Bureau of Reclamation's WaterSMART Aquatic Ecosystem Restoration Projects for Fiscal Year 2023

No. R23AS00106

Peshastin Creek Historic Channel and Floodplain Restoration Design Project

Chelan County Natural Resources Department
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Executive Summary

Task A: Study and Design

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The Peshastin Creek Historic Channel and Floodplain Reconnection Design Project will complete 60 percent designs to build two highway bridges, reconnecting a constructed channel to the historic channel and its wide floodplain in a split-flow configuration. The design will also include improvements to the constructed channel, adding up to 1.5 miles of high quality ESA-listed steelhead, spring Chinook, and bull trout habitat in Chelan County, Washington near the town of Leavenworth. The project is a collaboration between the Category A applicant, Chelan County Natural Resources Department (CCNRD), the Washington Department of Fish and Wildlife (WDFW), and the Washington State Department of Transportation (WSDOT). In order to accommodate construction of State Route 97 (SR 97), channel relocation in the project reach resulted in a 440 foot reduction in channel length, disconnection of 90 % of the floodplain and abandonment of high quality functional habitat in the historic channel and adjacent wetland. The current alignment through the constructed channel is entrenched, and due to high velocity, simplified conditions, and straight alignment, retains no spawning gravel or large wood and no functional pools. High flows are quickly exported downstream and out of the system, significantly restricting natural water storage. The currently inaccessible historic channel represents the largest known floodplain restoration opportunity in Peshastin Creek and perhaps the best chance to provide low gradient habitat preferred by spring Chinook salmon. There is a mature riparian buffer throughout the channel, wetland habitat in the downstream area, woody instream cover, and beaver impounded pools up to 4 feet deep sourced by ample cool groundwater and hillside drainages, that if connected, could provide thermal refuge for rearing salmon in the hot summer months. Peshastin sub-watershed is one of the top three flow limited watershed in the Wenatchee Basin, due largely

to irrigation withdrawals for the Icicle Peshastin Irrigation District (IPID), but also due to widespread floodplain disconnection. One of the greatest opportunities for streamflow restoration lies in restoring the watershed's ability to naturally store and release water. The abandoned historic channel at the proposed project site has significant untapped natural water storage potential through the water course and the wide floodplain, wetland, and riparian buffer. In combination with an IPID pump exchange project, this project is a key component in the Peshastin Strategy to restore baseflows for in-stream and out-of-stream uses, address Rank 1 habitat limiting factors for ESA-listed species recovery, support interests of the Yakama Nation and Colville Tribes, and enhance climate change and community resiliency.

Project Location

The Peshastin Creek Historic Channel and Floodplain Reconnection Design Project is located in the Peshastin sub-watershed (HUC-10) which is one of the twelve major sub-watersheds that comprise the Wenatchee Watershed (HUC-8). The project is located in Chelan County, Washington, approximately 9 miles north of the unincorporated town of Peshastin, and 13 miles northeast of Leavenworth. The project latitude is 47°28'15.76" N, and the longitude is 120°39'12.03'W (Appendix A, Figure 1).

Project Description

Task A: Study and Design

CCNRD proposes to complete an alternatives analysis, conceptual design and preliminary design to reconnect a disconnected historic mainstem channel of Peshastin Creek to the existing artificial channel constructed during a highway project in the 1950's. CCNRD completed an alternatives analysis and pre-conceptual design in 2015, but landowner constraints to the proposed concept as well as associated cost estimates prohibited us from moving the project into the Preliminary Design phase at that time. The project history is addressed in the *Prior Restoration Planning and Stakeholder Involvement and Support* section of this document.

The applicant will work with a consulting engineering firm and other sub-contractors to complete the following tasks within the 3year time frame.

<u>Background Review and Field Reconnaissance</u>

This task will include the formation of a design team, a kickoff meeting and field recon visits and background data review. The sponsor and consultant will lead this task. This will include consolidation and review of input from the main stakeholders on key design considerations and guidelines gathered during previous project phases. This task will build on previous design efforts including the Baseline Characteristics Assessment.

<u>Hydrology and Hydraulic Assessment</u>

This revised model will utilize the 2022 Bathy LiDAR collected by US Bureau of Reclamation and be completed for both existing and proposed conditions at the Conceptual (30%) and Preliminary (60%) Design Phase. This will include difference mapping between the existing

conditions and proposed conditions. A WSDOT hydraulics report will be prepared as part of this task.

Alternatives Analysis

Two separate alternatives will be considered for design review. These are based on previous design efforts and feedback from reviewing committees. At this stage, there is also a question as to which channel would be utilized to convey low flows, so this will also be incorporated into each alternative. This task will be led by the consultant and the sponsor and will seek input from local fish biologists as well as geomorphic input on the preferred approach. WSDOT and local landowners will also be consulted to identify issues and opportunities regarding these alternatives. Creation of a decision matrix for comparing alternatives will be completed. Comments from stakeholders will be incorporated into the matrix.

Conceptual Design (30%)

This task will follow the selection of a preferred alternative and include engineering and design drawings and specifications for the project. Products will include a cover sheet, general notes, location map, access and staging, existing conditions plan view, proposed conditions plan view, plan and profiles, typical details (channel materials, low water mark, etc.), earthwork cut and fill volumes, planting/rehabilitation plans, temporary erosion and sediment control, de-watering, and construction sequencing.

Bridge Feasibility Analysis- The consultant will work with WSDOT and a structural engineer to complete a bridge feasibility review and identify any issues.

Geotechnical Background Data- The consultant will work with a geotech subcontractor to review local existing geotech data.

Conceptual Cost Estimate-Consultant will prepare.

Preliminary Design (60%)

Engineering and design drawings and specifications for the project will be produced. Products will include a cover sheet, general notes, location map, access and staging, existing conditions plan view, proposed conditions plan view, plan and profiles, typical details (channel materials, low water mark, etc.), earthwork cut and fill volumes, planting/rehabilitation plans, temporary erosion and sediment control, de-watering and construction sequencing.

Channel Design and Engineering- Channel design, ELJ, Floodplain and Engineering calculations.

Design Drafting- Plan set drafting and quantities calculations. Incorporating bridge designs into the plan set.

Basis of Design Report- Update existing Basis of Design Report to accommodate revised Conceptual Design and the Preliminary Design. A civil/bridge BOD will also be prepared as a stand along document.

Civil Engineering- Site prep, demo plan with utilities relocation, traffic control plan. Assumes WSDOT standard specifications for road and bridge construction.

Structural Engineering- Structure type, materials, span, vertical clearance. Bridge layout, foundation/abutment plan, elevation details. Engineering work will be done per AASHTO LRFD Bridge Design Specifications, WSDOT standard Specifications 2014 M41-10, WSDOT Bridge Design Manual M 23-50.04.

Risk Analysis

This task includes identification of performance and sustainability criteria for project elements and assessment of risk of failure to perform as well as evaluation of risk to infrastructure, property, human safety, recreation, etc. and potential consequences and supplemental analysis to mitigate risk.

Survey- PLS with topo and planimetric and combined with LiDAR.

Geotech- Drilling and reporting at two bridge locations. Multiple holes at each location.

Environmental Compliance - Consultant will provide metrics calculations, agency meeting support and sponsor support for materials needed for permit applications. Provide overview of compliance requirements for applicable federal, state, and local permits. Provide expected completion schedule or whether any exemptions apply.

Sec. 106 Cultural Resources- Contract for cultural resource surveys for ground disturbance associated with Geotech exploration. Complete Sec. 106 consultation and other environmental compliance needed to proceed with Geotech. Contract for additional cultural resource surveys based on Area of Potential Effect from final Preliminary (60%) Designs.

Wetland Delineation- Complete a wetland determination with a contracted Wetland Specialist during the Alternatives Analysis phase of the project. Complete a memo of findings including maps of estimated wetland extant and permitting strategy. Complete a wetland delineation based on the final Preliminary (60%) Designs. Flag wetland and OHWM boundaries, complete a wetland delineation report and participate in permit meetings with agency, applicant and engineer.

Project Management/Admin- Sponsor will manage and administer contracts, stakeholder outreach and design team. Sponsor will be responsible for all necessary access agreements/easements during the design process and will keep stakeholders apprised of design steps, outreach and comment phases of the project. Sponsor will develop the design team, schedule meetings and outline deliverables and overall project schedule with the consulting team. Sponsor and consultant will develop a matrix to account for design review and comments by interested parties.

Stakeholder feedback

The sponsor will work with the consultant to document comments from stakeholders to further understand project feasibility and better identify site constraints, designs details and project costs.

EVALUATION CRITERION A: Project Benefits (30 points)

Sub-Criterion A.1. General Project Benefits, Task A Design Projects

•What are the critical issues of concern in the watershed? Provide documentation and support for how the critical issues were identified.

Peshastin Creek is a major tributary of the Wenatchee River and is a major spawning area (MASA) and stronghold for the Wenatchee basin independent population of ESA-listed Upper Columbia summer steelhead. The creek is also a minor spawning area (MISA) for ESA-listed Upper Columbia spring Chinook, and foraging, migrating, and overwintering (FMO) habitat for ESA-listed bull trout (A Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region, RTT 2020, hereafter "Biological Strategy"). However, salmonid habitat within Peshastin Creek has been dramatically degraded from historic conditions by two main factors: 1. Floodplain disconnection and channel entrenchment due to anthropogenic development, especially construction of State Route 97 (SR 97) and 2. Irrigation diversions for the Icicle-Peshastin Irrigation District (IPID) (Salmon, Steelhead, and Bull Trout Habitat Limiting Factors for the Wenatchee Subbasin, Andonaegui 2001).

SR 97 follows the Peshastin Creek valley for almost its entire length of 16 RMs and directly abuts the channel for 18% of the total channel length between RM 0 and 9.3. Highway construction in 1956 involved reconstructing 19,317 feet of stream channel, which resulted in the reduction of channel length by 0.8 miles and disconnection of 34 % (194 acres) of its floodplain (Andonaegui 2001). This action has resulted in dramatic simplification, straightening, and degradation of salmonid spawning and rearing habitat into a predominantly plane-bed morphology. Historically, because of connection to the wide floodplain areas below RM 9.3 and longer channel length, lower Peshastin Creek was characterized by significantly more meander bends, pool riffle habitat, channel complexity and functional habitat forming processes that result in recruitment of spawning gravels and ground water storage (Andonaegui 2001). Specifically, within the proposed project reach at RM 8.4 – 9.2, highway construction involved diverting Peshastin Creek to a straight, constructed channel that is directly abutted on its east bank by the highway. This straight, channelized reach is disconnected from 90% of the historic floodplain, lacks any large wood or complexity, is a homogeneous plane-bed morphology, lacks significant riparian cover, and provides no spawning or rearing habitat for ESA-listed species (NSD 2015, Interfluve 2010). The channel is also significantly incised in this reach, which has resulted from the stream's inability to dissipate energy through channel migration (Andonaegui 2001).

Previously, the channel meandered across a wide floodplain within the project reach, providing diverse habitat (Andonaegui 2001). However, the well-defined historic channel and wide floodplain within the project reach is currently disconnected from Peshastin Creek at both the upstream and downstream ends by SR 97 (Appendix A, Figure 2). This currently inaccessible historic channel represents the largest known floodplain restoration opportunity in Peshastin Creek, and perhaps the best chance to provide low gradient habitat preferred by spring Chinook salmon. There is a mature riparian buffer throughout the channel, wetland habitat in the downstream area, and beaver impounded pools up to 4 feet deep sourced by ample cool groundwater and hillside drainages. In total, channel relocation at the project site resulted in a 440 foot reduction in channel length (from 4,320 to 3,880 feet), a reduction in sinuosity from 1.13 to 1.0, and abandonment of 90 % of the reach's floodplain (Appendix B, Photos 1 and 2). While

channel relocation to accommodate the highway occurred throughout the 16 RMs of Peshastin creek, alterations at the project site have had a disproportionally high effect. This reach contains 10 percent of the overall abandoned floodplain within the watershed; is situated at a key location of substantial slope reduction and widened floodplain which would naturally support sediment deposition and retainment of salmon gravels (versus the current condition as a transport reach); and is directly below the Ingalls creek confluence, the largest tributary in the Peshastin sub-watershed. Current conditions prevent the dynamic processes that create ESA-listed species habitat, such as sediment and wood recruitment, pool formation, and floodplain aquifer recharge.

Other human activities that have most notably impacted river processes and habitat in the Peshastin sub-watershed include mining and placement of mining tailing piles, logging of riparian forests and uplands, continued residential and agricultural development in the floodplain, and flood protection (small levees, bridges, riprap and roads). The upper portion of the basin (RM 9.3-16) has been heavily impacted by timber and mining activities, with agricultural and residential activities compromising the lower portion of the drainage (RM 0-9.3). Combined with water diversion (discussed below) these effects have resulted in several habitat factors that have been identified in the 2020 prioritization effort of the Biological Strategy as limiting recovery of ESA-listed steelhead, spring chinook and bull trout (RTT 2020). Limiting factors deemed Rank 1 for restoration and "unacceptable" in the project reach include those stemming from unnatural channel confinement, and include lack of floodplain connectivity, low pool quantity and quality, low riparian cover, high rearing temperature, degraded channel and bank stability, and low wood cover (RTT 2020). Peshastin Creek also has several 303(d) listings for impaired temperature, including one just below Ingalls Creek within the proposed project reach (Washington Dept of Ecology Water Quality Map Atlas 2023). These unacceptable habitat factors are also detrimental to other wildlife that depend on Peshastin Creek and its floodplain, including beaver, deer, elk, bear, amphibians, riparian birds and un-listed native fish like cutthroat and rainbow trout.

