Lower Chiwawa AU, Area D – Implementation

Chelan County Natural Resource Department

Scott Bailey
411 Washington Street, Suite 201
Wentachee, WA 98801
509-679-2131 / scott.bailey@co.chelan.wa.us

Prism #: 26-1642

Anticipated SRFB Request:	$ 499,113
Anticipated Trib Comm Request:	$ 560,312
Other Funding (PRCC):	$ 823,158
Anticipated TOTAL Project Budget:	$1,882,583

Contact Information

2026 Upper Columbia Regional Project Pre-Application

* Pre-applications due March 11, 2026 (COB)

*Complete SRFB applications due in PRISM April 17, 2026 (COB)

*Revised SRFB proposals due in PRISM May 27, 2026 (COB)

*Final revised applications due in PRISM June 22, 2026 (noon)

Project Title	Lower Chiwawa Area D, Implementation
Sponsor	Chelan County Natural Resource Department
Primary Contact	Scott Bailey
E-Mail Address	scott.bailey@co.chelan.wa.us

Project Summary

Please provide a description or summary of the proposed project, including project goals. The goal of the project should be to solve identified problems by addressing the root causes. Then clearly state the desired future condition.

This project addresses identified habitat limiting factors for high- and medium-priority spring Chinook and steelhead life stages (i.e., holding, summer and winter rearing, and fry colonization) in Reach 4 of the Lower Chiwawa River AU including Floodplain Connectivity, Off-channel Side-channels, Riparian Canopy Cover, Instream Cover (wood), Deep Pools, and Temperature (rearing). This phase of the project will execute contracts for project construction, vegetation planting, and construction oversite; complete all tasks needed to implement the restoration project as designed; and complete post-implementation tasks needed to close out the project including preparation of as-built drawings, and reporting as required to comply with permits and funding agreements. The completed project will improve conditions along ~0.6 miles of mainstem channel; create ~0.2 miles of side-channel habitat; enhance a cold water tributary confluence; and consolidate/reduce dispersed camping, decommission up to 1,000 lf of unauthorized roads, and reduce potential for future impacts and enhance vegetation within ~15 streamside acres.

What are the project objectives? Objectives support and refine biological goals, breaking them down into small steps. Objectives are specific, quantifiable actions the project will complete to achieve the stated goal. Each objective should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). Note: This exact question is included in the PRISM application. Example format: The project seeks to address [specify limiting factor(s)] for [limiting life stage(s)] by [specific actions proposed] to create an estimated [include specific target metrics, as described below] upon implementation in [estimated year].

Objectives of the proposed project are:

Within 24 months of funding

1. Execute all contracts needed to implement the project and provide engineering oversite.

2. Construct a restoration project as identified in construction-ready design documents that will:
(a) add large wood structures and other habitat features along ~0.6 miles of mainstem channel (and at the mouth of a cold water tributary) that will increase wood loading to greater than 70 pieces of wood per mile, improve cover and increase pool quantity and quality, redirect flows and increase inundation of the river left floodplain, and improve habitat quality and access at the tributary confluence.
(b) add up to 0.2 miles of side-channel habitat to increase side channel area in project reach to greater than 5% of total channel area.
(c) decommission approximately 1,000 lf of forest roads, consolidate camp sites/control access, and plant native trees, shrubs, grasses and forbs to improve conditions within ~15 streamside acres.

3.Complete post-implementation tasks including as-built drawings, reporting required by funders and permitting agencies, and close out of all contracts and agreements.

Budget Request

Values MAY be duplicative and do not have to equal TOTAL anticipated budget in pre-application.

Anticipated Request - SRFB	$500,000
Tributary Committee - Anticipated or Actual	$500,000
Anticipated or Actual Other Funding	$1,000,000
Anticipated TOTAL Budget	$2,000,000

Other Funding Source(s), please note if funding is anticipated or actual.

We intend to request additional funds for this implementation effort from Priest Rapids Coordinating Committee, Colville Tribes Fish & Wildlife Department, and/or one or more other sources. No other applications have been submitted yet. Funding is anticipated, not secured.

Project Location

Briefly describe the location of the project	The project site is located along the lower Chiwawa River from ~0.6 miles downstream of the Chiwawa River Road bridge upstream to the Alder Creek confluence, approximately RM 6.6-7.25
Latitude (decimal degrees)	47.8396
Longitude (decimal degrees)	-120.6638

Project subbasin	Wenatchee
Wenatchee Assessment Unit(s)	Lower Chiwawa River
Does the proposed project span multiple assessment units?	No
Reach(es) Name	Reach 04
Identify the reach(es) priority/ reach ranking. Note: If the project involves work in multiple reaches, select "Multiple" and include details in the text box that will appear below. Please reference the Prioritization Web Map: https://prioritization.ucsrb.org/.	Rank 2

Project Information

1. What species will the project benefit?	Spring Chinook Steelhead Bull Trout
2. Select the project's objectives and the associated tracking metrics	Instream Habitat (Includes Floodplain & Off-Channel Reconnection) Riparian Habitat Upland Habitat
Instream Habitat: Reporting Code	Total miles of instream habitat treated Miles of off-channel stream created or connected Acres of channel/off-channel connected or added Number of structures placed in channel Pools created through channel structure placement
Riparian Habitat: Reporting Code	Total riparian miles streambank treated Total riparian acres treated
Upland Habitat: Reporting Code	Acres of upland habitat treated Number of erosion/ Sediment control installations Miles of road abandoned

4. Does this project already exist in Salmon Recovery Portal or PRISM?

Yes

5. Has this project been submitted previously for funding through the SRFB and/or other process(es)?

Yes

Please explain which process(es) and how this proposal differs from the previous submission (e.g., different phase, modified scope, etc.)

Two design phases for this Area D project have been funded by SRFB: the Preliminary Design phase was funded through the 2022 grant round, and the Final Design phase was funded through the 2025 SRFB grant round. The Final Design agreement is still active, and work under this 2025 SRFB agreement is expected to continue through fall 2026. Previous design documents (Conceptual and Preliminary designs) and other work products have been uploaded to PRISM during these previous phases, and newly produced work products also will be uploaded to PRISM for the 2025 agreement.

The Bureau of Reclamation (BOR) also has provided financial support during both design phases. During the Preliminary Design phase, BOR contracted directly with the design firm that is designing the in-stream restoration treatments. The Final Design phase is being funded, in part, through a BOR WaterSMART Aquatic Ecosystems Restoration Projects (WaterSMART AERP) agreement that CCNRD received in 2025.

Unlike these previous agreements, this proposal is requesting funding for project implementation (not project design).

6. What category is the project?

Restoration

If applicable, what is the secondary project category?

N/A

Design and Restoration Proposals

7. What project phase(s) are proposed for completion?

Construction

8. Is your project within a completed (or soon-to-be completed) Reach Assessment or other type of assessment (e.g., Rapid Site Assessment, other)?

Lower Chiwawa River Assessment (InterFluve, 2023) and Upper Wenatchee Pilot Project: Aquatic Habitat Assessment and Restoration Strategy Report (Cramer Fish Sciences, 2019)

9. Which limiting factors does the project propose to address?

Cover - Wood
Off-Channel - Floodplain
Off-Channel - Side-Channels
Pool Quantity & Quality
Pools - Deep Pools
Riparian - Canopy Cover
Riparian - Disturbance
Temperature - Adult Holding
Temperature - Rearing

10. Which life stages will the proposed project address?

Fry
Holding and Maturation
Summer Rearing

Winter Rearing

11. Freshwater Benefits - Describe how your project will improve survival, capacity and/or distribution for target species at the reach scale?

Currently, floodplain connectivity, side-channels, cover wood, riparian canopy cover, and temperature are classified as Unacceptable, and deep pools are classified as At-risk, for Reach 4 of the lower Chiwawa River (UCRTT 2020). Based on the Upper Wenatchee Pilot Project: Aquatic Habitat Assessment and Restoration Strategy Report (Cramer Fish Sciences, 2019), streambed substrate is dominated by cobbles and boulder and LWD is rare along this reach. Overall pool frequency was rated Adequate, but the reach was rated At-risk for pools due to a limited number of deep pools. Riparian road densities were rated Moderately High and this resulted in a riparian condition rating of At-risk. Channel dynamics were rated Poor in this reach due to a high bankfull width to depth ratios, low entrenchment ratio, and low side channel percentages compared to predicted meandering and braided channel forms.

This project is intended to improve habitat quality for target species life stages including holding, fry, summer rearing, and winter rearing. The proposed project will improve habitat quality at the Alder Creek confluence(by adding a pool and large wood structure); increase the length of side channel habitats (by excavating an ~1,000 lf river-left side-channel that will include habitat wood), the number of deep pools and amount of LWD present along ~0.6 miles of mainstem channel (through construction of eight mainstem ELJs); and treat historical and ongoing recreational impacts to riparian and upland vegetation and water quality (and minimize potential for future impacts) along the project reach (by treating impacts, creating structures and planting native plants in three dispersed camping areas adjacent to the river).

Through the aforementioned work, this project will enhance the quantity and quality of habitats along the project reach. We expect that this will increase capacity for holding, incubation, fry and summer and winter rearing life stages, which we expect to improve survival, reproduction and fitness for target species.

12. Temporal Effect - Briefly describe how and to what extent the project would promote natural stream/watershed process consistent with the geomorphology of the stream?

The lower Chiwawa River has been impacted by historical land use practices, particularly timber harvest practices that used the stream corridor to transport logs. This has resulted in a simplified, plane bed channel that is wide and shallow and disconnected from its historical floodplain. As a result, the streambed is well-armored and large cobbles and small boulders dominate the bed substrate. Pools and persistent LWD structures are rare. In addition, dispersed camping in the area has adversely affected riparian and upland vegetation, resulted in a web of social roads and trails and a proliferation of garbage and unauthorized latrines. These impact water quality and stream and forest health (and create management issues for USFS).

The project will treat ~0.6 miles of in-stream habitats and ~15 acres of adjacent riparian and upland habitats and will restore habitat values, promote natural processes, minimize future recreational impacts, and facilitate USFS management of the area. The design process has been supported by extensive data collection and modeling, anticipates the projected effects of global climate change and is consistent with reach-scale geomorphology and USFS planning and management efforts. The project also is consistent with guidance provided by the UCRTT in its recent restoration prioritization update which promulgates the following recommendations for the project reach: Improve cover wood, Improve off-channel side channels, Improve off-channel floodplain, and Improve temperatures.

Treatments associated with the proposed project will promote natural stream/watershed processes. Selective grading and the addition of wood structures in the mainstem channel and lower Alder Creek (a cold water tributary) and on adjacent floodplain surfaces will:
(1) more regularly connect the stream channel to its floodplain,
(2) enhance hydraulic and habitat diversity,
(3) initiate horizontal and vertical scour that will mobilize sediments and organic materials,
(4) create off-channel habitats, and
(4) facilitate deposition of naturally occurring LWD and streambed materials along the project reach.

In addition to reducing potential for future recreational impacts to the area, treatments for past

anthropogenic impacts in recreation areas adjacent to the river will:
(1) improve streamside vegetation (which will facilitate recruitment of organic matter and other allochthonous inputs and increase shade);
(2) enhance infiltration in upland and riparian areas; and
(3) reduce runoff and delivery of fine sediments, garbage, fecal coliform bacteria, and other contaminants to the stream.

13. Temporal Effect - How long will it take for the project to achieve its intended response?

Less than or equal to 1 year | 1-10 years

14. Temporal Effect - How long will the restoration action and its benefits persist?

10-50 years

15. Temporal Effect - What level and/or interval of maintenance is anticipated? What is the plan for any anticipated maintenance?

It is our intent that the project will be self-maintaining and require little or no further human intervention once construction is completed. That said, we will work with USFS to monitor the project post-construction and will complete maintenance as needed to ensure the project continues to function as designed.

This request funds project construction, but this grant program does not provide funds for post-construction monitoring and maintenance. As a result, should maintenance needs be identified it is likely that a new fundraising effort will be required to secure funds in support of that work.

16. Methods - Briefly describe the potential (for design) or proposed restoration methods and how they will achieve project objectives.

This project is designed to improve in-stream and floodplain habitat quality, quantity and diversity; improve flow connectivity and juvenile fish access to off-channel habitats; and promote stream processes including scour, sediment deposition and sorting, organic matter recruitment, and others. Restoration treatments associated with the project include mainstem and tributary ELJs (apex, bank-attached, and side-channel confluence structures), habitat tree placement, selective grading, and recreation area treatments including selective grading, wood/rock structures, and vegetation planting. The current 60% plan set depicting these restoration treatments will be uploaded to PRISM in support of this application (and has been uploaded under previous RCO agreements that have funded design work for this project), and the final design iteration is expected by September 2026 (it also will be uploaded to PRISM).

The project includes a total of nine ELJs, all of which will be machine-built. There are two apex ELJs, six bank-buried ELJs, and one side-channel confluence ELJ. All of these structures will include excavated pools, and the excavated streambed materials will be used to backfill the structures (supplemented with excavated materials from the side-channel, if needed). The fill material will be planted with live stakes and a native seed mix to facilitate establishment of vegetation on the structures.

The Apex ELJs will be constructed at a mid-channel location and a flow split location (side-channel inlet) in the mainstem channel. These structures are designed to enhance hydraulic complexity, initiate lateral channel processes, and provide pool habitat and cover at all flows. They will be stabilized via mechanical connections to vertical piles either driven or dug into the channel bed (17-20 piles - 16"dbh and 25' length), and will include 30-37 rootwad logs (18" dbh and 40' length), 6-8 whole trees and ~15-30 CY of salvaged slash (as racking materials).

The bank-buried ELJs will be constructed at several locations along river-left and are designed to add pools/enhance pool quality and provide cover and refuge areas at all flows. They will each include approximately 20 rootwad logs (18" dbh and 40' length), eight piles (16" dbh and 25' length), two whole trees and ~10-15 CY of slash (as racking materials). These structures will be stabilized by burying a large portion of the rootwad logs under at least two feet of backfill, with additional support provided by mechanical connections to driven or dug piles.

The side-channel confluence structure will be constructed at the downstream end of the constructed side-channel. It is intended to maintain a pool at the channel outlet and provide cover and refuge habitat at all flows. It will include 25 rootwad logs (18" dbh and 40' length), 12 piles (16" dbh and 25' length), five whole trees and ~15-25 CY of slash (as racking material). This structure will be stabilized by burying a large portion of the rootwad logs under at least three feet of backfill, with additional support provided by mechanical connections to driven or dug piles.

The project also will construct an approximately 1000 lf, river-left, side-channel. The channel will have a bottom width of ~15 ft and typical excavation depths will be 4-6 ft. It will have an average longitudinal gradient of 0.7 percent. It will be excavated with heavy equipment and will generate approximately 4,300 CY of excavated materials, which will be used as supplemental backfill for ELJs and in the recreation area treatments above ordinary high water. The side-channel is designed to convey flow perennially and will include ~100 pieces of large wood to provide cover and in-stream complexity. Large wood will be stabilized by burial or by bracing the logs with partially buried upright logs or standing trees. No ferrous connections are anticipated for this woody material. The channel alignment was identified using LiDAR and surveyed tree locations, and the path it follows was designed to minimize impacts to large standing trees. Additional field fitting and variable side slopes may be employed during construction to further limit impacts to large trees.

Finally, the project includes a suite of treatments in three separate streamside areas used primarily for dispersed camping. This work is intended to treat impacts from historical and ongoing recreational use in these areas and limit potential future impacts associated with this use. Ground-based equipment including excavators and dump trucks will be used for this work. Soils will be de-compacted; large wood and boulders will be placed as roughness features throughout these areas to improve habitat quality, create barriers impassable to vehicle travel, and delineate camping areas. We will also enhance native vegetation throughout these three areas. A crew with hand tools will plant a variety of native trees and shrubs (~2,100 plants), and we will contract with a hydroseeding company to seed/mulch (with a native grass/forb mix) a total of approximately 7 acres throughout these three areas .

Assessment Proposals

Protection Proposals

Monitoring Proposals

Project Risk and Economic Benefits

1. What is the landownership? US Forest Service

2. Have you secured landowner participation in or acceptance for this project? Yes

Please explain

We currently have a signed Landowner Acknowledgement Form from the USFS for the current project design phase, and will secure an acknowledgement for this proposal prior to submitting the final application. The project is on USFS's work plan and we also will obtain a signed Landowner Agreement from them prior to project implementation.

3. Describe any land owner requirements (e.g., design elements, right-of-ways, access agreements, liability waivers, etc.) and if/how they could affect the project

Project must avoid impacting nearby long-term lease cabins, Goose Creek Campground, and the Chiwawa River Road bridge that crosses the river just downstream of the Alder Creek confluence. The design process has considered these constraints and we do not anticipate any adverse impacts to these features.

Dispersed camping consolidation/reduction and road decommissioning follows USFS guidelines and standards, and in-stream restoration is consistent with design criteria and conservation measures promulgated under ARBO II (Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Aquatic Restoration Activities in the States of Oregon and Washington) and the Upper Wenatchee Pilot Project Environmental Assessment.

None of these constraints, requirements, or permit conservation measures are expected to adversely affect the project because the project was designed with these considerations in mind, and because safety considerations and following established guidelines and standards is commonplace in stream restoration design.

4. Will the project raise potential concerns for interest groups (e.g., recreational users) or the community at large (including upstream/ downstream/ adjacent landowners)?

We have not received any specific feedback from interested parties expressing concern for the project or the proposed treatments. However, campers who use the dispersed camping areas to be treated at this project site may raise concerns about the reduction in camping sites that will result from this project. In addition, in-stream projects often raise concerns for recreational boaters, adjacent property owners, and other interested parties.

Our recreation area treatments are designed to improve habitat conditions in the dispersed camping areas and reduce potential for future user-created impacts to the stream and adjacent habitats. The treatments (which have been approved by USFS) will bring the areas into better agreement with USFS standards and guidelines for dispersed camping areas. In addition, they are expected to enhance user experience by reducing the total number of campers at any given time and increasing the distance between campsites (enhancing privacy).

Our in-stream treatment designs take public safety and project risk to into account through the use of the Bureau of Reclamation's Large Woody Material - Risk Based Design Guidelines (which assesses risks to property and public safety). In addition, we have commissioned a recreational safety assessment that identified risks to non-motorized boaters in the Lower Chiwawa River and provided recommendations for minimizing risks associated with stream restoration efforts. This work also has informed the design of this project.

5. Who will have the responsibility to manage and maintain the project? What is the responsibility of current or future landowners?

This proposal supports project construction within a National Forest unit. CCNRD will work with USFS to monitor the site post-construction. As a public land manager USFS is ultimately responsible for maintenance and management of the lands and waterways it administers. However, CCNRD will work with USFS to determine if maintenance is needed and seek additional funding should we determine that adaptive management actions are necessary.

6. Are other projects being proposed immediately upstream or downstream of worksite?

No

7. Please describe the risk of failure associated with this project.

There is always risk associated with stream restoration projects, but with good data collection, careful design and modeling, and implementation that follows the designs and utilizes construction best management practices, potential for failure is low.

For this project, we have worked with licensed engineers, landscape architects and other technical staff employed by reputable companies with extensive experience in river restoration and recreation area treatments. The design effort considered applicable design criteria and conservation measures, and has included extensive technical review and revision. Finally, we will contract for implementation in a manner that assures that the project is constructed by a firm with demonstrated experience in river restoration and

work in and around sensitive environments. Collectively, these steps assure a high factor of safety and minimize potential for failure.

8. Is there any public outreach planned during and/or after implementation? Does the project build community support for salmon recovery efforts?

We will work with USFS to continue and expand outreach that began during the design phase of this project to assure that local residents and forest users are aware of the project and its potential effects and benefits. Outreach will be structured such that it meets USFS standards and needs and informs the public about the type of restoration actions being implemented, emphasizes the need for and benefits of stream restoration, and builds support for salmon recovery efforts.

9. Does the project represent an opportunity for economic benefit? How much benefit does the project create for the dollars invested?

Yes, this project represents an opportunity for economic benefit. The proposal supports project construction. As a result, it will employ design consultants, agency staff, construction contractors and material providers. Kellon and Hesselgrave (2014) have reported that restoration efforts support 19-24 jobs for every $1-million invested (depending on labor intensity), money spent on restoration projects generates substantial additional spending and economic output (roughly double the amount of the original investment), and 80% of funds spent on restoration efforts stay in the county where the project is located (with 90% staying in state). While their study focused on restoration projects in Oregon, economic benefits of restoration are almost certainly similar for Washington state.

Cathy P. Kellon and Taylor Hesselgrave, “Oregon’s Restoration Economy: How investing in natural assets benefits communities and the regional economy”, S.A.P.I.EN.S [Online], 7.2 | 2014, URL: http://journals.openedition.org/sapiens/1599 (link confirmed March 3, 2025)

10. Describe any partnerships, their experience, and types of contributions supporting the project.

Chelan County NRD has extensive experience implementing construction efforts such as the one proposed, and is well situated to complete the proposed implementation effort on-time and on budget and achieve the expected results

We have worked with USFS on several stream restoration projects, and have partnered with them over the course of this project effort. USFS has reviewed and commented on the designs, and the project has been designed accordingly. In addition, we have worked extensively with the Bureau of Reclamation, RCO, and the Tributary Committees. These entities have provided funding throughout the design phase of this project.

