










Appendix B: Chewuch Project Opportunities




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 2.44L	Inner Zone 2 (IZ-2)	Instream Habitat Enhancement	LWD enhancement	This project is located at a pool tail-out just upstream of a riffle crest. The river left bank is low near 2.44, with low-velocity habitat along the bank. A LWD jam would create and maintain pool scour and enhance existing in-stream habitat.	 <p>View to the east at the river left bank near RM 2.44 at a potential LWD location. November 2009.</p>
2a	Project RM 2.68L	Outer Zone 5 (OZ-5)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	At the downstream end of OZ-5, a long, narrow wetland occupies an area that was an active side-channel in 1954. There does not appear to be an upstream surface connection. The wetland appears to be groundwater fed with a downstream surface water connection with the main channel near RM 2.65. The outlet channel has a passable gradient and likely provides access to quality off-channel habitat in its current condition. There is an opportunity to increase habitat cover and complexity in the off-channel complex using LWD. Passage conditions at the outlet should also be further investigated to ensure year-round passage.	 <p>View to the north in the upstream direction at a wetland located at the down-stream end of OZ-5 near RM 2.65. November 2009.</p>
2a	Project RM 2.65L	Inner Zone 2 (IZ-2)	Instream Habitat Enhancement	LWD enhancement	At this location, LWD would be used to enhance existing streamside riparian willows and alders that are currently providing limited cover to an area of slow water along the river left bank near RM 2.65.	 <p>View to the east at the river left bank near RM 2.65 where LWD could enhance in-stream habitat. November 2009.</p>

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 2.75R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	Along river right near RM 2.75, there is approximately 450 ft of riprap protecting the toe of the glacial terrace and creating a barrier to channel floodplain connection at the upstream end of DOZ-2. This riprap is located on the outside of a meander bend. Look for opportunities to remove the rip-rap and replace with LWD meander jams or enhance the riprap in situ with LWD. Adjacent residential development will be a potential significant constraint.	 <p>View to the south in the downstream direction at riprap along the river right bank near RM 2.75. November 2009.</p>
2a	Project RM 2.87R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	There is one location in IZ-2 where the historical channel position has been relatively dynamic. A steady eastward meander migration has resulted in almost 500 ft of lateral change since 1945, and the formation of a large gravel point bar and side-channel between RM 2.76 and 2.94. This channel currently functions as a frequently inundated high flow cut-off channel. Limited LWD is present near the upstream inlet. There is a well-defined channel that has a gravel bed with a high percentage of fines. The channel spreads out near the outlet and has several potential points of outflow, large sand deposits, and stabilizing vegetation that has colonized sand and gravel bars. There are several large pines that are being recruited on the opposite bank from the outflow.	 <p>View to the south in the downstream direction at the outflow of a high flow side-channel near RM 2.76. November 2009.</p>
2a	Project RM 3C	Inner Zone 2 (IZ-2)	Instream Habitat Enhancement	LWD enhancement	Several LWD jams could be placed on both sides of the channel between RM 3.2 and RM 2.8. Several log jams could be placed along the outside of the bend between RM 3.2 and 3.23 to install natural active channel features, increase habitat quality, and provide bank stability. Similar log jam placements could be made along the outside of a meander bend between RM 3.08 and 3.12. Meander migration between RM 2.7 and 2.8 with a down-valley and eastward trend has created a tight meander bend. Log jams along the bank would increase roughness and add stability during high flow events that overtop the inside of the bend.	
2a	Project RM 3.45R	Outer Zone 6 (OZ-6)	Off-Channel Habitat Enhancement	Alcove habitat enhancement	The goal of this project is to create a large off-channel alcove with an open downstream connection to the channel. At the downstream end of OZ-6 there is a topographic low area that corresponds to the 1945 active channel. This channel scar joins with a high-flow channel on a river-right gravel bar near RM 3.45. Excavation through the gravel bar and channel scar to create an alcove feature would connect inner and outer zone habitats providing valuable habitat for native fish.	



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 3.58L	Inner Zone 1 (IZ-1)	Instream Habitat Enhancement	LWD enhancement.	This LWD project involves placing several jams along a river-left cut-bank. Immediately upstream, a riffle orients flow directly into this bank, creating pool scour and an undercut bank. Wood placement here can increase cover and habitat quality as well as enhance pool scour along the cut bank while maintaining bank stability.	
2a	Project RM 3.7R	Disconnected Outer Zone 1 (DOZ-1)	Reconnect Floodplain Processes	Off-channel habitat reconnection	Downstream of golf course development at the downstream end of the sub-unit original floodplain topography is intact and shows channel scars and high-flow side-channels. These floodplain features could be re-connected to the channel using some excavation and placement of LWD. The USBR identified this floodplain area as a potential project with the primary goal as “reconnect primary side and secondary channels with wetlands”. The concepts behind this restoration include removing roads or providing openings across floodplain channels near RM 4.15. There is also mention of restoring cleared riparian areas though restoration of the entire golf course is not considered (USBR 2008b).	
2a	Project RM 3.85R	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	At this site, a high-flow split channel extends between RM 3.75 and 3.9. The channel is well-defined with a gravel and cobble bed. There is an existing apex LWD jam at the inlet to the channel. This jam could be enhanced to increase lateral channel dynamics and the frequency of inundation.	 <p>View to the south in the downstream direction at the inlet to a high-flow channel near RM 3.9. November 2009.</p>
2a	Project RM 4.15L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Side-channel habitat reconnection.	An opportunity exists here to enhance an existing high-flow cut off channel by select excavation of material to reduce the elevation of the side-channel bed and placing bar apex LWD jams to direct flow into the side-channel. Creating perennial flow through the channel would increase the availability of off-channel habitat.	 <p>View to the south in the downstream direction at the outflow of a side-channel near RM 4.1. November 2009.</p>






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 4.35R	Outer Zone 2 (OZ-2)	Reconnect Floodplain Processes	Off-channel habitat reconnection	LiDAR data and aerial photos show channel scars and wetlands at the downstream end of OZ-2. This is an area mapped as the low flow channel in 1893 cadastral maps. A floodplain side-channel could be excavated into the existing low areas here. The wetlands suggest a shallow alluvial aquifer that may be conducive to a groundwater gallery an off-channel backwater at the downstream end of a high-flow channel. LWD would be placed at the upstream inlet to guide flow in to the off-channel network at higher flows. The USBR identified this floodplain area as a potential project with the primary goal as “reconnect primary side and secondary channels with wetlands”. The concepts behind this restoration include removing roads or providing openings across floodplain channels near 4.4 (USBR 2008b).	
2a	Project RM 4.45L	Inner Zone 1 (IZ-1)	Instream Habitat Enhancement	LWD enhancement	A long pool runs along the outside of the bend along river left in this area. LWD structures along the river left bank would encourage scour to enhance pool formation, provide cover and increase habitat quality. The proposed location is at the toe of the glacial terrace, which is composed of unconsolidated alluvial material. There is a home built near the top of the bank. Excess erosion of the bank may be undesirable at this location.	 <p>View to the southeast in the downstream direction at a potential LWD jam location along river left near RM 4.45. November 2009.</p>
2a	Project RM 4.65L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	This project combines elements of Projects RM 5.3L and 5.25L. There is a high-flow cut-off channel on the inside of a meander bend extending between RM 4.5 and 7.73, similar to Project RM 5.25. However, this high-flow channel is well defined and experiences more frequent ground disturbing flow similar to Project RM 5.3. Sand deposition at this site is similar to RM 5.3L. A combination of excavation and LWD placement could increase low flow connection and habitat in this side-channel.	 <p>View to the northwest in the upstream direction at groundwater collected in a high-flow channel near RM 4.5. November 2009.</p>

