

WASHINGTON STATE
DEPARTMENT OF
E C O L O G Y

Application for a 2015-2017 Floodplains by Design Project Grant

Submitted applications will be rated to create a ranked list in support of Ecology's FY 2015-2017 Floodplains by Design budget request.

Applications must be submitted electronically via email to Ecology by 5:00 pm, **September 8, 2014**. Send applications to:

Adam Sant at Adam.Sant@ecy.wa.gov

With the Subject line: 2015-2017 Floodplains by Design Project Grant Application

You will receive confirmation that your application has been received by close of business on September 15.

Applicants must use this form as provided. No alterations will be accepted.

Project Title: **Entiat River Stormy Reach Floodplain Project**

Organization/Jurisdiction Name: **Chelan County Natural Resource Department**

Contact Name: **Mike Kane**

Address: **316 Washington Street Suite 401**

City, State, Zip Code: **Wenatchee, WA 98801**

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Legislative District(s): 12

County: Chelan

WRIA(s): 46

Congressional District(s): 8

Specific Project Location

Section: 14 Township: 27N Range: 19E River Mile: 19.8

Latitude: 120°24'55.141" Longitude: 47°50'24.334" GPS coordinates, if available

Major Watershed Project is in: **Entiat**

Full project (or phase proposed herein) should be completed in 3-4 years.

Project Narrative and Budget are limited to 20 pages.

Scope of Work, Schedule, Maps and Photos can be in addition to those 20 pages.

1. Short Description of Project (500 words or less)

Please describe the overall goals for this floodplain area that is the focus of your proposal. Include in the description all major components of the project or activity such as breaching a levee, constructing a new levee, restoring a specific number of acres of floodplain, wetland creation or fill, restoration planting, project design planning, public process, or any other appropriate major component. Please indicate if funding is being requested for a phase of a larger multi-year project.

The goal of the Entiat River Stormy Floodplain Reconnection Project is to restore natural channel and floodplain processes to 0.5 miles of the Entiat River (RM 19.3-19.8) through acquisition of development rights; levee and road removal; and habitat restoration (see attached maps/air photos).

This proposal seeks funding for the construction phase of the project. The Chelan-Douglas Land Trust has purchased 109 acres, 80 of which is floodplain, from adjoining private landowners, and the US Bureau of Reclamation and Bonneville Power Administration are funding design for a reach-based salmon habitat recovery project within the Gray and Stormy Reaches (RM 16.1-20.8) of the Entiat River. Secured funding includes Chelan County project management for 2014 and a consulting team of design engineers from ICF, CH2M Hill and Natural Systems Design.

The Entiat River Valley has a history of catastrophic fires, debris flows and floods with significant recent large fires occurring in 1970, 1976, 1988, 1994 and 2014. Debris flows/landslides occurred in 1972, 1974, 1977 with 4 people killed in the Preston Creek Slide and Flood of June 1972. The flood of record occurred in 1948 (~10,800 cfs) and caused significant damage to infrastructure. The US Army Corps of Engineers (ACOE) and Soil Conservation Service (SCS) at various times participated in large channel clearing operations including levee building, large wood removal and channel straightening especially after the 1948 and 1972 floods.

The construction project is focused on removal of a large levee (1050 lineal feet), access road (350 lineal feet) and associated riprap built in 1973 by the Soil Conservation Service. In addition, a 12-acre floodplain area (graded farmland) behind the levee will be restored and replanted to start restoration of natural floodplain plant communities. Levee removal will promote a more natural, higher-sinuosity meander pattern that will in turn improve channel dynamics and floodplain connection (Reclamation 2013).

The Stormy Reach of the Entiat River is characterized by a low-gradient, sinuous, unconfined channel with a gravel-dominated bed and an active floodplain. These characteristics provide a high-intrinsic habitat potential. Removal of the large levee within RM 19.3-19.8 represents the highest priority for habitat restoration within the Stormy and Gray Reaches according to the UCRTT Technical Memo ranking project opportunities identified in the Stormy and Gray Project Map Books (2013). Construction of the Bremer levee altered the natural lateral migration pattern of the Entiat River. The levee, by design, increased the flow velocities and transferred hydraulic energy to downstream reaches, upsetting historic and natural sediment transport

patterns and ecological function for aquatic species that utilize this reach. The levee also disconnected the floodplain along the left bank of the river, further upsetting the ecology and altering the available habitat to rearing salmonids.

The Entiat River contains ESA-listed Chinook salmon, steelhead and bull trout as well as other non-listed salmonids and other aquatic species.

Benefit metrics include:

- 80 acres floodplain protected from development
- 1050 lineal feet of levee/riprap removed
- 3.3 acres floodplain reconnected at 2-year event.
- 12 acres of the 100-year floodplain reconnected.
- 12 acres of floodplain (wetland/non-wetland) reforested
- 0.5 miles of stream restored natural channel migration

2. Flood hazard / risk reduction (60 points)

Describe your project and how it will reduce the magnitude or frequency of flood damages to people, structures or infrastructure. Projects will be evaluated on the significance of the flood hazard and the ability of the solution to address the hazard. Evidence of flood hazard reduction can be demonstrated via flood storage added (acre-feet), flood stage reduction [reduced BFE (base flood elevation)], conveyance increased (cubic ft/sec), sediment storage added or inputs reduced, number or value of structures and/or development rights removed from hazard area (# or areal extent), critical facilities removed from high hazard area, transportation and infrastructure facilities removed from high hazard areas, and other project-specific goals. Describe both upstream and downstream effects of your project.

Answer question 2 here:

The construction project is focused on removal of a large levee (1050 lineal feet), access road (350 lineal feet) and associated riprap built in 1973 by the SCS to protect hay and pasture land. In addition, a 12-acre floodplain area (graded farmland) behind the levee will be restored and replanted to start restoration of natural floodplain plant communities. Levee removal will promote a more natural, higher-sinuosity meander pattern that will in turn improve channel dynamics and floodplain connection (Reclamation 2013).

The Entiat River Valley has a history of catastrophic fires, debris flows and floods with significant recent large fires occurring in 1970, 1976, 1988, 1994 and 2014. The largest recorded floods were in 1894, 1948 and 1972. Additional large floods occurred in local drainages attributed to thunderstorms in 1956, 1974, 1977, 1989, 1995 and 1997. Debris flows/landslides occurred in 1972, 1974 and 1977 with 4 people killed in the Preston Creek Slide and Flood of June 1972 (see attached Hydrology Timeline). On August 24 of 2014 a thunderstorm over the recently burned Duncan Fire bumped the Ardenvoir gage from 150 cfs to 200 cfs and released a dense torrent of mud and ash into the Entiat which was still showing increased turbidity two weeks later. The flood of record occurred in 1948 (~10,800 cfs) and caused significant damage to infrastructure. ACOE and SCS at various times participated in large channel clearing operations including levee building, large wood removal and channel straightening especially after 1948 and 1972 floods.

According to hydraulic modeling in the Entiat River Stormy Reach Assessment (Reclamation 2009), an overall increase in flow area and decrease in velocity and shear stress result from removal of the levee for the 2-year event (2650 cfs). “The flow area increased an average of 53% while the velocity and shear stress decreased an average of 53% and 74% respectively, (P. 24, Reclamation 2009).” Levee removal would likely increase localized channel stability and associated channel units beneficial to holding and rearing habitat for spring Chinook and steelhead. Levee removal also increases direct floodplain connection at the 2-year event by 3.3 acres. Modeling of the 100-year event (6250 cfs) at this location showed that it does not overtop the levee, further reducing the opportunity for channel migration under existing conditions (see attached floodplain graphic).