Optional Section - Preparation for PRISM (SRFB applications only)

The following questions are identical to the questions RCO requires in the PRISM application for SRFB projects. If desired, sponsors can complete associated questions early and copy responses into PRISM during the "Complete Application" phase due on April x, 2026

Do you want to review and/or pre-populate PRISM questions?	No

Supporting Documents

[Upper Columbia Process Guide 2026]

SRFB Manual 18 (2026)

RCO Application Resources

PROJECT: 26-1642 REST, LOWER CHIWAWA AREA D IMPLEMENTATION

Sponsor: Chelan Co Natural Resource Program: Salmon State Projects Status: Application Submitted

Parties to the Agreement

PRIMARY SPONSOR

Chelan County Natural Resources Department

Address 411 Washington St Ste 201

City Wenatchee **State** WA **Zip** 98801

Org Type County-Open Space/Nat Resources

Vendor # SWV0001231-12

UBI

Date Org created

Org Notes

link to Organization profile

☐ Org data updated

SECONDARY SPONSORS

No records to display

MANAGING AGENCY

Recreation and Conservation Office

LEAD ENTITY

Upper Columbia Salmon Rcy Bd L

QUESTIONS

#1: List project partners and their role and contribution to the project.

US Forest Service, Wenatchee River Ranger District (landowner, design team member, permit support)
US Bureau of Reclamation (funder for Conceptual, Preliminary and Final Designs),

The HCP Tributary Committee and BOR also funded the Lower Chiwawa River Assessment which identified this and 6 other specific project sites in the Lower Chiwawa AU.

External Systems

SPONSOR ASSIGNED INFO

Sponsor-Assigned Project Number

Sponsor-Assigned Regions

LINK AN EXISTING SRP PROJECT

Unlink

26-1642, Lower Chiwawa Area D Implementation, Salmon

Project Contacts

Contact Name Primary Org	Project Role	Work Phone	Work Email
Amee Bahr Rec. and Conserv. Office	Project Manager	(360) 867-8585	Amee.Bahr@rco.wa.gov
Doran Lower Rec. and Conserv. Office	MAgy Fiscal Contact	(360) 902-3007	doran.lower@rco.wa.gov
Scott Bailey Chelan Co Natural Resource	Project Contact	(509) 679-2131	Scott.Bailey@co.chelan.wa.us
Michael Kaputa Chelan Co Natural Resource	Alt Project Contact	(509) 670-6935	mike.kaputa@co.chelan.wa.us
Ariel Edwards Upper Columbia Salmon Rcy Bd L	Lead Entity Contact	(208) 540-2691	ariel.edwards@ucsrb.org
Lorie Wiseman Chelan Co Natural Resource	Billing	(509) 679-1926	Lorie.Wiseman@co.chelan.wa.us
Sofia Bjorklund Chelan Co Natural Resource	Billing	(509) 667-6324	sofia.bjorklund@co.chelan.wa.us

Worksites & Properties

#	Worksite Name
#1	Lower Chiwawa AU, Area D

Restoration	Property Name
✓	Lower Chiwawa AU, Area D

Project Application Report - 26-1642

Worksite Map & Description

Worksite #1: Lower Chiwawa AU, Area D

WORKSITE ADDRESS

Street Address N/A

City, State, Zip

Worksite Details

Worksite #1: Lower Chiwawa AU, Area D

SITE ACCESS DIRECTIONS

From Chiwawa Loop Road turn north onto Chiwawa River Road (towards Fish Lake). Proceed along Chiwawa River Road for approximately 2.75 miles to bridge over Chiwawa River. Cross bridge and proceed for ~175 ft to first turnout on right (south side of road). Park alongside road or at this dispersed camping area.

TARGETED ESU SPECIES

Species by ESU	Egg Present	Juvenile Present	Adult Present	Population Trend
Chinook-Upper Columbia River Spring, Wenatchee River, Endangered	✓	✓	✓	Declining
Steelhead-Upper Columbia River, Wenatchee River, Threatened	✓	✓	✓	Declining

Reference or source used

NOAA Fisheries -UCR Steelhead, Status of the Species Update 2024 and UCR Spring Chinook Status of the Species Update 2024.

TARGETED NON-ESU SPECIES

Species by Non-ESU	Notes
Bull Trout	

Questions

#1: Give street address or road name and mile post for this worksite if available.

No address available. Project is located at milepost 2.75 on Chiwawa River Road (2.75 miles from junction with Chiwawa Loop Road). LAT: 47.8412 N, LONG: -120.6661 W

Project Location

RELATED PROJECTS

Projects in PRISM

PRISM Number	Project Name	Program Name	Current Status	Relationship Type	Notes
22-1499 P	Lower Chiwawa AU, Area D - Prel. Design	Salmon Federal Projects	Closed Completed	Earlier Phase	Completed.
25-1216 P	Lower Chiwawa Area D Final Design	Salmon State Projects	Active	Current Phase	Ongoing effort. Agreement expires September 2027, but scope of work is expected to be completed before that date.

Project Application Report - 26-1642

Related Project Notes

The purpose of the prior and current design phases has been to assess the site and develop designs for restoration treatments in aquatic and terrestrial areas (dispersed camping areas) to improve conditions for listed steelhead, spring Chinook, and bull trout in Reach 4 of the Lower Chiwawa Assessment unit, an area identified as a high priority for habitat improvements to benefit the target species. Environmental compliance tasks including wetland delineation, cultural resources clearance, and permit applications have been/are being completed under these agreements. SRFB Grant Round Scoring for these prior phases were: 22-1499 = 73, Rank 5 (RTT) & Rank 4 (CAC - the CAC did not issue numeric scores during this grant round); and 25-1216 = 71, Rank 6 (RTT) & 76, Rank 3 (CAC).

Questions

#1: Did this project originate from the Shore Friendly program?

No

#2: Project location. Describe the geographic location, water bodies or habitat types, and the location of the project in the watershed, i.e. nearshore, tributary, main-stem, off-channel, etc.

The project occurs within the mainstem channel and on adjacent floodplain and upland habitats along the lower Chiwawa River from the approximately 0.4 miles downstream of the Chiwawa River Road bridge upstream to the Alder Creek confluence, approximately RM 6.6-7.25.

#3: How does this project fit within your regional recovery plan and/or local lead entity's strategy to restore or protect salmonid habitat? Cite section and page number.

This project is located within Reach 4 of the Lower Chiwawa Assessment Unit (LCAU). In Step 1 of its most recent Habitat Prioritization effort, the Upper Columbia Regional Technical Team (UCRTT) classified the LCAU as a Tier 1 Priority Assessment Unit for restoration actions targeting spring Chinook, and a Tier 2 Priority Assessment Unit for steelhead and bull trout. UCRTT has further prioritized Reach 4 within the AU as Priority Rank 2. Information on the UCSRB Prioritization process is available at https://www.ucsrb.org/science-resources/prioritization/. The information is distributed largely in the form of maps and spreadsheets, so we are unable to cite section and page numbers for the information below.

In Step 2 of its prioritization update, UCRTT has identified that Reach 4 supports a number of high (H) and medium (M) priority life stages for spring Chinook (Holding/Maturation [M], Fry Colonization [H], Summer Rearing [H], and Winter Rearing [H]); steelhead (Winter Rearing [H]); and bull trout (Adult Migration [M], Adult Non-Spawning [M], and Subadult Rearing [M]). The proposed project is consistent with a number of actions listed to address life stage limiting factors within Reach 4. These include:

1. Improve cover wood for holding/maturation, fry, summer rearing, and winter rearing life stages (Cover - Wood - Unacceptable),

2. Improve off-channel side channels for fry, summer rearing, and winter rearing life stages (Off-channel Side Channels - Unacceptable),

3. Improve off-channel floodplain for summer rearing and fry life stages (Off-channel Floodplain - Unacceptable), and

4. Improve temperatures for holding/maturation and summer rearing life stages (Temperature - Unacceptable).

Additionally, the Chiwawa River features prominently in the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan (UCSRB 2007). Recovery criteria for bull trout and naturally produced steelhead and Chinook include evidence of spawning within major spawning areas in the Wenatchee Basin, including the Chiwawa River.

Finally, as noted elsewhere in this application, this project was identified during a previous effort that evaluated the entire LCAU (~13.5 river miles), identified potential project sites and developed restoration concepts for each site. Only seven discrete locations were identified where habitat improvement treatments needed to address habitat limiting factors appeared feasible. This site is one of those seven locations.

#4: Is this project part of a larger overall project?

Yes

#4a: How does this project fit into the sequencing of the larger project?

This project is not part of a larger project in that it is addressing a portion of the work needed at a specific site in a phased construction approach. Rather, it was identified through an effort to evaluate the Lower Chiwawa AU, pick out potential restoration sites and develop initial concepts for work at those sites. Partners included CCNRD, BoR, Trib Comm, and USFS, with other interested parties also involved. This is one of only seven (7) discrete project areas identified in the AU during that work, underscoring the fact that opportunities for restoration in the lower basin are very limited.

In addition, this project area is within the USFS Upper Wenatchee Pilot Project (UWPP), a proposal to restore watershed health and resiliency by returning fire to the landscape, improving wildlife habitat, and improving watershed function on about 74,760 acres through cumulative actions. The Area D project is consistent with aquatic restoration treatments identified in UWPP documents.

#5: Is the project on State Owned Aquatic Lands? Please contact the Washington State Department of Natural Resources to make a determination. **Aquatic Districts and Managers**

No

Property Details

Property: Lower Chiwawa AU, Area D (Worksite #1: Lower Chiwawa AU, Area D)

✓ **Restoration**

LANDOWNER

Name	US Forest Service Okanogan-Wenatchee
Address	600 Sherbourne
City	Leavenworth
State	WA Zip 98826
Type	Federal

CONTROL & TENURE

Instrument Type	Landowner Agreement
Timing	Proposed
Term Length	Fixed # of years
# Yrs	10
Expiration Date	
Note	

Project Proposal

Project Description

This project primarily addresses identified habitat limiting factors for high- and medium-priority spring Chinook and steelhead life stages (i.e., holding, summer and winter rearing, and fry colonization) in Reach 4 of the Lower Chiwawa River AU including Floodplain Connectivity, Off-channel Side-channels, Riparian Canopy Cover, Instream Cover (wood), Deep Pools, and Temperature (rearing). The project was identified during an assessment of the entire Lower Chiwawa AU completed in 2022. That effort identified a total of only seven locations where projects designed to address the above habitat limiting factors appeared feasible.

This phase of the project will finalize permitting tasks; execute contracts for project construction, vegetation planting, and construction oversite; complete all tasks needed to implement the restoration project as designed; and complete post-implementation tasks needed to close out the project including preparation of as-built drawings, and reporting in compliance with permits and funding agreements.

The completed project will improve conditions along ~0.6 miles of mainstem channel; create ~0.2 miles of side-channel habitat; enhance a cold water tributary confluence; create an ~0.4 ac inset floodplain; and consolidate/reduce dispersed camping, decommission up to 1,000 lf of unauthorized roads, and reduce potential for future impacts and enhance vegetation within ~11 streamside acres.

Project Questions

Project Application Report - 26-1642

#1: Problem statement. What are the problems your project seeks to address? Include the source and scale of each problem. Describe the site, reach, and watershed conditions. Describe how those conditions impact salmon populations. Include current and historic factors important to understand the problems.

Reach-specific information for portions of the Chiwawa River that include the project area, including descriptions of conditions and recommended actions to improve deficiencies, is provided in the following documents: Upper Wenatchee Pilot Project: Aquatic Habitat Assessment and Restoration Strategy Report (Cramer Fish Sciences [CFS] 2019), and Upper Wenatchee Thermal Refuge Assessment (CCNRD 2020). Additional information on the Upper Wenatchee Pilot Project is available in the Upper Wenatchee Pilot Project Draft Environmental Assessment (USFS 2020). The Upper Columbia Regional Technical Team (UCRTT) identified reach-specific limiting factors and recommended actions to treat these limitations in its updated prioritization strategy (UCRTT 2021). The proposed project area is within Reach 4 of the lower Chiwawa River AU as defined by UCRTT 2021, and within the Clear-Alder reach as defined by CFS 2019.

Within the AU, the stream is generally single-thread, plane bed and entrenched within glacial deposits. It is largely disconnected from its floodplain, stream power is high, channel bed substrate is dominated by large cobbles and small boulders, persistent large wood assemblages are rare, hydraulic diversity is low, and few side-channels or other off-channel features are present. The project reach is consistent with this description. This documented lack of floodplain connectivity and in-stream structure (large wood) are primary problems the project is seeking to address.

Additionally, water temperatures in the lower Chiwawa River can be elevated above acceptable standards during summer months, and climate change is expected to exacerbate this problem (NorWeST Stream Temperature Projections). Pre-spawn mortality for spring Chinook in the upper Wenatchee Basin can be high and, although the causes of this mortality have not been determined, high water temperature is suspected to be a factor (C. Willard, pers. comm.). High water temperatures also have been shown to adversely affect juvenile salmonids by reducing or eliminating feeding, increasing harmful metabolic effects, decreasing growth rates, impairing smoltification and increasing vulnerability to predation and the feeding rates of potential predators (Sauter et. al. 2001). Alder Creek is a cold surface water tributary that enters the river at upstream end of this project reach (and work at it's confluence is included in proposed project treatments). It creates a cold-water plume in the river that is up to 4.7oC cooler than the mainstem river during the hottest part of the year (Roumasset 2020), and water temperatures in this stream are expected to continue to remain below WA state standards as the climate continues to warm (NorWeST 2040 and 2080 Stream Temperature Projections). Alder Creek is an important cold-water resource for adult and juvenile salmonids, but it lacks deep pools and there is limited in-stream structure near its confluence with the Chiwawa River. Habitat deficiencies at and near this confluence is an additional problem the project seeks to address.

Finally, dispersed camping in areas adjoining the river has resulted in a web of social roads and denuded areas that are susceptible to erosion. It has destabilized streambanks, compacted soils, reduced riparian cover and diversity, and given rise to accumulations of garbage and human waste in close proximity to the river. These ongoing recreational impacts and riparian habitat impairments are additional problems this project seeks to address.

A project completed by CCNRD and BoR in 2022 evaluated the Lower Chiwawa AU and identified only seven sites where restoration projects capable of uplifting habitat conditions for target species appeared feasible, so opportunities to improve problems identified for the Lower Chiwawa AU are very limited. This project area is one of those seven sites, so it is a critically important component of the larger effort needed to address identified problems in the Lower Chiwawa AU.

#2: Describe the limiting factors, and/or ecological concerns, and limiting life stages (by fish species) that your project expects to address.

This project will improve conditions for all three listed fish species and other aquatic species in the lower Chiwawa River. However, it primarily addresses the following spring Chinook, steelhead, and bull trout life stage limiting factors identified for Lower Chiwawa Assessment Unit, Reach 4 (UCRTT 2021):

Floodplain Connectivity is rated "Unacceptable" for spring Chinook and steelhead fry colonization, summer rearing and winter rearing life stages; as well as bull trout natal and subadult rearing and adult non-spawning life stages.

Off-channel Side Channel is rated "Unacceptable" for spring Chinook and steelhead spawning and incubation, fry colonization, summer rearing and winter rearing life stages; and bull trout natal and subadult rearing and adult non-spawning life stages.

Cover-Wood is rated "Unacceptable" for spring Chinook and steelhead holding/maturation, fry colonization, summer rearing and winter rearing life stages. It is also rated "Unacceptable" for bull trout holding/maturation, natal and subadult rearing and adult non-spawning life stages.

Temperature is rated "Unacceptable" for the following spring Chinook and steelhead life stages: holding/maturation, spawning/incubation, and summer rearing. It is also rated "Unacceptable" for bull trout holding/maturation, subadult rearing, natal rearing and adult non-spawning life stages.

Cramer Fish Sciences (CFS 2019) also rates Reach 4 as "At Risk" for Riparian Conditions, and UCRTT rates Deep Pools as "At Risk" for spring Chinook, steelhead and bull trout holding/maturation life stage.

#3: **Project Goals.** What are the project goals? The goal of the project should be to solve identified problems by addressing the root causes. Then clearly state the desired future condition. Include which species and life stages will benefit from the outcome, and the time of year the benefits will be realized. **Example Goals and Objectives**

The overall goal of the proposed project is to implement restoration treatments at the Lower Chiwawa Area D project site as designed during during previous SRFB-funded phases. The project addresses Limiting Factors identified for Reach 4 of the Lower Chiwawa River AU including cover-wood, floodplain connectivity/off-channel side channels, water temperature, deep pools, and riparian habitat.

The designs identify actions intended to improve habitat characteristics important for a variety of spring Chinook, steelhead and bull trout life stages including summer & winter rearing, fry colonization, holding/maturation, subadult rearing, natal rearing, & adult non-spawning life stages. Benefits from the proposed actions should be realized quickly, persist for decades, and will be year-round in nature.

Project Goals include:

Goal 1: Add structure (large wood and/or boulders) within the mainstem channel.

Goal 2: Create/Improve off-channel floodplain/side channel habitats.

Goal 3: Increase pool quantity and Improve pool quality throughout the project reach.

Goal 4: Treat upland and floodplain impacts associated with dispersed camping, decommission social roads, limit and consolidate camp sites for future use, and enhance riparian and upland vegetation in areas adjacent to the treatment reach.

#4: **Project Objectives.** What are the project objectives? Objectives support and refine biological goals, breaking them down into smaller steps. Objectives are specific, quantifiable actions the project will complete to achieve the stated goal. Each objective should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). **Example Goals and Objectives**

Objectives of the proposed project are:

Within 24 months of funding

1. Execute all contracts needed to implement the project and provide engineering oversite.

2. Construct a restoration project per construction-ready design documents that will:

(a) add large wood structures and other habitat features along ~0.6 miles of mainstem channel (and at the mouth of a cold water tributary) that will increase wood loading to greater than 70 pieces of wood per mile, improve cover, increase pool quantity and quality, redirect flows and increase inundation of the river left floodplain, and improve habitat quality and access at the tributary confluence.

(b) add up to 0.2 miles of side-channel habitat to increase side channel area in project reach to greater than 5% of total channel area.

(c) decommission up to 1,000 lf of forest roads, consolidate camp sites/control access, and plant native trees, shrubs, grasses and forbs to improve conditions within ~11 streamside acres.

3.Complete post-implementation tasks including as-built drawings, reporting required by funders and permitting agencies, and close out of all contracts and agreements.

#5: **Scope of work and deliverables.** Provide a detailed description of each project task/element. With each task/element, identify who will be responsible for each, what the deliverables will be, and the schedule for completion.

The scope of work includes the following tasks (schedule assumes a summer 2027 implementation window):

1. Contract Execution (December 2026–May 2027):
Bid documents for construction and vegetation planting will be prepared and released during the ongoing Final Design phase. Also, under the Final Design phase pre-bid meetings will be held and questions about the project from interested contractors will be answered. Under this proposed implementation phase, we will select construction and planting contractors and complete all tasks needed to fully execute contracts with these contractors. CCNRD and Consultants lead, stakeholders involved. Products: Fully-executed contracts for construction and vegetation planting.

2. Project Implementation (May 2027–November 2027):
Once contracts are executed project implementation tasks will begin. For the purposes of this scheduling question, implementation includes all tasks needed to prepare for project construction and complete all construction tasks needed to implement the project as designed. Required submittals (e.g., Erosion and Sediment Control Plan, Temporary Water Management Plan, etc.) will be prepared, reviewed and accepted; construction materials will be procured; equipment and materials will be mobilized to the project site; project elements will be constructed; equipment will be de-mobilized from the site, and post-construction vegetation planting will be completed. CCNRD, Consultants and Contractors lead, stakeholders involved. Products: a completed restoration project.

3. Post-construction Tasks (November 2027-May 2028)
This item includes all tasks needed to close out the project following construction. This includes, but is not necessarily limited to, as-built reporting, contract close outs, preparation and submittal of required permit and funder reports, etc.. CCNRD lead, consultants involved. Products: as-built reporting, close out reporting, completed contracts.

4. Management and Meetings (Ongoing during life of project):
Project sponsor will manage grant agreements, contracts, permits, etc. and work with landowners, permit agencies and other stakeholders as needed before, during and after project construction. CCNRD lead, consultant & stakeholders involved. Deliverables: grant compliance materials including progress reporting, invoice processing/billing, and final reports.

#6: **Assumptions and Constraints.** What are the assumptions and physical constraints that could impact whether you achieve your objectives? Assumptions and constrains are external conditions that are not under the direct control of the project, but directly impact the outcome of the project. These may include ecological and geomorphic factors, land use constraints, public acceptance of the project, delays, or other factors. How will you address these issues if they arise?

The project area includes a bridge over the river, a small community of cabins on leased USFS land on river-right, and a designated USFS campground on river-left just downstream of the project area. It is assumed that these features will remain in place long after the project is implemented, and we designed the project with the understanding that the project must not adversely affect these physical features or increase risks to occupants/users. As a result, the constraints that these features impose and potential project-related effects on hydraulics, hydrology, topography, etc. have been carefully considered during project design phases.

