEB funding?

❍ Yes
● No

Do you need state OWEB dollars (not Federal) to match the requirements of any other federal funding you will be using to complete this project?

❍ Yes
● No

Does the non-OWEB cash funding include Pacific Coast Salmon Recovery Funds?

❍ Yes
● No

Uploads

Map: ProjectMap_SFWW Baseflow Assessment.pdf -

Support Letters: City of Milton Freewater Letter of Support.pdf -

Support Letters: WW Ranger District_OWEB_support_letter_20200424.pdf -

Support Letters: WWRID letter of support.pdf -

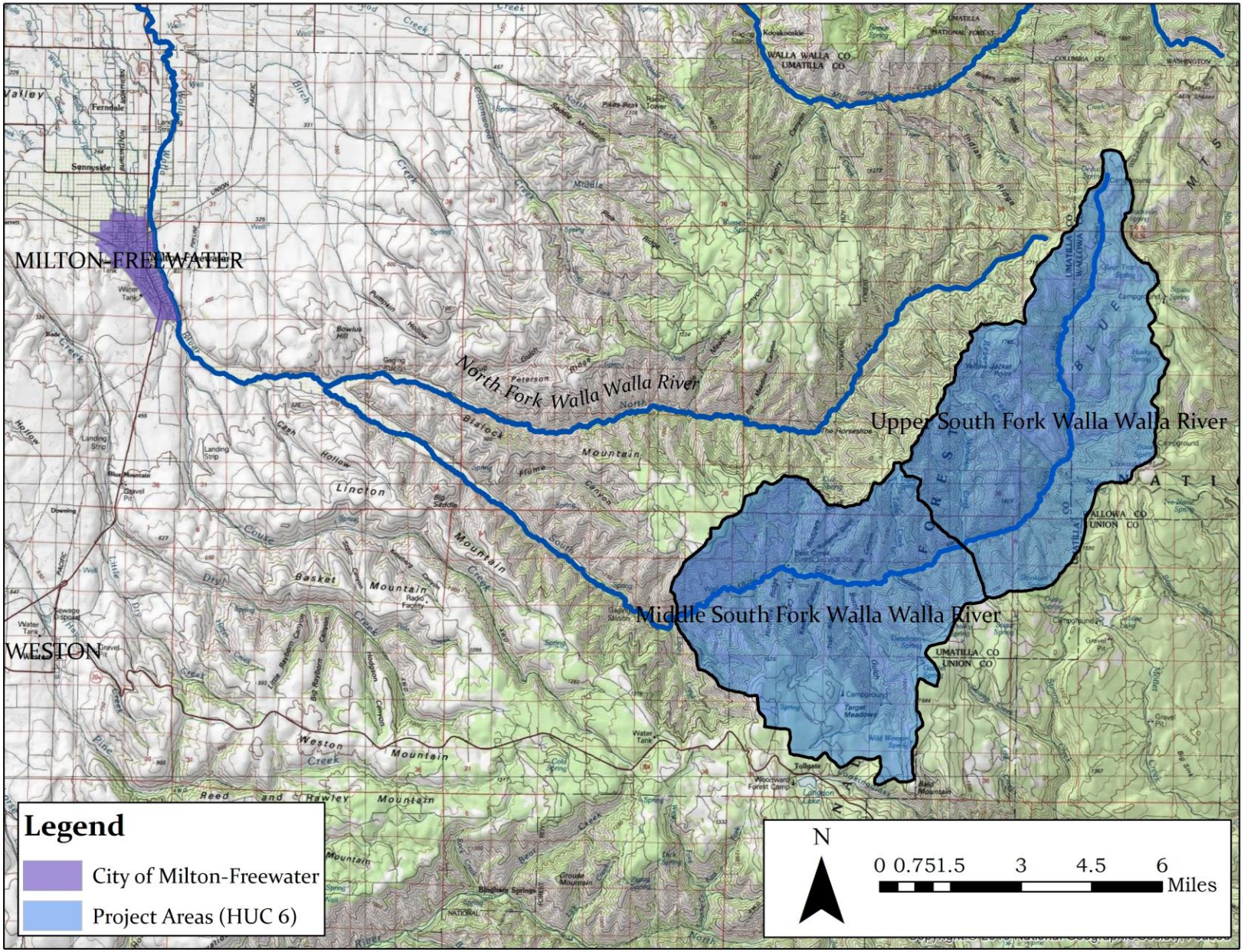
Photos: Spring Photos.pdf -

Reports: References.pdf - **Includes links to cited documents**

Project Design: Addressing Review Team Concerns_217-6070 Upper Walla Watershed Hydrology Assessment.pdf - **Compares current proposal to 2016 proposal**

Permit Page

Project Activity Requiring a Permit or License	Name of Permit or License	Entity Issuing Permit or License	Status
Conducting a study on US Forest Service Land	Special Uses Permit	Walla Walla Ranger District	Pending