Removal of the levee would not increase risk to life or property. Breaching or removing the levee will restore natural flow conditions to the Entiat River in this reach and reduce hydraulic energy in the downstream sections, reducing erosion rates and risk that were increased when the levee was constructed. The levee removal will reconnect the floodplain and enhance the valley’s natural flood attenuation characteristics including sediment and debris storage during large events and provide benefits to the residences located downstream. A 1-D hydraulic model will be used to estimate the changes in water surface elevation and velocity in the vicinity of the levee as part of the design process. With the immediate connectivity to the restored 12 acre floodplain, both water surface and velocity values are expected to decrease and reduce the local flood risk.

In August of 2014, the Chelan-Douglas Land Trust purchased 109 acres of which about 80 acres is in the floodplain. The levee project is on a portion of this property. This effectively removes development rights from the hazard area and allows the design and implementation of the levee removal and floodplain reconnection to move forward.

3. Floodplain ecosystem protection or restoration element (60 points)

Describe the ecological benefit of the project, its significance, and the ability of the solution to address the overall need in the project area or watershed. Examples include, but are not limited to, reconnecting floodplains, salmon recovery actions, habitat restoration, Channel Migration Zone protections, etc. Evidence of ecosystem benefits include floodplain (including estuary) habitat type (e.g., wetland, side channel, forest) and area restored (# acres), floodplain area protected from bank armoring (# of acres), floodplain area protected from development or other land use change (# acres), hardened bank removal or levee/riprap removal (linear feet), levee setbacks constructed (linear feet, # acres), new side channels or reconnection of old side channels (linear feet or storage volume), salmon species benefitted (# of listed, non-listed species). Secondary evidence includes culvert replaced to restore fish passage or increase conveyance, logjam and or wood structures installed, riparian area planted, and other project-specific goals.

Answer question 3 here: The Stormy Reach of the Entiat River is characterized by a low-gradient, sinuous, unconfined channel with a gravel-dominated bed and an active floodplain. These characteristics provide a high-intrinsic habitat potential. Removal of the large levee within RM 19.3-19.8 represents the highest priority for habitat restoration within the Stormy and Gray Reaches according to the UCRTT Technical Memo ranking project opportunities identified in the Stormy and Gray Project Map Books (2013).

The Stormy Reach of the Entiat River is characterized by a low-gradient, sinuous, unconfined channel with a gravel-dominated bed and an active floodplain. These characteristics provide a high-intrinsic habitat potential. Removal of the large levee within RM 19.3-19.8 represents the highest priority for habitat restoration within the Stormy and Gray Reaches according to the UCRTT Technical Memo ranking project opportunities identified in the Stormy and Gray Project Map Books (2013).

As described in the Biological Strategy (UCRTT 2013), the priority Ecological Concern for the middle Entiat River are impacts to channel structure and form. The removal of the levee will directly address this priority concern and promote the natural river processes that it currently limits. This includes the enhancement of lateral channel migration, increased floodplain storage, the formation of pool and riffle habitat complexes, and increased large wood recruitment.

The middle Entiat River is also a Major Spawning Area for both Upper Columbia Steelhead (DPS) and Spring Chinook Salmon (ESU). Both spring Chinook and steelhead spawn immediately upstream and downstream of the levee, however the reach along the levee face is a long run with no riffle formation and has no recent history of redds. The removal of the levee will lengthen the main channel and will allow for the natural formation of riffle and pool complexes which will improve bed complexity and the formation of spawning areas.

Removal of the levee materials and rip rap will create immediate floodplain connectivity benefit for the ecology of the Entiat River. There are currently no geologic based reports to help identify the makeup of the levee fill, but surficial inspection indicates it is largely native stream gravels and cobbles. The riverward side of the levee is faced with a 1 to 2 foot layer of uniformly sized angular rip rap. The thickness of this layer and total quantity is uncertain, but would be in the range of 1,600 cubic yards assuming a 1.5 foot average thickness over a 30 foot slope length and along the 1,000 feet of levee. The balance of the levee material would be available for reuse in other stream restoration projects or could be distributed strategically to enhance existing Entiat River bar structures throughout the Gray and Stormy Reaches and also along proposed shorelines of the channel realignment areas in the floodplain adjacent to the levee removal area.

- 4. Is your project in a Puget Sound Partnership Priority Floodplain? (5 points)**
(Deschutes, Dungeness, Duwamish/Green, Elwha, Hood Canal, Lake Washington, Lower Skagit, Nisqually, Nooksack, Puyallup, Sauk, Skokomish, Skykomish, Snohomish, Snoqualmie, Stillaguamish, Upper Skagit)

Answer question 4 here: Yes

No X

- 5. Other benefits (40 points)**

Describe how your project maintains or improves agricultural viability, water quality, public open space/recreation access, economic development, or other important local benefits or values, and does not conflict with other objectives of this program. Projects receive points based on the importance of the result produced, the ability of the solution to address the overall stakeholder need and the long-term improvement.

- a. Agricultural viability (evidence of agricultural benefits include reductions in flooding (acres), protection from development (acres), improvement of drainage infrastructure (acres), or other capital or non-capital benefits to agricultural productivity).
- b. Water quality improvement [e.g., through stormwater infrastructure upgrades, treatment of a TMDL or 303(d) issue, reduction in sediment, restoration of wetlands or riparian areas, implementation of related best management practices, etc.].
- c. Public access and recreation (e.g., through land acquisition, the development of trails or other recreational infrastructure, etc.)
- d. Other floodplain values or services of local importance.

Answer question 5 here:

The project will potentially benefit numerous acres of pear and apple orchards and associated irrigation intake infrastructure. The Entiat Watershed Plan identified erosion and sediment load as an impact to agricultural infrastructure and the proposed project will increase storage of sediment and woody debris during flood events. This will also improve water quality by providing increased sediment storage.

The recent acquisition of the property has opened up 109 acres to public access that were previously off limits. No trails are currently planned for this site, but increased access at this and other Chelan Douglas Land Trust properties along the Entiat River will vastly improve river access for canoeing. The Middle Entiat is an untapped recreational opportunity for river trippers.

6. Cost-effectiveness (20 points)

- a. Project will be judged on whether the budget is appropriate to the project scope, and designed for project success.
- b. Describe how the project will be continued or maintained after the grant has been completed.
- c. If project cannot be fully funded, explain how the project could be scaled downward.

Answer question 6 here:

US Bureau of Reclamation has funded The Entiat Tributary Assessment and The Stormy Reach Assessment in 2009, the Stormy Reach Assessment Update in 2013 and the Stormy and Gray Reaches Project Map Book in July 2014.

They are committed to funding the current design process as part of a reach-scale effort (RM 16.1-20.8) with the intention of restoring natural stream processes in a cost-effective manner.