In addition, CCNRD commissioned a study that looked at water-based recreation in the Lower Chiwawa AU, assessed the stream with an eye towards recreational hazards and boater safety, and provided recommendations to minimize risks to recreational users associated with in-stream restoration treatments. While designs were already underway before this study was initiated, our design team has reviewed this study and incorporated its recommendations and findings.

Because we have accounted for these physical constraints throughout the design phase for this project, the potential for these constraints to adversely affect project implementation or for the project to adversely affect these resources during or after construction is low.

#7: **Previous Lessons Learned.** How have lessons learned from completed projects or monitoring studies informed this project?

This project is informed by a thermal refuge assessment (Roumasset 2020), and a project that identified potential restoration sites in the LCAU and developed concepts to restore/enhance those sites (InterFluve 2023). Other studies of the basin (e.g., Cramer Fish Sciences, 2019) and information and products included in UCSRB's biological strategy and prioritization also have informed project selection and design.

The 2023 InterFluve study identified this project site, developed and analyzed restoration alternatives and prepared an initial design concept. Project designs were refined during subsequent iterative design phases, which included additional data collection and analysis along with internal and external review and comment.

Also, CCNRD commissioned a study that looked at water-based recreation in the Lower Chiwawa AU, assessed the stream relative to recreational hazards and boater safety, and provided recommendations to minimize risks to recreational users associated with in-stream restoration treatments (Elliott Consulting, 2026). The design effort for Area D was initiated before this study began, but the Area D design team has reviewed the final recreation safety assessment and is incorporating information and recommendations from the report in project designs.

Finally, Chelan County NRD has completed many projects to enhance in-stream conditions throughout our service area, and we have drawn on this experience in designing this project and preparing for implementation.

#8: **Project Alternatives.** Describe the alternatives considered and why the preferred was chosen.

Alternatives were evaluated as part of the LCAU assessment (InterFluve 2023). Three alternatives were developed/analyzed for Area D. Each included similar in-stream large wood treatments and upland treatments in all three dispersed camping areas. They differed mainly in the extent of new channel excavation - one included no side-channels; another a single side channel; and the third a side-channel and an alcove and groundwater collection gallery. The preferred alternative was an amalgamation - it incorporated large wood treatments from one alternative, a single side channel, and treatments in all dispersed camping areas.

The Conceptual Design phase included identification and evaluation of different upland treatment options in the dispersed camping areas. Per USFS feedback, all proposed recreation area treatments are being advanced to final.

Preferred alternative in-stream treatments were refined during the design process. Different ELJ configurations were explored to better avoid impacts to river-right cabins and align with other USFS requirements. Per USFS feedback and public safety/constructability concerns, some structures originally proposed for the lower project reach (~RM 6.0-6.4) were eliminated during early design phases, leaving few treatments in the lower reach. This area is not contiguous with the upstream area, so work here would require a contractor to remobilize from the upstream work area(or have two separate work crews). Based on this, we determined that it would no longer be cost-effective to include the few remaining lower treatments in conjunction with work in the upper reach (~RM 6.6-7.25). As a result, treatments below ~RM 6.6 were not advanced to the final design iteration, which focuses all treatment efforts in the upper reach.

Final designs achieve desired aquatic habitat improvements, improve riparian conditions (and facilitate USFS management of dispersed camping in these areas), avoid impacts to adjacent facilities and are cost-effective.

#9: How were stakeholders consulted in the development of this project? Identify the stakeholders, their concerns or feedback, and how those concerns were addressed.

A variety of parties including staff from CCNRD, USFS, BoR, WDFW, members of the Tributary Committee, and technical consultants participated in the earlier effort to identify projects in the LCAU (InterFluve 2023), . We also consulted with many private landowners.

Subsequent to that earlier effort, this project has been refined based on feedback provided by USFS staff and others. For example, project scope was originally limited to in-stream work, but USFS feedback resulted in an expanded scope which included treatments in three areas outside of the channel impacted by dispersed camping.

The number of ELJs in the lower project reach (~RM6.0-6.4) was reduced based largely on USFS feedback during design reviews. This treatment area is not contiguous with the upstream area: work here would require a contractor to remobilize equipment and materials from the upstream work area. At the end of the Preliminary Design Phase we concluded that treatments in the lower area had been reduced to the point where it would not be cost-effective to implement these actions in conjunction with work in the upper reach. As a result, the current proposal is limited to treatments between ~RM 6.6-7.25. These include 9 ELJs (with excavated pools), an ~1,000 lf side-channel (with habitat wood), an ~0.5-acre inset floodplain area (with plantings and large wood), dispersed camping area/riparian treatments on ~11 acres adjacent to the channel, seeding/mulching, and tree/shrub planting.

#10: **Climate Change.** Does your project address or accommodate the anticipated effects of climate change?
Yes

#10a: How will your project be climate resilient given future conditions?

Resilient rivers have space to move and are connected to adjacent floodplains, underlying sediments, and up- and downstream reaches. They are also diverse – physical diversity equals habitat diversity, which supports biological diversity.

This project is designing actions to enhance physical diversity and connectivity in a stream reach that has been simplified and laterally disconnected. It also will treat disturbed riparian habitats and limit potential for future disturbances. Anticipated actions are long-lived and expected to facilitate subsequent natural changes in aquatic and terrestrial environments, promoting continued physical diversity and connectivity. Stream temperature projections indicate that, even as stream temps throughout the NW continue to rise, flows in the project area are expected to remain favorable for salmonids through 2080.

Based on the above, this project is expected to contribute to a more resilient landscape that ameliorates the effects of climate change.

#10b: How will your project increase habitat and species adaptability?

This project is intended to enhance habitat quality over the long term along ~0.6 miles of mainstem river and adjacent riparian habitats in proximity to a known cold water tributary. In addition to the immediate direct benefits of better floodplain connectivity, ELJ/pool construction, and riparian habitat enhancement, the project is expected to facilitate subsequent natural processes in aquatic and terrestrial environments and promote continued physical diversity and connectivity. This is expected to contribute to a more resilient landscape and improve survival and productivity for salmonids using the Chiwawa River, which should, in turn, facilitate species resiliency and adaptability.

#11: **Project Team Experience.** Describe the project management team's experience managing this type of project. Describe other projects where they have successfully used a similar approach.

CCNRD has considerable experience designing and implementing stream restoration projects and has managed numerous similar projects. It regularly completes projects with similar design elements and construction requirements, and has utilized funding from SRFB and other funders to realize these projects.

Scott Bailey and Hannah Pygott will manage the implementation effort for CCNRD. Mr. Bailey has nearly 40 years of professional experience, has implemented many stream/wetland restoration projects, and is managing similar efforts on the Chiwawa River and other nearby streams. Ms. Pygott has over 10 years of restoration construction management experience and manages numerous, similar CCNRD construction efforts annually.

#12: **Veteran Involvement.** Will veterans (including the veterans conservation corps) be involved in the project? If yes, please describe.

No

Restoration Supplemental

#1: What level of design (per Appendix D) have you completed? Please attach.
Preliminary

#1a: What level of design will be produced prior to construction?
Final

#2: Will (or did) a licensed professional engineer design the project?
Yes

#3: Does the project include measures to stabilize an eroding stream bank?
No

#4: Is the primary activity of the project invasive species removal?
No

#5: Is the primary activity of the project riparian planting?
No

#6: Describe the steps you will take to minimize the introduction of invasive species during construction and restoration. Consider how you will use un-infested materials and clean equipment entering and leaving the project area.

Project will follow conservation measures and BMPs described in ARBO II to minimize the chance of weed species introduction: equipment and vehicles will be cleaned and weed free before entering the site; materials (gravel, rocks, etc.) shall be free of invasive plant seed; and designs minimize soil disturbance and limit damage to native vegetation to the extent possible.

Post-construction, all disturbed areas will be seeded/mulched with a native seed mix and planted with native shrubs/trees in order to establish a native-dominated plant community and control the establishment/spread of weeds. All plant materials will be native to the Wenatchee Watershed and, per HPA requirements, plantings will be monitored and maintained for at least 3 years post-construction to enhance survival.

Eastern book trout may be present in the project area. We will not return any brook trout encountered during stream dewatering and fish salvage activities to the stream.

#7: Describe the long-term stewardship and maintenance obligations for the project.

CCNRD will work with USFS to monitor and maintain the project site for 3-5 years post construction. We will monitor survival of planted shrubs and trees annually to assure that survival requirements established under the HPA are met (expected to be 80% survival after 3 years). We will complete annual maintenance of plantings (e.g., weed/competition control, supplemental watering, etc.) to facilitate survival.

We will monitor ELJs and side-channel structure/morphology with repeat photography and other methods to determine how these features change over time and whether they continue to function as planned. We will work with USFS and potential funders should monitoring indicate that adaptive management actions are needed.

Restoration Metrics

Project Application Report - 26-1642

Worksite: Lower Chiwawa AU, Area D (#1)

Miles of Stream and/or Shoreline Treated or Protected (C.0.b)	0.58
Project Identified In a Plan or Watershed Assessment (C.0.c)	Upper Columbia Regional Technical Team. 2021. Habitat Action Prioritization Within the Upper Columbia River Basin. Upper Columbia Salmon Recovery Board. https://www.ucsrb.org/mdocs-posts/habitat-action-prioritization-strategy-v-3/ Raumasset, A. (Chelan Co. Natural Resource Dept.). 2020. Upper Wenatchee Thermal Refuge Assessment. Unpublished report to RCO. InterFluve. 2023. Lower Chiwawa River Assessment: Conceptual Design Report. Unpublished report to US BoR and Chelan County.
Priority in Recovery Plan	The Upper Columbia Regional Technical Team (UCRTT) and Upper Columbia Salmon Recovery Board (UCSRB) have identified the Lower Chiwawa River Assessment Unit as a Tier 1 Priority HUC12 watershed for restoration efforts that benefit spring Chinook, and as Tier 2 for steelhead and bull trout. Reach 4 has a Reach Rank of 2.
Type Of Monitoring (C.0.d.1)	Implementation Monitoring
Monitoring Location (C.0.d.2)	Onsite

INSTREAM HABITAT PROJECT

Total Miles Of Instream Habitat Treated (C.4.b)	0.58
Channel reconfiguration and connectivity (C.4.c.1)	
Total cost for Channel reconfiguration and connectivity	$122,283
Type of change to channel configuration and connectivity (C.4.c.2)	Creation of Instream Pools Creation/Connection to Off-Channel Habitat
Miles of Stream Treated for channel reconfiguration and connectivity (C.4.c.3)	0.58
Miles of Off-Channel Stream Created or Connected (C.4.c.4)	0.19
Acres Of Channel/Off-Channel Connected Or Added (C.4.c.5)	1.2
Instream Pools Created/Added (C.4.c.6)	9
Channel structure placement (C.4.d.1)	
Total cost for Channel structure placement	$220,562
Material Used For Channel Structure (C.4.d.2)	Logs Fastened Together (Logjam) Rocks/Boulders (Unanchored)
Miles of Stream Treated for channel structure placement (C.4.d.3)	0.58
Acres Of Streambed Treated for channel structure placement (C.4.d.4)	3.1
Pools Created through channel structure placement (C.4.d.5)	9

UPLAND HABITAT AND SEDIMENT PROJECT

Acres of Upland Habitat Area Treated (C.6.b.1)	10.7
Miles of Road Treated (C.6.b.2)	0.18
Trail or campground improvement (C.6.k.1)	
Number of acres improved for sediment control by Trail or Campground improvements (C.6.k.2)	10.7
Total cost for trail or campground improvement	$110,055

ARCHITECTURAL & ENGINEERING

Architectural & Engineering (A&E)

Total cost for Architectural & Engineering (A&E)	$35,750

AGENCY INDIRECT COSTS

Agency Indirect

Total cost for Agency Indirect	$10,463

Project Application Report - 26-1642

Overall Project Metrics

COMPLETION DATE

Projected date of completion	04/15/2028 **Note:** includes time for post-construction reporting, contracts close out, etc.

Restoration Cost Estimates

Worksite #1: Lower Chiwawa AU, Area D

Category	Work Type	Estimated Cost	Note
Agency Indirect Costs	Agency Indirect	$10,463	
Instream Habitat Project	Channel reconfiguration and connectivity (C.4.c.1)	$122,283	
	Channel structure placement (C.4.d.1)	$220,562	
Upland Habitat And Sediment Project	Trail or campground improvement (C.6.k.1)	$110,055	
	Subtotal:	$463,363	
Admin, Architecture, and Engineering		$35,750	
	Total Estimate For Worksite:	$499,113	

Summary

Total Estimated Costs Without AA&E:	$463,363
Total Estimated AA&E:	$35,750
Total Estimated Restoration Costs:	$499,113

Cost Summary

	Estimated Cost	Project %	Admin/AA&E %
Restoration Costs			
Restoration	$463,363		
Admin, Architecture, and Engineering	$35,750		7.89 %
SUBTOTAL	$499,113	100.00 %	
Total Cost Estimate	$499,113	100.00 %	

Funding Request and Match

FUNDING PROGRAM

Salmon State Projects	$499,113	100.000000

SPONSOR MATCH

Questions

#1: Explain how you determined the cost estimates

> Sponsor costs were estimated by estimating the total amount of time needed to administer and manage the project and to participate in project activities including stakeholder coordination, construction oversight, permit and funding coordination and project administration. Estimates for contracted services are based on estimated costs provided by technical service providers and previous project costs.

Other Funding

OTHER FUNDING DETAILS

Other Funds: Monetary Funding	Local Grant	
Amount		$560,312
Funding Organization		Habitat Conservation Plan Tributary Committee
Grant Program		General Salmon Habitat Program
Other Funds: Monetary Funding	Local Grant	
Amount		$823,158
Funding Organization		Priest Rapids Habitat Sub-committee
Grant Program		PRCC Habitat Fund
	Other Funding Detail Total:	$1,383,470

Cultural Resources

Cultural Resource Areas

Worksite #1: Lower Chiwawa AU, Area D

Area: Area D Cultural A.P.E

#1: Provide a description of the project actions at this worksite (acquisition, development and/or restoration activities that will occur as a part of this project)

A.P.E. encompasses all restoration treatments as well as access routes and staging areas

#2: Describe all ground disturbing activities (length, width and depth of disturbance and equipment utilized) that will take place in the Area of Potential Effect (APE). Include the location of any construction staging or access roads associated with your project that will involve ground disturbance.

Ground disturbing activities associated with the proposed project include vegetation clearing, channel excavation, wood and rock structure placement, and vegetation planting. Material and equipment staging also will occur within the project area. Project designs that identify work and staging areas and the types of actions that will occur in specific locations are provided as an attachment to this proposal.

The project includes approximately 1,000 lf of side channel excavation. Channel excavation typically will range from 4-7 ft below existing grade, and excavated widths are generally less than 40 ft. Shallow (2-3 ft deep) excavations lateral to the side channel will be needed for placement of habitat wood. Excavation will also be needed for engineered log jam placement. These structures are primarily located within and along the margins of the mainstem channel. Excavated depths for this work generally generally will not exceed 6 ft below ground surface. Tree and shrub planting will be completed primarily with hand tools. Planting with this method will generally excavate holes less than 2ft deep.

#3: Describe any planned ground disturbing pre-construction/restoration work. This includes geo-technical investigation, fencing, demolition, decommissioning roads, etc.

None

#4: Describe the existing project area conditions. The description should include existing conditions, current and historic land uses and previous excavation/fill (if depths and extent is known, please describe).

Project area is on US Forest Service lands and the area has been extensively used for dispersed camping and stream access. The area is forested, but there are gaps in the canopy associated with this recreational use. The forest floor is largely denuded and lacking understory vegetation throughout the project area (also associated with recreational uses).

#5: Will a federal permit be required to complete the scope of work on the project areas located within this worksite?

Yes

#5a: List the agency that will be issuing the permit and the date you anticipate applying for and receiving the permit. Will the federal permit cover ALL proposed ground disturbing activities included in the project?

This project is being permitted in cooperation with the US Forest Service, Wenatchee River Ranger District and the intent is to utilize available general permits and programmatic agreements for federal and some state permitting. Permits and approvals from USFS and WA Dept of Fish & Wildlife. Work below the OHWM will be permitted using Regional General Permit 8, which is a programmatic permit issued to USFS by the Army Corps of Engineers (with water quality certification from WA Dept of Ecology). An HPA from WDFW also will be needed. We anticipate all applicable permit applications will be submitted by September, 2026, and to be in place by February 2027.

#6: Are you utilizing Federal Funding to complete the scope of work? This includes funds that are being shown as match or not.

Unknown

#7: Do you have knowledge of any previous cultural resource review within the project boundaries during the past 10 years?

Yes

#7a: Summarize the previous cultural resource review; including lead agency and date of review, reference name and numbers, etc. If RCO, include the prior phase grant number. NOTE: Do not provide any site-specific information considered confidential. Attach previous surveys or other reference documents.

We have worked with USFS Cultural Resources Staff to comply with applicable cultural resources regulations. USFS staff is leading this process and has consulted with the Confederated Tribes and Bands of the Yakama Nation and the Confederated Tribes of the Colville Reservation. As part of this process we contracted with ASM Affiliates to complete a cultural resources survey and prepare a report. Survey and reporting were completed under PRISM # 22-1499, and the USFS Heritage Review Form was submitted to RCO under PRISM # 25-1216.

USFS determination = No Adverse Effect: The Forest finds that there are historic properties, but the undertaking will have no adverse effect on them as defined by 36 CFR 800.16(i). SHPO Concurrence was provided 04/26/2024.

#8: Is the worksite located within an existing park, wildlife refuge, natural area preserve, or other recreation or habitat site?

No

#9: Are there any structures over 45 years of age within this worksite? This includes structures such as buildings, tidegates, dikes, residential structures, bridges, rail grades, park infrastructure, etc.

No

Project Permits

Permits and Reviews	Issuing Organization	Applied Date	Received Date	Expiration Date	Permit #
Dredge/Fill Permit [Section 10/404 or 404]	Army Corps of Eng.			11/13/2028	NWS-2004-189
		Note: Project permitted under NWS-2004-189 (RGP-8, U.S. Forest Service Aquatic Restoration Program Within the State of Washington). WQC is attached to RGP8, USFS must comply with conditions specified in the WQC as a special condition of RGP8.			
Hydraulics Project Approval [HPA]	Dept of Fish & Wildlife				
		Note: HPA Application (APP ID 0045257) has been initiated online, but is not yet complete			
NEPA	Federal Agencies				Upper Wenatchee Pilot
		Note: Project is being implemented under USFS, Upper Wenatchee Pilot Project NEPA Pathway.			
Water Quality Certification [Section 401]	County/Dept of Ecy.			11/13/2028	NWS-2004-189
		Note: Regional General Permit 8 [RGP-8], USFS Aquatic Restoration Program Within the State of WA authorizes 11 restoration activities in waters of U.S. that maintain, enhance, and restore watershed functions that affect aquatic species.			

Permit Questions

#1: Are you planning to use the **Limit 8** streamlined Environmental Species Act consultation pathway?