IPID maintains two irrigation diversions on Peshastin Creek at RM 4.9 ("Tandy diversion") and 2.4 ("Peshastin diversion"). IPID diverts up to 5 cfs at the Tandy diversion and up to 50 cfs at the Peshastin diversion. In late summer, low flows can be below 5 cfs, and Peshastin Creek can be effectively dewatered due to cobble size in the lower creek. These low flow conditions and associated high stream temperatures are considered Rank 1 or "unacceptable" conditions in these lower reaches, factors that limit survival of ESA-listed steelhead and spring Chinook that rear and spawn throughout Peshastin Creek (RTT 2020). Summer base flows are also ranked "at risk" in the proposed project reach, since high flow velocities and lack of floodplain connectivity through the constructed channel restrict natural water storage and aquifer recharge that would otherwise provide a source of additional base flow in the summer.

Because Peshastin Creek is a designated MASA for Upper Columbia River ESA-listed steelhead, degraded habitat due to development and water withdrawals in Peshastin creek effect recovery of the entire Wenatchee independent population (NOAA 2022). The project reach is a prime example of how infrastructure built in the past disregarded the riverine environment and habitat forming processes, abandoning a complex, meandering channel for a man-made, ditch-like channel. The proposed Peshastin Creek Historic Channel and Floodplain Reconnection Design project presents an opportunity to re-connect 10% of the Peshastin Creek floodplain, restore the historic alignment in the highest ranking restoration reach, reverse the mistakes of the past and restore up to 1.5 miles

of instream habitat for the benefit of ESA-listed salmonid recovery, water quality and quantity, ecosystem resilience and wildlife habitat.

• Explain how your project will benefit aquatic ecosystems, including benefits to plant and animal species, fish and wildlife habitat, riparian areas, and ecosystems.

Once constructed, the Peshastin Creek Historic Channel and Floodplain Reconnection Project will add 0.9 - 1.5 miles of high quality ESA-listed habitat to a Rank 1 restoration reach (RTT 2020). This includes ≥ 0.5 miles of newly accessible, high quality habitat in the historic channel and ≥ 0.4 miles of improved existing habitat in the constructed channel. The project will occur at a dynamic location just below the confluence of Ingalls Creek, on Peshastin Creek RM 9.2 – 8.4, and take an existing 2300 – 3,880' channel constructed during the 1950's highway project and reconnect it to a 2850 – 4320' historic channel (exact length depends on the outcome of design, Appendix A, Figure 3). The reconnection will occur as a split flow or side channel configuration using two highway bridges that reconnect the current channel on the west side of the highway to the historic channel on the east side. The project will also include habitat improvement (e.g. added complexity) to the constructed channel, thereby vastly improving the existing habitat while adding new high-quality habitat. Split flow will allow construction to preserve the intact riparian area surrounding the historic channel, while also seizing opportunities for maximum habitat accessibility, natural water storage, and re-instatement of habitat forming processes that create spawning and rearing habitat throughout the reach. Split flow will also allow for reduced flow velocity to transform the reach from a transport reach to one where gravel recruitment occurs. Implementation of the project will increase the quantity and quality of off-channel rearing, spawning and over-wintering habitat for juvenile spring Chinook and steelhead in Peshastin Creek, benefitting recovery of the Wenatchee watershed independent populations of both ESA-listed UCR steelhead and ESA-listed UCR spring Chinook and ESA-listed bull trout.

The project represents the largest floodplain restoration opportunity and the highest priority habitat project in Peshastin Creek, as it is in the only Rank 1 priority reach above RM 2.5 (RTT 2020), and it received the highest benefit score possible in the 2010 Lower Peshastin Reach Assessment (Interfluve 2010). As such, it is a key piece of the overall strategy to improve habitat for ESA-listed species in Peshastin Creek and, combined with the IPID pump exchange project (described below), will help assure species persistence under climate change.

As described above, the current configuration is through a constructed and confined channel, of homogeneous plane-bed morphology, with no spawning habitat, wood, or functional pools, and limited riparian vegetation. Splitting flow below Ingalls Creek at the project location will reduce flow velocity within the project reach and slow the rate at which water is exported out of the system. Design will also include components to add roughness and complexity to the channel, which along with the decrease in velocity will encourage deposition of spawning gravels, and reinstatement of habitat forming processes that form functional habitat, including pools. Design may also include notching the levee on the west bank and at the downstream end of the project reach in order to increase floodplain connectivity adjacent the constructed channel. The design will be geared towards improving water quality by preserving the cool temperature input of Ingalls creek, which may include narrowing up the channel and/or riparian planting. These actions will encourage the formation of both spawning habitat through gravel recruitment, and high quality rearing habitat with the addition of shaded, cool pools.

Perhaps most importantly, the project will also reinstate salmonid access to the high quality habitat that exists in the historic channel and restore connectivity between Peshastin Creek and the floodplain on the east side of the highway. The habitat within the historic channel is characterized by palustrine emergent and scrub shrub wetlands supported by tributary flows from the hillslope to the east and hyporheic and cool ground water flows. The abandoned channel has several beaver dams that result in 1- to 4-foot deep pool habitats in the spring and winter, and has substantial overhead and instream woody cover (Appendix B, Photos 3 and 4). Even in the summer, the channel retains small pools of ground water several degrees cooler than the mainstem Peshastin (CCNRD staff, personal observation). Although the riparian buffer width has been reduced by adjacent land uses, the shrub and tree dominated riparian strip provides good shade and cover to the channel, as well as enhanced channel stability (compared to the constructed channel). Therefore, simply by reconnecting mainstem flow to this historic channel as a split-flow or side channel, the project will provide access to an additional 0.5 – 0.8 RMs of high quality, complex and meandering habitat to ESA-listed species. Restoring fish access to the cool groundwater and shade that exist in the historic channel will provide thermal refugia for rearing salmonids. Activating the historic channel will allow the project site to fill up with water, which will substantially increase natural water storage in the watercourse and improve wetland, floodplain and riparian area and function within the reach. Baseflow and water quality will be improved by providing an enhanced source of cool ground water to the channel, as well as improving downstream conditions.

In essence, by re-connecting the historic channel and improving habitat within the existing channel, the project will reverse channel confinement that is the source of all of the "unacceptable" and "at risk" (Ranks 1 and 2) limiting factors identified in the Upper Columbia RTT Prioritization, including, floodplain connectivity, pool quantity and quality, low riparian cover, high rearing temperature, degraded channel stability, low wood cover, coarse sediment, and low baseflows.

Benefits to the floodplain and wetland environment will also improve conditions for multiple other species that depend on these habitats, including riparian birds, amphibians, raptors such as osprey and bald eagles, and mammals such as black bear, mule deer, elk, cougar, coyote, and wolverines. Importantly, beaver activity has also been observed in the project area, so that by increasing flow through the abandoned, historic channel, the project will also improve conditions for beaver while also providing fish access to the complex habitats provided when beaver activity is present. Additionally, the constructed bridges will provide a wildlife transport corridor under the highway that will benefit multiple species and reduce deer-vehicle collisions which are an issue in this area.

• Does the project affect water resources management in 2 or more river basins (defined as a minimum HUC-10 level)?

The proposed project is located at RM 9.2- 8.4 of Peshastin Creek, which is a tributary to the Wenatchee River that flows into the Wenatchee River at RM 18 (Appendix A, Figure 1).

The primary IPID Peshastin diversion (up to 50 cfs) on Peshastin Creek is located at RM 2.5, with the much smaller Tandy diversion (up to 5 cfs) located at RM 4.9. The IPID Peshastin diversion provides irrigation water for approximately 3,700 acres in the lower Wenatchee River valley (Anchor QEA 2012). Therefore, water resources management in Peshastin Creek also affects the

HUC-10 lower Wenatchee Basin, which is defined as the Wenatchee River watershed RM 26.5 – 0.

Portions of the channel downstream of the main Peshastin Creek diversion at RM 2.5 may become de-watered during drought years (Interfluve 2010). These critically low baseflows create depth and temperature barriers for fish passage. The proposed project and the joint CCNRD/IPID "Pump Exchange Project" are the main components of the strategy to increase instream flow in Peshastin Creek. The proposed project will allow the Peshastin Creek basin to fill up with water between RM 9.2 and 8.4 during annual flooding, instead of being quickly exported downstream in the current condition, and will increase water storage to supplement baseflows. The Pump Exchange Project (not part of this proposal) will allow for decommissioning and removal of the IPID Peshastin diversion, restoring normative flows in the creek. The proposed project and other floodplain reconnection projects in Peshastin Creek will increase baseflows in Peshastin Creek and provide increased instream flow in the lower Wenatchee River.

Natural water storage provided by hydraulically connected floodplains, watercourses, and wetlands are an important source of baseflow in functional river systems and can help mitigate against chronic low flows caused by water management (Lange et al 2017). Reconnection projects like the proposed project are a key part of the Chelan County Climate Change Resiliency Strategy and are aimed at increasing the natural water storage throughout the Wenatchee watershed in order to help mitigate against water scarcity issues in this agricultural watershed (Chelan County 2020).

• Does the project provide regional benefits, in addition to fish or habitat restoration, including:

o Supporting water needs for multiple water uses (i.e., agricultural, municipal, Tribal, environmental, recreational)?

The project supports multiple water uses, including agricultural, municipal, Tribal , and environmental.

Agricultural: By increasing natural water storage in the watercourse, wetland, and floodplain in the project reach, this project will help support and protect in-stream flow. This project represents an important strategy in protecting the agricultural community from the hardships of drought, such as potential irrigation curtailments (see Criterion A.2, Water Supply Benefits and Criterion D second bolded question for details).

Municipal: Improved instream flow and water supply will protect existing and future rural domestic water needs which can be stressed during drought periods.

Tribal: This project will benefit Tribal water uses by supporting in-stream flow for salmonid species of cultural significance as well as supporting their Coho reintroduction program (see Criterion D, tribal benefits).

Environmental: This project will provide numerous environmental benefits by restoring ecosystem services provided by a functional stream corridor that is connected to the surrounding floodplain. Please see Criterion A.2, Species and Habitats, for details.

o Reducing water conflicts?

Scientists predict agricultural watersheds like Chelan County may lose the capacity to deliver water at current levels due to the impacts of climate change (USDA 2012). This could lead to irrigation curtailments and associated water conflicts. The proposed project represents a stream and floodplain restoration project that will increase natural water storage within watercourses, wetlands, and floodplains. These types of projects can dampen climate change impacts on the baseflow hydrograph (Lange et al 2017). Restoration projects that increase natural water storage are part of the Chelan County Climate Resiliency strategy to protect water supply and reduce associated conflicts (CC 2020).

o Providing other regional benefits, such as job creation or public safety benefits?
Chelan County is committed to providing good-paying jobs from revenue from all awarded grants. The proposed project includes job creation for contracted work (Geotech surface, traffic control for Geotech survey, Wetland Delineation, Design development, Cultural Resources), as well as job security for existing Chelan County employees. The eventual construction of the proposed design project will create a myriad of jobs for construction related and scientific monitoring tasks.

Helping to ensure ESA-listed salmon viability provides a regional benefit, as salmonids provide recreational as well as commercial fishing opportunities throughout Washington state, and have inherent value to tribal members and many Washington residents. Public safety benefits of the project will be realized through mitigation of drought and flood (see Criterion D).

• Broader strategy, including replacing aging facilities.
The project fits within a broader strategy to improve habitat conditions within Peshastin Creek and upgrade aging IPID infrastructure. In addition to floodplain reconnection, the primary habitat goal in Peshastin Creek is streamflow restoration. IPID diverts up to 50 cfs at Peshastin Creek RM 2.5 and up to 5 cfs at RM 4.9. CCNRD is a long-time partner with IPID and has been working with IPID to modernize their existing facilities to improve both operational efficiencies and instream flows. CCNRD and IPID have jointly developed a "source switch" project to design and construct pumpback facilities on the Wenatchee River to reduce demand on Peshastin and Icicle Creeks. The Bureau of Reclamation Tributary Habitat Program is currently processing a Cooperative Agreement with CCNRD for pumpback facility design for ~$2.1 million, with an initial ~$500,000 currently committed. Design and construction of the pumpback facilities will allow IPID to deliver water to their canal system through two pump stations on the Wenatchee River that would operate throughout the irrigation season and include piping improvements to the IPID delivery system. The IPID Peshastin diversion at RM 2.4 would be eliminated, restoring normative flows to Peshastin Creek, and Icicle Creek diversions would be substantially reduced. The pumpback project has been refined through many years of alternatives analysis, feasibility study, and a Reclamation-led value planning workshop in 2019. The Cooperative Agreement covers detailed design drawings and specifications, basis of design report, final bid packages, opinion of costs, and completion of permit applications.

• Describe the status of the species and/or habitat that will benefit from the project:
This project will benefit three anadromous fish species listed under the Endangered Species Act (ESA), including: spring Chinook (*Oncorhynchus tshawytscha)*, listed as endangered, and steelhead (*Oncorhynchus mykiss*) and bull trout *(Salvelinus confluentus*), both listed as threatened. The *Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region*

(Biological Strategy), includes a new Prioritization online web-map (Prioritization) that provides prioritized habitat limiting habitat factors. The Regional Technical Team (RTT) gathered and synthesized habitat and fish data to arrive at these reach-based habitat priorities; thus, the Prioritization online web-map, which provided the limiting factors discussed below, is a reliable source for current ESA-listed species and habitat status within the project reach.

Lower Peshastin reach 8 (RM 9.1 – 8.3) corresponds to the project reach between RM 9.2 and 8.4, and is the only Rank 1 reach above RM 2.5 (RTT 2020). By reconnecting the historic channel and adjacent riparian area and floodplain, this project will benefit all Rank 1, "unacceptable" habitat features as well as all Rank 2, "at risk" habitat factors that limit ESA-listed species recovery within the reach (See Criterion A.2, Species and Habitat Health, for details). Redd surveys reveal steelhead spawning occurs both upstream and downstream of the project reach, but not within the reach, which reflects the poor spawning habitat (NSD 2015).