CCNRD is currently funded by the US Bureau of Reclamation to prepare a post-construction monitoring plan and the Bureau will partially fund implementation monitoring. The project budget includes two years of monitoring funding for CCNRD staff to evaluate the restoration actions and implement adaptive management actions as needed. Chelan Douglas Land Trust staff will continue their involvement in the project and participate in long-term monitoring and stewardship of the reconnected floodplain area. The project has been designed to restore natural stream processes so it is intended to be self-sustaining over the long term.

7. Long-term cost avoidance: (30 points)

- a. Describe how your project minimizes or eliminates future costs for maintenance, operation, or

emergency response. **(15 points)**

Answer 7.a. here:

Levee removal and removal of development rights from behind the levee will eliminate any future repairs or maintenance on the existing levee. Reduction of downstream flooding impacts specifically those from debris torrents will also reduce emergency response and maintenance to road infrastructure, private center-pier bridges and residences. Increased flood storage capacity will also reduce the potential flooding and impacts to the downstream landowners. Reducing impacts to roads saves costs associated with disruptions to infrastructure and increases reliability of these systems.

- b. Describe how your project accounts for expected future changes to hydrology, sediment regimes, or water supply resulting from other floodplain management efforts, land use changes, extreme weather events, or other causes. **(15 points)**

Answer 7.b. here:

The project improves floodplain access to attenuate changes in hydrology arising from climate change that could move the drainage from a snow-melt dominated regime to a rain on snow type regime. The fire season of 2014 was extreme in North central Washington and any increases in the frequency of extreme fire weather and subsequent thunderstorm flooding as a result of changes in climate will also benefit by increases in floodplain reconnection.

Salmon recovery efforts upstream of the site include numerous LWD structures installed in 2012 and proposed for installation in 2016 and 17. Improving floodplain reconnection at this site would also improve large wood recruitment at the site in the event of a large-scale flood event that moved installed and naturally occurring wood downstream.

8. Demonstration of need and support (30 points)

- a. Describe how your project is consistent with the intent of existing floodplain management or habitat recovery plans or is specifically identified through existing plans or work programs. (Elements of the project may have been developed through more than one planning process. Please identify the planning process used for each major element if they are not from a common plan.) **(15 points)**

Answer question 8.a. here:

County Multi-Jurisdiction Natural Hazard Mitigation Plan (2012)

The multi-jurisdiction plan adopted by Chelan County and the Cities of Cashmere, Chelan, Entiat, Leavenworth and Wenatchee through an extensive public process identifies actions to encourage development of land protection and management strategies to preserve open space for flood mitigation, fish habitat and water quality in the floodplain. These actions include: exploring funding for property protection, developing partnerships between flood mitigation and fish habitat to improve educational programs and identifying sites and working with landowners to benefit flood mitigation, fish habitat and water quality.

Entiat Watershed (WRIA 46) Management Plan (2004)

The watershed plan adopted by the County Commission in 2004 identifies the Core spawning area for spring Chinook salmon to be between RM 16.2 and 23.1.

NOAA Fisheries Upper Columbia Salmon and Steelhead Recovery Plan (2008)

The federal salmon recovery plan habitat restoration priorities are largely based on the Entiat watershed plan recommendations. The plan incorporates habitat improvement metrics and overall recovery goals and supports the high priority actions of the project in the Entiat River. Federal review and public comment periods were extensive and noted in the Federal Register.

The US Bureau of Reclamation completed a geomorphic reach assessment of the Stormy Reach of the Entiat in 2009. Removal of the large levee within RM 19.3-19.8 represents the highest priority for habitat restoration within the Stormy and Gray Reaches according to the UCRTT Technical Memo ranking project opportunities identified in the Stormy and Gray Project Map Books (2013).

The Entiat Watershed Management Plan (WRIA 46 Planning Unit 2004) and the Upper Columbia spring Chinook salmon and Steelhead Recovery Plan (Upper Columbia Salmon Recovery Board 2007) recommend the following restoration actions in the Entiat: increasing habitat diversity and natural channel stability by increasing in-channel large wood complexes, restoring riparian habitat, and reconnecting side channels, wetlands, and floodplains to the stream. This project proposes floodplain reconnection and riparian habitat restoration consistent with the habitat improvement recommendations in the watershed and salmon recovery plans.

In addition, the Biological Strategy (Upper Columbia Regional Technical Team 2013) identifies bed and channel form and reconnection of peripheral and transitional (floodplain) habitat as the highest priority salmon recovery restoration actions in the Entiat basin and the Middle Entiat is the priority assessment unit for protection and restoration. This document also describes levee removal as a Tier 1 action or restoration strategy for improving floodplain conditions to address ecological concerns.

- b. Describe which flood control authorities, Tribal Nations, local governments, lead entities, key stakeholders or decision-makers representing floodplain interests located within the river reach or affected by the project have provided letters of support explicitly endorsing the project and its outcomes for their interests. **(15 points)**

Answer question 8.b. here:

Letters of support will be forthcoming.

9. Readiness to proceed and complete the proposed phase of the project (25 points)

Describe how your project is ready to proceed with the scope of work, and your capacity to complete the project successfully and maintain it over time, including your project schedule and deliverables. Describe your experience with similar projects. If your project is acquisition only, describe how you will complete floodplain restoration subsequent to the acquisition.

Answer question 9 here:

The project is in the design phase and has a host of committed partners actively working on the project (see attached timeline).

The Chelan County Natural Resources Department (CCNRD) is a department within Chelan County government under the general direction of three (3) elected county commissioners. CCNRD has been actively involved in the development, public review, adaptive management and implementation of the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan for over twelve (12) years.

CCNRD is a successful and prolific salmon habitat restoration project implementer and has secured over \$20 million from various funding sources for these efforts, including but not limited to the Bonneville Power Administration, Department of Ecology, WA Salmon Recovery Funding Board and Mid-Columbia HCP contracts. CCNRD has implemented over 60 salmon habitat restoration projects in the Wenatchee and Entiat subbasins. These projects range in complexity from small riparian planting projects on private land to fish barrier removals on both public and private land to large floodplain reconnection projects requiring multiple years of planning and design with multiple entity coordination and negotiated agreements. CCNRD has successfully completed projects with BNSF Railways, WA Department of Transportation, US Forest Service, large organized private landowner groups, individual private landowners, irrigation districts and other local and state government landowners.

CCNRD managed the BNSF Lower White Pine floodplain reconnection project in the Wenatchee watershed which was built in 2013. This high priority restoration project re-connected 152 acres of floodplain habitat in Nason Creek. Design incorporated significant landowner and stakeholder comments. This project also involved extensive negotiations with BNSF because it included construction of a bridge in the BNSF main line. CCNRD has implemented two other floodplain reconnection projects in Nason Creek. The 2007 and 2009 oxbow reconnections as well as the Lower White Pine project demonstrate CCNRD ability to manage, develop, and implement large scale projects that involve negotiations with nearby utilities and infrastructure. CCNRD has worked to successfully implement projects on Chelan Douglas Land Trust property in the Wenatchee and Entiat basins. The Dillwater Project (2012) was used as a model to develop low-impact project implementation guidelines for the current effort on CDLT land in the Middle Entiat.