No

Attachments

Required Attachments	7 out of 7 done
Applicant Resolution/Authorizations	✓
CCA Tribal Notification	✓
Cost Estimate	✓
Landowner Acknowledgement	✓
Map: Restoration Worksite	✓
Photo	✓
RCO Fiscal Data Collection Sheet	✓

PHOTOS (JPG, GIF)

Photos (JPG, GIF)


707332 Primary


707328 Secondary


707329


707330


707331

PROJECT DOCUMENTS AND PHOTOS

Project Documents and Photos

File Type	Attach Date	Attachment Type	Title	Person	File Name, Number Associations	Shared
	05/06/2026	Applicant Resolution/Authorizations	Applicant resolution_authorization SRFB 2026.pdf	ScottB	Applicant resolution_authorization SRFB 2026.pdf, 714156	✓
	04/17/2026	Project Application Report	Project Application Report, 26-1642R (sub 04/17/26 13:54:24)	ScottB	Project Application Report - 26-1642 (submitted 04-17-2026_13-54-24).pdf, 708031	✓
	04/17/2026	Application Document	Jotform_Reach-04-Lower-Chiwawa-Area-D-Implementation.pdf	ScottB	Jotform_Reach-04-Lower-Chiwawa-Area-D-Implementation.pdf, 708030	✓
	04/17/2026	Cost Estimate	CCNRD_Area D_CostEstimate_SRFB2026.xlsx	ScottB	CCNRD_Area D_CostEstimate_SRFB2026.xlsx, 708001	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixF_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707993	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixE_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707992	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixD_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707991	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixC_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707990	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixB_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707989	✓
	04/17/2026	Design document	ChiwawaAreaD_60pctDesign_AppendixA_	ScottB	ChiwawaAreaD_60pctDesign_Append… 707987	✓
	04/17/2026	Preliminary design report	ChiwawaAreaD_60pctBoDR_20250829.pd	ScottB	ChiwawaAreaD_60pctBoDR_2025082… 707986	✓
	04/15/2026	CCA Tribal Notification	2026_CCA-TribalNotice_PRISM Placeholder.docx	ScottB	2026_CCA-TribalNotice_PRISM Placeholder.docx, 707387	✓
	04/15/2026	RCO Fiscal Data Collection Sheet	CCNRD_FiscalDataCollectionSheet_2026.	ScottB	CCNRD_FiscalDataCollectionSheet_2… 707348	
	04/15/2026	Photo	IMG_5688_1.jpg	ScottB	IMG_5688_1.jpg, 707332	✓
	04/15/2026	Photo	IMG_2218.jpeg	ScottB	IMG_2218.jpeg, 707331	✓
	04/15/2026	Photo	IMG_2215.jpeg	ScottB	IMG_2215.jpeg, 707330	✓
	04/15/2026	Photo	IMG_5691.jpg	ScottB	IMG_5691.jpg, 707329	✓
	04/15/2026	Photo	IMG_2217.jpeg	ScottB	IMG_2217.jpeg, 707328	✓
	04/15/2026	Map: Restoration Worksite	SRFB Project Location Map_Area D.pdf	ScottB	SRFB Project Location Map_Area D.pdf, 707327	✓
	04/14/2026	Landowner Acknowledgement	LandownerAcknowledgement_USFS.pdf	ScottB	LandownerAcknowledgement_USFS.p… 707020	

Application Status

Application Due Date: 06/22/2026

Status Name	Status Date	Submitted By	Submission Notes
Application Submitted	04/17/2026	Scott Bailey	
Preapplication	03/26/2026		

I certify that, to the best of my knowledge, all information in this application is true and complete, and if artificial intelligence (AI) was used to prepare this application, I accept full responsibility for ensuring its accuracy and compliance. I understand incomplete applications will be rejected by RCO and that I may be asked to submit additional documentation before evaluation or approval of this project. I understand that if a grant is awarded to my project, I will be bound by all representations and commitments in this application, which RCO may enforce to the fullest extent permitted by law. (Scott Bailey, 04/17/2026)

Date of last change: 05/27/2026

RESTORATION

				OVERALL PROJECT	GRANT REQUEST	MATCH & OTHER FUNDING			
				Budget must account for all costs to complete the project	*Enter only the amount of the grant request*	*The Grant Request, Match, and Other Funding should equal the total project cost and Budget Check cell should be 0. Sponsors must account for all sources and types of funding needed to complete the project.*			
				Amount	Grant Amount	Match in PRISM	Other Funding not reported as match in PRISM	Source (Grant, Cash, Materials, Labor, Volunteers, etc)	Funding Type (federal, state, local)
Construction									
Category (choose one)	**Task Description**	**Qty**	**Rate**						
Mobilization	*Mobilization*	1.00	$ 108,000.00	$ 108,000	$ 100,000	$ -	$ 8,000	Trib Comm	Local
Construction	*Erosion, Pollution & Sediment Control*	1.00	$ 60,000.00	$ 60,000		$ -	$ 60,000	Trib Comm	Local
Construction	*Clearing & Grubbing*	3.00	$ 6,000.00	$ 18,000	$ -	$ -	$ 18,000	Trib Comm	Local
Construction	*Temporary Access & Staging*	1.00	$ 48,000.00	$ 48,000	$ 44,000	$ -	$ 4,000	Trib Comm	Local
Construction	*Diversion & Dewatering*	1.00	$ 138,000.00	$ 138,000	$ -	$ -	$ 138,000	Trib Comm	Local
Construction	*Side-channel Grading*	4,280.00	$ 24.00	$ 102,720	$ -	$ -	$ 102,720	Trib Comm	Local
Construction	*Riparian Bank Grading*	1,730.00	$ 24.00	$ 41,520	$ -	$ -	$ 41,520	Trib Comm	Local
Construction	*Apex LWS*	1.00	$ 103,200.00	$ 103,200	$ 103,200	$ -	$ -		
Construction	*Apex LWS - narrow*	1.00	$ 94,800.00	$ 94,800	$ -	$ -	$ 94,800	Trib Comm	Local
Construction	*Bank-buried LWS*	6.00	$ 52,800.00	$ 316,800	$ -	$ -	$ 316,800	PRCC	Local
Construction	*Side-channel confluence LWS*	1.00	$ 64,800.00	$ 64,800	$ -	$ -	$ 64,800	PRCC	Local
Construction	*Side-channel habitat wood (imported)*	77.00	$ 1,680.00	$ 129,360	$ -		$ 129,360	PRCC	Local
Construction	*Side-channel habitat wood (salvaged)*	23.00	$ 1,020.00	$ 23,460	$ -	$ -	$ 23,460	Trib Comm	Local
Construction	*Riparian live plants (installed)*	0.15	$ 31,200.00	$ 4,680	$ -	$ -	$ 4,680	Trib Comm	Local
Construction	*Transitional/Upland zone (installed)*	0.20	$ 44,280.00	$ 8,856	$ -	$ -	$ 8,856	Trib Comm	Local
Construction	*Seed/mulch (excludes rec. area treatments)*	1.40	$ 3,000.00	$ 4,200	$ -	$ -	$ 4,200	Trib Comm	Local
Construction	*Rec Area D2 Treatments*	1,874.00	$ 4.50	$ 8,433	$ -	$ -	$ 8,433	PRCC	Local
Construction	*Rec Area D3 Treatments*	1,120.00	$ 4.50	$ 5,040	$ -	$ -	$ 5,040	PRCC	Local
Materials	*Tie Down Cable*	1,100.00	$ 4.00	$ 4,400		$ -	$ 4,400	PRCC	Local
Materials	*Boulders, 1-2 man*	32.00	$ 295.00	$ 9,440	$ -	$ -	$ 9,440	PRCC	Local
Materials	*Boulders, 3-4 man*	34.00	$ 395.00	$ 13,430	$ -	$ -	$ 13,430	PRCC	Local
Construction	*Willow Fascines*	70.00	$ 20.00	$ 1,400	$ -	$ -	$ 1,400	PRCC	Local
Materials	*Conifer logs (rec area treatments)*	50.00	$ 1,680.00	$ 84,000	$ -	$ -	$ 84,000	PRCC	Local
Construction	*Hydroseed mix 1*	3.70	$ 6,050.00	$ 22,385	$ -	$ -	$ 22,385	PRCC	Local
Construction	*Hydroseed mix 2*	3.40	$ 6,050.00	$ 20,570	$ -	$ -	$ 20,570	PRCC	Local
Materials	*Native shrubs/trees*	2,500.00	$ 18.00	$ 45,000	$ -	$ -	$ 45,000	PRCC	Local
Construction	*Berm Grading (rec. area)*	6,450.00	$ 14.00	$ 90,300	$ -	$ -	$ 90,300	PRCC	Local
Construction	*Channel Grading (rec. area)*	450.00	$ 14.00	$ 6,300	$ -	$ -	$ 6,300	PRCC	Local
Materials	*Mulch*	100.00	$ 75.00	$ 7,500	$ -	$ -	$ 7,500	Trib Comm	Local
Construction	*Tree/Shrub Planting*	2,500.00	$ 14.00	$ 35,000	$ -	$ -	$ 35,000	Trib Comm	Local
Other (consultant-IFI)	*Construction support*	1.00	$ 107,000.00	$ 107,000.00	$ 107,000	$ -	$ -		
Other (consultant-IFI)	*As-built documentation*	1.00	$ 29,000.00	$ 29,000.00	$ 20,000	$ -	$ 9,000	Trib Comm	Local
Other (consultant-SCJ)	*Construction support*	1.00	$ 12,000.00	$ 12,000.00	$ 12,000	$ -	$ -		
Other (consultant-SCJ)	*As-built documentation*	1.00	$ 1,000.00	$ 1,000.00	$ 1,000	$ -	$ -		
Other (CCNRD)	*Construction Oversite*	1.00	$ 56,500.00	$ 56,500.00	$ 56,500	$ -	$ -		
Other (CCNRD)	*Travel - motorpool*	1,200.00	$ 1.48	$ 1,776.00	$ 1,200		$ 576	Trib Comm	Local
Other (CCNRD)	*Travel - CCNRD Truck*	2.00	$ 1,000.00	$ 2,000.00	$ 2,000	$ -	$ -		
Other (CCNRD)	*Travel - Rental Truck*	2.00	$ 2,500.00	$ 5,000.00	$ 5,000				
Other (CCNRD)	*Supplies*	1.00	$ 1,000.00	$ 1,000.00	$ 1,000	$ -	$ -		
			$ -	$ -	$ -	$ -	$ -		
			$ -	$ -	$ -	$ -	$ -		
			$ -	$ -	$ -	$ -	$ -		
			STotal	**$ 1,834,870**	**$ 452,900**	**$ -**	**$ 1,381,970**		

Administrative, Architechtural & Engineering				Amount	Grant amount	Match in PRISM	Funding not reported in PRISM	Match Source	Match Type (federal, state, local)
Category	**Task Description**	**Qty**	**Rate**						
Administrative (consultant)	*Project mngt/coordination*	1.00	$ 6,000.00	$ 6,000.00	$ 6,000	$ -	$ -		
Other (consultant)	*Pre-construction services*	1.00	$ 15,000.00	$ 15,000.00	$ 15,000	$ -	$ -		
Administrative (consultant)	*Project mngt/coordination*	1.00	$ 1,500.00	$ 1,500.00		$ -	$ 1,500	PRCC	**Local**
Other (consultant)	*Pre-construction services*	1.00	$ 1,500.00	$ 1,500.00	$ 1,500	$ -	$ -		
Administrative (CCNRD)	*Project mngt/coordination*	1.00	$ 13,250.00	$ 13,250.00	$ 13,250	$ -	$ -		
			STotal	**$ 37,250**	**$ 35,750**	**$ -**	**$ 1,500**		

Indirect Costs				Amount	Grant amount	Match in PRISM	Funding not reported in PRISM	Match Source	Match Type (federal, state, local)
	Description	**Approved Rate**	**Total Project Base**						
	Indirect	15.000%	$ 69,750.00	$ 10,463	$ 10,463	$ -	$ -		
	Indirect	0.000%	$ -	$ -	$ -	$ -	$ -		
			STotal	**$ 10,463**	**$ 10,463**	**$ -**	**$ -**		

AA&E Budget Check	
A&E maximum allowed in PRISM $	*135,870.00*
A&E validation	100,120

Totals	**$ 1,882,583**	**$ 499,113**	**$ -**	**$ 1,383,470**
		PRISM Project Total	$ 499,113	

RCO Percentage **100.000000%** **Match Percentage** **0.000000%**

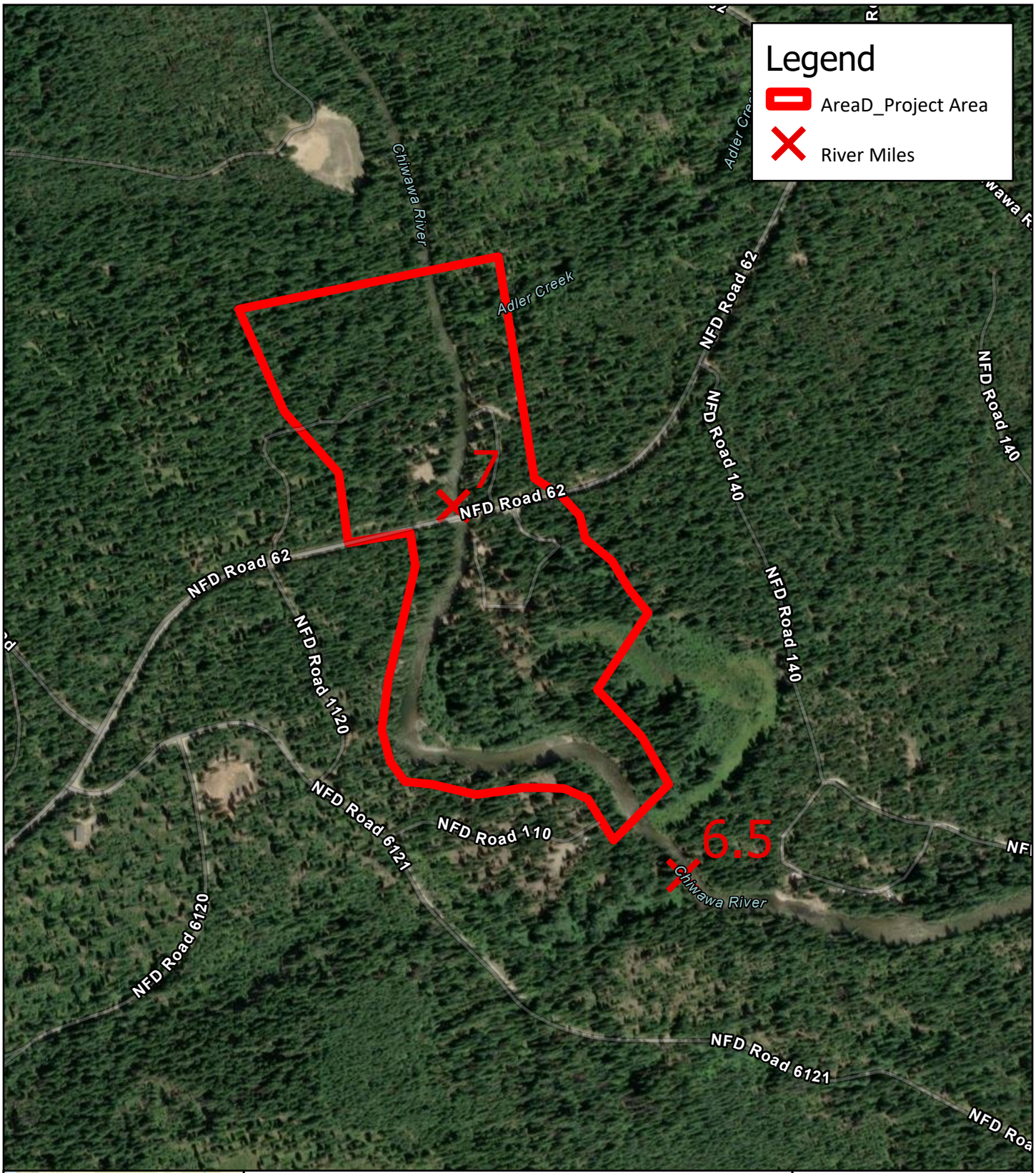
Trib Comm
PRCC

CUMULATIVE TOTALS

This sheet contains automatic calculations

Project Name	Lower Chiwawa Area D
SRFB #	enter
Sponsor	Chelan County Natural Resource Department

	OVERALL PROJECT Cost	GRANT REQUEST Amount	PRISM MATCH Amount	OTHER FUNDING NOT REPORTED AS MATCH IN PRISM Amount	*Budget Check*
Sheet #1 Acquisition					
Property Costs	$ -	$ -	$ -	$ -	0
Incidental Costs	$ -	$ -	$ -	$ -	0
Administrative Costs	$ -	$ -	$ -	$ -	0
Indirect Costs	$ -	$ -	$ -	$ -	
STotal	$ -	$ -	$ -	$ -	0
Sheet #2 Design					
Design Costs	$ -	$ -	$ -	$ -	
Indirect Costs	$ -	$ -	$ -	$ -	
STotal	$ -	$ -	$ -	$ -	0
Sheet #3 Restoration					
Construction Costs	$ 1,834,870	$ 452,900	$ -	$ 1,381,970	0
AA&E	$ 37,250	$ 35,750	$ -	$ 1,500	0
Indirect Costs	$ 10,463	$ 10,463	$ -	$ -	
STotal	$ 1,882,583	$ 499,113	$ -	$ 1,383,470	(1)
Totals	$ 1,882,583	$ 499,113	$ -	$ 1,383,470	(1)



Lower Chiwawa AU - Area D

Instream Complexity and Floodplain Reconnection Project

Project Location Map

Prepared by: Scott J. Bailey
Chelan Co. Natural Resource Dept.

4/15/2026

Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet

COUNTY OF CHELAN

N

0 337.5 675 Feet

0 120 240 Meters

Lower Chiwawa River Area D Habitat Enhancement Project

60% Design Level — Basis of Design Report

SUBMITTED TO

Bureau of Reclamation and Chelan County Natural Resource Department

August 2025

Lower Chiwawa River Area D Habitat Enhancement Project

60% Design Level — Basis of Design Report

SUBMITTED TO

U.S. Department of the Interior
Bureau of Reclamation
301 Yakima Street, Room 319
Wenatchee, WA 98801

Chelan County Natural Resource Department
411 Washington Street, Suite 201
Wenatchee WA, 98801

PREPARED BY

Inter-Fluve
501 Portway Ave., Suite 101
Hood River, OR 97031

August 2025

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1. Introduction

This report describes the development of the 60% designs for the Lower Chiwawa Area D Habitat Enhancement Project and the rationale for key decisions made during the design process. The project reach is located on U.S. Forest Service land along the Chiwawa River between River Mile (RM) 6.0 and 7.0, near the town of Plain, WA (Figure 1). In this document "Area D" or "the project" refer to this reach of the Chiwawa River and the habitat enhancement actions proposed there.

The Columbia Pacific Northwest Region of the Bureau of Reclamation (Reclamation) has partnered with several local, state, and regional entities to develop habitat enhancement projects for ESA-listed salmon and trout species in the Wenatchee River subbasin, which includes the Chiwawa River. The Lower Chiwawa Area D Habitat Enhancement Project is an example of these efforts – a product of the partnership between Reclamation and the Chelan County Natural Resources Department (CCNRD). Prior project development steps, and a broader planning effort by Reclamation to identify habitat enhancement opportunities in the Chiwawa River basin included defining habitat enhancement goals and objectives (USBR 2021), a project identification assessment (Inter-Fluve 2022) and conceptual design efforts (Inter-Fluve 2023) throughout the Lower Chiwawa River Assessment Unit (LCAU)[1] performed in collaboration with the CCNRD. The overall purpose of this effort is to enhance habitat for ESA listed steelhead, bull trout, and spring Chinook in the lower Chiwawa River; an area identified as a high priority for habitat improvements to benefit the targeted species by a regional prioritization framework (UCRTT 2020). The LCAU is now designated as a high priority area for habitat improvement actions.

The actions proposed for the Area D project have been developed to the 60% design level to address previously identified Chiwawa River habitat limiting factors. This report summarizes the planning and design steps that preceded the 60% designs, project goals and objectives, design criteria, background information and analyses used during design development. Appendices to this report include a wetland delineation report (Appendix A), a large wood risk assessment memorandum (Appendix B), hydraulic modeling results (Appendix C), the engineer's opinion of probable construction cost (Appendix D), and the Area D 60% design drawings (Appendix E). The results of a recreation site management study performed by others is included as Appendix F, and the terrestrial recreation management treatments proposed as part of this effort are summarized in this report and are incorporated into the design drawings described herein.

[1] The Lower Chiwawa Assessment Unit refers to the Chiwawa River from RM 0–13.1, yet the referenced assessment and conceptual design documents do not cover RM 0–1.

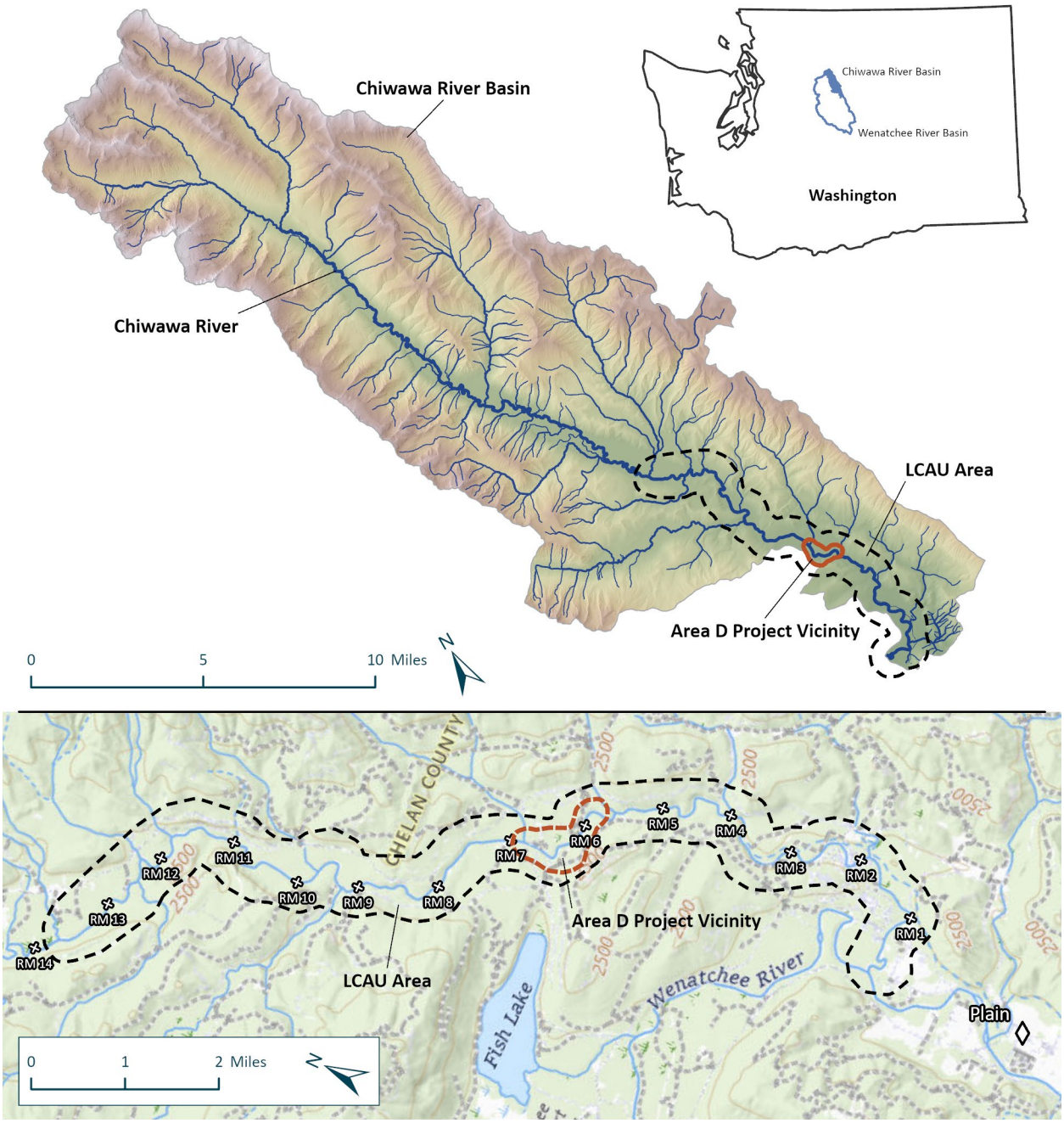

Figure 1. Project location map. The upper pane shows the project in the context of the entire Chiwawa River watershed. The lower pane shows the location of the project within the LCAU (dashed black line).