MILTON-FREEWATER
WESTON
North Fork Walla Walla River
Upper South Fork Walla Walla River
Middle South Fork Walla Walla River
Legend
City of Milton-Freewater
Project Areas (HUC 6)
N
0 0.751.5 3 4.5 6
Miles

CITY OF

MILTON-FREEWATER

P.O. Box 6, Milton-Freewater, OR 97862 • Phone (541)938-5531 • Fax (541)938-8224

Since 1889

April 27, 2020

TO: Oregon Watershed Enhancement Board
Oregon Department of Environmental Quality Grant Reviewers

It is my sincere pleasure to write this letter of support on behalf of the CITY OF MILTON FREEWATER for the grant application submitted by the Walla Walla Basin Watershed Council for funding to a water source inventory and isotope sampling to identify crucial spring water sources.

The City of Milton Freewater is a partner and avid supporter of the work that the WWBWC staffers are doing to identify and thus study and protect the valuable and shrinking sources of our valley's water resources. Our Council has unanimously supported this partnership when the issue was considered at their public meeting in December of 2019. In fact, our Council has made it one of their driving comprehensive goals and policy directives to partner with the Walla Walla Basin Watershed Council in working toward the protection and preservation of our precious water resources. Without them, our valley would not exist.

We are fully aware and on board with the paramount goal of restoring and protecting the health of our watersheds, monitoring and studying the aquatic and riparian ecosystems, and learn all we can about how best to protect this crucial area. Its springs feed our Walla Walla River and the upper watershed where they originate. It is vital that these studies move forward and if this funding is not granted, that puts this goal at jeopardy.

PLEASE, I urge you to fund this grant application fully; as we desperately need to learn all we can about this precious resource in order to protect it.

Thank you for your support.

Sincerely,

Linda Hall, City Manager

USDA United States Department of Agriculture | Forest Service | Walla Walla Ranger District | 1415 W Rose Street Walla Walla, WA 99362

File Code: 2510 April 24, 2020

Subject: Walla Walla Basin Watershed Council's Remote Sensing and Source Water Inventory for the South Fork Walla Walla River

Dear OWEB Review Team:

I am writing to express my support of the Walla Walla Basin Watershed Council's inventory of springs and lidar acquisition for the South Fork Walla Walla River. As the primary land management agency of the upper watershed area, the Walla Walla Ranger District has a vested interest in maintaining and improving upland, riparian and stream habitat conditions. The South Fork Walla Walla River is important habitat for Steelhead, Bull Trout and Chinook salmon and has been identified as a priority area for protection and restoration. The proposed project will map seeps, springs, wetland areas, perennial and intermittent streams and identify potential recharge areas. This information will help the Walla Walla Ranger District gain a better understand of surface and groundwater flow paths that are vital to forest management actions and downstream water users. The survey will build on current work within the basin including habitat and fish passage improvements.

I support the proposed Walla Walla River Watershed Assessment and look forward to collaboratively working together.

Sincerely,

MICHAEL RASSBACH
District Ranger

Walla Walla River Irrigation District
PO Box 248/323 Evans Street
Milton-Freewater, Oregon 97862
541-938-0144
teresa@wwriver.com

Walla Walla Basin Watershed Council
810 South Main Street
Milton-Freewater, Oregon 97862