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 4.75C	Inner Zone 1 (IZ-1)	Instream Habitat Enhancement	LWD enhancement	There are a series of actively migrating meander bends between RM 4.55 and 4.95. There are opportunities to place several large meander bend jams on outside bends to mimic jams formed through natural recruitment. Jams would increase scour pool development and habitat cover and complexity.	
2a	Project RM 5.25L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	This site consists of a large point bar with a network of high-flow channels located at the inside of a tight meander bend between RM 5.2 and 5.3. The frequency of flow through these channels is variable, with decreasing scour farther from the channel. Bar apex LWD jams and select excavation could be used to enhance side-channel connectivity across the bar. The meander appears to be actively migrating to the west, away from the project location. The river's abandonment of the constructed channel could be a possibility in the future.	 <p>View to the south in the downstream direction at the outflow of a network of high-flow channels near RM 5.21. November 2009.</p>
2a	Project RM 5.3L	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	This project involves enhancing existing side-channel habitat in a large high-flow side channel that extends between RM 5.1 to 5.5. At the upstream end, the side-channel is well-defined and frequently scoured by high energy flows. The low water surface is about 3 ft below the bed of the side channel. Bed material fines to sand near the downstream end of the side channel and there is a large deposit of sand at the outlet. Enhancing flow in the channel could increase velocities and maintain a sand-free bed that is suitable for salmonid habitat. The upstream end would require some excavation to create a split flow condition, or increase the frequency of flow through the side channel. LWD near the inlet to the side-channel could also enhance low-flow connection.	 <p>View to the southeast in the downstream direction at the upstream end of a large high-flow channel near RM 5.47. November 2009.</p>
2a	Project RM 5.37C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics	At this location, flow splits around a stable gravel bar. This is a natural wood deposition area. The project would involve creating new or enhancing existing bar apex LWD jams to re-establish inner zone dynamics and enhance cover habitat and complexity.	 <p>View to the north in the upstream direction at a split flow location where some wood has naturally accumulated. November 2009.</p>









Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2a	Project RM 5.5R	Inner Zone 1 (IZ-1)	Instream Habitat Enhancement	LWD enhancement	This project involves LWD placement along the river right bank. LWD could enhance scour and pool formation and provide cover to enhance habitat. This project is located immediately upstream of a riffle crest and a narrow low surface that expands along the right side of the channel. The low surface is backed by a terrace with residential development	 <p>View to the north in the upstream direction at a potential LWD placement along river right near RM 5.5. November 2009.</p>
2b	Project RM 5.6L	Inner Zone 2 (IZ-2)	Instream Habitat Enhancement	LWD enhancement	A transverse riffle orients flow into the river-left bank. A meander-bend log jam would provide cover, enhance scour for pool formation, and provide bank stability.	
2b	Project RM 5.69R	Inner Zone 2 (IZ-2)	Instream Habitat Enhancement	LWD enhancement	There is an exposed root mass and undercut bank providing limited cover to a shallow pool along the river-right bank near RM 5.69. A LWD meander bend jam would enhance existing habitat through creating and maintaining pool scour and increasing habitat cover and complexity.	 <p>View to the southwest in the downstream direction at the river-right bank near RM 5.76 where LWD could enhance existing habitat. November 2009.</p>
2b	Project RM 5.87R	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Alcove habitat enhancement	This project would enhance an existing alcove that has formed as the result of beaver activity. LWD jams would be installed to increase cover and habitat quality in the alcove.	


Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2b	Project RM 5.95L	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	At this site, there is a long eroding bank section with active erosion of unconsolidated alluvium and limited LWD recruitment. Pool habitat could be enhanced with LWD meander jams to increase scour depth, lateral channel dynamics, and continued recruitment of LWD.	 <p>View to the south in the downstream direction at bank erosion and LWD recruitment near RM 5.95. November 2009.</p>
2b	Project RM 6.1C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics	This project involves several log jam placements between RM 6.17 and 6.07 to re-establish natural levels of LWD in the channel and the associate geomorphic processes. In addition, LWD will enhance existing instream habitat, add cover, and structure. At the upstream end of the project area near RM 6.17, LWD can be use to enhance an existing cut-bank that provides some cover and quality habitat. There are exposed root masses and overhanging riparian vegetation along the top of the cut-bank. Scour along the bank is caused by flow plunging over a transverse bar and flowing directly against the bank. Placing LWD at this location could increase scour depth and provide increased cover and habitat quality. Also near RM 6.16, a bar apex jam would be placed on a mid-channel gravel bar to encourage split flow and channel migration processes. At RM 6.07, a riffle tails out into the outside of a meander bend, creating a scour pool along the river right bank near RM 6.07. Unconsolidated alluvium in the bank is eroding, driving the recruitment of small woody debris. LWD could be placed along the bank to encourage dynamic inner zone processes and increase habitat quality.	 <p>View to the southeast in the downstream direction at a scoured cut-bank along river-left near RM 6.16. November 2009.</p>
2b	Project RM 6.1L	Outer Zone 3 (OZ-3)	Off-Channel Habitat Enhancement	High-flow habitat enhancement	Cadastral maps from 1915 place the active channel immediately upstream of this project. There are high flow channels associated with the older active channel and current flood overflow channels. Channel excavation and LWD placement could enhance the current connectivity of these high-flow channels to the active channel and create complex off-channel habitat.	 <p>Floodplain over flow channels in OZ-3 near RM 5.96. November 2009.</p>

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2b	Project RM 6.25R	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	There is a long, narrow side-channel channel between RM 6.16 and 6.33 that can be enhanced to increase process dynamics and habitat formation. The project could include excavation of the existing high-flow channel to increase the size of the backwater and its downstream connection to the main channel, and log jam placements at the apex and along the low flow channel margin to encourage scour at the upstream end.	
2b	Project RM 6.27L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics	This location is the upstream inlet to a high-flow channel, which was mapped as an overflow channel in 1974, and has since lost connectivity. Log jam(s) and select excavation would enhance side-channel connectivity and increase in-stream habitat cover and complexity.	
2b	Project RM 6.39R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	LWD meander bend jams would enhance pool development along a cut-bank and increase habitat cover and complexity.	
2b	Project CR_Prj-6.45 (USBR 2008b)	Outer Zone 3 (OZ-3)	Off-Channel Habitat Enhancement		The USBR has identified this area for restoration, suggesting that reconnection of primary side-channels is the primary goal. Removal of a push-up levee between RM 6.45 and 6.2 is seen as the initial step to achieving this goal. Field surveys suggest that there is no push-up levee in this location.	






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2b	Project RM 6.65C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics.	Between RM 6.5 and 6.8 lateral channel migration has formed large gravel point bars, high-flow channels, and scour-pools. Several log jams at bar apexes and on the outsides of bends would increase side-channel connectivity and enhance inner zone processes such as scour, lateral channel dynamics, and future LWD recruitment.	 <p>View to the south in the downstream direction at a side-channel that is active during high flow near RM 6.8. November 2009.</p>
2b	Project RM 6.7R	Outer Zone 1 (OZ-1)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	A meander scar provides wetland habitat made up of several small beaver ponds in this area. The upstream inlet is at RM 6.82, and the downstream outlet is at RM 6.62. At the inlet, the bank is high and there is no evidence of frequent conveyance of flood water. Where the channel scar hits the toe of the hillslope, groundwater fills low areas and the surface is wet and consists of a series of beaver ponds. This wet area becomes a more well-defined channel network in the downstream direction. A combination of LWD, channel excavation, and habitat enhancement would be used to enhance process dynamics and habitat connectivity as well as habitat quality through this area.	 <p>View of off-channel wetland occupying a meander scar at the extreme west side of the floodplain near RM 6.82. November 2009.</p>
2b	Project RM 6.8L	Outer Zone 2 (OZ-2)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	In this area there is a network of high-flow channels that appear to receive infrequent flood inundation. Habitat and process connection could be enhanced by excavating off-channel habitat. A groundwater gallery might potentially draw enough sub-surface water to create perennial flow at the downstream end of the project.	 <p>Floodplain wetlands near RM 6.75 that could be enhanced to provide off-channel habitat. November 2009.</p>