1.1 PROJECT BACKGROUND, DEVELOPMENT & CONSTRAINTS

Habitat enhancement efforts for the Area D project area focus on improving Chiwawa River channel aquatic habitat conditions, increasing side-channel habitat, enhancing channel-floodplain connectivity via installing large wood structures in the mainstem channel, excavating a side channel through a section of river-left floodplain, and improving aquatic habitat conditions at tributary confluences. Proposed habitat enhancement treatments primarily target two vicinities in Area D, described from upstream to downstream in the project area: in the mainstem channel at and downstream of the confluence of Alder Creek; and, in the mainstem channel and on the adjacent semi-regularly inundated floodplain on river left in the center of the project area. Treatment vicinities were selected based on locations where aquatic habitat uplift potential was the greatest, and the specific styles and locations of treatments have been developed to achieve project goals while accommodating project constraints and minimizing risks to persons and/or built features present within the project area. Site features which shaped the project design approach include, but are not limited to, the Chiwawa River Road bridge which crosses the river in the upstream portion of the project area, the presence of private cabins located on leased USFS land on the south side of the river in the central portion of the project area, and extensive dispersed camping sites on both sides of the river throughout the project area. Input from project stakeholders related to anthropogenic project constraints has been incorporated into the designs presented in this report. Project designs will continue to evolve at subsequent design phases based on stakeholder and project team input. A Chelan County-led recreational use assessment and planning effort focusing on trail, dispersed camping, and other uses in the Area D vicinity has occurred in parallel with the designs for aquatic habitat treatments described in this report. Proposed terrestrial recreation management treatments resulting from this effort have been incorporated into the project plans and reporting at the current design phase. Additionally, a wetland delineation was performed for the site to inform the design, and the results of this delineation are included in Appendix A. Further information about previous stages of design and planning steps for the project can be found in the Alternatives Analysis (Inter-Fluve 2022), Concept Development (Inter-Fluve 2023), and Preliminary Design reports (Inter-Fluve, 2025).

1.2 PROJECT GOALS & OBJECTIVES

Aquatic habitat enhancement goals for the Area D project area were defined by the project team in the Lower Chiwawa Assessment Unit Project Development: Project Goals and Objectives Memo (USBR 2021). This memo describes how project goals were developed for each segment of the LCAU, provides a logical pathway to link the UCRTT habitat assessment and restoration prioritization to project goals, and includes a set of objectives and linked actions by which the objectives will be accomplished. Table 1 illustrates the primary goal, objectives, and linked actions for Area D.

Table 1: Goals, objectives, and linked actions for the project.

Goal: Improve off-channel floodplain / side channel habitat for 1) summer rearing, 2) winter rearing, and 3) fry life stages	
Objective 1: Install a minimum of four engineered log jams along ~0.15 miles of channel to redirect flows and increase inundation of river left floodplain surface. Objective 2: Create up to 0.25 miles of side channel habitat on river left floodplain surface to increase side channel area in project reach to greater than 5% of total channel area.	Linked Actions: Add roughness; Place material; Maintain Flow; Maintain Defined Channel; Create stickiness; Add scour agent; Excavate material; Add obstacle

In addition to the specific goal of improving off-channel floodplain and side channel habitat, design development for the project area aimed to address LCAU-wide habitat goals of increasing channel complexity and improving large wood-related processes in the lower Chiwawa River. Specific design treatments proposed for Area D and the uplift associated with each treatment are described in subsequent sections.

1.3 KEY SPECIES & HABITAT LIMITING FACTORS

Spring Chinook, summer Chinook, steelhead, sockeye, and coho were relatively abundant in Upper Columbia River tributary streams such as the Chiwawa River before extensive fishing, logging, mining, dams and diversions, and agriculture activities combined to reduce habitat area, quality, and alter the physical conditions necessary to create and maintain healthy aquatic habitats. The commencement of large-scale commercial fishing in the Columbia Basin in the late 19th century further depleted the Mid- and Upper Columbia River spring and summer Chinook runs, and eventually steelhead, sockeye, and coho (Mullan et al. 1992).

Currently, the Chiwawa River supports populations of Endangered Species Act (ESA) listed Upper Columbia spring Chinook salmon (*Oncorhynchus tshawytscha*), Upper Columbia steelhead (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*). The lower Chiwawa River has been identified as a major spawning area for spring Chinook and steelhead (UCRTT 2021). Additionally, much of the bull trout spawning in the greater Wenatchee watershed also occurs in the upper Chiwawa River. Consequently, the primary focal species for restoration efforts in the lower Chiwawa River, and for this project, includes spring Chinook salmon, steelhead trout, and bull trout. A diagram that provides the life stage and usage timing for these species is provided in Figure 2.

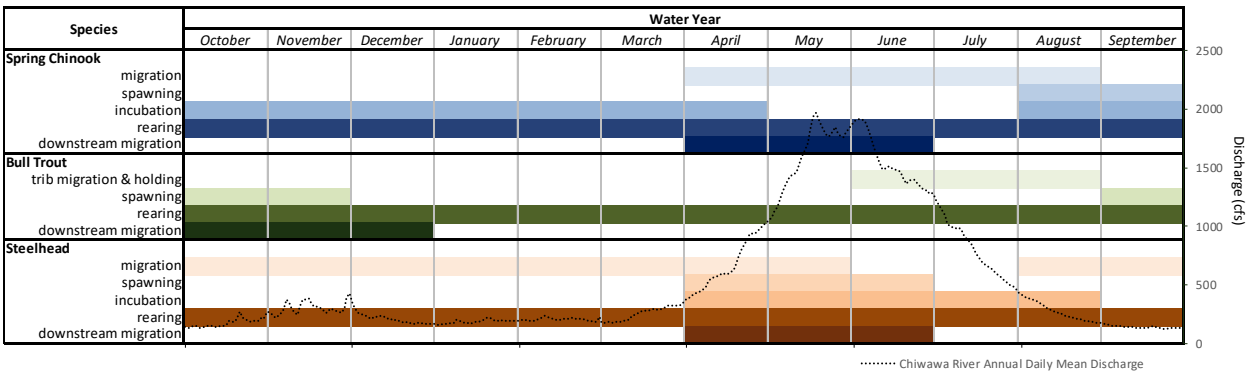

Figure 2: Life history timing of ESA-listed spring Chinook salmon, steelhead, and bull trout overlaid on the Chiwawa River annual hydrograph.

Limiting factors affecting salmonid habitat conditions for the lower Chiwawa River, including in the vicinity of the project area, are identified by the Upper Columbia Regional Technical Team (2020; 2021) and are categorized by severity of the impairment to habitat conditions. Limiting salmonid habitat factors identified in the vicinity of the project area include the following:

- Loss of large wood cover;
- Loss of floodplain connectivity;
- Low baseflow discharge;
- High summertime water temperatures;
- Decreased quantity and quality of pools; and,
- Reduced riparian canopy cover.

Habitat limiting factors have informed decisions throughout the project development and design process. Linkages between limiting factors, restoration goals and objectives, and design development are described briefly in this document. These linkages between habitat limiting factors and design criteria and decisions are described in greater detail in documents issued for previous phases of the project development process (USBR 2021; Inter-Fluve 2022, 2023).

2. Site Characterization & Analysis

The following subsections provide summaries of existing watershed, reach, and project area conditions to provide the biophysical context required to interpret the 60% design. The topics discussed within each section are based on the existing literature, recent field observations, and analyses performed to support project development. A more comprehensive review of these topics is included in the Lower Chiwawa River Assessment: Alternative Analysis Report (Inter-Fluve 2022). Additionally, key points described under each topic are based upon a large body of previously completed work, and these reports should be referred to for additional information.

2.1 GEOLOGY

The lower Chiwawa River Valley is located in the northern portion of the Chiwaukum Graben (Enkelmann et al. 2015) which extends from the Leavenworth Fault to the Entiat Fault (to the west and east of the Chiwawa Valley, respectively) (Figure 3). The Chiwawa Valley is underlain by Tertiary sedimentary rocks (Chumstick Formation) which have been folded into an anticline-syncline pair in the vicinity of the project site (Cheney and Hayman 2009). The Chumstick Formation is primarily composed of medium- to coarse-grained sandstone, with shale and conglomerate interbeds and subunits present throughout the formation (Tabor et al. 1987). Outcrops of the Chumstick Formation are commonly exposed on the valley sides and are intermittently exposed in and along the Chiwawa River channel, affecting channel gradient and lateral confinement in several locations. The Chumstick Formation is relatively erodible compared to other lithologies found in the upper Wenatchee Basin (Gresens et al. 1981) and has been a source of sediment to the river.

Late Pleistocene glaciation had a profound effect on the lower Chiwawa Valley, eroding the underlying bedrock and depositing thick layers of glacial till and outwash. Six episodes of glaciation have been documented via till deposits in the upper Wenatchee Basin, deposited circa 13 k.a., 17 k.a., 70 k.a., 93 k.a., 105,000 k.a., and at least 165,00 k.a. (Porter and Swanson 2008). Most till deposits found along the lower Chiwawa River are believed to be associated with the most recent glaciation, though some patches of older glacial deposits may be preserved on the valley sides (Tabor et al. 1987). Thick layers of outwash gravels interbedded with fine-grained lacustrine sediments were deposited in the Chiwawa and neighboring valleys, frequently on top of till or other glacial sediments (Tabor et al. 1987). Deposition of tephra and other volcanic material sourced from Cascade Range eruptions is another key post-glacial source of sediment in the Chiwawa Valley (Porter 1978). Glacier Peak, which is located only a few miles from the Chiwawa Basin, has erupted multiple times following the last major glaciation of the Chiwawa Valley and has potentially contributed 0.5–2 meters of airfall in the Chiwawa Valley for at least three post-glacial eruptions (Porter 1978; Beget 1983). In response to changing sediment and flow conditions in the Holocene, the Chiwawa River has incised into these late Pleistocene glacial sediments abandoning the post-glacial valley surface. Lateral channel migration concurrent with and/or after this period of post-glacial fluvial incision and reduced sediment supply has produced terraces and areas of floodplain inset within the higher glacial outwash terraces.

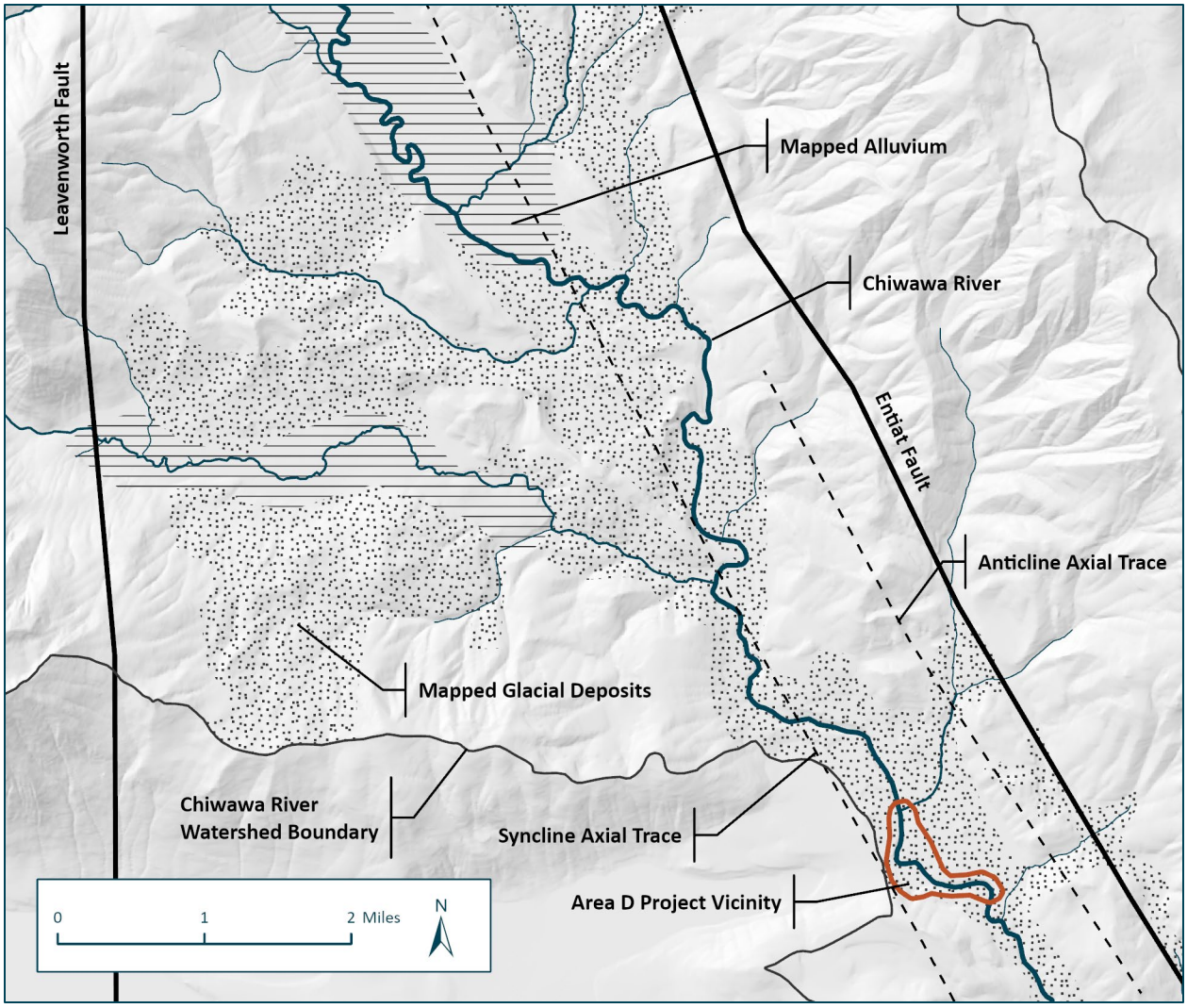

Figure 3: Generalized geologic map of the lower Chiwawa River Valley. Areas within the Chiwawa watershed boundary that aren't indicated as glacial or alluvial deposits are mapped as Chumstick Formation by Tabor et al. (Adapted from Tabor et al. 1987).

2.2 HYDROLOGY

The Chiwawa River is a major tributary to the Wenatchee River, joining the Wenatchee about 5 miles downstream of Lake Wenatchee near the town of Plain, WA. At the confluence with the Wenatchee River the Chiwawa River drains 188 miles^2 - approximately 14% of the Wenatchee Basin (1,328 mi^2). The Chiwawa River drains the North Cascades east of Glacier Peak, and its watershed ranges in elevation from 9,040 feet to 1,840 feet, with an average basin slope of roughly 195 feet/mile. This assessment focusses on the hydrology of the lower Chiwawa River Basin (LCRB), which contains the project area, and comprises the lower 73 mi^2 of the Chiwawa River watershed from Chikamin Creek to the confluence with the Wenatchee River (Figure 4).

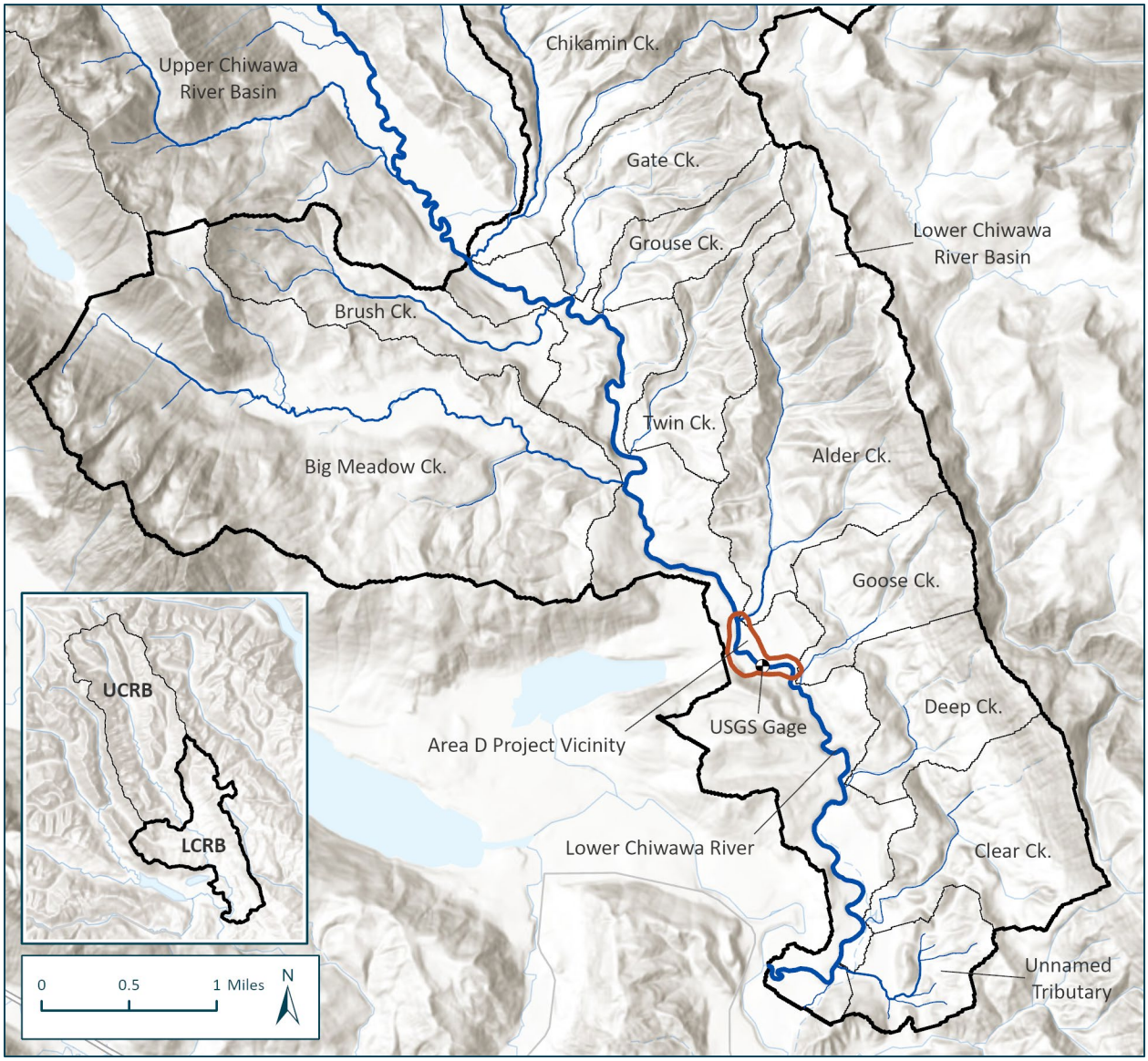

Figure 4: Location of watersheds comprising the lower Chiwawa River Basin and how they relate to the project area. An inset locator map shows the extent of the Chiwawa River watershed divided into the upper (UCRB) and lower (LCRB) sub-basins.

Mean annual precipitation in the Chiwawa River Basin is spatially variable, ranging from 26–107 inches, and 63 inches when averaged across the basin (PRISM 2022); increases in precipitation are positively correlated with elevation in the Chiwawa Basin. Most of the annual precipitation in the Chiwawa Basin falls from October through March, much as snow, especially at higher elevations[2]. Streamflow in the Chiwawa River varies seasonally, with snowmelt-driven high flows commonly peaking in May and June, and the lowest flows typically occurring in September and October (Figure 5). Occasional late-fall high flows occur from late-October through December, including the

[2] Accessed from Western Regional Climate Center at https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa1426

two floods of record (Nov. 1991 and Nov. 1996), and typically result from rain-on-snow events and/or extreme rainfall.