10. Pilot project and leverage opportunities (25 points)

- a. If applicable, describe how your project could serve as a pilot effort or result in changes or results with broader impacts to the state. **(10 points)**

Answer question 10.a. here:

- b. If applicable, describe how your project leverages existing investments, such as SRFB, FCZDs, Dike Districts, TMDLs, WWRP, ESRP, NEP, and other funding sources. Evidence of this will be based on the amount and diversity of the leveraged funding sources. **(10 points)**

Answer question 10.b. here:

The US Bureau of Reclamation has invested in 5+ years of Tributary and Reach Assessments in this reach of the Entiat River. In addition, \$250,000 has been secured from USBR for the design process including project management by CCNRD, the Priest Rapids Coordinating Committee has provided funding to the Chelan Douglas Land Trust to acquire 109 acres for \$535,000 and Bonneville Power Administration is planning to fund around \$590,000 toward project implementation.

- c. If applicable, describe how your project addresses inequity or social justice issue by benefitting underserved communities. **(5 points)**

Answer question 10.c. here:

11. Budget (add more tasks as needed).

Task	Amount Requested from Ecology*	Other Funding for Project** (20% of Total Cost Minimum)	Total Cost
Task 1—Land Acquisition		\$536,000 PRCC	\$536,000
Task 2 CCNRD Project Management Design, permitting, outreach phase		\$185,640 USBR/BPA	\$185,640
Task 3 Engineering Consultants Design		\$200,000 USBR/BPA	\$200,000
Task 4 Project Construction	\$500,000	\$590,000 BPA	\$1,090,000
Total			\$2,011,640

*Amount requested from Ecology under this grant program

**Other sources of funding dedicated to this project. Insert narrative below that details what the source of funding is and whether or not it has been received or applied for but not yet received.

Match must be at least 20% of Total Project cost.

Narrative and/or Table of other funding sources for project, here:

Task 1- Land Acquisition has been funded by Priest Rapids Coordinating Committee

Task 2- Project management for 2014 has been funded

Task 3-Project Design for 2014 has been funded

Task 4 Project Construction has not been funded.

If it's not possible to fully fund this proposal, please describe a *phased* approach that would still significantly advance the effort:

12. SCOPE OF WORK: Please attach a Scope of Work and schedule. If your proposal is a phase of a larger multi-year project, please place this proposal in the context of the overall project and provide preliminary cost projects to complete the project.

This section describes the work to be carried out by describing major tasks occurring each year. This information is also summarized in Figures 3 and 4. The main tasks include project management, field data collection, landowner and stakeholder coordination, outreach, assisting with development of project design, drafting and obtaining permits, construction management, and monitoring. These tasks would be coordinated with the project engineer and/or design team, as appropriate, and each task is further described below.

Project Management

The project management approach would generally follow the Project Management Body of Knowledge (PMBOK) Guide by developing a project work plan as one of the first work products. This work plan would help identify project stakeholders, roles/responsibilities, project tasks and a work schedule. A draft work breakdown structure and project schedule have been developed for this proposal to identify the major project tasks and timelines. Figures 3 and 4 would be updated as part of the development of the project work plan.

Field Data Collection

This task would start with review of existing information such as the Reach Assessment, map books, and technical memorandums prepared by Reclamation and the RTT for this site. The project sponsor would also review LIDAR, historic aerial photographs, County soil survey, existing ground and surface water data, fish use data, and discuss site conditions and land use history with the landowners. The sponsor would coordinate a field visit to the site in early spring with the design team to document existing conditions, review project concepts and develop a list of potential data collection sites.

Field data collection needs would be identified and outlined in a technical memorandum following the review of existing information and with input from the design team. Field data collection in 2014 would include spot elevation survey by CCNRD staff (for LIDAR verification), wetland determination, ground and/or surface water data collection, vegetation surveys, habitat assessments and general ground truthing of the Reach Assessment and map books that have been developed for the project area. Any field data collection that involves excavation (ground water wells and/or geotechnical surveys) will need to be coordinated with the BPA Environmental Compliance Lead to determine permit requirements including possible HPA for below OHWM work and Section 7 and Section 106 consultation to meet requirements for ESA and cultural resources. Other state and local permits may need to be secured for this work.

In 2015, CCNRD would work with the design team, Reclamation, and project engineer to identify remaining data collection needed in order to advance designs to a permit ready or approximately 60% design stage. Examples of the type of information that may be collected in the second field season include: additional ground and/or surface water data, water temperatures, wetland delineation, geotechnical sampling, assessment of work area impacts, identification of work limits, staging areas, work access, and material stockpile areas.

CCNRD staff would continue field data collection in 2016 and 2017, as needed.

Landowner and Stakeholder Coordination

Landowner and stakeholder coordination will be ongoing throughout the project so it is not depicted as a task in Figure 3, the draft project timeline. Landowner coordination would start with a meeting with Chelan Douglas Land Trust (CDLT). CDLT has requested that they be the primary point of contact with the landowner until a purchase option has been secured on the property. The purchase option will define that site access be granted and all site access for 2014 field surveys will be coordinated with CDLT for the left bank project elements. The right bank project elements will include coordination with USFS and other landowners for access to collect field data and implementation.

In winter 2014-2015, CCNRD staff would work with Reclamation and the project engineer to coordinate the review of design alternatives with the following stakeholders: landowner, EHSC, RTT, regulatory agencies, and the design team. This process might involve routing paper or electronic copies, giving presentations, and/or one on one meetings to describe the range of potential actions, biological benefit, and preliminary modeling results. Stakeholders would be given a comment period and all comments provided will be summarized in a table, meeting notes, and/or memorandum for the file record. All comments received would be responded to and/or incorporated into selection of the preferred alternative.

Outreach Plan

An outreach plan (similar to the one developed for Nason Creek: Upper White Pine) would be developed to define the project goals and key messages to communicate with stakeholders. The outreach plan would also list outreach actions proposed for the pre-design, alternatives analysis, design, permitting, and construction phases of the project. Outreach would be closely coordinated with Cascadia Conservation District and other project sponsors and landowners.

Permitting

CCNRD staff involvement with the project design development as well as the landowner and stakeholder coordination will assist with securing local, state, and federal authorizations for this project. CCNRD will coordinate with BPA and the landowner very early in 2014 to secure cultural resources review and other permits if needed, for any field data collection that involves earthwork on site.

CCNRD will meet with regulatory staff from local, state, and federal permitting agencies to review the conceptual design alternatives. Comments provided by regulatory agencies will be used by the design team to select the preferred alternative. CCNRD will also schedule a site visit with regulatory agencies to review the preliminary design. CCNRD will work with the design team to incorporate regulatory agency comments into the design plans. CCNRD will coordinate with the BPA Environmental Compliance Lead and the fisheries agencies (WDFW, USFWS, and NOAA) to discuss work window timing in order to minimize impacts to ESA species and allow construction to be completed on schedule.

In fall 2015, CCNRD will prepare a Joint Aquatic Resource Permit Application for submittal to the County, WDFW and the US Army Corps of Engineers. CCNRD will work with BPA

Environmental Compliance staff to ensure that the design avoids and/or minimizes impacts to cultural resources and ESA listed species. If possible, the project will be designed to meet the BPA programmatic ESA consultation (HIP III). CCNRD will also review the SEPA checklist prepared by the consultant. CCNRD will review other documents that the consultant may prepare for the local permitting process such as the wetland variance, riparian variance and/or shoreline permits or exemptions.

In winter 2015-2016, CCNRD will submit permit applications and subsequently track all permit submittals. This will include responding to agency requests for additional information and it may involve setting up additional meetings and/or field visits to ensure all authorizations are obtained by June 2016.