By improving limiting factors, the project will also benefit other native fish species that exist in the lower Peshastin sub-watershed, including rainbow, coho salmon and westslope cutthroat trout. These species are not ESA-listed.

Due to development, SR 97, and legacy logging in the riparian area, riparian species have been compromised in lower Peshastin Creek (Interfluve 2010). Adjacent to the abandoned historic channel at the project site, there is a healthy, mature riparian buffer throughout the channel as well as some wetlands, with a diversity of species including western red cedar, black hawthorn, black cottonwood, red osier dogwood, big leaf maple, willow, mountain alder, smallfruit bulrush, and horsetail, among others (NSD 2015). Further out from the historic channel but still within the floodplain is an un-vegetated, gravel borrow-pit with storage-pile areas; however, a well-vegetated and wide riparian buffer provides good cover and shade to the channel. Providing perennial surface flow to the historic channel will improve water availability for native riparian species. Riparian habitat adjacent to the current, constructed channel is compromised by the highway, channel entrenchment and incision, and is characterized by a strip 0 – 3 trees deep, with species such as Ponderosa pine, Douglas fir and big leaf maple (NSD 2015, Appendix B). The proposed project design will include strategies to enhance riparian habitat along the constructed channel, which will not only improve cover and shade for ESA-listed species but will also improve conditions for birds and mammals that exist in the Peshastin watershed and depend on these habitats (see below "species and habitat health").

O Does the project contribute to species listed under the Endangered Species Act (ESA)?
Yes. This project contributes to the restoration of the following ESA-listed species: spring Chinook (*Oncorhynchus tshawytscha)*, listed as endangered, and steelhead (*Oncorhynchus mykiss*) and bull trout *(Salvelinus confluentus*), both listed as threatened.

O Does the project contribute to the restoration of listed anadromous fish?
Yes. The species listed above are all anadromous salmonids. The project will also benefit anadromous coho salmon (*Oncorhynchus kisutch*), which are unlisted.

O Are the species subject to a recovery plan or conservation plan under the ESA?
The *Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan* (Recovery Plan) is the document that guides recovery efforts for these ESA-listed species in the Upper Columbia region (UCSRB 2007). The *Biological Strategy to Protect and Restore Salmonid Habitat in the*

Upper Columbia Region (Biological Strategy) is a frequently updated Appendix to the Recovery Plan that prioritizes Assessment Units (AUs) and habitat restoration actions (RTT 2017). Both the Recovery Plan and the Biological Strategy are available at https://www.ucsrb.org/science-resources/reports-plans/recovery-plan/. Recently, the Regional Technical Team (RTT) gathered and synthesized habitat and fish data to formulate a new Prioritization online web-map (Prioritization). Completed in 2021, the Prioritization contains reach-based restoration recommendations in the region and is available at https://prioritization.ucsrb.org .

o Has there been a designation of critical habitat?
Critical habitat has been designated for the ESA-listed species mentioned above (NOAA 2005). According to the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IpaC) page, the project overlaps with bull trout *(Salvelinus confluentus*) critical habitat. Construction of the proposed design will improve temperature conditions, fish cover, and pool habitat for the foraging, over-wintering, and migrating bull trout that occur in the reach

o If the species are not listed under the ESA, please describe their status.
Improvements to riparian habitat through increased water availability achieved through channel and floodplain reconnection will improve conditions for multiple native amphibians, birds and mammals. Coho salmon (*Oncorhynchus kisutch*) are a species of Tribal significance. By the end of the 20th century, indigenous natural coho salmon no longer occupied the upper Columbia basin. Coho salmon are a culturally important species to the Yakama Nation, and in the early 2000s the Tribe launched its Coho Reintroduction Program (https://yakamafish-nsn.gov/restore/projects/mid-columbia-coho). Through this program, hatchery raised coho salmon have been observed returning to and spawning in the Wenatchee basin, including Peshastin Creek.

Sub Criterion A.2. Quantification of Specific Project Benefits

• Species and Habitat Health

o Provide information regarding the current status of species and habitat health
NOAA Fisheries *2022 5-year review: Summary and Evaluation of Upper Columbia River (UCR) Spring-run Chinook Salmon and UCR Steelhead*, reaffirms the endangered status of UCR spring-run Chinook and the threatened status for UCR steelhead. The UCR steelhead "evolutionarily significant unit" (ESU) is composed of four extant major population groups (MPGs), which includes the Methow, Okanogan, Entiat and Wenatchee populations. The UCR spring-run spring Chinook ESU is composed of three MPGs, which includes Methow, Entiat and Wenatchee populations. The 2022 NOAA review concluded that all MPGs of both spring-Chinook and steelhead ESUs remain at high overall risk of extinction, and that abundance data showed a downward trend of 48 percent between 2016 and 2021 (NOAA 2022).

The 2022 review called out the primary habitat conditions in the Wenatchee river subbasin that currently limit abundance, productivity, spatial structure and diversity of spring-chinook salmon and steelhead. These included several factors that the proposed project will address, including lack of habitat diversity and quantity, lack of channel stability, low flows, and high summer water temperatures. The review stated the key factors effecting habitat diversity are channel confinement, loss of floodplain connectivity and off-channel habitat, reduced quantities of large wood, lack of riparian vegetation, and lack of high-quality pools and spawning areas associated with pool-tail outs. The review also states that lack of pools is directly related to the loss of riparian

vegetation and channel confinement, such as the current condition of the proposed restoration reach in Peshastin Creek.

Reach-based life stage and habitat priorities identified by the Upper Columbia 2020 Prioritization (results available at https://prioritization.ucsrb.org/) reveal important information regarding the health of species and habitat within "lower Peshastin Reach 8", which extends just 0.1 mile above and below the project reach and is ranked as a Number 1 Restoration Priority due to the current degraded condition and the high potential benefit of restoration. The Prioritization ranks spawning steelhead as a high priority life stage for restoration within the project reach, with several medium priority life stages including steelhead fry and winter rearing, and spring Chinook adult migrating, holding, spawning, fry, and summer rearing (RTT 2020). Rank 1 "unacceptable" habitat factors that limit recovery include impaired riparian cover, high stream temperatures, lack of floodplain connectivity, low pool quantity and quality, and low wood cover. Rank 2 priority, "at risk" factors include low summer flow and coarse substrate. All these factors will be addressed as part of this project. ESA-listed bull trout also occur in the reach, and are similarly limited by the factors listed above.

Specific habitat conditions for the current constructed channel and the abandoned historic channel detailed below was garnered from a *Baseline Habitat Assessment* conducted in the project reach in 2015 by Natural Systems Design (NSD 2015), the *Lower Peshastin Reach Assessment* completed by Interfluve in 2010 (Interfluve 2010), and several CCNRD photos and site visits performed in the past several years.

The RM 9.2 – 8.4 Peshastin Creek project site is located in a dynamic setting immediately downstream of the confluence of Peshastin Creek and Ingalls Creek, an input which essentially doubles the flow of Peshastin creek (NSD 2015). The current Peshastin creek alignment within the project reach is channelized within a constructed, straight reach approximately 3,800 feet long and directly abutted by Highway 97 on the east bank. The channel is confined by the highway on the east, as well as features on the west bank including a glacial terrace near RM 9.2 and an artificial levee near RM 8.4. A wider floodplain exists on the west bank downstream of RM 8.9, but due to channel incision and confinement throughout, the project reach completely lacks any hydrologic connectivity with the floodplain (NSD 2015). The entrenchment ratio is 1.3 (<1.4 is entrenched), meaning all the erosive energy and runoff is contained within the channel and passed downstream (NSD 2015). The average gradient of the constructed channel is 2.4%, while just upstream of the Ingalls Creek confluence, the Peshastin Creek channel steepens to a grade of approximately 3.7%. Often, slope changes of this magnitude are areas where sediment deposition can occur (Johnson et al 2017). However, because this slope change is coupled with an increase of flow from Ingalls creek, and because the current alignment supports a high velocity flow, in a shortened, floodplain disconnected and confined channel, the reach is a transport reach without depositional spawning gravels (NSD 2015). As a result, the reach is a homogeneous plane-bed channel which lacks developed bedforms, has boulder and large cobble substrate, and is devoid of any functional wood. Essentially, rearing and spawning habitat is absent –,redd survey data indicate steelhead and spring Chinook spawning directly upstream and downstream of the project – and no redds have been observed within the project reach, likely because of the lack of suitable habitat within the constructed channel (NSD 2015). Sinuosity in the current channel is 1.0, which reflects the lack of meander bends. Trees line the edge of the constructed channel; however, this riparian buffer is most often only one or two trees deep, with large areas of cleared open space behind (NSD 2015, Appendix B, Photos 1 and 2).

The historic channel within the same project reach of 9.2-8.4 is entirely cut off from Peshastin creek due to SR 97; however, the channel still retains shape and is watered throughout the year due to a shallow groundwater table and extensive hillside runoff, and has an additional 440 feet of primary channel compared to the constructed channel, for a total length of 4320 feet (NSD 2015, Appendix B, Photos 3 and 4). The channel is inaccessible to ESA-listed species, yet it represents good salmon habitat, with significantly more channel depth than the current Peshastin alignment, good woody cover, a wide and mature riparian buffer, and functional pools up to 4 feet deep (photos). Portions of the floodplain beyond the buffer are affected by an un-vegetated gravel borrow-pit and storage pile areas. Wetland habitat exists in the lower reaches of the historic channel, where beaver activity and cold ground water pools have been observed (NSD 2015). These wetlands have a diversity of plant species including western red cedar, red-osier dogwood, big leaf maple, willow, mountain alder, smallfruit bulrush, horsetail, and cattail, among others.

Other wildlife and game species also occur in the Peshastin sub-watershed, including mule deer, black bear, cougars, bobcats, wolverines, martens, red-tail hawks, bald eagles, elk, and great horned owls, among others (WDFW 2020). CCNRD staff have also observed beaver activity in the disconnected historic channel at the project site, and several species of riparian birds. The long-term persistence of these species depends on intact riparian areas characterized by connected floodplains; therefore, the floodplain disconnection and alteration of riparian habitat described is a form of habitat loss (Catterall et al 2012). Specifically, diversion of the project reach from the historic channel to the constructed, straight channel resulted in the loss of 34.5 acres of hydrologically connected floodplain, including wetland habitat and a riparian buffer vegetated with mature riparian species (Appendix B, Photos 3 and 4).

In summary, the current alignment within the project reach is characterized by a constructed channel that is 440 feet shorter than the inaccessible historic channel, and is disconnected from 90 % of the floodplain. This results in a confined, transport reach in an incised channel without suitable spawning habitat, wood cover, adequate riparian or functional pools to support ESA-listed species. In contrast, the historic channel has additional length and floodplain accessibility, with a healthy riparian buffer, wood cover, and cool, deep pools and represents good salmonid habitat which is currently inaccessible due to disconnection caused by SR 97.

O Describe how your conceptual project will address these issues

The proposed data-driven design of the Peshastin Creek Historic Channel and Floodplain Reconnection Project will result in restoring flow from the current alignment, which is through a constructed, straightened transport channel with sparsely vegetated banks immediately adjacent to the highway, into the relatively undisturbed historic channel with access to the wide historic floodplain, undisturbed riparian zone and cold groundwater pools. This will occur in a split-flow or side channel configuration and include habitat improvements to the existing, constructed channel for an overall addition of up to 1.5 miles of high quality ESA-listed salmonid habitat.

Depending on the outcome of design, the project will open up a minimum of 2850 feet and a maximum of 4320 feet of high-quality habitat present in the currently disconnected historic channel. This includes 2850 – 4320 feet of mature riparian buffer (NSD 2015). This action will also result in additional floodplain connection to the wide floodplain surrounding the historic channel– however the acreage of additional floodplain activation has not been modeled at the time of this application.

As described above, the existing historic channel consists of a series of impounded pools along with dense riparian vegetation. The addition of flushing, perennial flow to the channel will not only provide fish access, but will recharge the habitats, removing algae and importing woody material and organics. The historic channel maintains a slope of 2 percent, and fine sediments will be flushed out by high flows upon connection. Over time the reconnected channel will likely accumulate gravels, an outcome that will be supported by design elements, in order to facilitate creation of ESA-listed spawning habitat (NDS 2015). In fact, because of the low slope, local Fish Biologist and Salmon Recovery Policy lead with Washington Department of Fish and Wildlife (WDFW) Jeremy Cram asserts that restoring flow into the historic channel may represent the best chance to provide low gradient habitat preferred by ESA-listed spring Chinook salmon in the entire Peshastin Creek watershed (see WDFW letter, Appendix C).

In combination with elements designed to improve habitat in the existing channel, restoring flow to the historic channel will provide additional floodplain connectivity and habitat complexity for the benefit of ESA-listed salmonids. Complexity will be in the form of increased sinuosity (from 1.0 to 1.13), large wood, riparian cover, and re-instating habitat forming processes to add pool-riffle channel type in the place of the more homogeneous plane-bed (NSD 2015).

Specific mechanisms for how the project will address priority habitat factors currently limiting ESA-listed species, as detailed in the 2020 Prioritization (RTT 2020), are detailed below:

Rank 1, "Unacceptable" limiting factors:

Impaired riparian cover – The historic channel is lined by dense riparian vegetation. By designing a split-flow configuration (rather than plugging the constructed channel and diverting 100 percent of the flow into the historic channel), little to no clearing of this vegetation will be required upon construction. Therefore, upon reconnection of the historic channel, ESA-listed species will have access to habitat with dense riparian cover (Appendix B). Design may also include riparian improvements to the constructed channel. This will improve habitat for all life stages of ESA-listed steelhead, bull trout, and spring Chinook (RTT 2020, NSD 2015).