A hydrologic analysis was conducted to estimate peak flows and sub-annual flows in the lower Chiwawa Basin, including in the vicinity of the project area. There is a USGS stream gage (USGS #12456500) situated within the project area, near RM 6, with approximately 47 years of peak flow data. Peak flow statistics for the mainstem Chiwawa River were estimated by conducting a Bulletin 17-C EMA Flood Frequency Analysis (FFA) on the gage data using HEC-SSP software (USACE 2017). The resultant peak flows for the Chiwawa River were subsequently scaled to the upstream and downstream ends of the lower Chiwawa Basin using published guidance for estimating discharge at ungagged sites in Washington (Mastin et. al 2016). The peak flow contributions from each major tributary were then determined by distributing the difference in flow between tributaries using a simple ratio of drainage areas. There are likely additional flow contributions between the major tributaries from inputs such as hillslope runoff and additional small tributaries. However, these contributions were assumed to be small relative to the major tributary inputs and are therefore included in the estimates for each tributary. The resultant peak flow statistics are summarized in Table 2.

Table 2: Summary of peak flow estimates for the lower Chiwawa River basin.

Tributary	Drainage Area (mi^2)	Peak Flow Estimates-Drainage Area Scaled (cfs)					
		2-year	5-year	10-year	25-year	50-year	100-year
Unnamed Trib (Below Gage)	1.7	41	55	63	73	80	87
Clear Ck (Below Gage)	4.0	95	127	146	169	186	201
Deep Ck (Below Gage)	2.8	66	87	101	117	128	139
Goose Ck (Below Gage)	2.6	61	81	93	108	118	128
Alder Ck	7.5	138	185	214	249	273	297
Big Meadow Ck	15.8	291	389	449	522	574	624
Twin Ck	2.2	40	54	62	73	80	87
Grouse Ck	1.7	31	41	48	55	61	66
Gate Ck	3.0	55	73	85	98	108	117
Brush Ck	3.2	59	80	92	107	117	128
Chikamin Ck	18.7	344	460	531	617	679	738
Chiwawa R (USGS Gage Location)	**172.1**	**3,206**	**4,362**	**5,103**	**6,014**	**6,677**	**7,328**
Chiwawa R (RM 15)	114.8	2,248	3,079	3,622	4,293	4,786	5,271
Chiwawa R (At Confluence w/ Wenatchee)	188.3	3,468	4,711	5,505	6,481	7,189	7,883

Sub-annual flow statistics were determined using similar methods to distribute flow between each of the major tributaries. Monthly average flows were obtained from the gage data (Figure 5) and scaled using drainage area ratios. The resultant monthly flow estimates are summarized in Table 3. Select flow rates were used in the hydraulic modeling described in Section 3, and the utility of these data may evolve as the project progresses.

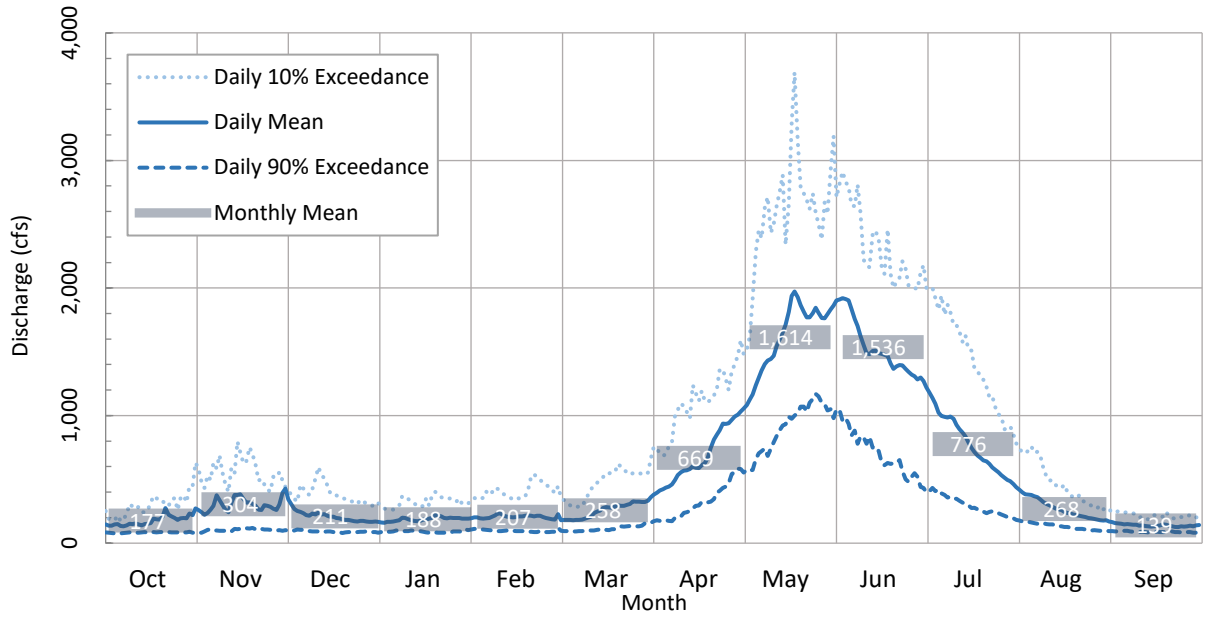

Figure 5: Annual Hydrology Statistics for USGS Gage 12456500 Chiwawa River Near Plain, WA | Water Years 1991 to 2022

Table 3: Summary of monthly average flow estimates for the assessment reach.

Tributary	Drainage Area (mi^2)	Mean Daily Flow Estimates-Drainage Area Scaled (cfs)											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Unnamed Trib (Below Gage)	1.7	3	4	3	3	3	4	10	24	23	11	4	2
Clear Ck (Below Gage)	4.0	6	10	7	6	7	9	23	55	52	26	9	5
Deep Ck (Below Gage)	2.8	4	7	5	4	5	6	16	38	36	18	6	3
Goose Ck (Below Gage)	2.6	4	7	5	4	4	6	15	35	33	17	6	3
Alder Ck	7.5	9	15	10	9	10	12	32	78	74	37	13	7
Big Meadow Ck	15.8	18	31	21	19	21	26	68	163	155	78	27	14
Twin Ck	2.2	2	4	3	3	3	4	9	23	22	11	4	2
Grouse Ck	1.7	2	3	2	2	2	3	7	17	16	8	3	1
Gate Ck	3.0	3	6	4	4	4	5	13	31	29	15	5	3
Brush Ck	3.2	4	6	4	4	4	5	14	33	32	16	6	3
Chikamin Ck	18.7	21	36	25	22	25	31	80	193	183	93	32	17
Chiwawa R (USGS Gage Location)	**172.1**	**177**	**304**	**211**	**188**	**207**	**258**	**669**	**1,614**	**1,536**	**776**	**268**	**139**
Chiwawa R (RM 15)	114.8	118	203	141	125	138	172	446	1,077	1,025	518	179	93
Chiwawa R (At Confluence w/ Wenatchee)	188.3	194	333	231	206	226	282	732	1,765	1,680	849	293	152

2.3 WATERSHED AND AQUATIC HABITAT CONDITIONS

Instream aquatic habitat conditions in the lower Chiwawa River have been impacted by historical and ongoing land uses. Historical impacts to Chiwawa River habitat include logging and housing development along the lower river. Log drives systematically removed obstructions from the channel that could trap wood (e.g., boulders and large woody debris), and disassembled jams to recover the timber contained within, thus reducing channel complexity, dynamism, and sediment sorting and storage associated with these in-channel structural features. The reduction of large wood present in the channel, and the removal of structure on which new jams could form has resulted in a homogeneous, plane-bed condition for large segments of the river, with limited areas of spawning

gravel sized material present in the channel, and lack of regular connection to many historical floodplain surfaces which would provide high-flow velocity refugia. Figure 6 shows the location of Spring Chinook (UCSRB 2022a) and Steelhead redds (UCSRB 2022b) in the lower Chiwawa River, and the distribution of these data suggests that between approximately RM 5 and RM 11 the location of spawning sized material is limited to discrete zones where smaller sized material is preserved on the bed. Timber harvest in the riparian zones has altered stand composition present along the channel which has reduced the potential for natural recruitment of trees large enough to be self-stable in the channel, and therefore much of the recruited woody material is not retained in the channel in the vicinity of the project area. Some conversion of floodplain habitat to residential or agricultural land has occurred, reducing the already limited availability of floodplain and off-channel habitat areas for salmonids. In some areas, dispersed recreation appears to have impacted riparian function and potentially other floodplain functions. Most of the watershed is in public ownership (Figure 6) and upper portions of the watershed are protected as a Wilderness Area or under the Northwest Forest Plan, though legacy effects from logging or road building may still be present.

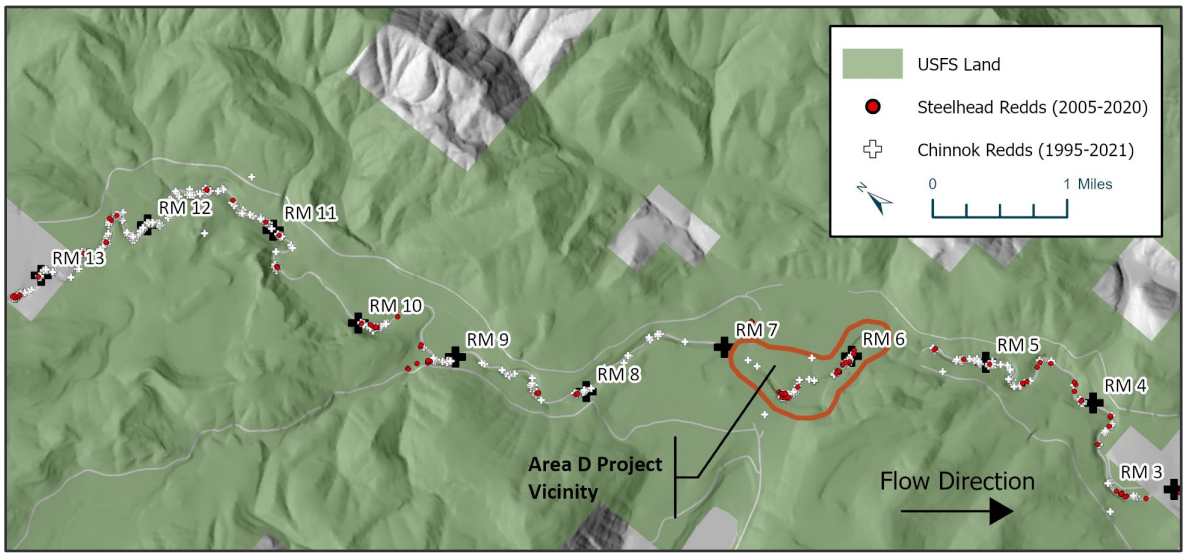

Figure 6: Map of the lower Chiwawa River from RM 3–13 showing mapped Chinook (UCSRB, 2022a) and Steelhead redds (UCSRB, 2022b) and land ownership in the vicinity of the project area. UCSRB redd data for the Area D project area document 36 Steelhead redds and 183 Chinook redds for the period of record of these data. Based on UCSRB redd data, average annual redd counts for the project area likely range between 3-6 and 7-20 for Steelhead and Chinook, respectively.

Habitat quality for both adult and juvenile life stages in the lower Chiwawa River is generally low, lacking cover from large wood, pool quantity/quality, appropriate water temperature conditions. Additionally, and of particular importance to primary life stages of interest for the Area D project, off-channel/side-channels and off-channel/floodplain habitat are lacking for much of the lower Chiwawa, and these types of habitats are infrequently connected to the channel where they do exist (UCRTT 2020; 2021). As a result, enhancement goals throughout the lower Chiwawa focus on improving off-channel/floodplain habitat types for fry and juvenile life stages in addition to mainstem habitat enhancement actions in suitable locations. Based on field observations and

desktop analyses, Area D offers opportunities for side channel creation and enhanced channel-floodplain connectivity, and these opportunities for uplift are key to the project design. Mainstem large wood structures are proposed in conjunction with side channel grading to increase channel roughness in the vicinity of available floodplain surfaces, thereby increasing the frequency of inundation of these surfaces. Additionally, wood placements are included at key locations to provide cover and complexity in the channel.

2.4 GEOMORPHOLOGY

The morphology of the lower Chiwawa River valley is shaped by the glacial history of the valley and subsequent reworking of glacial sediments and landforms by the Chiwawa River. Glacial landforms and sediments are pervasive throughout the Area D project site, and these glacial signatures affect modern day sediment dynamics and landscape evolution in the project area. Hence, the site's glacial history substantially modulates the processes responsible for aquatic habitat formation, and thus the distribution of aquatic habitats. This section provides a general overview of key geomorphic topics which pertain to the formation of aquatic habitats and the effectiveness of habitat enhancement designs at the Area D project site.

2.4.1 Post-Glacial Landscape Evolution

The last major glaciation in the valley deposited substantial glacial sediments in a terminal moraine which filled the valley with coarse sediment from approximately RM 13–14. This berm-like feature has trapped large volumes of alluvium and glacial outwash sediments upstream of it, and has persisted to the present day, forming the largest inflection point in the longitudinal profile of the lower Chiwawa River (Figure 7). Downstream of the moraine, glacial outwash sediments filled much of the valley, and these sediments have been incised through to form high terraces which bound the modern valley bottom on both sides. The combination of the terminal moraine controlling grade upstream of the lower Chiwawa Valley and the outwash terraces buffering the valley from adjoining hillslopes has limited sediment delivery to, and sediment storage within, the lower Chiwawa River. As a result, sediment delivered to the lower Chiwawa channel is primarily sourced from a few small tributaries, and to a lesser extent, erosion of banks or terraces by the mainstem channel.

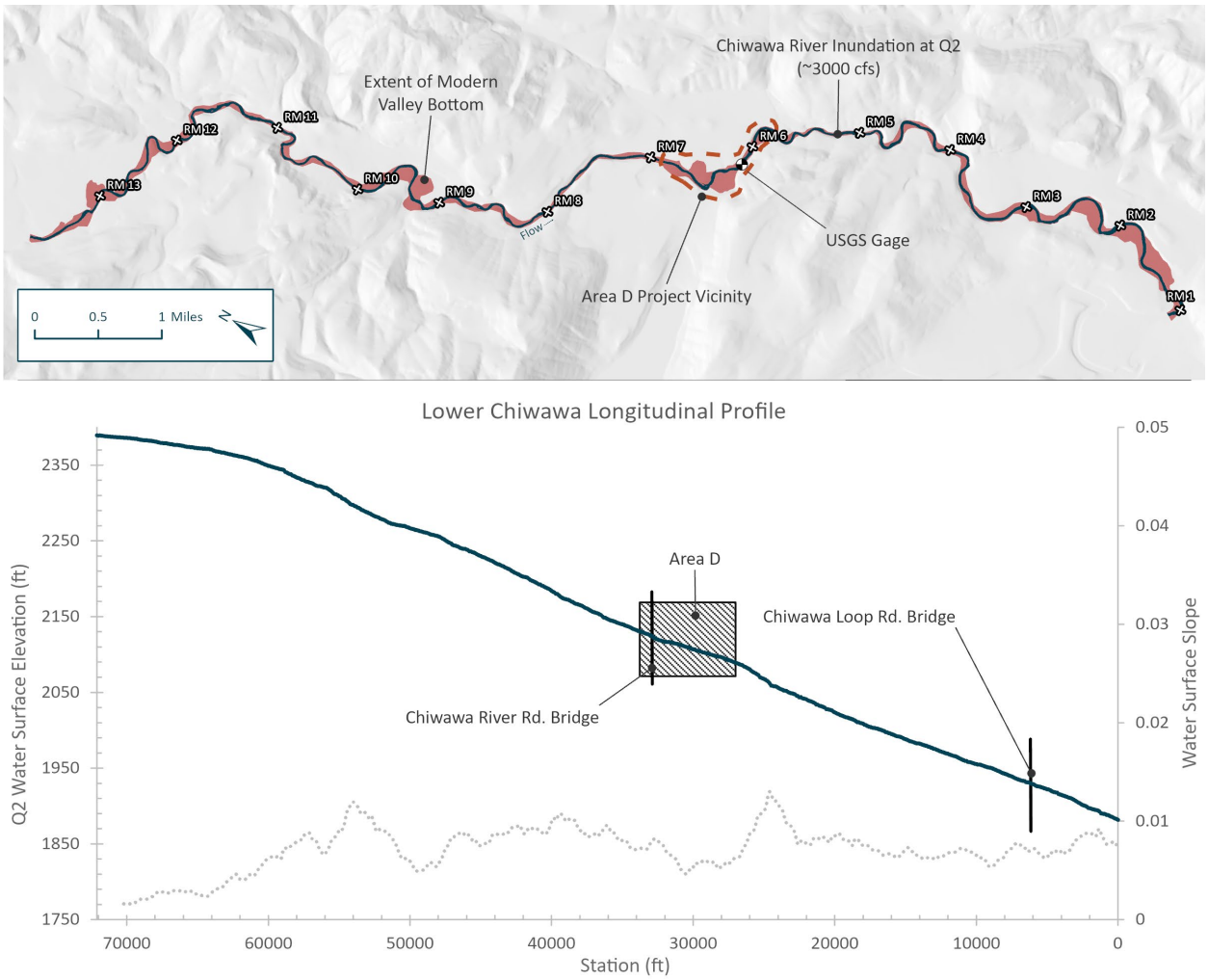

Figure 7: Map of valley confinement in the lower Chiwawa River Valley (top). The channel extent (blue) at the two-year return period peak flow (~3000 cfs) occupies very little of the historical valley bottom (red). Longitudinal profile of the lower Chiwawa River calculated from the modeled two-year return period peak flow water surface elevations (bottom). A substantial steepening in valley gradient associated with a glacial moraine is located at Station ~65,000ft. The average slope is ~0.007.

2.4.2 Channel and Valley Morphology

The morphology of the lower Chiwawa River is largely uniform from its confluence with Chikamin Creek (RM 13.5) to the large alluvial fan located at the Chiwawa's confluence with the Wenatchee River (RM 0–1). The lower Chiwawa River flows through a wide (115 feet on average), single thread channel, confined between glacial outwash terraces and bedrock hillslopes (Figure 7). The average active valley width is approximately 400 feet, and the confinement ratio (ratio of valley bottom width to channel width) is approximately 3.5, indicating a confined condition. The channel is relatively straight with a sinuosity of 1.29.

2.4.3 Channel Bed and in-Channel Storage

The lower Chiwawa River channel bed is primarily composed of cobble–boulder sized sediments derived from glaciofluvial processes occurring during deglaciation and post glacial outwash incision. In places, patches of sand, gravel, and smaller sized cobbles are found in locations of lower velocity along the banks and in the channel behind jams, boulders, or other obstructions which decrease velocity. Occasionally the channel flows over bedrock with no alluvial cover. Field observations suggest that cobble–small boulder sized bed material is mobile in many portions of the assessed reach, and that finer sediments (sand–small cobble sized) are readily mobilized and transported downstream and out of the reach unless they are retained in areas of lower velocity (e.g., slack water deposits in the lee of boulders, depositional zones on the downstream side of fallen trees). Stream power and sediment transport is high and available sediment supply is low. Therefore, areas of deposition and storage of mobile sediment are relatively small and infrequent along most of the lower Chiwawa River.

2.4.4 Channel Banks and Lateral Processes

Lateral channel processes are the primary mechanism of channel change along the lower Chiwawa River, and these processes are important as they promote channel-floodplain connectivity and facilitate sediment sorting and storage, yet these processes have been impaired due to decreased complexity and structure within the lower Chiwawa channel. Bank erosion and channel migration across the floodplain recruits additional wood into the channel, thereby increasing the wood load and enhancing the effects of large wood on channel processes. Furthermore, large, persistent wood jams may have acted as grade control structures, reducing local channel gradient and affecting sediment dynamics and channel planform upstream of some jam sites.

2.4.5 Overview of Sediment Dynamics

Observations and analyses of channel sedimentary characteristics and morphology suggest that much of the lower Chiwawa River operates in a supply limited condition, where the amount of sediment delivered to and routed through the channel is less than the channel's capacity to transport sediment (for regularly occurring flows, and sediment sizes which compose the mobile portion of the channel bed). Relatively low sediment supply is primarily due to the watershed's glacial history. This condition limits sediment supply from tributaries and from hillslope inputs. Additionally, incision down to bedrock and channel armoring act to reduce the ability of the channel to erode laterally into adjacent outwash terraces that could increase sediment supply. Therefore, in most reaches, sediment that is delivered to the lower Chiwawa is unlikely to be stored in the system for long durations, as landscape characteristics naturally favor transport over storage. The location and degree to which anthropogenic alteration of the channel through wood or rock removal has further enhanced the natural tendency of sediment transport versus storage is not well understood. However, removal of large wood and large boulders that would have provided channel roughness and opportunities for sediment storage and habitat is known to have occurred. In summary, the lower Chiwawa River does not receive large inputs of sediment from the watershed and is effective at entraining and transporting large volumes of alluvium in relatively frequently occurring flows.

This natural condition coupled with recent removal of large wood and boulders to facilitate log drives has reduced habitat quality and quantity.