Design

CCNRD will work with Reclamation, the project engineer, design team, and landowners to develop a project design that is supported by all entities moving forward with each design stage. In fall 2014, CCNRD would work with stakeholders to develop design alternatives that are consistent with RTT guidance to meet the biological objectives for salmon habitat restoration in the Entiat River. These design alternatives will also need to be supported by the landowner. In winter 2014-2015, CCNRD will route the design alternatives to a larger stakeholder audience for review and comments in order to help the design team select the preferred alternative.

Once the preferred alternative has been selected in early 2015, CCNRD will work with Reclamation and the project engineer to incorporate comments received into the proposed design. CCNRD will also work with the design team to develop 30% designs that are likely to be supported by regulatory agencies, RTT, and the landowner. 30% designs will be used to develop material lists and cost estimates and to determine if there is a need to start materials acquisition early.

In the fall of 2015, CCNRD staff will work with Reclamation and the project engineer to develop the more detailed aspects of design that relate to the project permitting. For example, this might include identification of work isolation methods, construction sequence, construction access, removal and fill volumes, work limits, and material stockpile and/or hauling locations.

In Spring 2016, CCNRD staff will work with Reclamation and the project engineer to ensure that final design and specifications are consistent with stakeholder input to date. CCNRD will prepare bid documents to hire a contractor for summer 2016 construction.

Implementation

CCNRD will be responsible for hiring contractors for construction and inspection of the project. CCNRD will also be responsible for securing all landowner agreements and construction easements. Project materials including, logs and plants will be arranged to be purchased either by the contractor or directly by CCNRD depending on quantities and timing. CCNRD will

contract with a nursery to ensure seed collection from local materials and orders are in place for installation following completion of earthwork.

CCNRD provides contract observation, surveying, de-fishing, turbidity monitoring and other services during actual construction.

Monitoring

CCNRD will work with Reclamation and other agencies conducting intensive monitoring in the sub-basin to develop a detailed monitoring plan that outlines proposed actions to monitor project implementation and effectiveness so the following description may be modified. Monitoring of identified physical and biological characteristics will be conducted prior to construction. Following construction, CCNRD will conduct implementation monitoring to ensure the project was constructed as outlined in the project plans. Implementation monitoring will start with preparation of an as-built and post-construction photo documentation. This will be followed up with high flow photo documentation in 2017 during spring run-off conditions. A stem count and/or percent cover data will be collected to document native plant re-vegetation survival rates. Fish presence/absence, water levels and/or water temperature and habitat may be monitored to evaluate site conditions during the first year following construction. A monitoring report will developed to document all findings and compare those to the project plans and goals/objectives.

13. Maps: Please attach at least two (2) maps to your application. The first map should be a vicinity map and the second should be a map of your project.

14. Planting Maintenance/Survival: If your project includes plantings, please provide a description of how you will ensure plant survival and maintenance.

CCNRD is currently funded by the US Bureau of Reclamation to prepare a post-construction monitoring plan and the Bureau will partially fund implementation monitoring.

The sponsor has many years of experience designing and installing successful plantings in the Entiat and Wenatchee watersheds. The best way to ensure plant survival starts with the design process and focuses on planting the right plant, at the right time and in the right place. The site will be prepped and heavily mulched with wood chips and soil moisture should negate the need for supplemental watering. Browse guards will be used for some species.

Chelan Douglas Land Trust staff will continue their involvement in the project and participate with CCNRD in long-term monitoring and stewardship of the reconnected floodplain area. The project has been designed to restore natural stream processes so it is intended to be self-sustaining over the long term.

15. Photos: Photos are not required, but if you think they enhance our understanding of your application, please include them. We are particularly interested in “before” photos that can be matched with “after” photos.

16. Executive order 05-05, Archaeological and Cultural Resources (online at http://www.governor.wa.gov/office/execorders/eoarchive/eo_05-05.pdf) directs state agencies to

review all capital construction projects for potential impacts to cultural resources to make sure that reasonable action is taken to avoid adverse impacts to these resources. If this grant program is funded by the 2015 Legislature, successful grant applicants will be required to submit additional information to Ecology to comply with this Executive Order.

Additional factors in ranking and award: This is a very new funding source. To ensure that projects meet the objectives of the program, these additional factors will be considered in creating the proposed funding list:

- **Balance of project types:** Balance funding ready-to-proceed construction projects with funding pre-construction activities. This balance in project types is vital to ensuring success over time.
- **Geography:** There is strong interest in ensuring that projects in all areas of the state receive funding.
- **Advancing multi-benefit floodplain management:** It is important that the project list advance the principles and practical application of multi-benefit floodplain management.

Certification

I certify to the best of my knowledge that the information provided above is true and correct and that I am legally authorized to sign and submit this information on behalf of the organization applying for this grant.