High stream temperatures – CCNRD staff have measured cool ground water inputs in the historic channel several degrees cooler than the mainstem, often present in deep pools. Opening up the historic channel will provide access to these cool habitats that can potentially serve as thermal refuge. Design elements in the constructed channel will also include efforts to retain the cool temperature input (e.g. slow the rate of downstream warming) provided by the Ingalls Creek confluence, such as channel narrowing, and the formation and planting of riparian benches. This will improve conditions for ESA-listed species present in the channel during the heat of summer, which includes juvenile rearing spring Chinook and steelhead, adult spring Chinook, and foraging bull trout (RTT 2020, NSD 2015).

Lack of floodplain connectivity – This project will improve floodplain connectivity by reinstating perennial flow to the unconfined historic channel. The project may also include efforts to improve floodplain connectivity in the constructed channel, such as notching the artificial levee near the downstream end. Current floodplain disconnection within the reach is 90 percent, which will be greatly improved by this project (exact acreage is unknown at this time, but will be modeled as part of the design effort). Enhanced floodplain connectivity will improve habitat forming processes that create diverse habitat for all ESA-listed species life stages (RTT 2020, NSD 2015).

Low pool quantity and quality – Reconnecting the historic channel will provide access to the numerous deep and cool pools present in the current channel, which range from 1 to 4 feet deep. Pool habitat will be especially beneficial to spring Chinook and steelhead rearing juveniles, but will also be beneficial to adults waiting to spawn (RTT 2020, NSD 2015).

Low wood cover – The historic channel also has ample wood cover (Appendix B, Photo 4). The project will include efforts to increase habitat complexity in the constructed channel, which may include the addition of large wood. Enhanced wood cover will especially benefit rearing spring Chinook and steelhead, who are subject to predation (RTT 2020, NSD 2015).

Rank 2, "At Risk" limiting factors:
Low summer flow – This project will result in increased natural water storage, which will help supplement low base flows. This is discussed in detail in the Water Supply Benefits section below.

Coarse substrate – Splitting the flow at the project site will slow flow velocities and allow for sediment deposition to occur in the constructed channel, which is currently characterized as a transport reach with boulder and large cobble substrate unsuitable for spawning. Similarly, reinstating flows in the historic channel with flush out fine sediment and allow for deposition of spawning gravels. These actions will increase the incidence of pool riffle habitat, in the place of the currently homogeneous plane-bed channel type of the current alignment. This will increase spawning habitat for ESA-listed spring Chinook and steelhead (RTT 2020, NSD 2015).

• Watershed Benefits

o Provide information regarding the current status of water quality, ecological function, and ecological resiliency in the planning area.
The watersheds located in the lower portion of the Wenatchee subbasin, which includes the Chumstick, Mission, and Peshastin Creek watersheds, have been severely altered from their naturally functioning condition and are highly fragmented. Among these three lower watersheds, Peshastin Creek is of primary importance given the watershed's potential to contribute to bull trout, spring chinook and steelhead production in the Wenatchee subbasin (Andonaegui 2001).

The lost channel sinuosity, floodplain function, and riparian habitat (including off-channel habitat) within the channel migration zone of Peshastin Creek has been the greatest impact on watershed function. This impact is primarily caused by SR 97. Construction of the highway altered the river corridor through channel straightening, levee construction, bank armoring, and vegetation clearing. Agricultural and residential development have disconnected riparian areas and floodplains (Andonaegui 2001). As a result, Peshastin Creek is disconnected from approximately 34% of its floodplain and from 90% of its floodplain in the project area (NSD 2015). Previously, the channel meandered across the wide floodplain in the project reach, providing diverse habitat. The current channelization and disconnection from the historic channel and floodplain habitat across the highway has caused further incision in the constructed channel (Appendix B, Photo 1). This is a symptom of channelization, resulting from the stream's inability to dissipate energy through channel migration (Andonaegui 2001).

The watershed has a checkerboard ownership of federal and private land from its mouth to the headwaters. Most private holdings in the upper watershed (upstream of RM 14.9) are owned by Chinook Forest Partners and have been heavily roaded and logged. Below Ingalls Creek and the project site, the Peshastin Creek corridor is exclusively private and largely converted to residential

use and orchards. These changes have affected the physical processes that create and maintain habitat conditions on which aquatic species depend (Interfluve 2010). Specifically, channel entrenchment, confinement and lack of floodplain connectivity have restricted physical processes such as channel migration, formation of pool-riffle habitat, sediment sorting processes, and ground surface water interaction. Logging and clearing of riparian areas have caused a lack large wood inputs that help form diverse habitat, as well as effects to the aquatic food web from reduced nutrient inputs that come from healthy riparian corridors (Interfluve 2010).

In addition to this reduction in ecological function, the described human-induced changes have also affected water quality. Loss of riparian function and extensive timber harvest throughout the watershed has resulted in increased fine sediment delivery to streams within the Peshastin watershed (Andonaegui 2001). Straightened stream channels have a higher gradient than meandering streams, increasing stream power and more efficiently eroding and evacuating sediment (Beechie et al., 2008). Loss of riparian function, and reduced hyporheic and groundwater flow caused by channel entrenchment has also caused an increase in stream temperature (Cristea and Pelletier 2005). In fact, several 303(d) listings for impaired stream temperature have been established in Peshastin creek, including a reach listing directly below Ingalls creek and within the project reach (Ecology Water Quality Access Online Map 2023).

Simplification of habitat represents a loss of ecosystem diversity, which results in a loss of ecosystem resilience (Casin and Matthews 2021). As stated, channel entrenchment has reduced Peshastin channel length and floodplain connectivity, which are key factors that create diverse habitat. This has resulted in a simplification of habitat, characterized by a largely homogeneous plane-bed channel form and lack of diverse riparian vegetation (Andonaegui 2001, Interfluve 2010). Spatial heterogeneity helps create species resilience, by allowing species to move between habitat types in response to varying environmental conditions. In contrast, the homogeneous habitat of Peshastin creek restricts this species resilience. Fragmented habitat areas, channelization, and disconnected floodplains such as what occurs at the proposed project site leads to smaller and less resilient populations and less capacity to accommodate disturbance, such as flooding, fire, and/or drought (Casin and Matthews 2021).

Climate change observations and predictions within Chelan County watersheds highlight the need for ecological resilience. Warming air temperatures are expected to result in increased 100-year stream flows, decreased summer flows, and increased stream temperature (Hamlet et al., 2013). In 2015, the Wenatchee watershed experienced extreme conditions that scientists warn may be a glimpse into the future and could become routine by 2070 (Mauger et al 2017). 2015 was a year with record low snowpack, high air temperatures, and low base flows that led to Washington Department of Ecology ordering an irrigation curtailment, as well as three presidential disaster declarations in Chelan County; two due to wildfires, and one due to flooding and landslides following a late fall rain on snow event. ESA-listed salmon mortality was historically high as a result of the 2015 drought due to high stream temperatures and associated pre-spawn die-offs and redd scour from late-fall flooding. The lack of ecosystem diversity and loss of habitat function exacerbate these climate change effects by decreasing the ability for the ecosystem to respond and be resilient to enhanced disturbance and extreme conditions (Cote and Darling 2010).

o Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach.

This proposed project addresses the root cause of ecosystem degradation, decreased resilience and impaired water quality in the Peshastin watershed and specific to the project reach (RM 9.2 – 8.4).

These root causes, as described above, are a 440 foot reduction in stream length and resulting unnaturally high gradient, a 90 % disconnected floodplain, and fragmented and homogeneous habitat (i.e. disconnection from the historic channel, plane-bed morphology, lack of riparian corridor, and loss of large wood).

The project will increase ecological function by opening 2850 – 4320 feet of high-quality habitat in the historic channel, which includes a wide floodplain, vegetated riparian buffer, and habitat complexity including pools and wood cover (NSD 2015, Photos). Restoring connection to this complex habitat will improve ecological function related to natural floodplain water storage, sediment sorting processes enhanced large wood, lower slope and decreased flow velocity, and riparian nutrient inputs that support the aquatic food web (Interfluve 2010).

Water quality will also improve as a result of the project. By opening up the historic channel as a split-flow configuration and increasing channel complexity, flow velocity will slow and allow sediment to settle in pools, around large wood, on the reconnected floodplain (acreage unknown, Beechie et al 2010). Cool groundwater inputs and increased shading in the historic channel versus the constructed will improve water quality, helping to address the 303 (d) temperature listing in the reach (Cristea and Pelletier 2005).

Lastly, the project will increase ecological and species resilience by increasing habitat diversity, both by opening up the new habitat (2850 – 4320 feet) and improving existing habitat within the constructed channel (2300 – 3,880 feet). This increase in complexity provides a greater capacity for both habitat creation and resilience to disturbances like flooding, drought and landslides that are expected under climate change (Gaines et al 2012). By opening currently inaccessible habitat, this project addresses climate change species resilience by providing ESA-listed steelhead and spring Chinook a broader range of options by which to respond to climate change. For example, CCNRD have observed cooler temperatures in the historic channel relative to mainstem Peshastin due to ground water input. These cooler waters represent a form of thermal refuge that will become increasingly important for anadromous fish survival as stream temperatures warm as projected under climate change. Therefore, opening up access to the historic channel will increase ESA-listed species resilience (Lee et al 2020).

• Water Supply Benefits

o Provide information about current status of water availability for aquatic ecosystems.

The Peshastin sub-basin was identified in the *Wenatchee Watershed Planning Phase IV – Detailed Implementation Plan* as one of the top three flow limited sub-basins within the Wenatchee watershed (WWPU 2008). This is largely due to water withdrawals for IPID, which occur from April through mid-September from diversion sites at RM 4.9 and 2.4. Peak diversions typically occur in June and July and can be as much as 53 cfs, with diversion amounts decreasing in late summer due to low flows (Interfluve 2010). As a result, portions of the channel downstream of the main diversion at RM 2.5 may become de-watered during drought years (Andonaegui 2001). Diversion sites are located below the project site; however, summer low flows are at risk within the project reach, where lack of floodplain connection, channel confinement and channel incision, likely exacerbate low flows throughout the lower watershed (RTT 2020, Tauge 2008). Based on data from Ecology's permanent streamflow gage located at RM 1.1, low flow below the diversion ranges from 5 to 10 cfs (Appendix D, Hydrographs, Figure 1 and 2; Station Information (wa.gov)). Based on IPID water withdrawal rates, estimated low flow above the main diversion is approximately 20 cfs (Appendix D, Figure 3). However, the project team measured a flow of 14

cfs during field reconnaissance on 9/15/2015 following a winter with record low snowfall totals in the Cascades. Between 1948 and 2006, streamflow declined in dry years by about 22 and 38 percent in central Washington rivers, including the Wenatchee River (Chelan County 2020). Coupled with the loss of water storage, climate change will likely exacerbate already chronic low flows, with a predicted 15 to 40 percent decrease in Peshastin Creek base flows in the 2030s (Mauger 2017).

The watershed upstream of the project site at Peshastin Creek river-mile (RM) 8.4 – 9.2 drains an area of 102 square miles, and the seasonal flow regime is characterized by a rainfall dominated period during fall, a snowfall dominated period during winter, snowmelt runoff during spring and early summer, and a period of low streamflow as snowmelt recedes in August and September (NSD 2015). Q2 in the project reach estimated at 900 cfs and the Q100 estimated at 3310 cfs (NSD 2015). Water availability through the summer is highly dependent on snowpack. A high percentage of Peshastin Creek's annual snowmelt runoff comes from Ingalls Creek, a steep drainage from a high-altitude basin located in the Alpine Lake Wilderness, that meets Peshastin Creek at RM 9.2, the upper boundary of the proposed project reach (Interfluve 2010). Declining snowpack is a critical component of observed and predicted lower baseflows as a result of climate change (Mauger 2017). Previously, the channel within the project reach meandered across a wide floodplain adjacent the historic channel, which allowed for greater water storage of the spring freshet out of upper Peshastin and Ingalls Creek (Andonaegui 2001). This condition allowed natural storage of floodwaters from Ingalls and upper Peshastin in riparian areas, wetlands, and floodplain aquifers that exist adjacent the historic channel. This subsurface water storage can then supplement baseflow in the summer months (Chelan County and NSD 2022). However, channelization and floodplain disconnection at the project location causes floodwaters to be quickly exported downstream and out of the system. Inundation mapping at the project site reveals little to no floodplain interaction within the reach, even in a 100-year flood (Interfluve 2010 Appendix A Figure 4). Essentially, channel incision in the constructed channel, loss of floodplain/riparian function and habitat fragmentation exacerbate drought because they represent a loss of floodwater storage and aquifer recharge.

Chelan County and the Wenatchee Basin have experienced two nationally recognized droughts since 1954, one in 1977 (FEMA declared emergency) and one declared by the U.S. Secretary of Agriculture (USDA) in 2015. State declared droughts are much more common, and have occurred in 2001, 2005, 2009, 2015, 2021 and 2022. As stated above, extreme drought conditions such as those experienced in 2015, are projected to become routine by 2070 (Mauger et al 2017).

Scientists predict municipal and agricultural watersheds, such as those found in Chelan County (agriculture/forestry constitutes 23 percent of the local economy) may lose the capacity to deliver water at current levels due to the impacts of climate change (USDA 2012, Chelan County 2019) With climate change projections for a smaller and earlier freshet into the future, retaining and restoring the natural storage functions of watersheds become even more critical for ecosystem resilience (Chelan County and NSD 2022).

o Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach.