2.5 INFRASTRUCTURE & BUILT FEATURES

The Area D project vicinity contains an important bridge crossing the Chiwawa River, several built features, and is commonly visited for recreational purposes. The most noteworthy infrastructure in the project vicinity is the full-span bridge for Chiwawa River Road in the upstream portion of the project area. There are eight rustic cabins and associated outbuildings built on USFS leased land on a river right floodplain surface adjacent to the central portion of the project site. The USGS gage for the Chiwawa River is located along the right bank of the channel slightly downstream of the floodplain surface where the cabins are sited. Other built features in the project area include extensive dispersed camping sites consisting of rudimentary roads, cleared areas, and fire rings, throughout much of the project area. Due to the extensive development in the project area, the hydraulic impacts of potential project elements were evaluated during design development to check that project elements were not putting structures at risk, and additional information about this assessment can be found in Section 4.3. Additionally, a risk assessment of project elements to public safety and property, and associated design recommendations are included in Appendix B.

2.6 HYDRAULIC MODELING

2.6.1 Hydraulic Modeling Overview

Existing and proposed channel and floodplain hydraulics were simulated using a two-dimensional (2-D) hydraulic modeled developed using the U.S. Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS 6.6; USACE 2025). A detailed description of the model setup is provided in the previously issued Lower Chiwawa River: Alternatives Analysis report (Inter-Fluve 2022). The following sections summarize the general approach taken for modeling the project, the model geometry, and key input parameters pertinent for modeling the project.

2.6.1.1 Model Geometry & Domain

The model geometry for existing and proposed conditions is based on a digital terrain model (DTM) that was developed using topo-bathymetric LiDAR data that were collected in 2021 (NV5 Geospatial 2021). A proposed DTM was developed in AutoCAD Civil3D for the floodplain bench and side channel grading. Large wood structures were represented as a modification to the terrain to obstruct a portion of the existing channel.

A subset of the larger Lower Chiwawa Reach Assessment model (Inter-Fluve, 2022) was developed to facilitate design iterations and computational efficiency. The subset model for Area D extends from approximately RM 7 at the upstream end to approximately 800 feet downstream of the Goose Creek confluence at the downstream end.

The Area D model domains consist of a computational grid with average cell spacing ranging between 10 and 16 feet within the active channel to approximately 30 feet in the floodplain. The resolution of the grid was adjusted based on terrain complexity and areas of interest, with smaller

cell sizes applied to areas where higher resolution results were desired. Break lines were added along the tops of banks, channel alignments, and various high ground features or channel obstructions to further refine the computational mesh where needed. Additional mesh refinements can be incorporated in response to project needs as the project progresses, and the utility of the model evolves.

2.6.1.2 Model Input Parameters

Key model input parameters are summarized under the following bullets:

- Boundary Conditions

2D hydraulic models require boundary conditions at locations where flow is expected to enter or exit the computational domain. Inflow hydrographs were used at the upstream end of the model near RM 7, and at each of the major tributaries (Alder and Goose Creeks) within the Area D project vicinity (depicted in Figure 4). These inflow hydrographs are based on the hydrology estimates discussed in Section 2.2 and the discharges used in the hydraulic modeling are summarized in Table 2 and Table 3.

Discharges were incorporated into synthetic quasi-steady state hydrographs with periods of steady flow (at the discharges of interest and other intermediate discharges) connected by smooth transition periods to create a stair-step like pattern. This approach does not allow for analysis of the receding limb of the hydrograph and likely provides conservatively high results with respect to large floods, as floodplain storage areas generally fill completely to allow the model to reach a steady state. Further, the timing of flood peaks at each of the tributaries relative to the timing of flood peaks in the mainstem Chiwawa were assumed to be equal, which likely provides additional conservativism with respect to larger flood events. Future modeling efforts may warrant additional hydrologic analyses to approximate the relative timing of each of the tributary inputs and the mainstem Chiwawa.

The downstream boundary condition consists of a stage/discharge rating curve derived from the results from the larger reach assessment model, to maintain consistency with previous modeling efforts. Both the upstream and downstream boundary conditions are relatively far from the project area, and therefore they dampen the effects of any potential uncertainties associated with boundary condition assumptions.

- Hydraulic Roughness

A spatially varying hydraulic roughness (Manning's n) layer was created in ArcGIS software using a combination of LiDAR derived vegetation heights and hand-digitized landcover regions. Roughness values were assigned to each landcover region based on published guidelines, field observations, and professional judgement. Roughness coefficient assumptions were based on guidelines for one-dimensional characterization of corresponding channel types and vegetation conditions (Arcement & Schneider 1989), with the understanding that 2D roughness values can often vary substantially from those published for 1D models (Robinson et al. 2019). Table 4 summarizes the roughness

coefficients used in the existing condition model. Proposed conditions roughness coefficients were assigned to prominent features in the 60% designs, such as side channels and large wood structures.

Table 4: Roughness coefficients used in the 2D model.

Land Cover Region Description	Manning's n Value
Active Main River Channel (gravel/cobble/boulder)	0.035 – 0.06
Veg. Height < 0.5 ft	0.04
Veg. Height 0.5 ft – 5 ft	0.08
Veg. Height 5 ft – 12 ft	0.14
Veg. Height 12 ft – 20 ft	0.1
Veg. Height > 20 ft	0.12
Existing Wood Accumulation	0.2
Proposed Large Wood (built into terrain)	0.065
Proposed Side Channel	0.075

2.6.2 Review of Model Results

Model results were used to gain a high-level understanding of hydraulic characteristics throughout the project area and inform the design development. Under existing conditions, the model results demonstrate that there are very few valley-bottom surfaces that are frequently inundated, resulting in relatively homogenous, high-energy hydraulics throughout the project area. There are some isolated areas of hydraulic diversity, which are typically associated with large obstructions such as boulders or log jams, or sharp meander bends. Figure 8 shows existing conditions model results for September average flow (approximately baseflow) and for the 5-year return period peak flow. Under both flow conditions, almost all flow is contained within the channel, and the channel displays fairly homogenous flow conditions, with the exception of the meander bend and areas on the river-left floodplain near the bottom of the image.

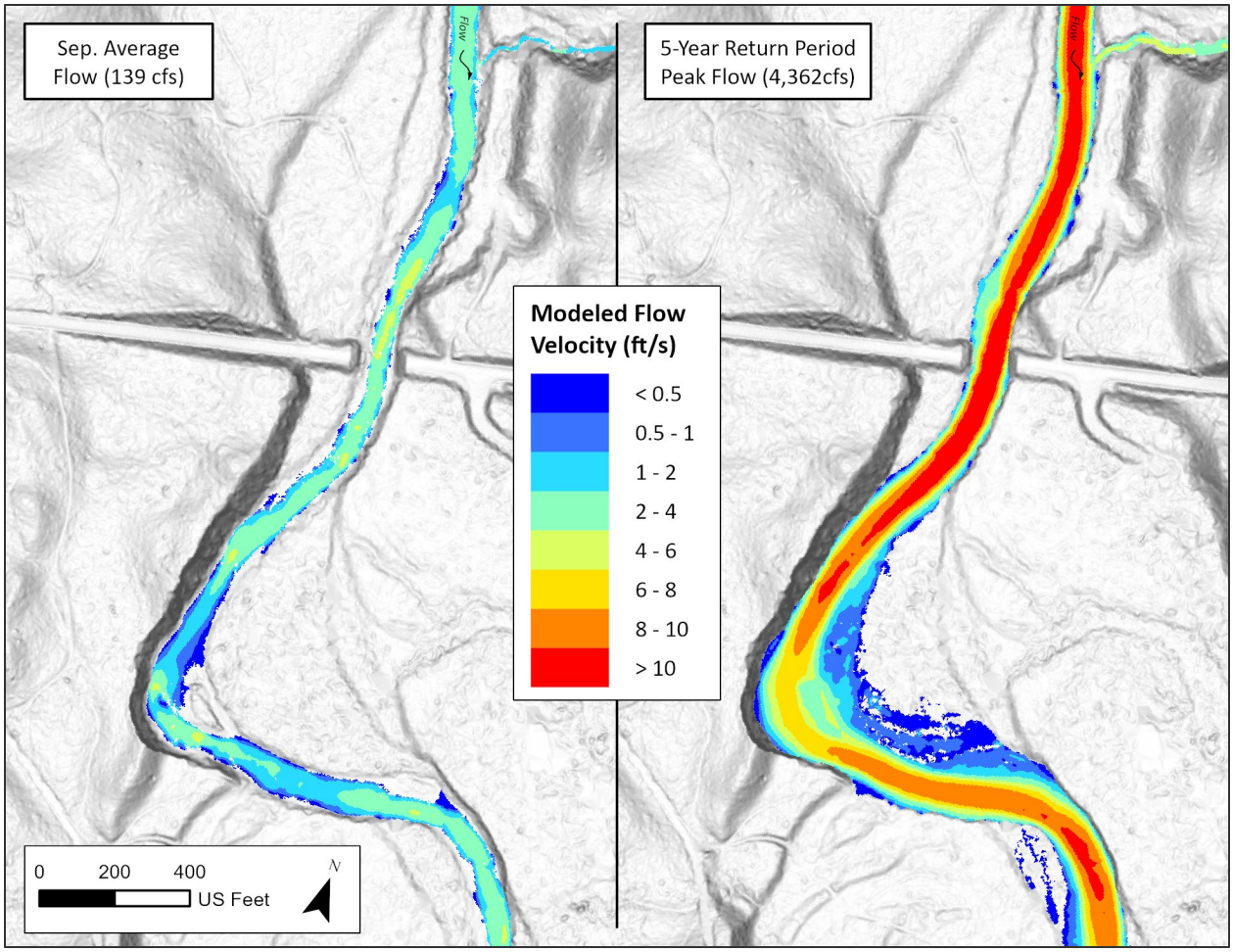

Figure 8: Velocity model results for September average flow (left) and the 5-year return period peak flow (right) under existing conditions in the project area Discharge magnitude values reported in the figure for the respective return periods are for the Chiwawa River at the USGS gage.

The proposed design aims to address the lack of hydraulic complexity and lack of floodplain-channel connectivity in the project area. The design includes one perennial side channel connection, and proposed mainstem large wood structures sited at locations that could increase in-channel hydraulic complexity, increase the frequency and magnitude of overbank flows, and influence the geomorphic conditions of the site to facilitate the development of complexity and habitat formation at the site. Subsequent sections provide a more robust description of how specific proposed project elements influence site hydraulics, and a compilation of modeled depth and velocity patterns for existing and proposed conditions are included as Appendix C.

3. Alternatives Assessment & Selection

Processes operating both at the watershed- and reach-scales were considered when identifying potential projects. At the watershed-scale, the influence and condition of the hydrologic, sediment, wood, and temperature regimes were considered when developing project recommendations. The conditions of these processes were obtained from the existing literature, the project sponsors' and investigators' knowledge of the subbasin, and from input from the project development team (PDT).

At the reach, or project area scale, potential projects identified throughout the Lower Chiwawa River during the reconnaissance site visit and memorandum (Inter-Fluve 2020), and promising reaches, including the vicinity of Area D, were refined or modified based on multiple considerations, including: 1) previous studies, 2) professional experience and knowledge of design consultants and PDT members, 3) new analyses and field surveys conducted as part of this effort, 4) evaluation of previous projects in the area, 5) a comparison of existing and target fish use and habitat conditions, 6) current site conditions and human uses, and 7) feasibility of side channel inlet and outlet locations and proposed slope of these features (when relevant).

Conceptual alternatives were identified at six potential project locations in the Lower Chiwawa River, and three conceptual alternatives for Area D are described in the following subsection. These alternatives represent various levels of biological uplift, impact to existing conditions, landowner constraints, risk, recreational use, and cost. Natural and anthropogenic factors were considered in the development of these alternatives. At Area D, a preferred alternative was selected, and this design has been developed to the conceptual design level, and subsequently been refined to the 60% design level, as described elsewhere in this report.

3.1 IDENTIFIED CONCEPTUAL ALTERNATIVES

Restoration goals for Area D focus on enhancing off-channel floodplain and side channel habitats to support summer and winter rearing, as well as fry life stages. The project aims to install a minimum of four engineered log jams along approximately 0.15 miles of the mainstem channel to redirect flows and promote greater inundation of the river left floodplain surface. In addition, up to 0.25 miles of new side channel habitat is proposed on the river left floodplain to increase overall side channel area in the project reach to greater than 5% of the total channel area. These objectives are intended to expand juvenile rearing habitat, improve hydraulic complexity, and restore lateral connectivity between the channel and floodplain. The following subsections describe three conceptual alternatives proposed for the project area, and the three alternatives described here are depicted in Figure 9. More information about the development of conceptual alternatives and the selection of a preferred alternative can be found in the Lower Chiwawa River Assessment: Alternatives Analysis (Inter-Fluve 2022).

3.1.1 Alternative 1

Alternative 1 includes large wood loading throughout Area D, and the creation of a perennial flow-through side channel through the river-left floodplain in the upper portion of the area. Large wood loading in the side channel is proposed, though not detailed on the drawing. This alternative includes partial decommissioning of the campsites and dispersed recreational areas, and no impacts to the cabins. Under proposed conditions, floodplain inundation in the upper left floodplain increases at the 2-year event and higher but remains the same throughout the rest of the reach. The total side channel length in this alternative is 1000 feet.

Preliminary modeling of Alternative 1 indicates that the perennial side channel proposed in the upper floodplain increase wetted habitat area compared to existing conditions at flows throughout the annual hydrograph (such as at base flows through the May average), though most water remains in the channel of the side channel feature until the 2-year event. At low flows, proposed side channel features offer increased quantities of margin and edge habitats that support rearing juvenile salmonids. At higher flows, juveniles rearing in the reach and adults migrating through into upstream spawning areas may benefit from the high-flow and large wood velocity refugia provided by this alternative.

3.1.2 Alternative 2

Alternative 2 includes large wood loading throughout Area D, and partial decommissioning of the campsites and dispersed recreational areas. Minor increases to floodplain inundation during the 2-year event and higher occurs from the wood loading, but there are no impacts to the cabins.

Preliminary modeling of Alternative 2 indicates that the primary benefit of this alternative is increased velocity heterogeneity in the main channel from large wood features creating cover habitat and increasing small pockets of velocity refugia for juveniles and adjust migrating through or spawning in the reach.

3.1.3 Alternative 3

Similar to Alternative 1, this alternative includes large wood loading throughout Area D, and the creation of a perennial flow-through side channel through the river-left floodplain in the upper portion of the area. A perennial-flowing groundwater side channel, fed via a buried infiltration gallery pipe, is proposed in the river right floodplain. This alternative includes partial decommissioning of the campsites and dispersed recreational areas, with no impacts to the cabins. Under proposed conditions, floodplain inundation in the upper left floodplain increases at the 2-year event and higher and increases in the created side channels. Inundation throughout the rest of the reach remains the same. The total side channel length in this alternative is 2100 feet.

Similar to Alternative 1, preliminary modeling of this alternative indicates that the side channels proposed in both floodplains increase wetted habitat area throughout the annual hydrograph. By the 2-year event, the upper side channel feature routes more water onto the floodplain than in existing conditions. The groundwater side channel in the lower portion of Area D does not substantially change flood patterns on that floodplain surface compared to existing conditions. At low flows, proposed side channel features offer increased quantities of margin and edge habitats that support rearing juvenile salmonids. In particular, the groundwater fed channel likely would provide high-quality cool water refugia within the reach for juveniles rearing in the system. At higher flows, rearing juveniles and adults migrating through or spawning in this reach may benefit from the high-flow and large wood velocity refugia provided by this alternative.

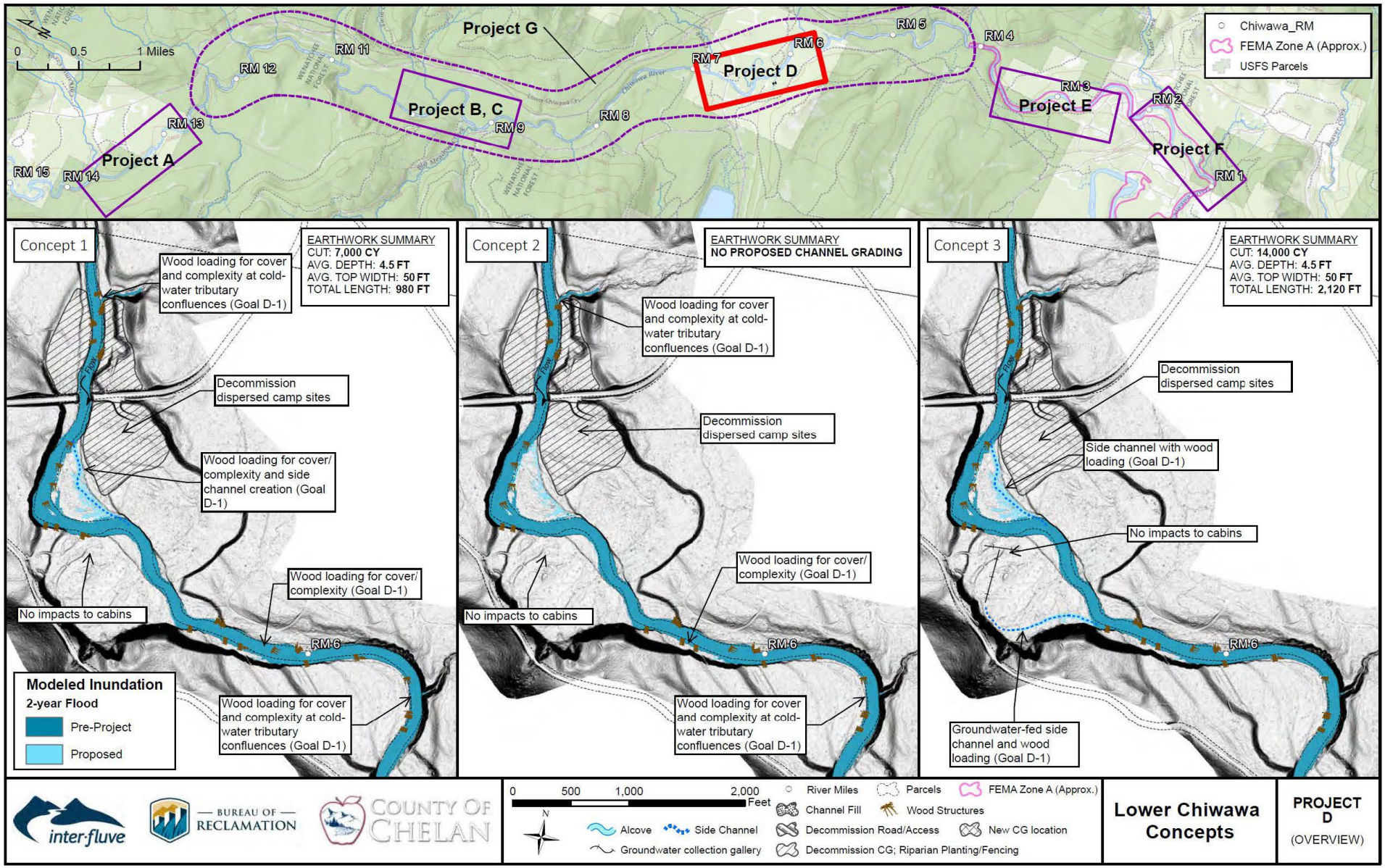

Figure 9. Conceptual alternatives for Project Area D.

3.2 PREFERRED ALTERNATIVE CONCEPTUAL DESIGN

Conceptual Alternatives 1 and 2 were combined to develop the concept level design for Project Area D which is shown in Figure 10. The combined design proposes adding large wood structures and boulders to the main channel and the excavation of a side channel on the river-left floodplain. Partial decommissioning of dispersed camping areas is also proposed for the project area. Alternative 3 was not pursued due to landowner constraints. Per USFS input, proposed actions were designed to avoid impacts to private cabins. More details about the conceptual design can be found in the Lower Chiwawa River Conceptual Design Package (Inter-Fluve 2023). The preferred alternative conceptual design presented in this section was refined further in response to additional stakeholder and project team feedback, resulting in the 60% designs for Area D, which are described in the following section.