Signature _____ Date _____

Printed name and Title _____

Name of Organization Applying for Grant _____

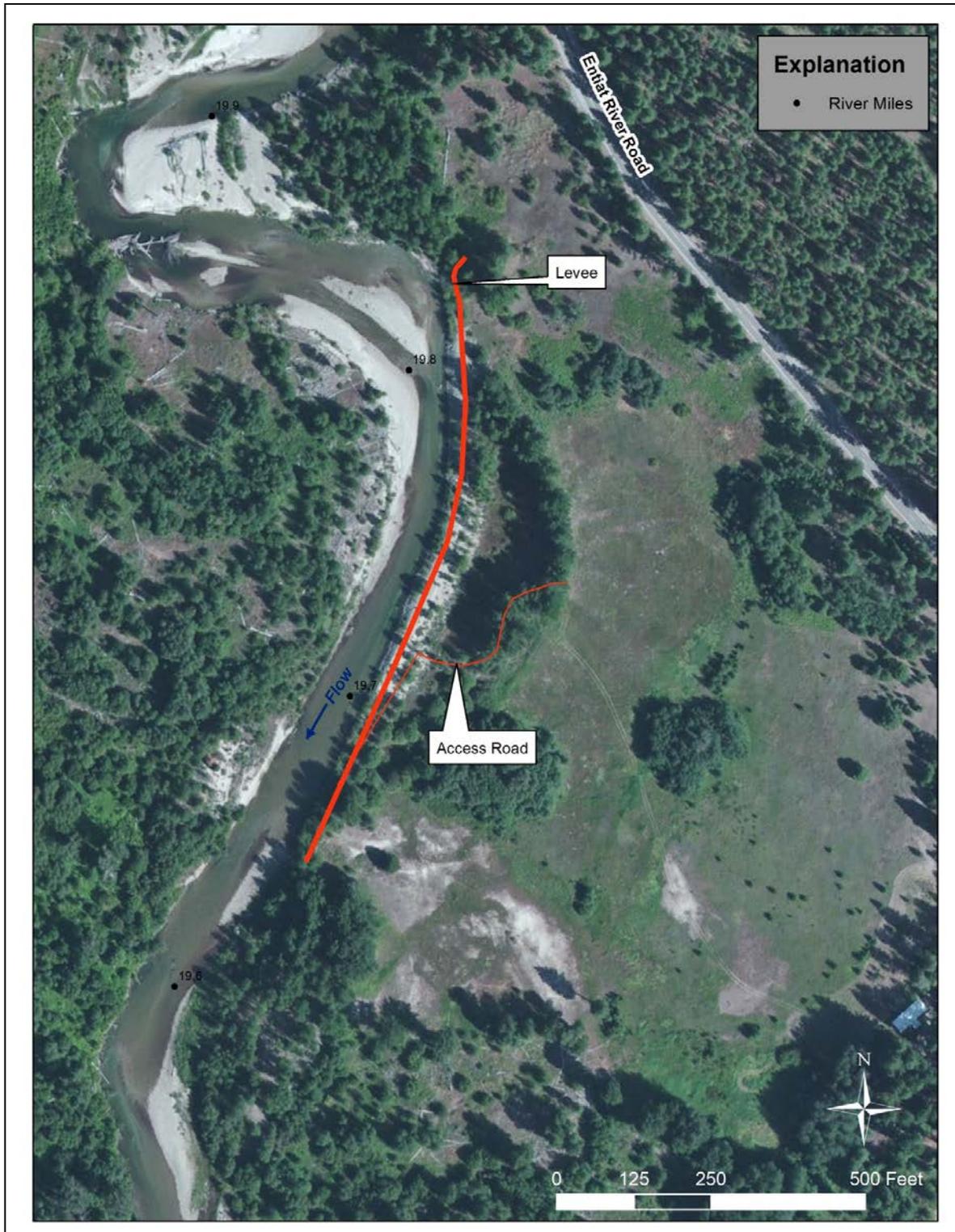


Figure 17. A large portion of the floodplain area located behind the levee near RM 19.75 has been cleared of mature riparian vegetation. Levee removal and subsequent channel relocation in this area may require short-term bank stabilization to reduce the risk of runaway channel migration.

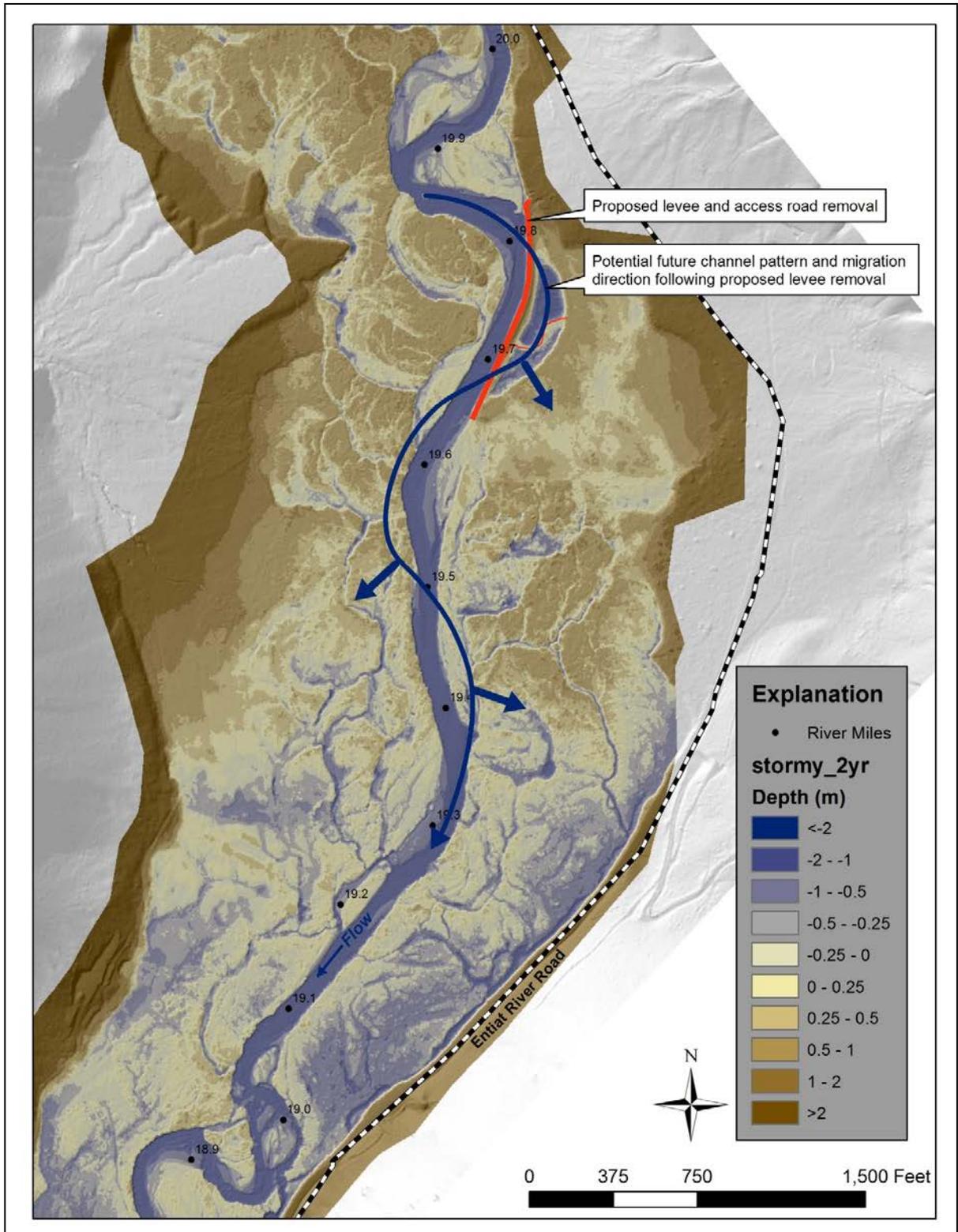


Figure 12. Given potential levee removal, the channel is likely to increase sinuosity and channel migration.