With changing climate conditions and intensified human use, the natural infrastructure provided by healthy, functioning watersheds—wetlands, watercourses, aquifers, and floodplains—have been significantly diminished. One of the greatest opportunities for streamflow restoration lies in restoring the watershed's ability to naturally store and release water (Wilson and Browning 2012). The abandoned historic channel at the proposed project site has significant untapped natural water storage potential through the water course and in the wide floodplain, wetland, and riparian buffer (Andonaegui 2001, Interfluve 2010). This is especially relevant because of where this reach is situated in the watershed at the base of Ingalls creek, a tributary which contributes roughly half of the flow downstream of the confluence (NSD 2015). Our design approach will include a total reconnection of the abandoned historic channel, as well as use data-driven approaches and habitat features to maximize groundwater recharge and subsurface water storage within the historic watercourse, riparian area and wetland. In addition, by creating a spilt flow at this site, flow velocities will decrease, creating a greater potential for water to infiltrate into the surrounding subsurface. Maximizing this interaction will be a key factor in the design. Similar to Appendix A Figure 4, flood inundation levels will be modeled under a variety of restoration conditions in order to maximize connected wetland and floodplain areas. The final design will be a result that maximizes restored natural water storage while adhering to landowner wishes and maximizing cost-benefit.

This project represents the highest priority floodplain project in one of only two high priority reaches in the Peshastin watershed (Interfluve 2010, RTT 2020). The other reach corresponds to the lower 2.5 miles of Peshastin creek, which is the reach that would benefit from the IPID Pump Exchange Project (see Sub-Criterion A.1 "broader strategy" question). The proposed project will reconnect the historic watercourse, associated wetland and riparian floodplain to perennial flow, thereby allowing the basin between RM 9.2 and 8.4 to fill up with water during annual flooding. This will allow for greater in situ water storage, which will benefit the baseflow hydrograph through increased groundwater supplementation (increased water storage, in acre/ft, and resulting baseflow contribution in cfs will be modeled as part of design).
Stream restoration such as the proposed project is a viable alternative to increase water storage and dampen climate change impacts on the baseflow hydrograph, while simultaneously providing numerous ecosystem benefits such as tree health, fish and wildlife habitat, and fire resilience (Lange et al 2017).

• Other Quantifiable Benefits

o Provide information regarding the other critical issues of concern in the planning area. Flooding is one of the most common natural hazards in Chelan County with large, damaging floods typically occurring every 2 to 5 years (Chelan County 2019). Flood risk in the Wenatchee Basin has been exacerbated due to riparian clearing for development, agriculture, and historic livestock grazing, as well as extensive timber harvest, instream wood removal and beaver trapping. These impacts have resulted in widespread incision of stream channels, loss of floodplain connectivity, and resulting loss of the floodplain's ability to store floodwaters (Collins et al., 2002; Phelps, 2011). The floodwaters are instead rapidly exported downstream, resulting in increased peak flow events (Shields et al 2009). This is especially true in the current alignment in the project reach, which is disconnected from 90% of its floodplain and flows through an entrenched and incised channel (Interfluve 2010, Andonaegui 2001).

Climate models predict that the Wenatchee basin will change from snow-dominant (peak flows in April/May) to rain-snow transition dominant by the 2020s and all rain by 2080, with a subsequent increase in the risk of flash and stage flooding (Tohver et al 2014). Six out of the seven notable major stage flooding events since 1990 were late fall/early winter heavy rain-on-snow events (Chelan County 2019), showing these events tend to be bigger and more destructive than the historic spring freshet. Scientists project what is currently considered a 1-percent-annual-chance flood may strike more often, leaving many communities at greater risk (Chelan County 2019). Additionally, and along with the loss of riparian cover and associated habitat, these events impede recovery of salmon species listed under the Endangered Species Act (ESA-listed spring Chinook, summer steelhead and bull trout), because they scour salmon redds full of salmon eggs incubating through the late fall and winter floods.

Wildfire modeling and risk analysis consistently show the Wenatchee basin at "very high" wildfire risk (CWPP 2019, USFS 2022). Unburned, second-growth forested zones like those in the Peshastin watershed are the highest risk areas for wildfire.

o Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach.

As stated above in the water supply section, the proposed project will result in increased water storage of flood waters by reconnecting the historic channel watercourse, wetland, and riparian zone to the mainstem Peshastin Creek. This will result in increased floodplain activation during flood events and can dampen flood magnitudes downstream (Tague 2008).

Restored wetland and floodplain hydrology in the historic channel, as well as efforts in the constructed channel, will result in wetter soils and an increase in fire-resistant riparian vegetation. This will allow the reconnected floodplain to function as a fire buffer between the dryer ecotones upstream, downstream, and laterally, and reduce the risk of fire spreading downstream to residential areas.

EVALUATION CRITERION B: Prior Restoration Planning and Stakeholder Involvement and Support

Sub-Criterion B1: Task A: Study and Design Stakeholder Involvement and Support and Restoration Planning

• Prior Planning and Design:

o Describe any prior planning efforts related to your proposed project

- **Describe the specific planning, strategy, study, and any design document(s) (plan(s)) that support your project.**

This project is supported by several planning documents and prioritization efforts, including the *Wenatchee Watershed Management Plan* (WWPU 2006), *The Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region* (RTT 2017, Appendix H of the *Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan*) that includes a recently updated *Prioritization Web Map* (RTT 2020). This project was identified as a priority in the *Lower Peshastin Creek Tributary and Reach Assessment*. Additional documents have also been completed specific to the project site in an early design effort, including the *Baseline Reach Characteristics Assessment* (NSD 2015), the *Peshastin Creek Project at RM 8.8 Channel Reconnection Project*

Alternatives Analysis (NSD 2015), the *Peshastin Creek Project at RM 8.8 Channel Reconnection Project Basis of Design Report (NSD 2015),* and a *Phase 1 Environmental Site Assessment; Peshastin Creek Project (Cascadia Technical 2019)*.

Wenatchee Watershed Planning began in the Wenatchee Watershed in 1999, with Chelan County designated as the Lead Agency, in response to the 1998 Watershed Management Act (RCW 90.82). This was a collaborative planning process formulated under the Wenatchee Watershed Planning Unit (WWPU). The outcome of this planning forum was the development of the *Wenatchee Watershed Management Plan,* which was finalized in 2006. The Plan focuses on characterizing water resource issues and identifying actions to manage water resources and improve conditions into the future. *The Wenatchee Watershed Plan – Detailed Implementation Plan* contains specific implementation recommendations and was completed in 2008 (WWPU 2008).

The Upper Columbia Salmon Recovery Board (UCSRB) developed the *Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan* for the recovery of UC spring Chinook (listed as endangered in 1999), UC steelhead (listed as endangered in 1997 and reclassified as threatened in 2006), and bull trout (listed as threatened in 1999). The Recovery Plan aligns with the Watershed Plan and was completed in 2007 to guide federal agencies charged with species recovery (UCSRB 2006). The *Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region* ("Biological Strategy") is Appendix H of the Recovery Plan, was first drafted in 2000, and has been frequently updated with the most recent version published in 2017 (RTT 2017). The Biological Strategy identifies the key biological considerations in protecting and restoring ESA-listed habitat, and is intended for use and is frequently referenced by project sponsors in order to identify locations and types of projects with a high likelihood of providing biological benefit for the recovery of ESA-listed salmonids (RTT 2017). The Biological Strategy includes a recently developed *Prioritization Web Map and Master Prioritization Table* that includes updated Prioritization results based on quantitative habitat and salmonid distribution data. The Prioritization includes including reach rankings within each Assessment Unit (AUs, HUC-12), and priority life-stages, limiting factors, and restoration recommendations. The proposed project is located in the Lower Peshastin Assessment Unit, in Lower Peshastin reach 8 (RM 9.2 – 8.3).

The Peshastin Creek Tributary and Reach Assessment was completed in 2010 and incorporates recommendations from the 2008 draft of the Biological Strategy as well as detailed geomorphic, hydrologic, and habitat data specific to the Peshastin creek. The assessment evaluates aquatic habitat conditions and identifies strategies to restore and preserve salmonid habitat and natural river processes, as well as prioritizes specific project actions.

The *Baseline Reach Characteristics Assessment* (NSD 2015) was completed in 2015 and describes baseline reach characteristics at the proposed project site, between RM 9.2 and 8.4. *Peshastin Creek Project at RM 8.8 Channel Reconnection Project Alternatives Analysis* and the *Peshastin Creek Project at RM 8.8 Channel Reconnection Project Basis of Design Report (NSD 2015),* were also completed in 2015 and present conceptual-level alternatives for river restoration at the project site as well as a preferred Conceptual Design and a Basis of Design Report. This initial design effort collected valuable site information, but ultimately the alternative we selected to develop in Conceptual Designs created too much impact to existing landowners and existing riparian cover and exceeded $14 million in proposed construction costs. A *Phase 1 Environmental Site*

Assessment; Peshastin Creek Project (Cascadia Technical 2019) was completed based on stakeholder review and comments and no issues were identified as part of that process.
The two alternatives explored in this current design effort was not included in the original Alternatives Analysis (NSD 2015, Appendix A, Figure 3) and is based on landowner and other stakeholder review and input as well as a concerted effort to reduce impacts to the existing historic channel riparian conditions.

o What was the scope of the planning effort that supports your project?
Wenatchee Watershed Management Plan and *The Wenatchee Watershed Plan – Detailed Implementation Plan:* The Watershed Plan covers all twelve Wenatchee Watershed component sub-watersheds at the HUC-10 level, which includes the Peshastin and Lower Wenatchee sub-watersheds. The Watershed Plan covers water quantity, water quality, and issues related to habitat function and connectivity of threatened, endangered, and culturally important salmonid species. The Plan contains strategies to meet in-stream and out-of-stream water demands, meet water quality standards, and improve ESA-listed habitat.

The Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region (RTT 2017, Appendix H of the *Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan*) covers the biological considerations for the protection and restoration of salmonid habitat in the Upper Columbia Region (UCR). This UCR comprises the mainstem Columbia River and its tributaries upstream of Rock Island Dam to the tailrace of Chief Joseph Dam, and includes four major watersheds: the Wenatchee, Entiat, Methow, and Okanogan. The Biological Strategy and associated Prioritization WebMap includes prioritization elements within each Assessment Unit (HUC-10 level for the 2017 strategy, HUC-12 for the updated WebMap). The 2020 Prioritization also prioritizes limiting factors and actions in smaller reaches within each AU. Prioritization elements include water quantity, water quality, as well as several habitat limiting factors such as wood cover, floodplain connectivity, and riparian condition. The Prioritization also lists priority life stages and actions.

The Peshastin Creek Tributary and Reach Assessment covers Peshastin Creek RM 9.3 – 0 and includes current and historical conditions, geomorphology, hydrology, as well as flood mapping, and quantitative reach-based habitat data. The Assessment also identifies specific projects and their priorities.

The Baseline Reach Assessment and *Peshastin Creek Project at RM 8.8 Channel Reconnection Project Alternatives Analysis* covers current habitat conditions at the project site and and analysis of project alternatives. As discussed the current preferred alternative (Appendix A Figure 3) was not included in the 2015 Alternatives Analysis. However, the Phase 1 Environmental Assessment for the site is still current.

o Was the plan developed collaboratively?
The Wenatchee Basin Watershed Plan and the Wenatchee Basin Detailed Implementation plan were developed in a collaborative process by the Wenatchee Watershed Planning Unit. The Watershed Plan integrated stakeholder issues and recommendations for the watershed and is a product of community and government participation in WRIA 45. The WWPU included a wide range of stakeholders from 28 organizations including federal, state, local agencies, tribes, and non-governmental entities, agricultural and environmental representatives. For example, stakeholders in the WWPU include the Yakama Nation, Icicle Peshastin Irrigation District, City of

Wenatchee, US Bureau of Reclamation, CCNRD, Chelan County Conservation District, US Fish and wildlife, Citizens and Landowners, Blue Star Growers, and the North Central Washington Audubon Society.

The Upper Columbia Salmon Recovery Board (UCSRB) developed the Recovery Plan and the Upper Columbia Regional Technical Team (RTT) developed the Biological Strategy and the 2020 Prioritization. UCSRB includes representatives from the Yakama Nation and Colville Confederated Tribes, and county commissioners from Okanogan, Douglas, and Chelan County. UCSRB worked closely with NOAA Fisheries and USFWS in the development of the recovery Plan. The RTT is a group of professional biologist working in various fields of natural resource science and management including USFWS, WDFW, U.s Forest Service, Yakama Nation, County Public Utility Districts, National Marine Fisheries Service, and several private consulting firms.

The Tributary and Reach Assessment was developed by Interfluve consulting firm for Yakama Nation Fisheries. The Assessment was presented at public forums for comment and questions, such as the Wenatchee Habitat Sub-Committee which includes agency members, project sponsons, and is open to public participation. The Baseline Reach Assessment and Alternative Analysis was focused on the project site and was completed by Natural Systems Design and CCNRD staff as an internal effort focused on a very small area. However, CCNRD has worked with landowners in this reach since 2015 and the current effort reflects important feedback from landowner coordination. WDFW is also a supporter and collaborator of the project, which is discussed in more detail below.

o Explain how any prior planning effort relates to your current proposal

The Peshastin sub-basin was identified in the 2006 Wenatchee Watershed Plan – Detailed Implementation Plan prepared by the Wenatchee Watershed Planning Unit as one of the top three flow limited sub-basins within the Wenatchee watershed. For these priority sub-basins, the Tier 1 (highest priority) action identified in the planning process include projects that will evaluate alternatives that could increase available water for instream and out-of-stream uses (Wenatchee Watershed Planning Unit_ Detailed Implementation Plan, 2006 – Table 3-2). As discussed in Criterion A.2 “Water supply” this project will be designed to increase in situ water storage that can supplement baseflow in the summer months.

