PROJECT: 21-1050 R, Stabler Bend Side Channel 2021

Sponsor: Underwood Conservation Dist Program: SALMON ST PROJ Status: Application Resubmitted

MEETING: Initial Review

Shared: 4/2/2021

Review Status: Needs more information

Considerations:

Topics	Comments
Review Panel Comments - Initial	
Questions (response required)	
	Have there been any changes or updates since the project was submitted and reviewed in 2020?
	Reply: This project did not significantly change from the 2020 application. All project elements are the same and the 2020 project was cleared for funding. A few minor adjustments are described here. We are no longer proposing a third, optional logjam in the mainstem. This was removed from the budget altogether. Some of the budget numbers have also been updated and adjusted slightly. Wetlands have now been delineated and impacts reported on, initiating environmental review with relevant permit agencies; since we believe we will be enhancing wetlands with this project, we have removed the optional wetland enhancement concepts from both the design and budget. We have prepared a no-rise flood-level memo, documenting that we expect a no-rise effect from this project. Other permit processes have begun, including SEPA, HPA, USACE consultation, etc. Our consulting design firm has provided an updated Plan Set, dated March 1, 2021, and attached in PRISM, which: • Added more detail about the ford crossing (sheet 9) • Removed the optional wetland enhancement areas and adjusted the revegetation boundaries (sheet 11) • Added a quantities table (sheet 2) • Added more details to the large wood typicals (sheet 10)
	Has there been a disposal site identified for the excavation spoils?

	Reply: Yes. We will dispose excavation spoils on the same property as the project as approved by the landowner, in another area completely away from the water and upland of the floodplain and riparian area.
Improvements to Make Project Technically Sound (response required)	
	The project sponsor should provide more information on the potential for channel migration to impact the long-term sustainability of fish passage into and out of the side channel. Why is the side channel considered a relatively stable location (p. 11 of the design report)? Please describe the type of adaptive management efforts and potential costs that may be required if channel avulsion impacts fish passage through the side channel. This reach of the Wind River is quite dynamic and shows evidence of active channel migration. The Review Panel is concerned that sediment deposits could block ingress to or egress out of the side channel, particularly if the river migrates away from its current location. Hydraulic models are excellent tools for evaluating flow conditions, but they rely on a static representation of channel conditions and do not account for changing conditions from sediment transport and deposition.
	Reply: While we cannot provide certainty that this side channel will perform perpetually as designed, it does stand out as having an excellent inherent configuration, and ready to have perennial flow activated by a relatively short inlet channel that has been configured to optimize flow and sediment transport conditions. The existing geomorphic setting, combined with proposed actions, support side-channel longevity. First, the mainstem Wind River at the location of the side-channel inlet has been in the same location for at least the last 68 years (see historical aerial photo sequence attached in PRISM). In contrast to the rapid past migration of the downstream bend, this is not an area likely to see significant lateral channel migration due to the river-left terrace just upstream and river-right floodplain fill/development across and downstream. Furthermore, the side-channel inlet takes off from the mainstem upstream from a riffle crest (hydraulic control) that has been in the same general location for decades. These factors suggest that this is a suitable location for a side channel inlet; similar locations for constructed side-channel inlets have proven sustainable for many years on numerous other projects throughout the PNW. The side channel is currently disconnected due to fill placed for road access to the floodplain. This project will reconnect the side channel by constructing an inlet through the fill/road berm. The proposed log jams at the inlet and just downstream in the side channel are placed to help scour and maintain sediment transport through the channel inlet. The inlet location has been selected at an existing scour pool, and will be enlarged during construction to reduce the potential for initial high water to scour and transport alluvium into the inlet. Coarse alluvium such as gravel and cobble will be bedload that the river transports past, downstream of, the side channel inlet. (The inlet mouth elevation is higher than the scour pool.) Suspended load such as sand will be transported into the inlet channel, but the inlet channel is steeper than the rest of the existing side channel so sediment entering the inlet will tend to flush through.

The jams at the inlet also help maintain the side channel width, thus reducing the potential capture of the mainstem within the relict side channel alignment. The inlet slope is 0.93%, which is steeper than the 0.71% side channel average slope, and steeper than the river average slope of 0.4%. Thus, the inlet is configured to transport sediments that move through the reach. Deposition may occur midway or more down the side-channel where localized roughness and mild slopes may cause flows to spread out into the floodplain during flooding, likely creating a multi-threaded, anastomosing-type channel and wetland complex.