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2b	Project RM 6.95R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	At this location, mature riparian trees overhang a long shallow pool. This location could be enhanced with LWD to increase scour depths, provide cover, and enhance in-stream processes.	 <p>View to the northwest in the upstream direction at a potential LWD location on the river-right bank near RM 6.95. November 2009.</p>
2b	Project RM 7.15L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Riprap removal or modification	There are 1,250 ft of riprap along river-left between RM 7.01 and 7.28 which creates a hardened 10-ft bank above the low flow water surface. Channel processes and floodplain connection are impaired by this modification. The riprap could be removed and replaced with LWD to provide bank protection and enhance in-stream habitat. Alternatively, the existing riprap could be enhanced with LWD to increase habitat cover and complexity.	 <p>View to the south in the downstream direction along the river-left bank near RM 7.28 where riprap has impaired in-stream processes and habitat. November 2009.</p>
2b	Project RM 7.2R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	This project involves a bank LWD structure along river-right near RM 7.2. There are mature trees along the bank providing shade, and cover in their exposed root masses. The channel flows through a long, shallow pool in this stretch of the river. LWD would enhance scour and pool formation and add to the existing habitat along the bank. There is residential development on the adjacent alluvial terrace.	 <p>View to the northwest in the upstream direction at the river-right bank near RM 7.2 where LWD could enhance in-stream habitat. November 2009.</p>
2b	Project CR_Prj-7.2 (USBR 2008b)	Outer Zone 1 (OZ-1)	Off-Channel Habitat Enhancement		The USBR has identified the entirety of OZ-1 as a restoration area with the primary goal of reconnecting primary side and overflow channels. The means to achieve this goal is stated as excavation of channel entrances and improving connectivity.	

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
2b	Project RM 7.3L	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	LWD placements within existing glide habitat will create and maintain pool scour and will increase habitat cover and complexity along the river-left bank.	
2b	Project CR_Prj-7.3 (USBR 2008b)	Disconnected Outer Zone 1 (DOZ-1)	Off-Channel Habitat Enhancement		The USBR identified this floodplain area as a potential restoration project with the primary goal as “reconnect primary side channel with wetland area”. The concepts behind this restoration include redesigning or removing a road between RM 7.15 and RM 7.0, and removing the riprap between RM 7.12 and RM 7.0, as well as excavation of the upstream and downstream end of the channel. There are considerable constraints associated with this effort.	
3a	Project RM 7.38R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	Similar to Project RM 7.42L, an apex log jam would be used to enhance side-channel connection and habitat quality along river right between RM 7.24 and 7.38.	
3a	Project RM 7.42L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Side-channel habitat reconnection	An apex log jam and selected excavation would enhance flows into a high-flow cut-off channel across the floodplain margin of a large cobble point bar between RM 7.37 and 7.48. A log jam at the upstream end would create scour and encourage a split flow condition. LWD would also provide habitat cover and complexity.	 <p>View to the south in the downstream direction at the inflow to a side-channel along river-left near RM 7.48 (November 2009).</p>










Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
3a	Project RM 7.5L	Outer Zone 2 (OZ-2)	Riparian Restoration	Riparian habitat enhancement, fencing	The terrace to the east of the channel has been developed for agriculture. Cattle grazing and river access have degraded riparian vegetation. Riparian fencing and re-vegetation would enhance riparian habitat in this area.	 <p>View to the north in the upstream direction where livestock have accessed water along the river-left bank near RM 7.5 (November 2009).</p>
3a	Project RM 7.6L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	There is a 400 ft long riprap bank along the river left near RM 7.6 that protects the toe of an eroding terrace. The terrace surface has been converted to agriculture. The riprap could be removed and replaced with log jams to enhance in-stream habitat and continue to provide bank protection. Alternatively, the existing riprap could be enhanced with additions of LWD to increase habitat cover and complexity. This project could be combined with restoration of a forested riparian buffer on the terrace in order to enhance long-term riparian functions including shading and LWD recruitment.	 <p>View to the northeast in the upstream direction at riprap along the river-left bank near RM 7.6 (November 2009).</p>
3a	Project RM 7.77C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD enhancement and side-channel reconnection	This project location is in an area with multiple high-flow channels, and a side-channel in the adjacent floodplain. Bar apex and meander-bend log jams would enhance lateral connectivity to side-channel habitat and would increase habitat cover and complexity	
3a	Project RM 7.95L	Disconnected Inner Zone 1 (DIZ-1)	Reconnect Stream Channel Processes	Levee removal and side-channel reconnection	A 685 ft long push-up levee along the left side of the channel near RM 7.95 creates a barrier at the upstream end of a side-channel that extends between RM 7.66 and 7.99. This project would entail removing this barrier to re-connect the side-channel to the main channel. Habitat features such as LWD would be added throughout the side-channel area to enhance existing complexity.	 <p>View to the southeast in the downstream direction at a boulder push-up levee blocking a side-channel along river left near RM 7.95 (November 2009).</p>

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
3a	Project RM 8.24L	Disconnected Outer Zone 2 (DOZ-2)	Riparian Restoration	Riparian habitat enhancement	This project involves re-vegetating riparian areas along the channel margin that have been cleared in association with residential, recreational, and agricultural development. Re-establishing streamside vegetation including canopy and understory improves habitat on the floodplain as well as in the adjacent channel by providing thermal shading, cover, and potential LWD recruitment.	
3a	Project CR_Prj-8.5 (USBR 2008 App. A)		Off-Channel/Side-Channel Habitat Enhancement		The USBR has identified this floodplain sub-unit as a restoration area. The restoration goal is to re-connect the low-surface (floodplain). This would be achieved through removal or re-design of a bridge crossing and associated riprap, as well as removal or re-design of several roads that block high-flow channels.	
3b	Project CR_Prj-8.55 (USBR 2008b)	Disconnected Inner Zone 1 (DOZ-1)	Off-Channel Habitat Enhancement		The USBR has identified a restoration area at the downstream end of this floodplain sub-unit. The focus of the project is re-connecting overflow channels by removing riprap located along the diversion dam at RM 8.5 and re-vegetating cleared areas.	




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo	
3b	Project RM 8.8R	Outer Zone 1 (OZ-1)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	This project entails enhancing connection and quality of side-channel and off-channel habitat throughout OZ-1. The project includes two primary overflow channel systems. The first is formed where overflow channels originating along the upstream inner-zone margin join into a single large channel near RM 8.88 that then trends south to its outflow near RM 8.55. This natural channel is paralleled by an irrigation overflow channel that runs the length of OZ-2 along its western margin all the way to the downstream end of the sub-unit. Excavation through gravel and boulder deposits would be needed to create upstream connection at moderate to low flows. This is a highly dynamic section of channel and floodplain where the longevity of restoration work would need to be carefully considered in planning any restoration activities. There also may be opportunities to utilize irrigation overflow to create floodplain habitat, although habitat in the existing outflow channel appears to be relatively abundant and complex.		View to the south in the downstream direction at an irrigation return flow channel near RM 8.54 (November 2009).
3b	Project RM 9.05L	Inner Zone 2 (IZ-2)	Re-Connect Stream Channel Processes	LWD enhancement and side-channel habitat reconnection	This project involves increasing connection between the main channel and an existing high flow side-channel. The side-channel shows evidence of being scoured frequently, but does not provide habitat at low flow. LWD at the inflow and outflow points, and excavation as needed would connect the channel over a wider range of flows. This is a highly dynamic section of channel and floodplain where the longevity of restoration work would need to be carefully considered in planning any restoration activities.		View looking north in the upstream direction at a side-channel near RM 9.05 (November 2009).
4a	Project RM 9.5C	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	Between RM 9.45 and 9.5 there are multiple opportunities for bank LWD jams. Near RM 9.5 there is an existing glide along river-right. There is existing overhanging vegetation and small root masses. A log jam here would provide cover and potentially increase bed scour to form pool habitat. RM 9.45 just upstream of a grade break where the channel steepens at the alluvial fan of Boulder Creek. The backwater created upstream of this grade break has boulders along the bank providing limited habitat. LWD placed in this pool would enhance habitat cover and complexity.		View to the west at the river-left bank near RM 9.5 (November 2009).