Dear Basin Partner,

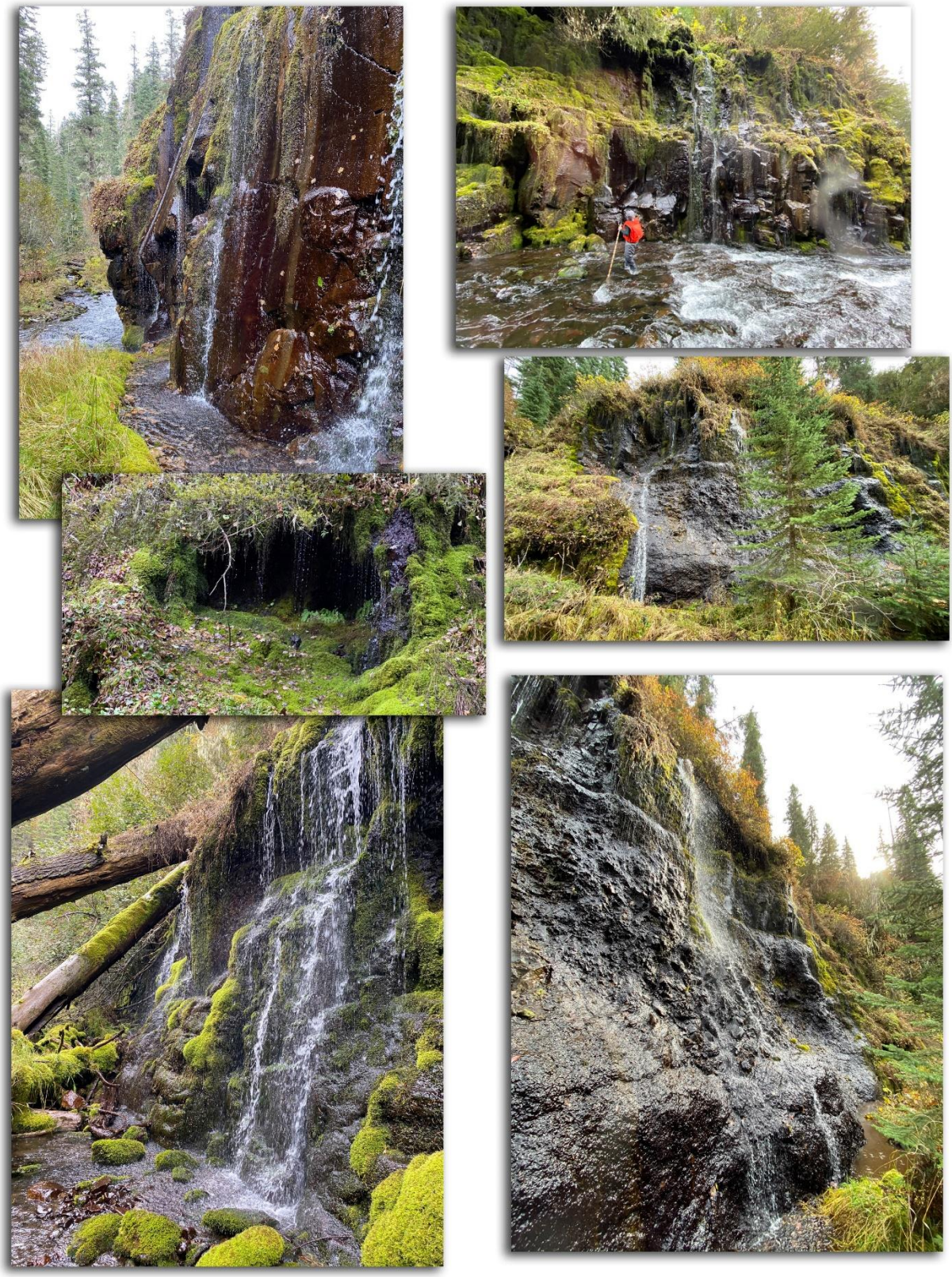
The Walla Walla River Irrigation District appreciates the opportunity to review, and express our support, to the Walla Walla Basin Watershed Council's proposal for Remote Sensing and Source Water Inventory.

We believe that identification and recording of current source water will assist in informing future water planning efforts. This important work also enables the Walla Walla Basin Watershed Council to educate the public of current water supply and quality, as well as the potential to inform the public of changes to water supply.

Please do not hesitate to contact us if there is anything we can do to assist your efforts.

Sincerely,

Teresa Kilmer
District Manager
Walla Walla River Irrigation District



Images showing examples of uncharacterized springs emerging from fractures in the basalt along the South Fork Walla Walla River corridor.

References

Dwire, K. A., Mellmann-Brown, S., & Gurrieri, J. T. 2018. Potential effects of climate change on riparian areas, wetlands, and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA. *Climate Services*, *10*, 44–52. Retrieved from https://www.fs.fed.us/rm/pubs_journals/2018/rmrs_2018_dwire_k001.pdf

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National Marine Fisheries Service. 2009. *Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan.* Portland, Oregon. Retrieved from https://archive.fisheries.noaa.gov/wcr/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/middle_columbia/mid-c-plan.pdf

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Below please find a description of how our current proposal addresses the concerns raised regarding our unfunded monitoring proposal from 2016.

- Our goals for the proposed base flow assessment are similar to those proposed in the 2016 monitoring application, but our approach has been significantly modified to utilize 1) LiDAR data for efficiency of source water identification, 2) an established USFS method for surveying and document groundwater-dependent ecosystems, and 3) the use of geochemical analysis to learn about groundwater recharge dynamics.
- WWBWC has developed partnerships with the Umatilla National Forest, USGS, City of Milton-Freewater, and ODEQ to achieve the goals set forth in the current proposal.
- Our rationale for the project is based in well-documented climate science and on our observations last fall of undocumented basalt springs that almost double South Fork Walla Walla flow within the project area. These basalt groundwater sources are playing an important role in Walla Walla River ecology but are predicted to decline. The proposed base flow assessment will allow us to protect and enhance these water sources, mitigating the impacts of climate change, and improving habitat conditions for our basin's threatened and endangered fish.
- We do not propose to evaluate past forest management practices.
- Data collection will follow a nationwide field inventory protocol for springs and wetlands.
- We aimed to more clearly describe the upper watershed process relating climate changes to groundwater recharge to spring production to Walla Walla River surface flows.
- A two year study will not provide all the information needed to protect and enhance Walla Walla River source waters. The proposed base flow assessment will, however, take the necessary first step toward that ultimate goal of creating a strategy. An understanding of current conditions and the mechanism of basalt groundwater recharge in the upper watershed will allow us to strategically design projects to enhance climate resilience.