The proposed project follows recommendations and prioritizations summarized below and detailed in the 2020 Prioritization (RTT 2020). As stated, this Prioritization represents the most updated Prioritization effort of the Biological Strategy, which itself is Appendix H of the Recovery Plan.

This project will occur in the Lower Peshastin Assessment Unit (AU) reach 8, which is a rank 1 reach and the highest ranking reach above RM 2.5. The priority species for this reach are spring Chinook and steelhead; spawning and incubating steelhead are high priority life stages in the reach. Several medium priority life stages are also present, including spring Chinook (adult migration, holding, spawning, fry colonization and summer rearing) and steelhead (fry colonization and winter rearing).

This project will address all the rank 1 (unacceptable) factors currently limiting the priority life stages listed above. These rank 1 factors include bank stability, channel stability, wood cover,

floodplain connectivity, pool quantity and quality, riparian disturbance and canopy cover, and rearing temperature. This will be accomplished by designing a project that addresses several of the listed Priority Action Categories, including bank restoration, channel complexity restoration, channel modification, floodplain reconnection, riparian restoration and management, and side channel and off-channel habitat restoration.

The proposed project was also called out as one of the highest priority projects in the Peshastin Creek Tributary and Reach Assessment, receiving the highest benefit score possible (Interfluve 2010, Project Prioritization Attachment).

As previously mentioned, site specific planning included: a Baseline Reach Characteristics Assessment, Alternatives Analysis and Basis of Design Report for Conceptual Design at Peshastin Creek Project RM 8.8 completed in 2015 and a Phase 1 Environmental Site Assessment completed in 2019. Those site specific planning efforts provide a baseline characteristic that has informed our thoughts about design parameters in this reach as they pertain to limiting factors for specific life stages of salmonids. Additionally, Thermal Refuge Data collection in other parts of the Wenatchee basin have informed our approach to minimize disturbance during large scale construction projects to better protect temperature regimes. Review of Thermal Refuge studies and FLIR data has indicated that spikes in downstream temperatures are often associated with artificially constructed channels and preserving existing shading to the degree possible should be a high priority component of the design.

The initial design effort collected valuable site information as we sought to restore Peshastin Creek to its historic alignment. In subsequent conversations with landowners, we learned that they were not willing to concede as much existing site use as we proposed in the preferred alternative. Significant portions of the floodplain had been filled during highway construction and landowners were currently using some of those acres and were not willing to give them up.
Ultimately, the alternative we previously selected to develop into Conceptual Designs created too much impact to existing landowners and existing riparian cover and exceeded $14 million in proposed construction costs. A *Phase 1 Environmental Site Assessment; Peshastin Creek Project (Cascadia Technical 2019)* was completed based on stakeholder review and comments and no issues were identified as part of that process.

The two alternatives explored in this current design effort was not included in the original Alternatives Analysis (NSD 2015, Appendix A Figure 3) and is based on landowner and other stakeholder review and input as well as a concerted effort to reduce impacts to the existing historic channel riparian conditions.

- **Stakeholder Involvement and Support for Task A: Study and Design Projects**

Identify stakeholders in the project area
Washington State Department of Transportation (Landowner and ROW)
R&P Rock, LLC (Landowner)
Mike Whitford (Landowner)
Washington State Department of Fish and Wildlife (Agency)
Habitat Conservation Plans (HCP) Tributary Committees' General Salmon Habitat Fund
Washington Department of Ecology (Agency)

o Describe what sector(s) the participating stakeholders represent and how they will engage
WSDOT will participate in the design and review process and will be heavily involved throughout the design effort.

The Landowners listed above have committed to review and provide comment on design documents throughout the design process and have already provided comment on past design documents, which has helped inform the current proposal.

WDFW has expressed an interest in restoration of salmonid habitat in Peshastin Creek and have provided important fish use data in the form of pit tag array installation and maintenance up and downstream of the project site. Staff will participate in the design review process and provide comment on benefits to listed species.

The HCP Tributary Committees have provided funding support for this project and other projects in this reach, including the aforementioned Phase 1 Environmental Site Assessment and the pit tag arrays. They have provided feedback on the current alternatives proposed at this project site and though they have yet to commit to providing funding for this next phase, they are committed to be involved in the study and design.

The Washington Department of Ecology has indicated an interest in funding a stream temperature study in Peshastin Creek, which includes the project area. The study has ranked high on their list and will likely receive funding. Information gathered as part of that study will help inform the project design.

o Provide documentation of the commitment by stakeholders
See attached letters and landowner acknowledgement forms.

o Are any stakeholders contributing to the cost-share?
Currently, the CCNRD is asking the HCP Tributary Committee and the Salmon Recovery Funding Board to provide funding for the revised Conceptual Design phase of the project. As of the time of this submittal, a decision on that funding has not been made.

o Describe stakeholders in the project area who have *expressed their support*
The previously mentioned stakeholders have expressed support for the study and committed to participate.

o Supporting documentation for this sub-criterion could include letters of support from stakeholders or a description of feedback from interested stakeholders.
Feedback from the HCP Tributary Committees and the Upper Columbia Regional Technical Team has included interest in seeing the longest side-channel connection option be considered in the design process, stated as follows: “There are few opportunities to reconnect side channels on Peshastin Creek; hence, this seems like a compelling opportunity given that there is a willing landowner, cold-water inputs, and a somewhat intact channel. Regardless of the enhancement action proposed, the project will be expensive. As such, the sponsor should seriously consider reactivating the greatest distance of the historical channel.” Additionally, they are interested in

which channel (proposed split-flow) would become the low-flow channel, the historic channel or the existing channel.

o What will the applicant do to ensure participation by a diverse array of stakeholders?
The applicant will hold community meetings (watershed specific meetings are typically held every two years by the applicant) to inform the community of the proposed study and restoration projects in the area. These meetings include an array of stakeholders, landowners, agency personnel, non-profit organizations, elected officials and tribes to provide information about upcoming or ongoing stream and forest restoration projects.

If some sectors are not yet represented, explain how this will be accomplished.
One sector that we will specifically reach out to during the design process is the small white water kayak community who paddle this section of Peshastin Creek during spring flows. The applicant has reached out to this community in the past for design input and will continue to do so in the future. Additional outreach to this community will be completed through local recreational websites, such as Wenatchee Outdoors, and through local contacts with kayak schools and outfitters.

o Is there opposition to the proposed project effort? If so, describe the opposition and explain how it will be addressed. Opposition will not necessarily result in fewer points.
We are currently looking at two alternative side channel alignments. One of these, the shorter one, was selected as a result of feedback from landowners and seems like a good fit. There was concern over a previous design effort which would have put more flow into the historic alignment and also followed a longer flow path. The other current alternative we are considering, with a longer alignment, based on feedback from the UCRTT and HCP Tributary Committee, includes a private landowner who has expressed some concerns about impacts to his property.In general, the community has been supportive of salmon recovery efforts in Peshastin Creek, and Chelan County has successfully worked with a variety of landowners to overcome and address concerns. At least one of the viable alternatives has been supported by the primary landowners.

EVALUATION CRITERION C: Project Implementation and Readiness to Proceed

Sub-Criterion C1: Task A: Study and Design Project Implementation

Task A: Study and Design

See Appendix E, Project Schedule

The applicant will work with a consulting engineering firm and other sub-contractors to complete the following tasks within the 3 year time frame.

Background Review and Field Reconnaissance (Jan-July 2024)

This task will include the formation of a design team, a kickoff meeting and field recon visits and background data review. The sponsor and consultant will lead this task. This will include consolidation and review of input from the main stakeholders on key design considerations and guidelines gathered during previous project phases. This task will build on previous design efforts including the Baseline Characteristics Assessment.

Hydrology and Hydraulic Assessment (ongoing)

This revised model will utilize the 2022 Bathy LiDAR collected by US Bureau of Reclamation and be completed for both existing and proposed conditions at the Conceptual (30%) and Preliminary (60%) Design Phase. This will include difference mapping between the existing conditions and proposed conditions. A WSDOT hydraulics report will be prepared as part of this task.

Alternatives Analysis (April 2024-Jan 2025)

Two separate alternatives will be considered for design review. These are based on previous design efforts and feedback from reviewing committees. At this stage, there is also a question as to which channel would be utilized to convey low flows, so this will also be incorporated into each alternative. This task will be led by the consultant and the sponsor and will seek input from local fish biologists as well as geomorphic input on the preferred approach. WSDOT and local landowners will also be consulted to identify issues and opportunities regarding these alternatives. Creation of a decision matrix for comparing alternatives will be completed as part of the Alternatives Analysis document. Comments from stakeholders will be incorporated into the matrix.

Conceptual Design (30%) (Jan 2025-July 2025)

This task will follow the selection of a preferred alternative. Engineering and design drawings and specifications for the project. Products may include a cover sheet, general notes, location map, access and staging, existing conditions plan view, proposed conditions plan view, plan and profiles, typical details (channel materials, low water mark, etc.), earthwork cut and fill volumes, planting/rehabilitation plans, temporary erosion and sediment control, de-watering, construction sequencing,

Bridge Feasibility Analysis- The consultant will work with WSDOT and a structural engineer to complete a bridge feasibility review and identify any issues. A memo will be developed.

Geotechnical Background Data- The consultant will work with a geotech subcontractor to review local existing geotech data and develop a memo.

Conceptual Cost Estimate-Consultant will prepare.

Preliminary Design (60%) (July 2025-December 2026)

Engineering and design drawings and specifications for the project. Products may include a cover sheet, general notes, location map, access and staging, existing conditions plan view, proposed conditions plan view, plan and profiles, typical details (channel materials, low water mark, etc.), earthwork cut and fill volumes, planting/rehabilitation plans, temporary erosion and sediment control, de-watering and construction sequencing.

Channel Design and Engineering- Channel design, ELJ, Floodplain and Engineering calculations.

Design Drafting- Plan set drafting and quantities calculations. Incorporating bridge designs into the plan set.

Basis of Design Report- Update existing Basis of Design Report to accommodate revised Conceptual Design (July 2025) and the Preliminary Design (December 2026). A civil/bridge BOD will also be prepared as a stand along document.

Civil Engineering- Site prep, demo plan with utilities relocation, traffic control plan. Assumes WSDOT standard specifications for road and bridge construction.

Structural Engineering- Structure type, materials, span, vertical clearance. Bridge layout, foundation/abutment plan, elevation details. Engineering work will be done per AASHTO LRFD Bridge Design Specifications, WSDOT standard Specifications 2014 M41-10, WSDOT Bridge Design Manual M 23-50.04.

Risk Analysis

Identification of performance and sustainability criteria for project elements and assessment of risk of failure to perform.

Evaluation of risk to infrastructure, property, human safety, recreation, etc. and potential consequences and supplemental analysis to mitigate risk.

Survey- PLS with topo and planimetric and combined with LiDAR. (July 2024-July 2025)

Geotech- Drilling and reporting at two bridge locations. Multiple holes at each location. (July 2025-July 2026)

Environmental Compliance - Consultant will provide metrics calculations, agency meeting support and sponsor support for materials needed for permit applications. Provide overview of compliance requirements for applicable federal, state, and local permits. Provide expected completion schedule or whether any exemptions apply.

Sec. 106 Cultural Resources- Contract for cultural resource surveys (July 2024-Nov 2024) for ground disturbance associated with Geotech exploration. Complete Sec. 106 consultation and other environmental compliance needed to proceed with Geotech. Contract for additional cultural resource surveys based on Area of Potential Effect from final Preliminary (60%) Designs (July 2026-Nov 2026).

Wetland Delineation- Complete a wetland determination with a contracted Wetland Specialist during the Alternatives Analysis phase of the project (May 2024-Oct 2024). Complete a memo of findings including maps of estimated wetland extant and permitting strategy. Complete a wetland delineation based on the final Preliminary (60%) Designs (May 2026-Oct 2026). Flag wetland and OHWM boundaries, complete a wetland delineation report and participate in permit meetings with agency, applicant and engineer.

Project Management/Admin (Ongoing)- Sponsor will manage and administer contracts, stakeholder outreach and design team. Sponsor will be responsible for all necessary access agreements/easements during the design process and will keep stakeholders apprised of design steps, outreach and comment phases of the project. Sponsor will develop the design team, schedule meetings and outline deliverables and overall project schedule with the consulting team. Sponsor

and consultant will develop a matrix to account for design review and comments by interested parties.

Stakeholder feedback (Ongoing)

The sponsor will work with the consultant to document comments from stakeholders to further understand project feasibility and better identify site constraints, design details and project costs.

o Describe the plan to conduct project specific outreach during your award period.
Outreach will include individual meetings with landowners to outline the project schedule, goals and objectives. Included will be detailed meeting notes outlining issues and opportunities identified by the landowners and review/comment steps during the design process. These meetings will be periodic as needed but at a minimum at project kickoff and during Conceptual and Preliminary draft design phases.

The larger community will be engaged in one or more watershed meetings to gage interest and understand possible concerns. A meeting/open house will be held during the summer of 2024 which will include a presentation of the alternative analysis phase of the project and opportunity for comments and questions. We would likely have additional community meetings during the summers of 2025 and 2026 where we would present the draft preliminary designs and solicit comments and questions.

Regional stakeholders will be targeted through joint presentations at the alternatives analysis, conceptual and preliminary design phases to the Upper Columbia Regional Technical Team, HCP Tributary Committees, Upper Columbia Salmon Recovery Board and the Wenatchee Watershed Action Team.

Agencies responsible for environmental compliance will also be targeted with specific outreach presentations to clarify questions and concerns at the alternatives analysis and conceptual design phases. Permit agencies will also be invited to site visits during the alternatives analysis and Conceptual design phase as well.