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4a	Project RM 9.6R	Outer Zone 2 (OZ-2)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement, alcove habitat enhancement	This side-channel feature does not receive regular scouring flows in its current condition. Although the lower portions of the feature hold surface water during wet periods, there is no evidence of scour from high-flows anytime in the recent past. Enhancing side-channel habitat may require the complete excavation of a new channel and habitat features. Another option at this site would be to create an open alcove or groundwater-fed channel at the downstream end.	 View to the south in the downstream direction at a side-channel near RM 9.6 (November 2009).
4a	Project RM 9.7R	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Riprap removal or modification	There are approximately 590 ft of riprap along the toe of a road embankment along river-right centered near RM 9.7. This project would enhance the riprap with several log jams to increase habitat cover and complexity.	 View to the northwest in the upstream direction at riprap along the toe of the road embankment along river-right near RM 9.7 (November 2009).
4a	Project RM 9.7L	Outer Zone 1 (OZ-1)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement, alcove habitat enhancement	This project would enhance the connectivity and quality of habitat in an existing high-flow channel. Currently, the channel is overgrown, and does not appear to receive regular scour from high flows. At the time of the survey, there were small wet areas at the downstream end of the feature, but the majority of the channel was dry. Excavation may be necessary along the entire length (approximately 820 ft) to create a well-connected channel. The position of the upstream inlet is controlled by a bedrock outcrop. Other alternatives at this location would be to excavate an off-channel alcove or groundwater-fed channel at the downstream end of the feature.	 View to the south in the downstream direction at the outlet of a high-flow channel near RM 9.64 (November 2009).
4b	Project RM 9.85R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	Near RM 9.85, the river has scoured a deep pool on the outside of a bend where the river flows against a bedrock outcrop. There are small pieces of wood in the pool now but large pieces would increase cover and habitat quality.	 View to the northeast in the upstream direction at a pool on river right near RM 9.85 (November 2009).



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4b	Project RM 9.88R	Disconnected Outer Zone 1 (DOZ-1)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	At this site, there is an older wetland that appears to have filled in naturally over time. There is no open water, but there are wetland plant species and a topographic depression that holds water seasonally. There is a channel that provides connectivity between the wetland and the inner-zone at high flow. The surface connection could be enhanced to provide connectivity at a wider range of discharges. The wetland would need to be excavated to increase availability of fish habitat; LWD could be added to increase cover.	 <p>View to the east at an old floodplain wetland north of the channel near RM 9.85 that has naturally filled in over time (November 2009).</p>
4b	Project RM 9.9L	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Alcove habitat enhancement	LWD would be utilized at this location to enhance the habitat quality of an existing pool. The pool has depth created by scour around a large boulder at the downstream end. LWD would add cover, increase overall reach complexity, and potentially increase scour adding greater residual depth to the pool. Overall, these actions would create a high-quality off-channel backwater for rearing and migrating fish.	 <p>View to the west in the downstream direction at a backwater pool near RM 9.9 (November 2009).</p>
4b	Project RM 10.1C	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	There are multiple opportunities to place LWD along both sides of the channel between RM 9.99 and 10.19. At the upstream end of this project area, there is a location for the placement of meander bend LWD jams along the river-left bank to increase habitat cover and complexity. There is very little habitat complexity in this portion of the river. The placement of several log jams would serve to increase pool development and maintenance and improve overall habitat quality. Another jam placement would be possible at RM 10.1 on river right. At RM 10.04 the river takes a right turn and has scoured a deep pool on the outside of the bend. There is riparian vegetation around the margin of the pool but LWD would increase cover and the quality of this pool habitat. Downstream of this pool, the bank is eroding at the toe of a glacial terrace. Additional LWD may be desired to protect the houses at the edge of the terrace. Several log jams could be placed on both sides of the river near RM 9.99 to increase overall cover and habitat quality in this reach. This would also encourage more active inner-zone geomorphic processes that support sustained habitat formation.	
4b	Project CR_Prj-10.1 (USBR 2008b)	Disconnected Outer Zone 1 (DOZ-1)	Off-Channel Habitat Enhancement		This area has been identified by the USBR as a location for to restore a wetland or network through restoration of cleared areas and assessment of impacts to connectivity.	





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4b	Project CR_Prj-10.2 (USBR 2008b)	Outer Zone 1 (OZ-1)	Off-Channel Habitat Enhancement		This area has been identified by the USBR as a location for to restore a wetland or network through restoration of cleared areas and assessment of impacts to connectivity.	
4b	Project RM 10.35L	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	There is a large floodplain wetland formed by old beaver dams at this site. There is a channel connecting this feature to inner-zone habitats, but it does not provide passability at all flow levels. Some excavation would be needed to provide fish passage into the off-channel habitat at lower flows. Wood could also be added to provide cover for rearing fish.	 <p>View to the north at a wetland located near RM 10.35 (November 2009).</p>
4b	Project RM 10.37L	Inner Zone 1 (IZ-1)	Riparian Restoration	Riparian restoration and LWD enhancement	This bank is directly downstream of the riprap section referred to in Project RM 10.46L. The bank is slumping and appears to be eroding at an accelerated rate due to riparian clearing. There is some LWD recruitment taking place where a large cottonwood has fallen. The uniform, eroding bank could be enhanced with several jams along the bank to provide erosion control and habitat cover and complexity. There is also an opportunity to re-establish a forested riparian buffer along this section.	 <p>Downstream view at the river-left bank where it is eroding near RM 10.37 (March 2010).</p>
4b	Project RM 10.37R	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	This project would enhance the habitat conditions of an existing side-channel that extends around the river-right side of a gravel bar between RM 10.33 and RM 10.42. The side-channel is active, carrying flow at a wide range of discharges. There is a pool formed at the upstream end by scour against bedrock and the hydraulic control of the gravel bar. Large log jams at the up and downstream end would be used to increase pool scour, add cover, and re-establish natural geomorphic features of the system.	 <p>View to the east in the downstream direction at a side-channel near RM 10.35 (November 2009).</p>
4b	Project CR_Prj-10.4R (USBR 2008b)	Disconnected Outer Zone 1 (DOZ-1)	Off-Channel Habitat Enhancement		This area has been identified by the USBR as a location for low surface reconnection through restoration of cleared areas.	