We acknowledge that a stochastic event such as a large wildfire or landslide could increase mainstem large wood loading and even conceivably form a large logjam that forces much more flow into the side channel, perhaps even causing side channel expansion and an avulsion. But this is a scenario that also already exists in the channel migration corridor even without a new and relatively short inlet channel. Likewise, such an event could cause a logjam that blocks the new inlet. Other reach-scale channel changes, including avulsions, are certainly possible. UCD, USFS, and Inter-Fluve staff have been working in this reach for more than 20 years. Geomorphic studies have been conducted on this reach since the late 1990s and we have been tracking conditions since then through various efforts. We have anticipated for a long time the potential for a neck cut-off avulsion across the downstream meander bend (the large gooseneck bend). See the attached Design Report, page 6, for discussion of this possibility.

If such an avulsion were to occur, there will be some incision that runs upstream for an unknown distance. The side channel inlet is at an existing pool tail out (lower than the riffle crest). If mainstem incision happens to go upstream this far, the inlet may remain low enough to maintain some, if less, flow. In addition, the proposed side-channel reconnection would help supply water to the abandoned portion of the mainstem, thus further increasing the availability of off-channel habitat for steelhead that might otherwise be lost due to the avulsion.

At some point in the future if the stream channel were to avulse through the side-channel alignment, or in another location across the large point bar (both scenarios of which are certainly possible over the long-term during large floods), we do not envision it would create any fish passage issues. We therefore do not envision needing significant adaptive management efforts or incurring any costs as referred to in the question. UCD is not indefinitely funded to maintain this project, but we do expect ongoing restoration funding in the Wind River from Bonneville Power Administration, and should a minor future modification to the project be necessary, we are confident we could act on it. In addition to expecting some amount of likely funding for ongoing watershed work from BPA, the site has a dedicated landowner and an established access road.

The project objectives should be SMART- only the wood quantities objective is actually specific and measurable. Perhaps fewer, but more specific objectives, such as the amount of new rearing or spawning habitat, the increased number or areal extent of

	pools, a 7-day average peak water temperature target, or the percentage of allowable cover for invasive species after 3 years of treatment.
	Reply: We have set measurable objectives that can be found in the PRISM application, under Restoration Metrics, as follows. • Length of side channel juvenile salmonid rearing habitat reactivated and re-connected to the Wind River, year-round = 0.34 mile • Acres of side channel reactivated as juvenile salmonid rearing habitat = 0.6 • Log jams constructed = 2 • Number of logs used in log jams = 37 • Pools re-activated, created or scoured from log jams = 8 • Acres of riparian area treated for weeds and established with native plants = 3.5 • Length of riparian area with improved vegetation (including both sides of channel) = 0.68 miles • Average width of riparian area with improved vegetation (on each side) = 50 feet
General Comments (response not required)	
	In 2020, this project was submitted and reviewed (20-1044). There were many questions from the local and state reviewers along with substantial replies from the sponsor. The project was eventually cleared, but not funded. Despite this, significant concerns remain regarding the geomorphic and sediment processes at the site in relation to achieving the side channel activation objectives.

	Reply: Please see our answers to other, related questions, discussing geomorphology, history, and sediment processes. This project did not significantly change from the 2020 application. All significant project elements are the same and the 2020 project was cleared for funding. The final TAC ratings included “High” scores under Benefits to Fish, Certainty of Success and Cost, and the application scored just 7.5 points below the funded projects on the list. If sufficient funding had been available, we would have been funded. In our experience and observation of stream restoration, natural stream dynamism and human-induced processes make all stream projects something of a risk to undertake, not just this particular one. While striving to meet fish habitat and landowner needs, we designed this project around strict geomorphic objectives so as to minimize the inherent risks and provide the most certain, sustainable side channel with the most biological benefit for the site. The Stabler Bend floodplain is historically dynamic. LiDAR and ground observations show relict high-flow channels, perhaps previous main channels, and a scrolling meander bend moving south. Part of the historic value of this floodplain area was its anastomosing and anabranching, dynamic nature. The existing roadway berm, proposed for excavation and opening under this project, cut off much of that potential. With this project, the relict side channel will once again be activated and free to move along the floodplain as it did historically. While we acknowledge that there is inherent risk in stream habitat projects, including this one, we developed those aforementioned geomorphic objectives to capture enough streamflow for an active side channel and sufficient habitat lift, while taking preventive measures against too much sediment and too much stream flow. These objectives led us to the engineering of the ELJs, pools, and streambed substrate proposed in our design. We have designed for and mitigated these dynamics and risks using appropriate and proven restoration methods, rather than walking away from a valuable, shovel-read habitat project. With years of planning and design completed, we are more than ready to proceed with this important project opportunity.
	A very minor comment for the application and design report: the correct reference should be to a "relict side channel," instead of "relic". Relic is a noun, typically an object of historical significance, while relict in this case refers to a relief feature on the landscape that remains after other parts have disappeared and can be used as an adjective.
	Reply: We appreciate the correct use of language; thank you for the clarification.