Comments, questions and concerns from outreach will be captured in a comment matrix at the different design phases.

o Describe the plan to carry out any relevant studies
See description above under Task A: Study and Design

o **Describe the current design status of the project and describe the design activities will need to be completed to advance the project to 60% design?**
As previously mentioned, site specific planning included: a Baseline Reach Characteristics Assessment, Alternatives Analysis and Basis of Design Report for Conceptual Design at Peshastin Creek Project RM 8.8 completed in 2015 and a Phase 1 Environmental Site Assessment completed in 2019.

EVALUATION CRITERION D: Presidential and Department of the Interior Priorities

• Climate Change:

- **Describe how the project addresses climate change and increases resiliency.**

Stream degradation due to logging, channelization, and agriculture in the Peshastin sub-watershed have resulted in increased risk of flooding, wildfire, and summer drought as well as water quality issues and loss of wildlife habitat. Effects of climate change have exacerbated these effects as evidenced by increased rain-on-snow events and resulting peak flood events, loss of snowpack and associated water storage, and higher wildfire risk, effects that are modeled to increase dramatically by the end of this decade (Mantua 2010, Tohver et al 2014, Musselmann et al 2018, Mote et al 2014). Overall patterns of change specific to the Peshastin watershed relate to the combination of reduced snowpack and higher temperatures, which are expected to result in less pronounced spring peak flow, lower flows in summer, increased risk of flash flooding in winter, and higher stream temperatures (Mauger 2017). These effects impose additional stress to ESA-listed fish species survival, as well as residential and agricultural communities.

The Peshastin Creek Historic Channel and Floodplain Reconnection Project will help increase climate resiliency by restoring ecosystem services – namely groundwater storage and release, flood attenuation, and habitat forming processes – by reconnecting the historic channel to the mainstem Peshastin Creek as well as improving functionality in the constructed channel. The constructed channel is entrenched, meaning that floodwaters are quickly exported downstream (NSD 2015). Connecting the historic channel will allow floodwaters to fill up the wide basin and recharge the sub-surface aquifer. This will help attenuate floods, reducing risk to downstream residential areas. Floodwaters will store in the reconnected floodplain, channel subsurface, and wetland. This increased natural water storage will then supplement low flows with cool groundwater, both cooling high temperatures and increasing low baseflows (Chelan County and NSD 2022). Therefore, this project will help communities by decreasing the magnitude of downstream flooding events, as well as mitigate against the effects of drought.

o How will the project build long-term resilience to drought?

As described in the project benefits "water supply" section, Chelan County and the Wenatchee Basin have experienced six state and one federally recognized drought in the last 21 years, with half of those occurring in the last seven years. The picture that the record breaking drought year of 2015 paints may be a glimpse into the future, as climate models predict 2015 conditions will become routine by 2070 (Mauger et al 2017). Climate change will likely exacerbate already chronic flows in Peshastin creek, with a predicted 15 to 40 percent decrease in Peshastin Creek base flows in the 2030s (Mauger 2017).

Construction of SR 97 has resulted in a 90% disconnection of the floodplain at the project site. Historically, the channel at the project site used to meander across the floodplain, which supported depositional forces and subsurface water storage. However, channelization in the reach and increased stream gradient due to channel straightening have caused an increase in transport capacity during flood events and increased channel incision (Andonaegui 2001). These effects translate into the stream's inability to recharge sub-surface aquifers and groundwater flow paths that can supplement base flows and protect against drought in the summer (Chelan County and NSD 2022).

One of the greatest opportunities to mitigate drought risk due to changing hydrology under climate change is to restore the watershed's ability to naturally store and release water. By reconnecting perennial, split-flow to the historic channel and wide floodplain at the project site, the proposed project will help the basin fill up with water during flood events, slow down flow velocity, and

help to realize its full water storage capacity. Essentially, instead of being quickly exported downstream as in the current condition, floodwaters will fill up the watercourse, wetland and floodplain for substantially enhanced ground water storage. This groundwater storage will recharge the aquifer, and help supplement baseflows later in the season, helping to mitigate against drought (Chelan County and NSD 2022). The proposed design effort will include hydrologic models of the increased inundated area during different flood events (e.g. Q2, Q10, Q100), as well as an associated estimate of restored subsurface water storage. This will then be translated into an estimated increase in baseflow flux. These estimates (increased water storage in acre/ft and increased flux in cfs) have not been calculated at the time of the application, but will become clear as part of the design effort.

Because the methods described in this proposal restore natural processes, the increase in baseflow will sustain into perpetuity, providing an increase in long-term resilience to drought under climate Change.

o Other contributions to climate change resiliency in ways not described above?

Providing perennial flow from Peshastin Creek to the wetlands and riparian area associated with the historic channel will help restore and/or expand wetland hydrology. Because wet soil is highly efficient at accumulating organic matter, wetlands can function as important carbon sinks. One of the more direct ways to improve carbon storage in a wetland is to restore the original hydrology that allows it to re-flood, as this project proposes to do (Krauss et al 2021).

By opening up currently inaccessible habitat, this project also addresses climate change species resilience by providing ESA-listed steelhead, spring Chinook and bull trout a broader range of options by which to respond to climate change. The historic channel is characterized by cool groundwater sourced pools that are several degrees cooler in summer than the mainstem Peshastin (CCNRD, personal observation). This cool water represents a form of thermal refuge that will become increasingly important for anadromous fish survival as stream temperatures warm as projected under climate change. Therefore, opening up fish passage to the historic channel at the project site will increase ESA-listed species resilience (Lee et al 2020).

The proposed project site is on land owned by Washington Department of Transportation (WSDOT, see letter of support) and directly adjacent to the Okanogan-Wenatchee National Forest. Within this forest, riparian and wetland habitats are ranked high vulnerability to climate change, and dry forest stands are ranked high vulnerability to increased susceptibility to wildfire (Gaines et al 2012). Providing perennial flow to the riparian and wetland habitats of the historic channel will help preserve functionality of wetland habitats as conditions warm and soils become dryer due to climate change. This will also help form a better fire buffer to dryer upland habitats in the National Forest, and help slow the spread of wildfire.

•Disadvantaged or Underserved Communities

The census tract that encompasses the project area is not considered disadvantaged based on the Climate & Economic Justice Screening Tool available at geoplatform.gov. However, Washington Tracking Network (https://fortress.wa.gov/doh/wtn/WTNIBL/), managed by the WA Department of Health, tracks environmental public health data across Washington State and identifies multiple high risk socioeconomic factors in the Peshastin community (Appendix F). On a scale of 1 to 10, with 10 being the highest risk factor, the Peshastin community ranks as follows:

- Overall Socioeconomic Factors: 9 out of 10
- Limited English: 8 out of 10
- No High School Diploma: 10 out of 10
- People of Color: 7 out of 10
- People Living in Poverty: 7 out of 10
- Transportation Expense: 10 out of 10

Based on this same site, the Peshastin community is 27 percent Hispanic, 70 percent white. The high risk ratings listed above are likely attributable to the underserved Hispanic community. U.S. Hispanics are also more likely to live in poverty, make only 35 percent of the income on average than the average U.S. citizen, are less likely to have a college education (Bartman 2015). The low average income and educational attainment of Hispanics are obstacles to receiving timely and appropriate health care (Escarce and Kapur 2006).

Historically, Hispanic people in the U.S. have faced racial, ethnic, and anti-immigrant prejudice, including discrimination in employment, housing and education (Feagin and Cobas 2014). Creating stability in the agricultural community of Chelan County by mitigating drought through the proposed project can help create more stable employment for the agricultural farm working community, which is 60 percent Hispanic in WA state (Berk Consulting 2022). This stable employment can help current and future generations receive the education, healthcare, and housing.

o Describe how the project benefits those disadvantaged or underserved identified using the tool.

Creating stability in the agricultural community of Chelan County by mitigating drought through the proposed project can help create more stable employment for the agricultural farm working community.

•Tribal Benefits:

o If applicable, describe how the project directly serves and/or benefits a Tribe

The project area includes the ancestral lands of members of both the Confederated Tribes and Bands of the Yakama Nation and the Confederated Tribes of the Colville Reservation. The Yakama Nation is one of four Columbia River basin Treaty Tribes, and the Colville Tribes were established by Executive Order. The mission of the Yakama Nation Fisheries Program is to "honor, protect, and restore culturally important fish populations and the ecosystems that produce them throughout the Treaty Territories of the Yakama Nation, and to protect the rights of Yakama Nation members to use these resources as reserved in the Treaty of 1855" (YN 2021). Chelan County and both tribes are actively working together on a number of restoration projects to improve resource conditions in the Wenatchee watershed for the benefit of tribal interests, including primarily fishing but also hunting, traditional root and vegetable gathering and ceremonial events. In the Peshastin Creek watershed, there is active traditional foods collection at Camas Meadows and fishing platforms just below the Peshastin Creek confluence with the Wenatchee River.

In particular, the project supports the YN Coho reintroduction program by restoring habitat used by Coho. By the end of the 20th century, native coho salmon no longer occupied the upper Columbia

basin, including the Wenatchee basin. Coho salmon are a culturally important species to the Tribes. In the early 2000s, the YN launched its Coho Reintroduction Program (https://yakamafish-nsn.gov/restore/projects/mid-columbia-coho) funded by the Bonneville Power Administration. Data from the Upper Peshastin Creek pit-tag array located at RM 10.9, which is 1.6 RMs above the proposed project site, shows detections of eight individuals including 3 steelhead, 2 spring Chinook, and 3 Coho in 2022 (www.ptagis.org, PEU Interrogation site). This indicates that Coho migrate through the habitat (or lack thereof) at the project site. Therefore, habitat improvements to both the quality and quantity of spawning and rearing habitat will support the YN's coho reintroduction program by providing an increase in available spawning and rearing habitat.

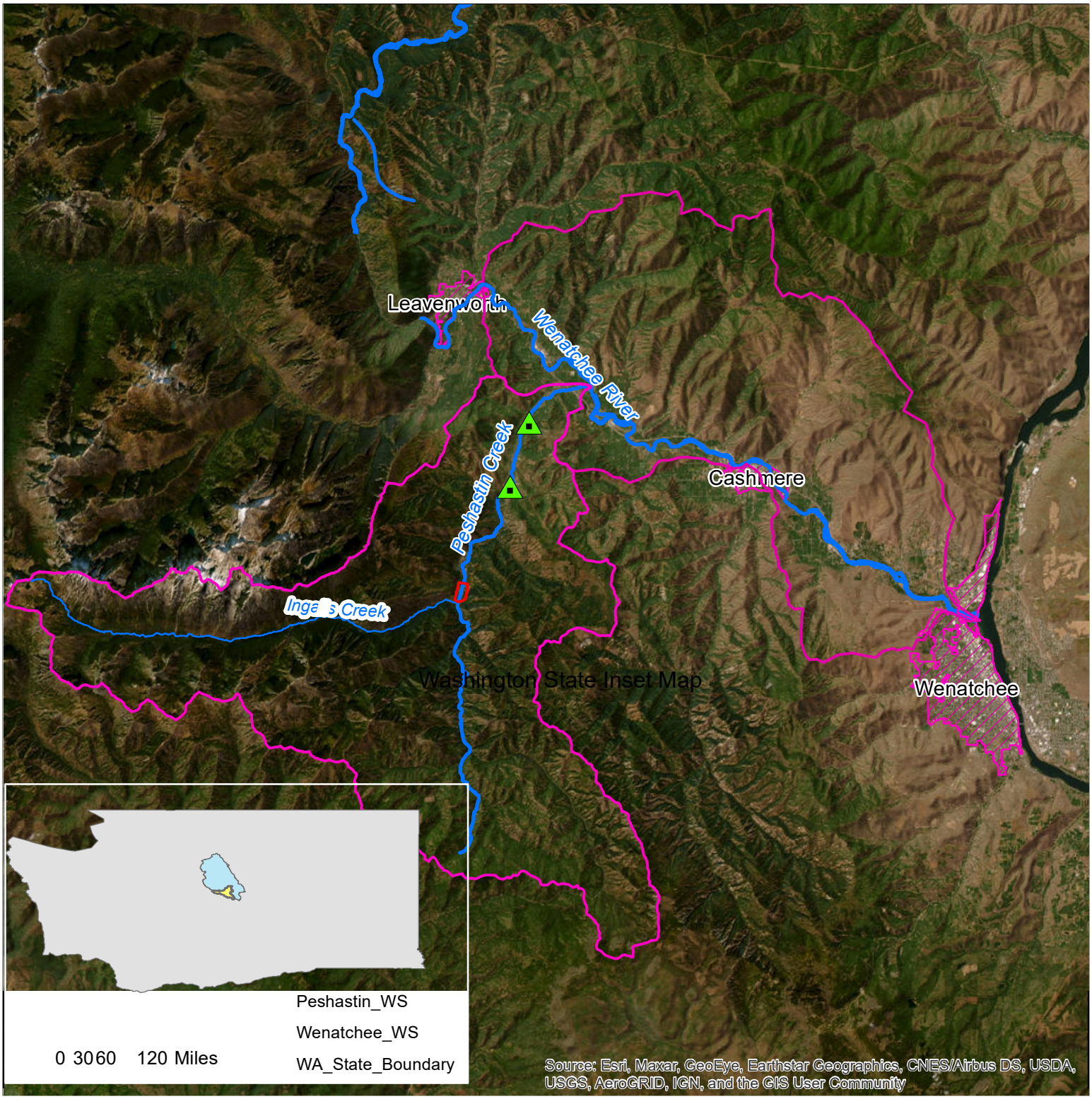
Summer steelhead and spring Chinook are also culturally important fish to the Yakama Nation and Colville Wenatchi tribes. These tribes maintain non-exclusive fishing rights at the confluence of Icicle Creek and the Wenatchee River, which is located just 9 RMs downstream (from the project site to the Peshastin/Wenatchee confluence) and another 9 RMs miles upstream (to the Icicle/Wenatchee confluence). Recently, the tribes have installed new traditional fishing platforms near the mouth of Peshastin Creek as well. Improved climate resilience and expanded spawning and cold-water rearing opportunities for these species will benefit these important tribal fisheries. Tribal interests play an integral part in the CCNRD-led "Icicle Work Group" which includes the development of collaborative strategies to support and optimize a wide range of in-stream and out-of-stream uses related to the Icicle watershed. This includes discussions regarding strategies to increase in-stream flows impacted by the IPID, including the Peshastin Pump Exchange project and habitat projects. The Colville Tribes are engaged in the IPID Pump Exchange Project Team and have expressed early interest in financially supporting this project. CCNRD enjoys its partnership with the Tribes and will continue to work with the Tribes on current and future habitat restoration projects.

o Does the proposed project support Reclamation's Tribal trust responsibilities or a Reclamation activity with a Tribe?