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4b	Project RM 10.46L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Riprap removal or modification	Riprap has been placed to protect the bank on the inside of a bend. Residential development of the adjacent floodplain has resulted in riparian clearing along this bank. Riprap could be replaced with LWD to provide bank protection, increase habitat quality and cover, and increase hydraulic roughness. Alternatively, existing riprap could be enhanced with LWD enhancements to increase habitat cover and complexity. This project should also include re-establishment of a forested riparian buffer along this section.	 <p>View to the east at riprap and floodplain clearing along the river-left bank near RM 10.46 (November 2009).</p>
4c	Project RM 10.6R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	This project involves LWD placement to increase local habitat quality and cover. This channel section is straight and currently lacks habitat complexity.	 <p>View to the south in the downstream direction at a low complexity stretch of river near RM 10.6 (November 2009).</p>
4c	Project RM 10.73C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics	Between RM 10.7 and 10.75 there are two opportunities to place bar apex jams that will enhance split-flow locations. This Near RM 10.75 there is an existing split-flow location by placing a bar apex log jam and side-channel wood to increase habitat quality. Upstream of this site, the river trends to the southwest. A bedrock outcrop near RM 10.75 turns the river south and creates the split flow. There is a deep pool at the bedrock outcrop which is at the downstream end of the split flow. Near RM 10.7 a bar apex log jam could be constructed on a natural wood deposition site. A log jam at the head of the island would increase habitat complexity through pool scour and increasing habitat cover. The site is a mid-channel bar with active split flow around either side.	 <p>View to the southwest in the downstream direction at a side-channel and bedrock outcrop near RM 11.75 (November 2009).</p>
4c	Project RM 10.8R	Disconnected Outer Zone 2 (DOZ-2)	Off-Channel Habitat Enhancement	Off-channel habitat enhancement	The goal of this project is to re-connect a floodplain overflow channel and create an off-channel backwater near the downstream end of the sub-unit. The elevation of this floodplain is currently too high to allow frequent inundation. However, there is geomorphic evidence of conveyance of overbank flow through small channels. There has been some fill of low areas on this surface. Excavation would be needed to remove the fill and enhance the upstream surface connection in the overflow channels.	




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4c	Project RM 10.9C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	Re-establish channel LWD dynamics	There are multiple opportunities between RM 10.93 and 10.87 to use LWD to reconnect channel processes. Near RM 10.93 there is a small section of split flow at this location where the river flows around a gravel bar and is actively eroding to the west into a relatively low terrace. The project would entail placing a log jam at the apex of the gravel bar to enhance split flow and encourage inner-zone processes such as scour and lateral migration. Near RM 10.87 is a location of active split flow where the channel flows around a short gravel bar and is eroding the terrace to the west of the channel. There is overhanging riparian vegetation, undercut banks, and root wads providing good habitat in the right side channel. Placement of an apex log jam would enhance the inner-zone processes creating the bar and the split flow and increase habitat complexity.	 <p>View to the south in the downstream direction at an area of split flow near RM 10.93 (November 2009).</p>
4c	Project RM 11C	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	This project involves placing log jams at several locations on both sides of the channel between RM 11 and RM 10.98. Near RM 11, there is a location on river-right where LWD would increase local cover and habitat complexity. The reach is currently a long glide. Near RM 10.98 natural wood elements of the system have been lost along the river left bank. LWD placements would replace these elements to provide bank stabilization, and increase cover. There is residential development east of the channel that has resulted in almost complete clearing of riparian vegetation. The bank has destabilized in a few areas and there is riprap along the bank. There are no large trees near the channel for recruitment.	 <p>View to the south in the downstream direction at a river section near RM 11 that has low habitat complexity (November 2009).</p>
4c	Project RM 11.35R	Inner Zone 1 (IZ-1)	Riparian Restoration	Riparian re-vegetation	The river-left terrace between RM 11 and 11.7 has been de-forested up to and including the river bank. There are patches of riparian vegetation in some areas, but these are not enough to provide riparian habitat, solar shading to the channel, or natural levels of LWD recruitment. This re-vegetation project will involve replating the native riparian forest along the channel margin to re-connect exiting patches of riparian vegetation creating a continuous riparian corridor along the channel, and a buffer between the channel and agricultural areas on the terrace.	





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
4c	Project RM 11.5C	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	There are multiple opportunities for log jams on both sides of the channel between RM 11.6 and 11.4. Several large jams placed on both sides of the channel near RM 11.6 will increase habitat complexity and cover utilized by a variety of aquatic species. At RM 11.55 there is a short section of undercut bank and a rootwad providing cover on river left that could be enhance with LWD. Near RM 11.5, the river starts to curve east and erode into a terrace on the outside of the bend creating a high bank. The terrace surface has been cleared eliminating a potential source for LWD. Several log jams placed along the outside of the bend at this site would increase the quality of the habitat, and replace the LWD that would have been generated through terrace erosion. At RM 11.4 there are some logs fallen along the bank. They are older trees that were potentially recruited prior to riparian clearing of the terrace. The project would add to these existing pieces.	 <p>View to the north in the upstream direction at a long riffle near RM 11.6 (November 2009).</p>
5a	Project RM 11.75L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	The channel flows directly against the hillslope at this location. There is riprap along the bank to protect a roadway located on the slope. LWD could be used to either replace the riprap or add cover and habitat complexity if the riprap were left in place.	
5a	Project RM 11.82L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This site is located on the outside of the south bend that the river takes just downstream of RM 11.84. This meander is migrating north and eroding the glacial terrace. Several large jams could be placed along the left bank to increase rearing habitat cover and complexity.	 <p>View to the southeast in the downstream direction at river-left near RM 11.82 where the river bends south (November 2009).</p>
5a	Project RM 11.83L	Outer Zone 4 (OZ-4)	Off-Channel Habitat Enhancement	Off-channel habitat enhancement	There is an existing channel alcove along the toe of the hillslope at this site. This is a future potential meander bend cutoff channel. It currently serves as a backwater channel that will likely expand through time. Any backwater habitat enhancement may be better suited to expand to the northeast to neither encourage nor discourage a future natural avulsion. Survey and hydraulic analysis would help determine detailed habitat options at this site.	
5a	Project RM 11.84R	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This location is on the outside of the hard east bend. This is near the inflection point where the river bends again and flows south. The goal of this project is to increase habitat cover and enhance pool formation.	









Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5a	Project RM 11.93R	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	The river starts taking a sharp eastward bend at RM 11.93. Log jams place along the outside of the bend would create locations for enhanced scour-pool formation with good cover and habitat quality. There are other large trees on the hill slope that would eventually be recruited adding sustainability to the log jams.	
5a	Project RM 12.05L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	Between RM 11.95 and 12.12 there are multiple opportunities for LWD placements along river left. Near RM 12.12 there is a gravel bar on river right that orients low flow to the east against the river left bank. This has resulted in scour and modest LWD recruitment. Log jams placed along the river left bank would increase scour, pool formation and cover. There is a location near RM 12.03 that is suitable for a bank log jam project. The goal is to increase cover and habitat quality along the river left bank. There is existing overhanging vegetation and root wads at RM 11.95. LWD would be use to enhance the existing cover to increase habitat quality. The placement would also increase bed scour to create pools along the outside of the bend.	 <p>View to the southeast in the downstream direction at a riffle, pool, and LWD on the river left bank near RM 12.12 (November 2009).</p>
5a	Project RM 12.22L	Inner Zone 2 (IZ-2)	Off-Channel Habitat Enhancement	Alcove and side-channel habitat enhancement	This project involves adding large wood to enhance the cover and habitat quality in an existing backwater that is fed by an upstream side-channel. The upstream side-channel could also be enhanced through excavation to be more active at lower flow periods.	 <p>View to the southeast in the downstream direction at a backwater located on river-left near RM 12.22 (November 2009).</p>