PROJECT: 21-1050 R, Stabler Bend Side Channel 2021

Sponsor: Underwood Conservation Dist Program: SALMON ST PROJ Status: Application Resubmitted

MEETING: LE Review

Shared: 4/15/2021

Topics	Comments
Lead Entity Comments	
Questions For Applicant	
	Describe the geomorphic trajectory at the site, including shifts in habitat availability and conditions over time, both in the mainstem and side channel. Describe whether the side channel is naturally filling in, or is increasingly disconnecting from the mainstem Wind River because of incision and meander migration, and how this might affect efficacy of side channel restoration. Also, how does upstream mainstem wood structure placement and associated flow splitting potentially impact mainstem low flow conditions or avulsion risk? What is the risk of losing overall quantity and quality of mainstem habitat by diverting flows into the side channel, and could this exacerbate risk of avulsion given downstream channel dynamics?
	Reply: Historically, this reach was likely characterized by anastomosing and anabranching channels interspersed with forested islands, comprising some of the greatest habitat diversity in the watershed. This area was likely one of the most important spawning and early rearing habitats for Wind River steelhead, most of which spawn and rear for a year in the upper watershed before finishing their freshwater life history in the lower canyon. Past forestry practices have impacted available habitat quantity and quality in streams in the watershed through timber harvest, splash damming, wood removal, boulder removal, and the building of roads and bridges. The mainstem Wind River through this area was subjected to splash dam logging and associated stream cleanouts in the early 1900s, which had a profound effect on channel complexity and function. Since that time, the project site has been impacted by agricultural and residential uses, resulting in clearing of riparian and floodplain vegetation. Recent conversations with local landowners familiar with timber harvest history in the Wind River basin indicate that the v-shaped chute running in a north-south direction and which outlets into the side channel alignment at the toe of the hillslope (Figure 3) may have been created to transport harvested logs from the valley slopes down into the Wind River (D. Wilson, pers. comm. 2019). Historically, a complex matrix of floodplain vegetation communities would have existed within the riparian zone and floodplain of the mainstem Wind River in this area. This would have included mature conifers that would provide abundant shade and a source of large wood that would fall in the river and create channel complexity, sort gravels and sediment, create side channel features, and provide high quality fish habitat. Floodplain and side channel connectivity, for floods and fish, would have been high, with numerous instances of split flow and an abundance of floodplain wetlands and off-channel features created by the dynamic lateral movement of the river over time. Past management impacts and development have, of course, caused channelization, isolation of large quantities of floodplain, and truncation of natural channel migration processes, which have reduced habitat quality and quantity. The mainstem channel form has changed to single thread in

much of this reach.

In terms of current habitat, much of the length of the relict side channel is active only at the 1-year event or greater. Fish have access to this length of side channel for rearing and refuge only during a few weeks each year, and stranding is a possibility for the remaining parts of the year. Under proposed conditions created by this project, the side channel will be active year-round, including at baseflow (77 cfs). Having the side channel active year-round is valuable for steelhead rearing, especially as high temperature refuge in the summer, and storm flow and velocity refuge in the winter. The relict side channel is partially fed by cold groundwater inputs, and temperature monitoring of the side channel vs. the mainstem indicate the side channel offers cooler summer temperatures and warmer winter temperatures.

The proposed inlet ELJ structure would induce scour in the channel inlet area. The inlet location has been selected at an existing scour pool, and will be enlarged during construction to reduce the potential for initial high water to scour and transport alluvium into the inlet. Coarse alluvium such as gravel and cobble will be bedload that the river transports past, downstream of, the side channel inlet. (The inlet mouth elevation is higher than the scour pool.) Suspended load such as sand will be transported into the inlet channel, but the inlet channel is steeper than the rest of the existing side channel so sediment entering the inlet will tend to flush through.