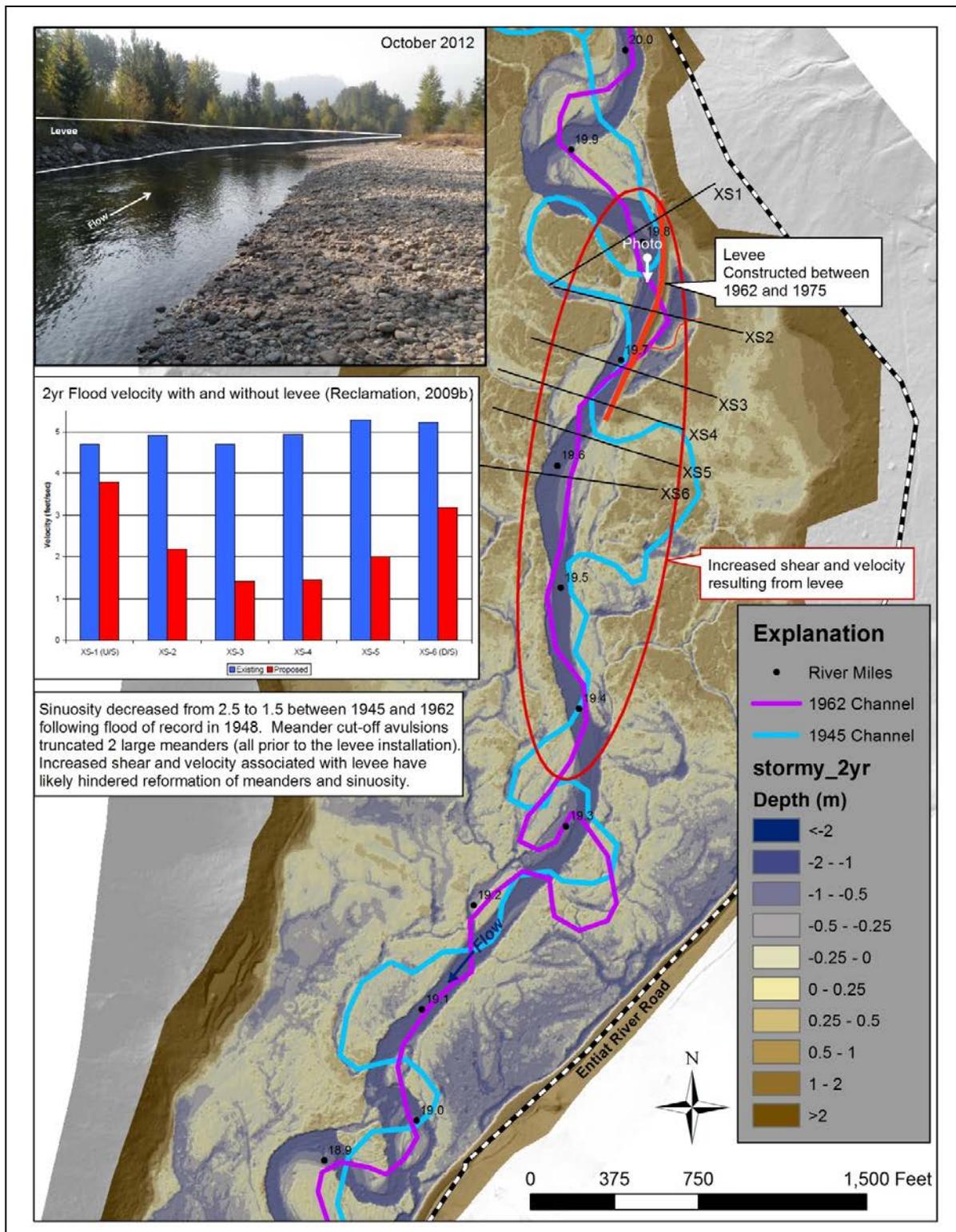
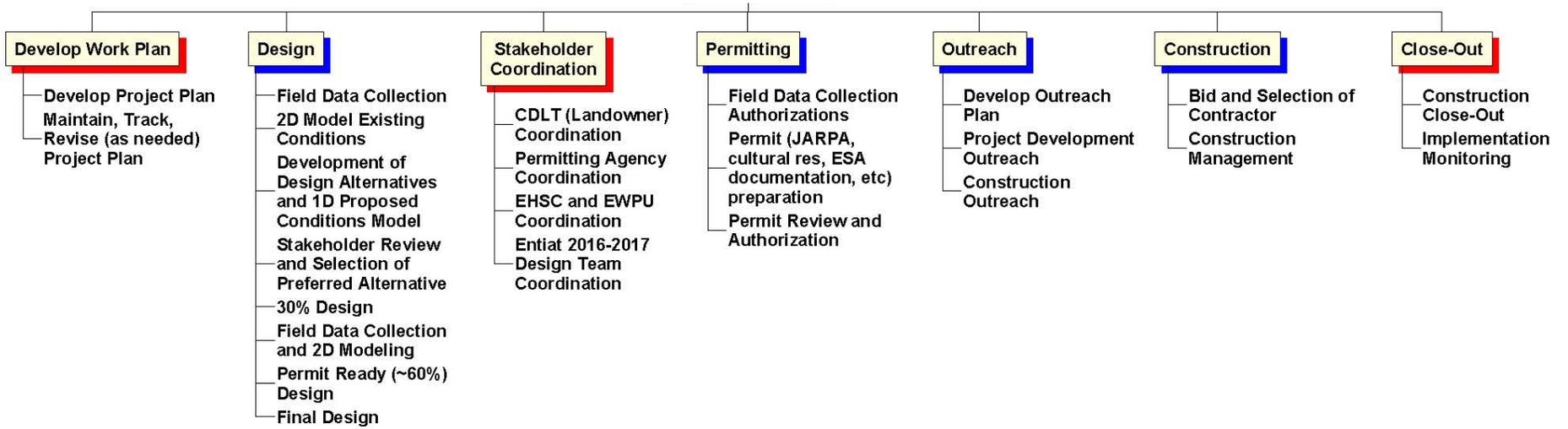


Figure 11. A levee near RM 19.75 has restricted channel migration, reduced floodplain connection, and increased instream velocity affecting downstream channel function (reduced overall sinuosity and floodplain connection).

Figure 3: Stormy Reach Project B Work Breakdown Structure (Major Tasks)





Entiat RM 19.8 Levee on left bank looking downstream



Entiat RM 19.8 Levee on left bank looking upstream.

3. HYDROLOGY

“Hydrology” includes events such as large floods and associated protection works, ice events, and debris torrents. The years of 1894, 1948, and 1972 are the largest historical floods reported on the Entiat River, with more damaging effects from 1948 and 1972 when more people and infrastructure were present in the basin. There were additional large floods in 1956, 1974, 1977, 1989, 1995, and 1997 reported in localized drainages due to thunderstorms, most of which were associated with debris torrents. A detailed timeline is provided below.

Year or Period	Hydrology Event
1894	Columbia Basin-wide flood noted in other nearby basins to be of similar or slightly less magnitude than the 1948 Flood; the dam and bridge at C.A. Harris Mill washed out by flooding (Erickson 2004)
1924	Localized flooding in Goman, Byrd, and Ribbon Cliff canyons (USFS 1996)
pre-1948	Flood control structures (Erickson 2004) <ul style="list-style-type: none"> • 28 bank erosion or flood control structures along 2.6 of 21 total miles of bank estimated to be placed prior to 1948 flood; noted to be low gravel levees and bank protection works (i.e. riprap)
1948	Flood of record (~10,800 cfs at old Keystone Gage at RM 0.6; #12453000); <ul style="list-style-type: none"> • “Damage from the 1948 flood was severe on the Entiat River, from Ardenvoir to the mouth. Further investigations will be necessary to determine a solution. It is believed that approximately 2 miles of channel clearing and rectification, together with about 6,000 feet of heavy rock riprap bank protection, are economically justifiable. Estimated costs are \$93,000 Federal and \$7,000 non-Federal.” (ACOE 1952) • 21 of 28 structures damaged, covering 5,350 feet along the left bank and 8,350 feet along the right bank of the Lower Entiat between RM 8 and the mouth (ACOE communication) • washed out last remaining dam on the Entiat River (Ardenvoir Mill Dam), damaged stream banks and levee systems • Soil Conservation Service and local funds used to repair dikes and banks to prevent further loss of farmland (CCCD 2004)