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5a	Project RM 12.3C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	Between RM 12.25 and 12.4 there are multiple locations for log jam placements that would re-establish channel geomorphic processes such as lateral migration. In this area, the channel is more complex and wood placements can be used to increase the quality of existing habitat features. A series of bar apex jams near RM 12.4 could be used to enhance split flow conditions, increase scour for pool formation, and enhance habitat cover and complexity. The bank near RM 12.3 is fairly high and slightly undercut with overhanging vegetation. An LWD project here would increase the existing cover, and create scour thereby enhancing pool formation. Near RM 12.25 there are multiple split flows locations and side-channels. This is potentially rich habitat. LWD would be beneficial throughout IZ-2 to maintain channel dynamics and increase habitat complexity. This project is a bar apex jam that would maintain split flow, and increase scour to drive pool formation.	 <p>View to the north in the upstream direction at the apex of a gravel bar and split flow location along river-right near RM 12.4 (November 2009).</p>
5a	Project RM 12.35L	Inner Zone 2 (IZ-2)	Off-Channel Habitat Enhancement	Alcove habitat enhancement	This project involves enhancement of habitat features in an existing side-channel and backwater. The side-channel, extending from RM 12.35 to 12.4 receives substantial scour during low main channel flows and empties into a large pool off the main channel that provides a backwater area for rearing and migrating fish. LWD would be placed to increase cover and complexity at this site.	 <p>View to the southeast in the downstream direction at a large backwater located on river left near RM 12.3 (November 2009).</p>
5a	Project RM 12.45R	Outer Zone 2 (OZ-2)	Reconnect Floodplain Processes	Enhance floodplain connectivity	OZ-2 provides the largest open water wetland in the study area. This feature is an oxbow pond formed by past channel avulsion and maintained through beaver activity. There are multiple high-flow channels originating at the upstream end of the sub-unit that provide high-flow connection to the wetlands. Campsite access roads create barriers in some of these high-flow channels. The USBR (2008b) has identified this as a restoration project area with a focus on removing or installing culverts in these roads to increase connectivity. Other restoration options include enhancing the upstream surface connection to the floodplain by excavating appropriate channel inlets and constructing log jams to increase juvenile rearing fish cover in downstream wetlands.	 <p>View to the southeast at a large oxbow pond on the west side of the valley near RM 12.3 (November 2009).</p>



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5a	Project RM 12.5L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to mitigate roadway impacts	The channel is oriented along the extreme east side of the valley in this area with a roadway on the adjacent hillslope. This project includes several log jam placements meant to increase local cover and habitat quality, and encourage flow to move away from the road towards a large floodplain area. Encouraging lateral river movement toward the west away from the road would increase connectivity to a more abundant habitat source. As the river moves away from the road, natural bedload deposition in the shadow of the log jams would develop a riparian floodplain buffer between the road and river. A riparian buffer between a road and river can provide opportunities for road related fine sediment to deposit within the riparian area instead of the river channel.	
5a	Project RM 12.63L	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	Between RM 12.59 and 12.66, there are two opportunities for log jam placements to enhance split-flow processes and bank habitat. Near RM 12.66, there is a potential bank log jam placement with the goal of enhancing in-stream habitat along a high eroding bank that currently provides very little cover. On the opposite side of the valley, there are networks of high-flow channels providing connectivity between inner and outer zone habitats. Log jam placement would be optimized to push water to the west and onto the floodplain. Near RM 12.59 is a bar apex jam at a location where split flow occurs as stage rises annually. The project is intended to enhance split flow over a wide range of discharges and to orient flow towards river right to increase lateral migration and scour of an existing cut-bank and pool.	 <p>View to the southeast in the downstream direction at the river left bank near RM 11.66 (November 2009).</p>
5a	Project RM 12.9C	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	There are multiple opportunities for installation of LWD on both sides of the channel between RM 12.82 and 12.95. Near RM 12.95 is a project that focuses on increasing the abundance of LWD in the upstream portion of the reach, which will provide habitat elements that increase local cover and complexity. The upstream end of the reach including this site is a relatively straight, low gradient, and low velocity for several hundred feet. LWD would help to enhance inner-zone geomorphic processes such as lateral migration and scour-and-fill. A log placement at RM 12.82 shares a similar goal and approach to RM 12.95. A lateral bend log jam could increase the dynamics of geomorphic processes such as lateral migration, and provide habitat in a long stretch of low-complexity channel.	 <p>View to the southeast in the downstream direction at a hydraulically simple section of river near RM 12.95 (November 2009).</p>







Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5b	Project RM 13.0L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	A lateral log jam on the left bank would increase habitat complexity within an existing glide.	 View to the southeast in the downstream direction at the river-left bank near RM 13.0 (November 2009).
5b	Project RM 13.24L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	There are two potential LWD placements between RM 13.21 and 13.27 along the river left bank. The site near RM 13.21 is on the outside of a bend where the river is eroding a high terrace to the southeast. There is large material eroded out of the bank that has provided natural protection of the toe of the slope. Some small wood has fallen in as well. Several jams could be placed along the river-left bank to take advantage of the hydraulics on the outside of the bend to create scour pools and provide cover. At the downstream end of the same bend, a LWD placement would increase cover and habitat quality.	 View to the southeast in the downstream direction at an eroding terrace on the outside of a bend near RM 13.27 (November 2009).
5b	Project CR_Prj-13.3 (USBR 2008b)	Outer Zone 3 (OZ-3)	Reconnect Floodplain Processes		The USBR (2008b) has identified this area as a potential location to re-connect the low surface by removing riprap between RM 13.1 and 12.9. Riprap was not found during ground truthing.	
5b	Project RM 13.36L	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement	At this location, the channel flows against a road embankment along river-left. Riparian vegetation has been cleared and there is no cover along the bank. LWD placed here could provide cover and increase the quality of the habitat.	 View to the east at the river-left bank near RM 12.34 (November 2009).
5b	Project RM 13.4R	Outer Zone 2 (OZ-2)	Reconnect Floodplain Processes	Enhance floodplain connectivity	This project involves enhancing a network of overflow channels that extends from RM 13.13 to 13.56. This floodplain surface is relatively high and does not appear to be frequently inundated. However, topographic evidence shows several areas with high-flow channels. These channels could be re-connected using log jams along the channel margin near the inlets. Inlet areas would need to be excavated to allow spring floods to access this area. At the downstream end of the unit, there may be opportunities for excavating to create a backwater channel with direct main channel connectivity.	




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5b	Project RM 13.59R	Inner Zone 1 (IZ-1)	Side-Channel habitat enhancement	Side-Channel habitat enhancement	This side-channel runs along river-right between RM 13.53 and 13.63. This is a low energy side-channel with sand deposits. There are well established trees in the channel suggesting that flow rarely has the power to scour the bed. A large apex log jam at the upstream end would encourage flow into the side-channel, scouring the bed and coarsening sediment. With the addition of wood and other habitat features throughout the side-channel, habitat conditions would be improved for rearing, migrating, and spawning fish. Increased flow in the side-channel also has the potential to increase connectivity to a network of floodplain channels to the west.	 <p>View to the south in the downstream direction at a river-right side-channel near RM 13.59 (November 2009).</p>
5b	Project RM 13.6C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	The area of the reach from RM 13.45 to RM 13.92 has multiple split flow locations with stable bars and islands. There are opportunities to load the entire stretch of river with wood and re-establish natural geomorphic elements and channel dynamics. Near RM 13.92 a large bank log jam would work with the natural sinuosity of the reach to move water laterally and encourage channel migration. The jam would also increase cover along the bank and create scour pool formation. AT RM 13.78 there is a bar apex log jam placement opportunity. This is a suitable location as wood naturally tends to accumulate on bar apexes, enhancing split flow, lateral channel migration, and habitat complexity. There is a split-flow location near RM 13.73 with opportunities for bank jams on both sides of the river. These jams would add complexity and enhance the split-flow condition. Near RM 13.62, a left-bank log jam would increase habitat quality and cover. There is bank erosion and modest LWD recruitment at this location that would be enhanced by the wood placement. A well-connected, active side-channel that extends from RM 12.4 to 12.54 could be enhanced with several log jams. The side-channel is an example of the effects of LWD on habitat complexity and abundance. There are scour pools around existing jams that provide good habitat when water is flowing through the channel. More wood could be added to increase the quality of habitat in the side-channel.	 <p>View to the northwest in the upstream direction at split flow around a gravel bar near RM 13.78 (November 2009).</p>  <p>View to the northeast in the upstream direction at the river left bank near RM 13.73 (November 2009).</p>
5b	Project RM 13.8R	Disconnected Outer Zone 1 (DOZ-1)	Riparian Restoration	Riparian re-vegetation	Riparian deforestation has degraded habitat and a potential LWD source along the channel margin of this sub-unit. This project would replant native riparian vegetation in a buffer zone along the channel margin to re-establish a longitudinal riparian corridor and lateral buffer zone. Eventually, thermal shading, improved habitat, and LWD would be provided.	