Fine sediment that is delivered to the side channel may be temporarily stored in the side channel during high sediment loading floods, but these can be expected to be sorted and mobilized through the side channel during the much more frequent smaller "clear water" floods and seasonal high water that are not mobilizing large volumes of sediment. Hydraulic modeling strongly suggests that sand size particles will be mobilized and carried through the side channel.

We have considered in our design that the neck cutoff avulsion at the sharp oxbow downstream is a likely future possibility. This is discussed in the Design Report (attached) on page 6. The proposed project is not likely to affect the potential for avulsion at the oxbow. Our Geomorphic Objectives on page 3 of the Final Design Report states: “Mainstem avulsion downstream could result in channel incision that moves up through the [project] site. This project should minimize habitat impacts that could result from mainstem channel avulsion.” By activating the side channel immediately upstream, the abandoned oxbow bend will probably remain active following avulsion of the mainstem, watered and usable by fish, year-round. In effect, the proposed side channel would be lengthened in the case of downstream avulsion by keeping the oxbow watered up and connected to the mainstem.

In regard to the risk of losing overall quantity and quality of mainstem habitat by diverting flows into the side channel, hydraulic modeling of existing and proposed conditions indicates the extent and depth of inundation in the mainstem Wind River will decrease very slightly under proposed conditions, primarily at low flows (a decrease of 0.03 feet at 77 cfs). However, there is currently little high-quality habitat in the mainstem adjacent to and immediately upstream or downstream of the project

	area, with the exception of the small pools scoured under the river-right logs previously placed in the late 1990's by UCD. This mainstem area offers little or no rearing habitat, no consistent refuge from high flows, or hot low laminar flows, and few locations with spawning-appropriate gravel beds. The presence of a perennial side channel with vegetative and wood cover, significant shade from solar radiation, and potential cool-water inputs would substantially increase the availability and quality of habitat for salmonids in the reach.
	What is the quantity of habitat encompassed in the project site relative to the broader Wind River reach where it is located? Address in your response if restoration at the site would support overall habitat needs in the reach, or if there other higher priority work areas that could produce greater habitat gains, such as working along the downstream bend.

Reply: Defining projects with an understanding of the broader river system is foundational to our salmon/steelhead habitat work. LCFRB, stakeholders and partners, including UCD as a subcontractor, have conducted a watershed-wide assessment resulting in the Wind River Habitat Restoration Strategy (2017, online here: https://www.lcfrb.gen.wa.us/windriver.)? The Strategy identified and prioritized dozens of actionable habitat projects. This project was defined and ranked the highest priority in the entire geographic scope of the assessment (page 28). Our proposal is driven by the Strategy's considerable analysis. Re-assessing the watershed's various other possibilities is obviously beyond the scope of this proposal.

The mainstem reach downstream of the side channel project gets into a bedrock and boulder-dominated channel and has much less potential for any restoration actions. There are other potential priority areas in the reach overall, as listed in the Wind River Habitat Strategy, but potential work is limited due to landownership, existing infrastructure, access and other feasibility challenges. This side-channel is one of the only privately-owned floodplain areas, if not the only one, that currently has potential for habitat work.

We have consulted numerous times with local biologists who study fish use and life history in the Wind River watershed, including Ian Jezorek at USGS Columbia River Research Lab, and Thomas Beuhrens, WDFW research lead. They strongly support this project. Beuhrens, WDFW research lead focusing on Wind River steelhead, provided helpful background on the context of the watershed's limiting factors and the fish benefit foundations of this project. In Beuhrens' view, the Stabler floodplain holds some of the most degraded habitat and provides the most opportunity for recovering lost habitat. Beuhrens has emphasized that projects that restore natural floodplain characteristics and processes, and particularly those that increase interactions between the river and its floodplain, offer the greatest potential to increase steelhead capacity in the basin (personal communication, Buehrens 2020).

Within the reach where the project is located, there is spawning habitat, but a lack of heterogeneity to produce rearing habitat. The entire reach is much simplified with very low complexity and little side-channel habitat. Opening the side channel will significantly increase rearing habitat within the project section. According to Ian Jezorek's professional opinion, opening this side channel with 10% flow might increase steelhead rearing habitat in the?project reach from 20 - 50% (personal communication, Jezorek 2020).