As described above, this project supports Reclamation's Tribal trust responsibilities by directly collaborating with Tribes, and supporting tribal priorities.

Appendix A: Maps

Figure 1 - HUC-10 Location Map:
Peshastin Creek Historic Channel and Floodplain Reconnection Design



N
W E
S

0 1.5 3 6 9 12 Miles

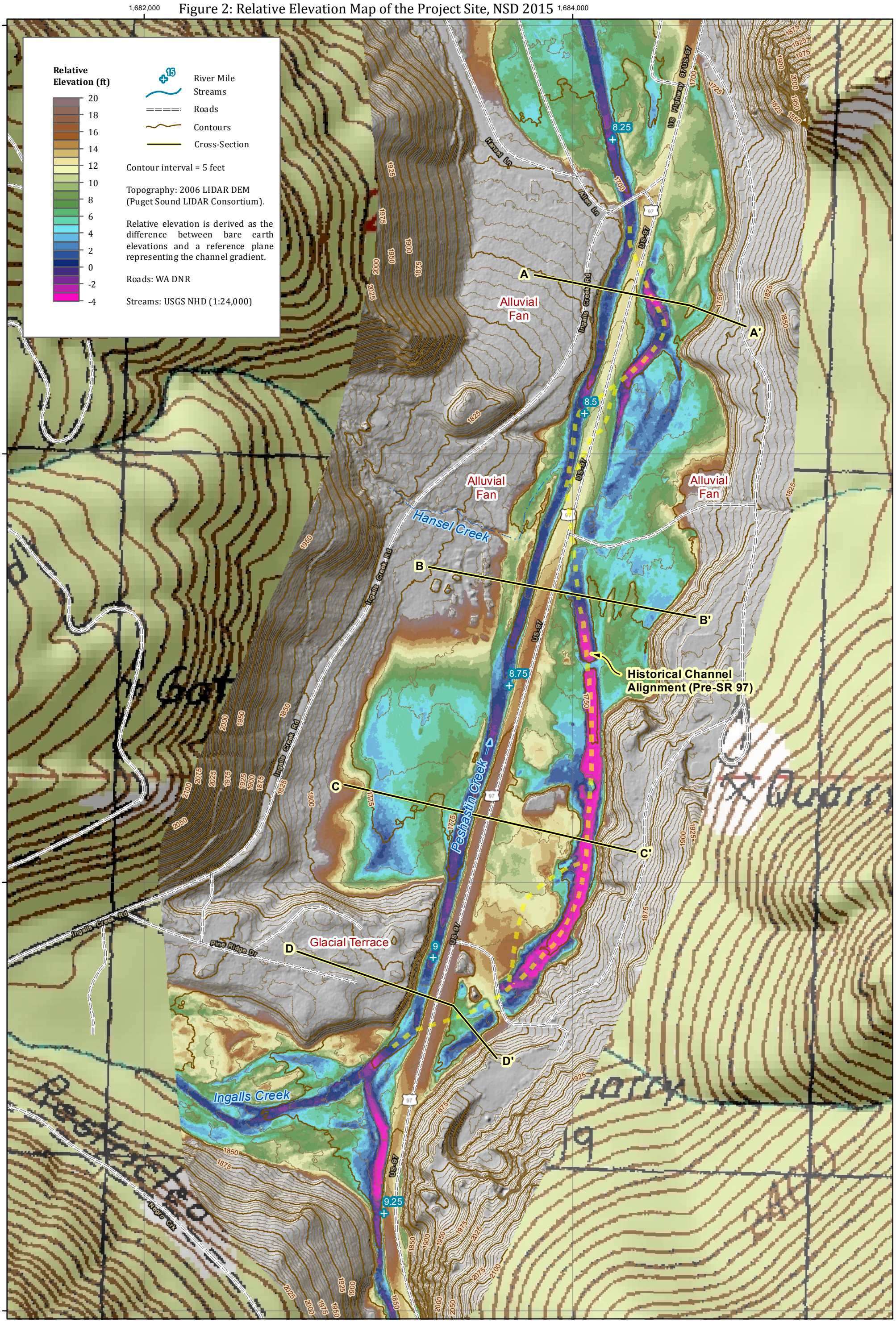
Legend

HUC-10 Watersheds
(Peshastin and Lower Wenatchee)

Proposed Project Site

IPID Peshasitn Creek Diversions

Figure 2: Relative Elevation Map of the Project Site, NSD 2015



Peshastin Creek (RM 8.4-9.2)

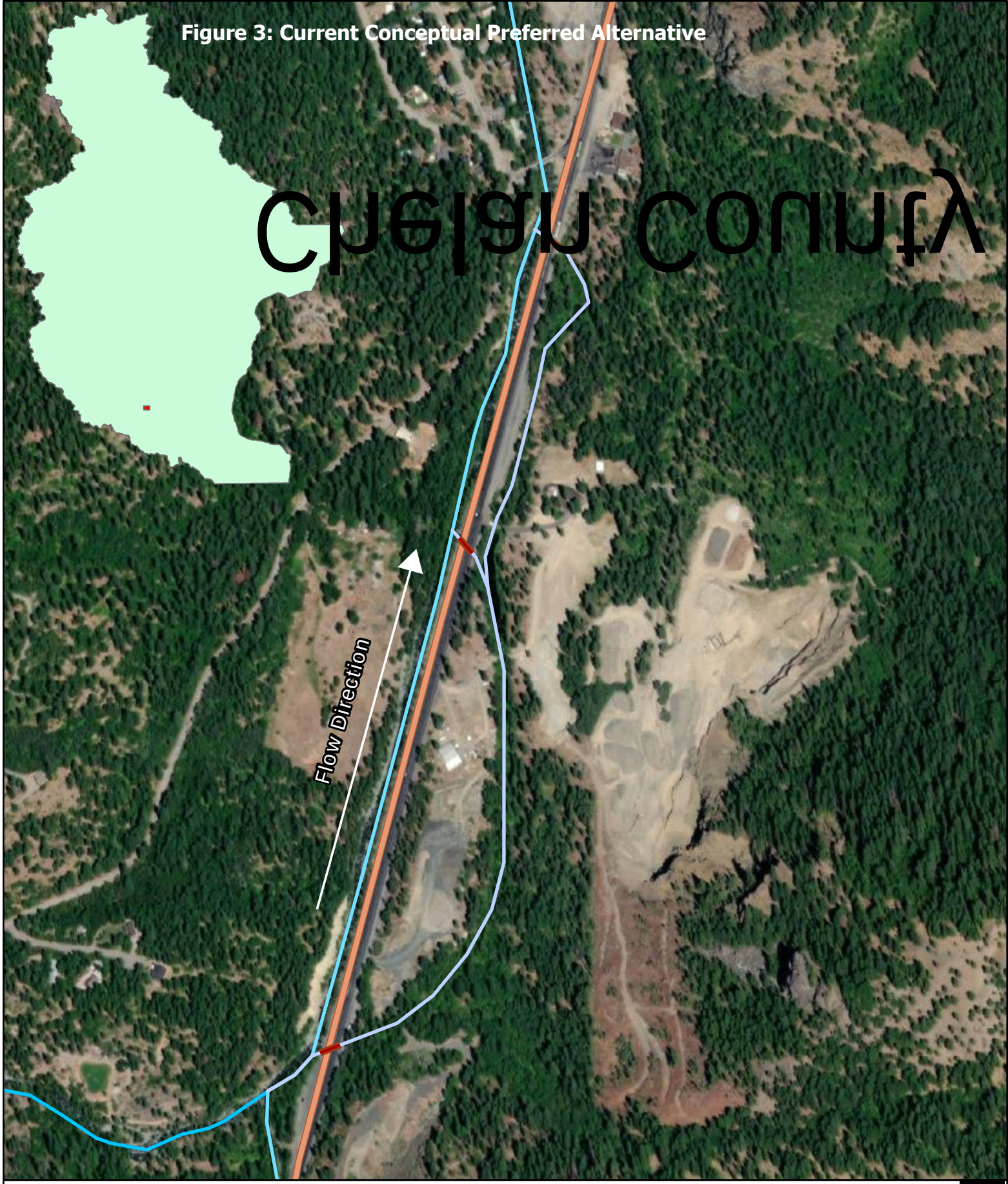
Valley Topography and Landforms
Relative Elevation Map (Oct 2006 LiDAR)

0 400 800 1,200 Feet

Lambert conformal conic projection, NAD 1983
State Plane Coordinate System (WA North Zone)

Natural Systems Design

Shawn Higgins, NSD Date: 10/16/2015 Path: C:\shawn\projects\Peshastin\GIS\maps\mxd\Peshastin_RM8.8_REM.mxd



Map Created by: Keeley Chiasson 4/20/23 Spatial reference used:NAD 1983 StatePlane Washington North FIPS 4601 (US Feet)

Peshastin Creek RM 8.8 Conceptual Design

COUNTY OF CHELAN

0 0.05 0.1 0.2 0.3 Miles

Ingalls Creek
HWY 97
Peshastin Creek
Proposed Channel

Figure 4. Modeled Flood Inundation in the Project Reach (Interfluve 2010)

Appendix B: Photos

Chelan Co Natural Resource; Peshastin Creek RM 8.8 Conceptual Design (#23-1288)

Attachment #559202, Pesh_existing 023.jpg

Chelan Co Natural Resource; Peshastin Creek RM 8.8 Conceptual Design (#23-1288)

Attachment #559137, Pesh RM 8.8 existing 019.jpg

Above : Photos 1 and 2: Constructed channel, current alignment in the project reach

Chelan Co Natural Resource; Peshastin Creek RM 8.8 Conceptual Design (#23-1288)

Attachment #559139, Pesh RM 8.8 historic 012.jpg

Chelan Co Natural Resource; Peshastin Creek RM 8.8 Conceptual Design (#23-1288)

Attachment #559205, Pesh_histoirc 024.jpg

Above : Photos 3 and 4: Abandoned historic channel. Photo 3 shows intact riparian and deep pools, Photo 4 shows intact riparian and woody cover.

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N · Olympia, WA 98501-1091 · (360) 902-2200, TTY (800) 833-6388
Main Office Location: Natural Resources Building · 1111 Washington Street SE · Olympia, WA

May 31, 2023

Mike Kaputa, Director
Chelan County Natural Resources Department
411 Washington Street, Suite 201
Wenatchee, WA 98801

RE: Peshastin Creek Historic Channel and Floodplain Reconnection Design

Dear Mr. Kaputa:

Thank you for the opportunity to provide a letter of support for Chelan County's application to the Bureau of Reclamation WaterSMART Aquatic Ecosystem Restoration Program for the *Peshastin Creek Historic Channel and Floodplain Reconnection Design Project*. Peshastin Creek is a critical tributary in the Wenatchee watershed for ESA-listed steelhead, bull trout, and spring Chinook salmon. The construction of HWY 97 disconnected significant portions of floodplain from Peshastin Creek, and this project represents the largest known floodplain restoration opportunity in Peshastin Creek, and perhaps the best chance to provide low gradient habitat preferred by spring Chinook salmon.

WDFW welcomes the opportunity to participate in the design and permitting process for this project. We intend to support the County's efforts to secure additional funding for project design and construction through other venues. We appreciate the County's work to restore floodplain function and hope that you are successful in securing grant funds for this project.

Please let us know if we can provide any additional information.

Sincerely,

Jeremy Cram
Salmon Recovery Policy Lead
Washington Department of Fish and Wildlife

Washington State Department of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

May 25, 2023

M. Camille Calimlim Touton
Commissioner, Bureau of Reclamation
Attn: NOFO Team
P.O. Box 25007, MS 84-27133
Denver, CO 80225

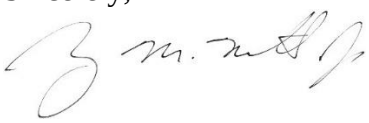
Dear Commissioner Touton:

I am writing to express Washington State Department of Transportation's (WSDOT) support for Chelan County's WaterSMART grant application to the Bureau of Reclamation Aquatic Ecosystem Restoration Program for the Peshastin Creek Historic Channel and Floodplain Reconnection Design Project.

WSDOT manages U.S. Highway 97 (US 97) for the State of Washington and has additional property interests nearby. The construction of US 97 disconnected significant portions of Peshastin Creek from the floodplain and this area represents the largest floodplain restoration opportunity in Peshastin Creek. WSDOT supports this project's objective to reconnect and restore lost floodplain functions in Peshastin Creek.

Given WSDOT's excellent working relationship with Chelan County and their experience successfully completing habitat restoration projects, WSDOT supports Chelan County's grant application for the Peshastin Creek Historic Channel and Floodplain Reconnection Design Project.

Sincerely,



Roger Millar, PE, FASCE, FAICP
Secretary of Transportation