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
5b	Project RM 13.85L	Inner Zone 1 (IZ-1)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	This project is focused on improving hydrologic, geomorphic, and habitat connectivity between the main channel and a side-channel. The side channel extends along river-left between RM 13.78 and 13.85. A project here would construct large log jams to increase habitat complexity within the side channel. Log jams at the inlet would be placed to encourage more flow into the side channel.	 <p>View to the south in the downstream direction at a river-left side-channel near RM 13.85 (November 2009).</p>
7	Project RM 14.39L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	A large log jam would be used here to increase local cover habitat. Currently, there are few features that provide quality habitat in this part of the river. A log jam would be placed on the outside of the bend, taking advantage of existing planform and hydraulics to create a scour pool	
7	Project RM 14.49C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Abandoned bridge abutment removal/modification.	There are old wooden bridge abutments on both sides of the channel here. They do not pose a significant hydraulic obstruction but may hinder riparian growth and LWD recruitment. These abutments could be removed and replaced with log jams or incorporated into a larger log jam depending on future hydraulic analysis and findings.	
7	Project RM 14.53C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity.	This is a location where log jams could be placed on both sides of the channel to increase the general availability of habitat and cover and to increase lateral migration, scour-and-fill, and pool formation. There is a small mid-channel bar at this site providing a location for a bar apex jam.	 <p>View to the south in the downstream direction at a mid-channel bar near RM 14.53 (November 2009).</p>
7	Project RM 14.65R	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	Similar planform conditions exist as at RM 14.76, with poor large wood complexity and opportunities to improve it. At RM 14.68, the river flows directly against the road embankment where placement of large wood habitat would be designed to both protect the road and create habitat. The tail out of a riffle near RM 14.63 where velocity slows down there is a poorly developed pool. A log jam here would provide cover for the pool habitat, and potentially increase bed scour to provide greater residual pool depth.	






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
7	Project RM 14.76L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This is the only section of the reach with planform complexity. The river takes an abrupt turn to the west, eroding into the margin of the glacial terrace. There is a poorly developed riffle-pool sequence with a narrow bar on the inside of the bend and some scour occurring on the outside. LWD can be used at this site to enhance the scour and pool formation on the outside of the bend while providing cover and improved habitat.	 <p>View to the northeast in the upstream direction at a bend in the river near RM 14.76 (November 2009).</p>
7	Project RM 15.15C	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	Between RM 15.34 and 14.93 there are opportunities to enhance instream habitat with bank log jams on both sides of the channel. Near RM 15.34 there is a long, straight section with little habitat availability. Several log jams could be placed along both banks in order to provide habitat cover and complexity. Near RM 15.21 is a right bank log jam opportunity meant to increase cover and habitat complexity. The bank is high and eroding, exposing several large root masses. There are pines that could be recruited as LWD. A log jam near RM 15.14 would alternate with the jam at RM 15.21, increasing overall density of cover and creating a location of potential pool scour on the opposite side of the channel. Bank conditions are similar with ongoing erosion of a terrace and potential for LWD recruitment. Near RM 14.93 there are several log jam opportunities in stream banks on both sides of the river. As with the inner zone upstream of this site, there is very little habitat complexity and there is an opportunity at this location to improve it.	 <p>View to the north in the upstream direction at a low complexity section of the reach near RM 15.34 (November 2009).</p>  <p>View to the northwest in the upstream direction at the river right bank near RM 15.21 (November 2009).</p>
7	Project RM 15.54R	Inner Zone 1 (IZ-1)	In-Stream Habitat Enhancement	LWD enhancement.	This site is at the tail-out of an upstream riffle that orients flow to the west toward the river-right bank resulting in erosion and overhanging root wads. The addition of LWD along the bank would increase scour and pool formation as well as provide cover.	 <p>View to the northwest in the upstream direction at the river-right bank near RM 15.54 (November 2009).</p>





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo	
7	Project RM 15.65R	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity, enhance side-channel connectivity	This LWD project involves meander-bend and apex log jams to encourage flow in a side-channel and connected alcove near RM 15.6. There are opportunities for meander-bend jams on both sides of the channel near RM 15.62. On river-left, the bank is actively eroding and wood has been recruited to the channel. Along river-right there is an active gravel bar that is appropriate for an apex log jam. These log jams would increase habitat and geomorphic complexity and move water into an adjacent side-channel. The side-channel provides seasonal flow to a backwater feature on river right near RM 15.6. Enhancing the existing bar apex wood jam near RM 15.69 would encourage flow to move toward river right and increase the range of flows that provide upstream connection and habitat access to the backwater.		View to the east at an eroding bank and LWD recruitment along river-left near RM 15.62 (November 2009).
8	Project RM 15.8R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	The river flows directly against the road embankment at this location. Riprap has been placed at the toe of the slope providing very little habitat or cover. This project would replace or enhance the riprap with LWD to increase the quality of instream habitat.		View to the north in the upstream direction at riprap along river right near RM 15.8 (November 2009).
8	Project RM 15.9C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This area of the inner zone exhibits high complexity with multiple bars, high flow channel networks on both sides of the channel, and off-channel backwater areas. This project entails several large log jams placed on both sides of the channel with the intention of working with the current geomorphic dynamics to increase lateral migration, enhance connections between the main channel and side-channel habitats, and create conditions conducive to long-term habitat formation. Several jams would be created along the river-left bank between RM 16 and RM 15.9. These would provide local cover as well as encourage high-flow onto the adjacent floodplain. A bar apex jam would be placed near RM 15.9 to enhance inner-zone processes and maintain split flow. Downstream of the gravel bar near RM 15.85, log jams would be constructed across the majority of the width of the active channel in order to move water east into floodplain habitat (See Project RM 16L).		View to the southeast in the downstream direction towards a low area along river-left near RM 16 that provides access to high-flow channel that access inner zone side-channels and floodplain channels to the east (November 2009).





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
8	Project RM 16L	Outer Zone 8 (OZ-8)	Reconnection Floodplain Processes	Off-channel habitat reconnection	There are large floodplain wetlands and high-flow channel networks throughout this sub-unit. This project would involve creating points of inflow to the floodplain with excavation and log jam construction along the channel margin. Excavation would create low points along the bank where high flow could access the floodplain network. Log jams would help to orient flow onto the floodplain and scour the mouths of the high-flow channel inlets. The downstream connectivity of the outlet may also need to be enhanced to ensure fish passage at lower flows and habitat access. The degree to which this habitat could be allowed to develop is varied. On the one end of the spectrum it appears possible to avulse the entire Chewuch into this relatively mature and complex valley segment. Doing so would greatly increase habitat and complexity in this segment of the valley. However, it would require substantial large wood resources in the current mainstream channel to develop these habitats. Future conceptual design work and preliminary hydraulic analysis will determine various project design options and benefits.	 <p>View to the northeast in the upstream direction at a river-left floodplain wetland with marginal connectivity near RM 15.9 (November 2009).</p>
8	Project RM 16.22C	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	Log jam placements on both sides of the channel near RM 16.27 could increase the amount of cover and improve the overall quality of in-stream habitat. A site near RM 16.3 has some good existing cover in the form of under-cut root masses. A site near RM 16.22 is without cover, and a bank log jam would greatly increase the quality of habitat in that area. Near RM 16.17, a riffle orients flow into the right bank, creating scour and a pool with good residual depth. LWD could be added to the bank to increase cover and habitat quality in the existing pool.	 <p>View to the east at overhanging pool cover along river-left near RM 16.3 (November 2009).</p>
8	Project RM 16.4R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This log jam project is located at the apex of a large gravel bar that is forming along river-right. The bar apex jam would be placed to take advantage of existing sinuosity and push water to the left to encourage greater lateral migration and sustained habitat formation.	