Year or Period	Hydrology Event
1949	<p>Flood protection work accomplished by ACOE or private landowners</p> <ul style="list-style-type: none"> ○ ACOE repaired 2,024 feet of levee and provided 910 feet of bank protection in 4 priority areas ○ Plans were drawn on 1949 ACOE map and Projects A thru F noted to be completed in February and November of 1949 (Erickson 2004); general areas are given below but exact extents are not all known; river miles are estimates <ul style="list-style-type: none"> ▪ Project F (RM 1.8) – Bank protection or levee, possibly on outside of meander bend on right side or on floodplain on left side, uncertain if constructed ▪ Project F (RM 2–2.1) – Bank protection or levee, possibly levee on left side, uncertain if constructed ▪ Project E (RM 3.1) – Bank protection possibly on right side ▪ Project D (RM 4.2) – Bank protection and levee, notes document that property owner constructed 700-foot-long levee using 4,000 cubic yards of material ▪ Project C (RM 4.9–5.0) – 410 feet of rock riprap on right bank (ACOE 2001) ▪ Project C (RM 4.7–4.8) – 400 feet of rock riprap on right bank (ACOE 2001) ▪ Project B (RM 6.3–6.6) – Left bank (near Roaring Creek) (ACOE 2001) – various bank protection and levee projects ▪ Project B (RM 6.6–6.7) – Right and left banks (ACOE 2001). 1,860 lineal feet rock armor to banks and levee (right bank); 145 lineal feet above bridge (left bank); 1,625 lineal feet below bridge (left bank); 275 lineal feet above bridge (right bank) ▪ Project A (RM 7.9–8.0) – Bank protection on right bank
1952	RM 8.4 right bank (ACOE 2001) – 255 lineal feet armored bank and levee; 152 lineal feet was destroyed in 1952 and repaired by Chelan County Roads
1956 (July 13)	Flash flood covers Highway 97 with up to four feet of mud, water, and debris (USFS, 1996)
1958 (October)	USGS removes old stream gage on the Entiat River near Entiat (RM 0.5)
1971	RM 16.0-26.0 right/left bank protection (following 1970 wildfires and 1971 high water) (ACOE 2001)
1972 (January 16)	River ice jams blasted in Entiat River. Entiat River freezes from the bottom upward (termed “anchor ice”) (CCCD 2004)
1972 (March)	McCrea Creek slope failure and debris-dam-break flood (Andonaegui 1999)

Year or Period	Hydrology Event
1972 (June 10)	<p>Flood recorded at the Ardenvoir Gage (RM 18; #12452800) was 6,430 cfs</p> <ul style="list-style-type: none"> • Preston Creek slide and flood kills four people; mud & debris also occur in Brennegan, McCrea, and Fox Creeks (CCCD 2004) • Debris torrent near Brief and Preston Creek (RM 20) (USDA 1979 as referenced in CCCD 2004) • Six-foot-high debris dam formed in Entiat River, backed up water, and then broke causing a flood torrent (Erickson 2004) • Preston Creek slide area debris removal (CCCD 2004) • Entiat river channel changed below Fox Creek (RM 27.7) to protect road
1977 (June 13)	<p>Crum Canyon Flood (2nd storm on June 25); followed a fire in Crum Canyon in 1976; Ringstead Canyon also flooded (USFS 1996; USDA Crum Canyon Flood Rehabilitation Report)</p> <ul style="list-style-type: none"> ○ ACOE stabilization project after 1977 flood event near confluence of the Entiat River and Crum Canyon about RM 7.8 (ACOE Entiat watershed files as referenced in Erickson 2004)
1972, 1974, and 1977	Landslides noted (Caldwell and Beecher 1995)
1977 (December)	RM 8.0 – left bank protection completed near mouth of Crum Canyon (ACOE 2001); 350 lineal feet of road/bank protection and removal of silt/debris from river cross-section
1989 (July)	Roaring Creek flood (confluence with Entiat at RM 6.15) (USFS 1996)
1989 (August 19)	Dinkelman flood; noted that many small Chinook salmon perished (no defined confluence with Entiat but enters valley at about RM 4.6) (USFS 1996)
1991 (January 10)	Ice dam in Entiat blasted; largest build-up noted in 50 years, location unknown (CCCD 2004)
1995 (February 2)	Flood on Potato Creek (Marsh 1995)

Year or Period	Hydrology Event
1995 (May 19)	<p data-bbox="500 247 1373 310">A debris torrent scoured lower Pope Creek (USFS written communication, 1995)</p> <ul style="list-style-type: none"> <li data-bbox="500 331 1360 394">• Resulted in a large quantity of material on the Pope Creek fan, spread out over a large area (~20 acres) <li data-bbox="500 415 1403 478">• The Entiat Valley Road (Forest Road 51) was impassable, with sediment and small debris deposits on the road <li data-bbox="500 499 1403 678">• The event plugged the existing channel at the mouth of the canyon and the stream shifted to an upvalley location on the fan, passing across the valley road and through a group of six summer homes. The structures themselves were not damaged; however, the area surrounding the homes is covered with from 1" to 12"+ of sediment and small woody debris <li data-bbox="500 699 1354 762">• Most of the large rock and woody debris that exited the mouth of the canyon retained near the mouth of the canyon <p data-bbox="500 783 873 804">June 1995 work done by USFS:</p> <ul style="list-style-type: none"> <li data-bbox="500 825 1170 846">▪ Clearing of the inlet basin for the Pope Creek culvert <li data-bbox="500 867 1110 888">▪ Cleanout of the barrel of the Pope Creek culvert <li data-bbox="500 909 1370 972">▪ Cleanout woody debris from the Pope Creek channel below the valley road <li data-bbox="500 993 1279 1014">▪ Channel restoration immediately adjacent to the Wixson cabin <li data-bbox="500 1035 1365 1119">▪ Channel restoration work at the mouth of the canyon above the actual diversion site (removal of loose large woody debris and channel armoring) <li data-bbox="500 1140 1289 1161">▪ Clean up of the valley road and repair of road shoulder damage
1997 (April 15)	<p data-bbox="500 1171 1373 1276">Debris flow in un-named stream that flows through "Entiat River West" for about 800 feet then into the Entiat River across the valley from Dill Creek. (Archibald 1997)</p> <ul style="list-style-type: none"> <li data-bbox="500 1297 1403 1360">○ Considerable deposit of mud and debris on the alluvial fan where the un-named stream meets the valley bottom <li data-bbox="500 1381 1338 1444">○ Estimated volume of mud and debris deposited on the fan to be approximately 2,600 cubic yards (1000 feet x 70 feet x 1 foot deep) <li data-bbox="500 1465 1360 1507">○ Newly-excavated channel about 100 feet long was made by unknown source and pushed flow back into the abandoned channel
1997 (August 26)	<p data-bbox="500 1518 1373 1581">Potato Creek debris torrent from severe thunderstorm (USFS Entiat Ranger District 1997; USFS 1996)</p> <ul style="list-style-type: none"> <li data-bbox="500 1602 1354 1665">• Variable amounts of timber blown down by storm and blocking area roads had to be cleared <li data-bbox="500 1686 1386 1906">• Lower Potato Creek (Gene Creek area and down) experienced a debris torrent involving high runoff, sediment, and woody debris. The floodplain area functioned to dissipate energy and trap all of the large material (rock and wood). A high flow surge laden with fine sediment reached the lower canyon and exceeded the capacity of both the lower box culvert and the Valley Road culvert; however, both structures were clear following recession of the high flow

Year or Period	Hydrology Event
1997 (August 26)	Mud/debris torrents issued from Stormy Creek after a high intensity thunderstorm (Archibald 2006 sediment monitoring report)
2001	Lowest total water yield for 43-year period of record at the Entiat near Ardenvoir USGS gage (CCCD 2004)
2006	Debris flow near RM 12.75 on north canyon wall of un-named drainage (P. Archibald, personal communication, 2008)