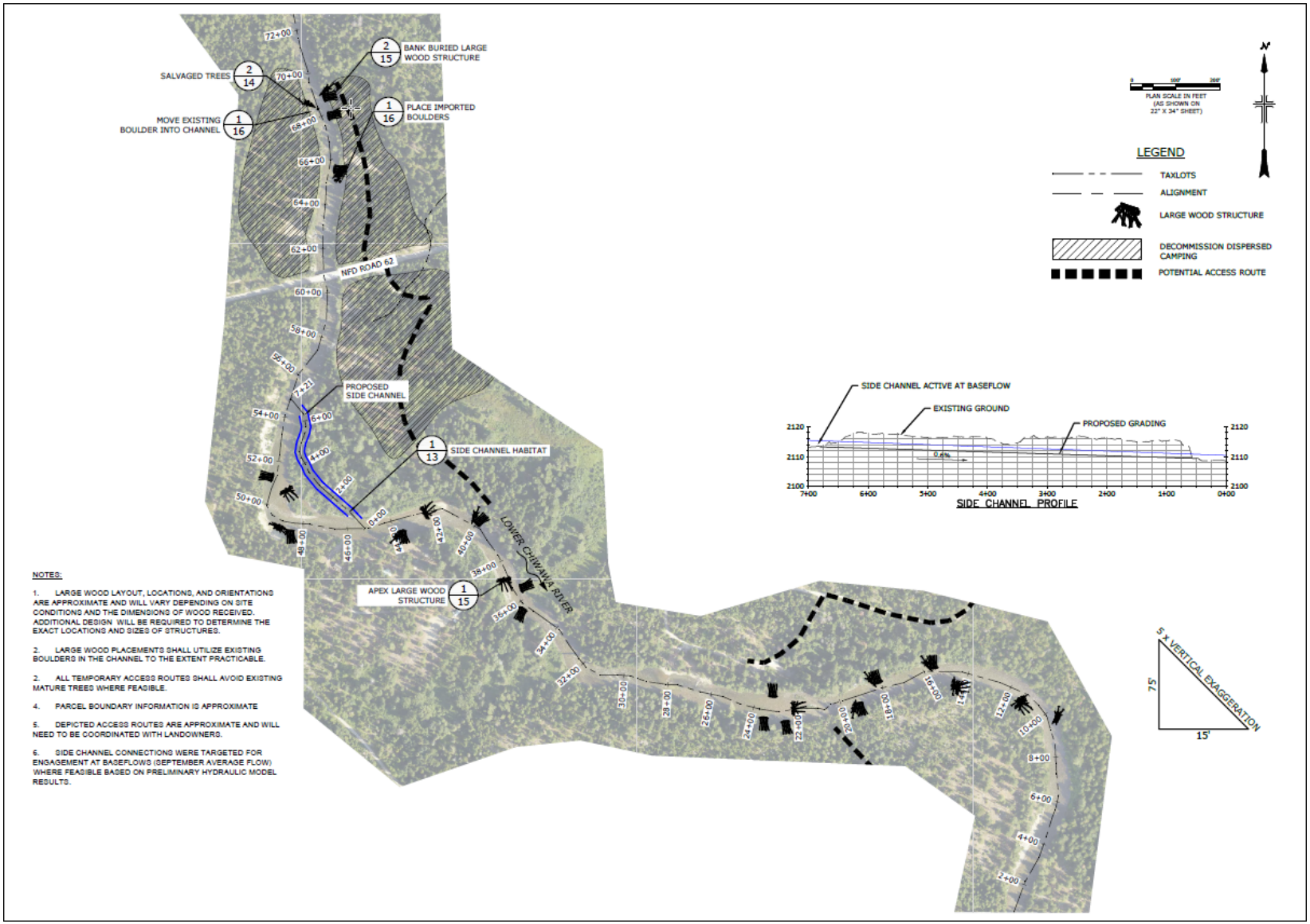

Figure 10: Concept-level design for Project Area D.

4. Project Design Details

Previously discussed site conditions, analyses, and design criteria were used to inform the arrangement and design of proposed treatments. Direction from the project development team in response to the 30% (preliminary) project designs resulted in the removal of all aquatic habitat treatments in the vicinity of, and downstream of, the Goose Creek confluence and USFS campground due to concerns regarding the feasibility of implementation and expected uplift. Additionally, one bank buried structure near the cabins was removed due to stakeholder feedback and risk concerns. Lastly, additional habitat treatments were added to the left bank of the Chiwawa River upstream of the Chiwawa River Road bridge based on project development team feedback in the designs described herein.

Refinements to the design may continue to evolve during future phases based on additional stakeholder feedback, availability of materials, landowner constraints, and other considerations that may arise. The proposed project includes placing large wood structures throughout the project reach and excavating a perennially connected side channel. It also includes terrestrial restoration work to treat impacts associated with dispersed camping and to improve riparian habitat conditions (e.g., Appendix F). The following subsections describe the proposed design treatments, the habitat uplift that is anticipated to result from the proposed treatment actions, the concerns pertaining to the implementation of different treatments and/or pertaining to working in different portions of the project area, and the estimated cost of project implementation. Supplemental information to this section can be found in the engineer's opinion of probable costs for the project (Appendix D), and the plans for this design phase (Appendix E).

4.1 PROPOSED TREATMENTS

The following subsections describe the proposed design treatments and a general description of each treatment type and location within the 60% design drawings. A general review of key considerations relating to the feasibility, construction, and risk associated with each treatment is provided.

4.1.1 Apex Large Wood Structures

4.1.1.1 Description and Benefits

Apex wood structures with excavated pools are proposed in midchannel and split flow locations (e.g., side channel entrances). The structures are intended to produce hydraulic complexity, initiate lateral channel processes, trap mobile wood, and sort sediment. Depending on the characteristics of the sediment load, bars formed in the lee of the structures should provide spawning locations. Apex structures may deflect the flow of the main channel around the proposed structure. A pool will be excavated on the upstream face of the structure, providing covered low flow habitat, and the hydraulic effects of the structure are anticipated to facilitate scour along the upstream face, thereby maintaining the excavated pool. An additional habitat benefit includes velocity refuge in the lee of the structure during higher flows.

4.1.1.2 Application of Treatment

Apex-style large wood structures are proposed in the vicinity of the proposed side channel. The location and number of apex structures are as follows:

- One narrow apex structure is proposed on river-left near the location of the proposed side channel inlet at approximately Sta. 55+00
- One apex structure is proposed on a midchannel bar near Sta. 50+00

Apex style structures will be stabilized via connections between vertical piles, either dug or driven into the channel bed. If vertical pile installation is not feasible at time of construction, then apex structures may be stabilized using ballast boulders connected to the structure, but this option should only be considered if site conditions prevent the installation of vertical piles. Most rootwads in apex structures face upstream, with a few rootwads placed facing out on either side of the structure. Salvaged trees and slash will be incorporated into the structure between layers of logs and packed into the upstream face of the structure to reduce porosity. A pool will be excavated at the upstream face of apex structures and salvaged alluvial material placed on top and behind the structure. Fine sedimentary material will be preferentially placed at the top of the backfill and the backfilled material will be planted with live stakes of appropriate riparian vegetation species.

4.1.1.3 Feasibility, Construction, and Risk Considerations

Apex large wood structures will be constructed by excavator. Wood will be delivered to each site via excavator or other tracked hauling equipment to reduce impacts to floodplain vegetation and ground surfaces. A temporary wet crossing will be needed for machinery to cross the small cutoff channel and reach the proposed structure location near station 50+00.

Vertical logs will be installed via a vibratory driver (or other methods if design embedment depths cannot be reached) and provide resistance to lateral and buoyant forces. Sheet pile coffer dams are preferred for dewatering and fish salvage during construction of apex structures. Other concerns associated with constructing apex wood structures include avoiding sensitive habitat areas such as wetlands.

An assessment of the risk to public safety and property damage was performed based on Reclamation's Large Wood Material Risk Based Design Guidelines (Reclamation 2014). The proposed structures have a moderate to high public safety risk and a low to moderate property damage risk. Based on the risk assessment, and based on direction from the project development team, the proposed large wood structures will be designed to resist hydrodynamic forces up to the 100-year flood with factors of safety of 1.75 and 1. 5 for vertical (buoyancy) and horizontal (sliding) forces, respectively. Wood species that are resistant to decay (e.g., Douglas-fir, western redcedar) will be required for key members larger than 12-inch diameter. Additional information about the engineering considerations and risk assessment can be found in the Large Wood Structure Risk Assessment Memorandum in Appendix B.

4.1.2 Bank Buried Large Wood Structures

4.1.2.1 Description and Benefits

Bank buried large wood structures with excavated pools are positioned along the channel margins, in locations where pools are already forming and will be maintained with the addition of in-channel structure. These structures will add or enhance pool quality and provide covered pool and refuge habitat at a range of flows, including low flows. Depending on the site characteristics, bank-attached bars may develop downstream of the structures.

4.1.2.2 Application of Treatment

Bank buried large wood structures are proposed throughout the project area. The location and number of bank buried structures in the project area are as follows:

- Six bank structures are proposed above the Chiwawa River Road bridge, along the left bank – one in Alder Creek, at the Alder Creek confluence (Sta. 68+00), near Sta. 67+50, and three in the riparian bank grading area from Sta. 63+00 to 66+00.
- One bank structure is proposed on river left downstream of the side channel outlet at Sta. 40+00.

Bank buried structures will be stabilized by burying a large portion of the rootwad logs in an excavated hole in the bank with salvaged alluvial backfill. The top rootwad logs will be buried with at least 2 feet of backfill material, and vertical logs will be used to provide additional ballast. All rootwads should extend beyond the bank into the channel. Salvaged trees and slash should be incorporated into the portion of the structure that extends into the channel between layers of logs and packed into the upstream face of the structure to reduce porosity. Tipped or salvaged trees can also be placed on top of the top layer of rootwad logs in the structure. A pool will be excavated at and below the location of the rootwads, and salvaged alluvial material can be placed on top of the structure to provide supplemental coarse alluvial material to the backfill. Fine sedimentary material will be preferentially placed at the top of the backfill and the backfilled material will be planted with live stakes of appropriate riparian vegetation species.

4.1.2.3 Feasibility, Construction, and Risk Considerations

Concerns regarding construction access, constructability of structures, and risk to infrastructure and public safety for bank buried large wood structures are very similar to those of apex style structures. Refer to section 4.1.1.3 for a discussion of these concerns.

4.1.3 Side Channel Confluence Large Wood Structure

4.1.3.1 Description and Benefits

The Side Channel Confluence structure with excavated pool is located at the outlet of the side channel, and the structure is intended to provide covered pool and refuge habitat, and maintaining a pool at the outlet of the side channel will facilitate connection between the mainstem and the side channel at a range of flows, including low flow conditions. In addition to ensuring connection between the mainstem and side channel and maintaining covered pool habitat, the side channel

confluence may also produce hydraulic complexity, trap mobile wood, provide velocity habitat refuge, and sort sediment.

4.1.3.2 Application of Treatment

A single Side Channel Confluence large wood structure is proposed at the outlet of the proposed side channel at its confluence with the mainstem (Sta. 42+50). The structure will be stabilized via connections between vertical piles, either dug or driven into the channel bed and backfill along the left river bank. If vertical pile installation is not feasible at time of construction, then they may be stabilized using ballast boulders connected to the structure, but this option should only be considered if site conditions prevent the installation of vertical piles. Rootwads in the structures will point either upstream towards flow coming down the side channel or stick out into the mainstem channel perpendicular to flow.

4.1.3.3 Feasibility, Construction, and Risk Considerations

Concerns regarding the constructability of structures and the risk to infrastructure and public safety for the side channel confluence large wood structure are very similar to those of apex style structures. Refer to section 4.1.1.3 for a discussion of these concerns.

4.1.4 Side Channel Creation

4.1.4.1 Description and Benefits

Side channel creation involves the excavation of a side channel on one of the few low floodplain surfaces present in the project area. The excavated material from the side channel will be hauled to the onsite disposal area and/or used as part of terrestrial recreation management treatments. Additionally, if the excavated material from the side channel meets certain grain size criteria, and if material is needed to supplement the backfill of nearby wood structures, then the coarse alluvium excavated from the side channel may be placed as backfill for nearby wood structures.

To meet lower Chiwawa-wide habitat enhancement goals, the proposed side channel will engage perennially to deliver off-channel habitat throughout the year. The side channel will be constructed with ample wood and a complex profile to create hydraulic and habitat diversity.

4.1.4.2 Application of Treatment

A roughly 1000-foot-long side channel is proposed along a low floodplain surface on the left bank of the Chiwawa River below the Chiwawa River Road bridge (inlet near Sta. 56+00). The side channel is designed to convey flow perennially, with an inlet elevation (2115 feet) lower than the modeled base flow water surface elevation at the inlet location. At the current design phase, the side channel has a bottom width of 15 feet, variable side slopes ranging from 1.5H:1V to 4H:1V, and an average longitudinal slope of 0.7%. Typical excavation depths range from 4–6 feet, and the side channel is expected to require approximately 4,280 cubic yards of excavation in total.

4.1.4.3 Feasibility, Construction, and Risk Considerations

Side channel excavation may require some field fitting to best protect the trees marked to be saved in the vicinity of the side channel alignment, and to facilitate that the bed of the side channel is

excavated to a depth where coarse alluvium is present and to regularly receive groundwater inputs throughout the year. Additionally, much of the wood that is placed in the side channel will be fit in the field.

4.1.5 Terrestrial Recreation Management Treatments

A suite of terrestrial treatments intended to manage dispersed camping use in the vicinity of the project area were designed by others in parallel with the development of the aquatic habitat enhancement treatments described in the previous subsections. Terrestrial treatments include targeted grading, wood placements, boulder placements, and plantings, which are designed to restore areas of the riverbank which have been denuded due to dispersed camping use, reduce recreational disturbance to the floodplain, and to better define the areas that are suitable for dispersed camping use in the vicinity of the project. Recreation management treatment designs have been incorporated into the project planset which is included as Appendix E, and additional details about the rationale and design development of these treatments can be found in Appendix F.

4.2 DESIGN BENEFITS AND EFFECTIVENESS

The effectiveness of the proposed design was evaluated based on how well the design is predicted to affect the goals and objectives, which is evaluated based on professional judgment and the interpretation of hydraulic model results.

The goal for Area D is to improve off-channel floodplain/side channel habitat for summer rearing, winter rearing, and fry life stages. The measurable objectives include increasing wood loading to greater than 70 pieces per mile and creating up to 0.25 miles of perennially inundated side channel habitat.

As proposed, the design calls for the installation of 2 apex wood structures, 7 bank buried wood structures, 1 side channel confluence structure and the use of 200 logs in the proposed side channel. This results in a wood loading rate that ranges from approximately 530 to 100 trees per mile (depending on whether the side channel is included), which is well above the target of 70 trees per mile. The side channel itself is also well above the target loading rate at nearly 1100 trees per mile. As proposed, the side channel is designed to inundate at low flows (September average flow; 139 cfs), providing off channel habitat through a large range of flows.

The performance of, as well as the anticipated stream response to, the wood structures was assessed using the proposed-conditions hydraulic model. Figure 11 shows predicted changes in velocity resulting from the wood placement for a 2-year return period peak flow. Decreases in velocity are predicted in the hydraulic lee of the proposed structures. These are interpreted to show areas that could provide velocity refuge and accumulate sediment, depending on supply. Increases in velocity are shown adjacent to structures and are interpreted as highlighting areas of the channel where erosion and the creation of new habitats could occur. Overall, the hydraulic diversity of the reach is increased compared to existing conditions, and the project is likely to produce increased habitat diversity. Furthermore, the predicted patchiness of the hydraulics should increase erosion and sediment storage and lead to a more complex channel overall. Maps containing detailed hydraulic modeling results are provided in Appendix C.

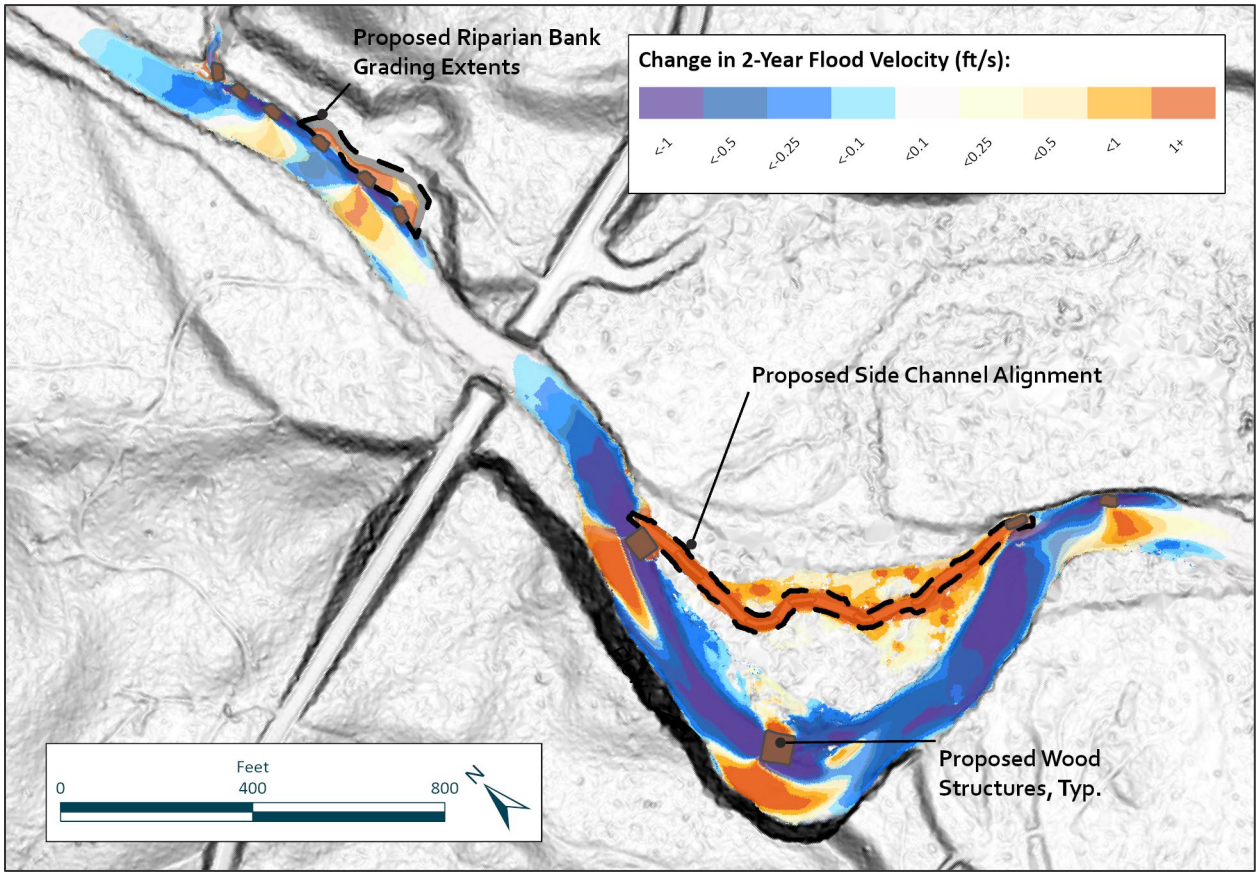

Figure 11: Predicted changes in velocity resulting from the wood placement for the project area. Cool colors show predicted decreases in velocity while warm colors show increases in velocity.

4.3 FLOODING IMPACT ASSESSMENT

A technical memo was prepared in January 2024 to assess the preliminary impacts of the project on the adjacent Forest Service Cabins located on the river right floodplain (Inter-Fluve, 2024). Based on the results of the analysis, several wood structures were removed from the project to reduce the flooding impacts to the cabins. The cabin footprints and finished floor elevations were surveyed by Inter-Fluve staff in May 2025.

The hydraulic model results show that four of the cabins, cabin numbers 1, 5, 6, and 7, are not within the existing or proposed 100-Year inundation extents. One cabin, number 8, is inundated above its first floor in existing conditions. However, the model results show that the proposed project is not increasing the 100-year water surface elevation (WSE) at the cabin location. Lastly, three cabins (numbers 2-4) are inundated below their finished floor elevation in the existing conditions 100-Year Flood, and the proposed project is raising the 100-Year WSE by 0.04 feet to 0.13 feet. However, the proposed 100-Year WSE remains below the finished floor elevation for each of the cabins. Thus, the updated 60% design hydraulic model shows that there is no adverse flooding above the cabin's finished floor elevation during the 100-Year flood.

Table 5: Modeled 100-Year Water Surface Elevation Compared to Surveyed Cabin Elevations

Cabin	Surveyed Finished Floor Elevation (ft NAVD88)	100-Year Modeled Water Surface Elevation (ft NAVD88)			
		Existing	Proposed	Difference	Proposed Depth above Finished Floor
1	2119.81	N/A	N/A		
2	2117.88	2116.89	2116.93	0.04	-0.95
3	2117.18	2115.16	2115.29	0.13	-1.89
4	2116.38	2114.48	2114.54	0.06	-1.84
5	2116.90	N/A	N/A		
6	2117.83	N/A	N/A		
7	2116.19	N/A	N/A		
8	2112.10	2112.18	2112.18	0.00	0.08

4.4 60% DESIGN LEVEL COST ESTIMATE

A 60% design level opinion of probable construction cost for the Lower Chiwawa Area D project was developed and is included as Appendix D. The estimated base construction cost is anticipated to be approximately $2,022,000 ($2,184,000 with 8.4% unincorporated Chelan County sales tax), including the recreation plan costs. Given the uncertainty of various items at the current design phase, the estimated costs should be expected to have an accuracy between -20% and +30%, in accordance with the Association for Advancement of Cost Engineering (AACE) guidelines. As a result, construction costs for the project are likely to range between approximately $1,618,000 ($1,747,000 including sales tax) and $2,629,000 ($2,839,000 including sales tax). Details about the cost estimate, including estimated line-item costs and assumptions underlying the cost estimate, can be found in the attached cost estimate narrative description and table (Appendix D). Engineering design, permitting, or construction oversight fees are not included in this estimate.

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