After implementation, the multi-thread channel condition restored by this project, will be one of only five island-braid floodplain complexes in the entire Wind River watershed downstream of the mining reach in?the headwaters. As a very productive habitat type that occurs at a low frequency in the watershed, the restoration of a forested island-braid habitat type is likely to be disproportionately productive for its area, (personal communication, Buehrens 2021).

To what degree does landowner willingness prevent additional work in the mainstem

	adjacent to or downstream of the restoration site?
	Reply: This project previously included large wood placements in the mainstem and on the river-right bank across from the proposed side channel inlet. These project elements were removed following landowner input, and analysis of potential actual or perceived flooding impacts to river-right landowners. Given the critical role landowner willingness plays in supporting habitat work, we are being careful to neither negatively affect nor be perceived as affecting landowners' property outside our direct, well-supported, modifications. The alluvial reach of the Wind River between Stabler Bridge and the Carson National Fish Hatchery offers the greatest remaining restoration potential in the Wind River watershed. USFS is actively pursuing other project work, such as the Beaver Campground reach, and UCD and USFS staff are planning to partner on additional projects that interface the national forest boundary. UCD is also partnering with LCFRB members (including Stabler Bend landowner, Del Wilson) and the USFS to develop incentives and feasible partnerships with additional private landowners in the watershed. Determining which other landowners in an area might possibly be engaged in a project now or later is, of course, a key part of all our work. However, factors beyond just landowner willingness pose real challenges to pursuing other work. The downstream bend and reaches below become bedrock and boulder-dominated channel and have much less potential for restoration actions. There are other potential priority areas upstream, but potential work is limited due to landownership (multitudes of small parcels), existing infrastructure, bedrock canyons, access and other feasibility challenges. This side-channel is one of the only floodplain areas, if not the only one, that currently has potential for work.
	Describe the potential for dewatering habitat (e.g., pools depth and area) currently provided by the mainstem Wind River log jams. Juvenile fish are using these logjam structures and pools, and are being provided low and high flow habitat benefits. Losing this habitat could be detrimental.

Reply: We don't believe this project will cause any habitat loss to the mainstem, in that most of the flow diverted into the side channel will occur at high flows. Watering the side-channel year-round, as shown in our hydraulic modeling, will not measurably alter the flow dynamics, pools, depth or area of habitat in the main stem.

Hydraulic modeling results, including a descriptive set of slides posing existing and proposed conditions side-by-side, are attached in PRISM. These results show a very slight effect to mainstem flows when comparing existing conditions to design conditions. At modeled baseflows (77 cfs), water depths near the mainstem wood structures on right bank drop by approximately 0.03 feet. At the 100-year event, water depths in the same location do not change. As discussed in the design report, these minor changes to flows in the mainstem vs. the side channel may relieve a small amount of erosion and potential avulsion risk, but it is unlikely to exert any noticeable changes either to landowners or to fish.

There is relatively little habitat heterogeneity in the mainstem immediately upstream or downstream of the project area, with the exception of a couple small holes or pools scoured under river-right logs (previously placed in the late 1990s by UCD). This mainstem area leaves little or no rearing habitat, no consistent refuge from high flows, or hot low laminar flows, and few or no spawning-appropriate gravel beds.

In Jezorek's professional opinion, this project will increase rearing habitat in both the mainstem and side channel. Ongoing research in the Wind River has documented large movements of age-1 parr Steelhead downstream from the upper river to lower river areas to rear, suggesting limitations on rearing habitat upstream of the lower river canyon reaches. Recent work involving PIT tagging of age-0 steelhead in headwater areas has yielded estimates that demonstrate that those fish are most likely to migrate downstream as age-1 parr (Jezorek 2020). Ongoing work is exploring how much density dependence influences this migration. Increases in rearing habitat throughout the entire watershed would be beneficial to juvenile steelhead capacity (Jezorek, personal communication 2020).?

Juvenile steelhead need habitat heterogeneity throughout the year for many reasons, among them cover, access to food, refuge from high water, potential to seek favorable temperature (higher or lower). This project will increase the yearly rearing capacity for juvenile steelhead in this reach of the Wind River, as well as refuge during high flows (Jezorek, personal communication 2019).