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
8	Project RM 16.65C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	Between RM 16.5 and 16.8 log jam placements are possible at several bar apexes and in multiple side-channels. A general goal with all the placements is to encourage the processes that are naturally taking place in this area and to enhance the habitat by providing cover and complexity. A bar apex jam has naturally accumulated a relatively significant log jam near RM 16.8 and there is active split flow around the bar at all flow levels. The river-left side-channel has some pool habitat but with little cover. LWD placements would include supplementing the bar apex jam and adding several smaller jams along the left side channel to increase cover and habitat complexity. There are several potential log jam placements around a gravel bar and the multiple active side channels near RM 16.62. A bar apex log jam has formed at the upstream end of the project area. This jam would be enhanced with several large logs to increase scour and enhance flow into the side-channels. Several other large log jams would be placed throughout the river-right and river-left side-channels where there are several small riffle-pool sequences and some undercut banks that would be improved with the addition of wood. Near RM 16.51 there is active gravel bar formation on river-left and active bank erosion on river-right. The bank erosion has resulted in LWD recruitment. This project would entail placing log jams on both sides of the river including a bar apex jam on the left and enhancement of existing bank wood on the right.	 <p>View to the south in the downstream direction at a bar apex log jam near RM 16.8 (November 2009).</p>
						 <p>View to the southeast in the downstream direction at a river-left side-channel near RM 16.78 (November 2009).</p>
8	Project RM 16.7R	Inner Zone 2 (IZ-2)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	There is a long narrow side-channel that runs along the river-right between RM 16.6 to 16.8. This channel is separated from the main channel by a narrow gravel bar. Near RM 16.7 the side-channel turns west and flows away from the main channel providing a greater connection to floodplain habitats. There is outflow at this point that reduces flow in the rest of the side-channel downstream during low flow periods. This project would include several log jams throughout the side-channel including at this outflow location with the intention of enhancing side-channel habitat and floodplain connectivity during high flow events. A wetland at the downstream end near RM 16.6 could be enhanced with wood for cover, and potentially excavated at its outlet to increase its connectivity with the main channel.	 <p>View to the southwest in the downstream direction at a side-channel outflow on river-right near RM 16.7 that dewateres the side-channel for the remainder of its length (November 2009).</p>




Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
8	Project RM 16.7L	Outer Zone 6 (OZ-6)	Reconnect Floodplain Processes	Off-channel habitat reconnection	This project focuses on enhancing the connectivity of a large area of floodplain wetlands and high-flow channels towards the downstream end of the sub-unit. These off-channel habitats provide groundwater-fed and wall-based wetlands, but are rarely connected to inner-zone processes or habitats. This project involves excavation and log jam construction at several points along the channel margin to create high-flow channel inlets or potentially low-flow access channels in order to increase the frequency of floodplain inundation and increase direct connectivity between the channel and floodplain processes and habitats.	 View to the west at a floodplain wetland near RM 16.8 (November 2009).
8	Project RM 17C	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This project area encompasses a straight stretch of river with very little cover or in-channel habitat complexity. Several log jam placements on both sides of the channel would increase overall habitat availability and channel complexity. At each proposed location, there is natural bank scour that has led to moderate recruitment of LWD. This process, as well as habitat quality, could be enhanced through log jam placement.	 View to the west at an example of bank erosion and LWD recruitment along the river-right bank near RM 17 (November 2009).
8	Project RM 17.16L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This log jam is proposed along river-left in a poorly developed pool/glide. A LWD jam would provide cover and increase bed scour to form a deeper pool in this location. A log jam(s) could also create backwater to enhance flow into a side-channel inlet located just upstream.	 View to the northeast in the upstream direction at the river-left bank near RM 17.16 (November 2009).
8	Project RM 17.31R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	There is large riprap along the river-right bank between RM 17.3 and 17.37. This material protects a roadway that runs along the hillslope above the channel. The river flows west directly against the riprap, then turns south and runs along the riprap for several hundred feet. The availability of complex bank habitat is limited by the presence of the riprap. This project would add LWD jams to this area to increase habitat cover and complexity. Two log jams are proposed in this area. One jam would increase habitat quality and cover at the point where the river turns against the riprap and a pool has formed. The second is at the downstream end where overhanging vegetation could be enhanced to increase cover.	 View to the northwest in the upstream direction at riprap lining the margin of a pool along river-right near RM 17.35 (November 2009).






Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
8	Project RM 17.4L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This project location is at the tail of a riffle where there is moderate pool development. A mature hemlock overhangs a portion of the pool, providing limited cover. A log jam placement would enhance the cover provided by the hemlock and potentially increase scour to provide greater residual pool depth.	 <p>View to the southwest in the downstream direction at the river-left bank near RM 17.4 (November 2009).</p>
8	Project RM 17.4R	Inner Zone 2 (IZ-2)	Off-Channel Habitat Enhancement	Side-channel habitat enhancement	This site is on the outside of a bend where the river turns south near RM 17.45. There is a network of high-flow channels across a gravel bar and the adjacent floodplain to the west. A large bar apex jam would be placed near RM 17.45 to move water into the high-flow channel network and increase connectivity between the main channel and side-channel habitat. Some channel excavation and installation of wood and riffle-pool sequences may also benefit habitat in the side-channel.	 <p>View to the southwest in the downstream direction at a gravel bar and side-channel inlet on river-right near RM 17.45 (November 2009).</p>
8	Project RM 17.45L	Outer Zone 4 (OZ-4)	Reconnect Stream Channel Processes	Side-channel habitat reconnection.	This project includes excavation and log jam construction at the upstream inlet of a floodplain channel that extends along the entire terrace margin of the sub-unit. The downstream end of the floodplain channel is well-defined but does not appear to frequently convey overbank flow. Excavation of an inlet and placement of a log jam to create scour and keep the side-channel open would increase connectivity between the main channel and floodplain habitat.	





Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo	
8	Project RM 17.56L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance side-channel connectivity	This project area involves using several log jams on both side of the river between RM 17.6 and 17.55 to enhance the flow conditions in a side-channel that extends along river-left between RM 17.5 and 17.6. Between RM 17.55 and 17.6 there are two river-right locations where streambank log jams would increase the amount of cover and available habitat in the vicinity while pushing flow to left with increasing discharge. At the upstream site, the log jam placement would enhance bank erosion that has the potential to recruit large pine trees. The inlet to the side channel is at about RM 17.6 on river left. Vegetation and geomorphic evidence suggest that the channel does not carry flows with sufficient energy to scour the bed. The bank at the upstream end is high, and there is not a well-defined inlet. However, farther downstream there are depressions that hold groundwater and a backwater pool with an open surface connection at the downstream end. A log jam at the upstream end would encourage scour and increase flow into the side channel. The backwater channel at the downstream end could be enhanced with wood for cover.		View to the southwest in the downstream direction at potential LWD recruitment along the river right bank near RM 17.55 (November 2009).
8	Project RM 17.77C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This project area includes potential log jam locations at RM 17.75 and at RM 17.8. At each of these locations, bank erosion is resulting in exposed root masses and moderate LWD recruitment. Log jams placed in these locations would serve to increase the local cover and habitat availability as well as encourage increased natural LWD recruitment and lateral migration that is taking place at moderate rates under current conditions.		View to the east at exposed root masses along the river-left bank near RM 17.5 (November 2009).
8	Project RM 17.95C	Inner Zone 1 (IZ-1)	Reconnect Stream Channel Processes	LWD placement to enhance habitat and connectivity	This project area includes the potential for several large log jams on both sides of the channel between RM 17.98 to RM 17. This area, as with most locations in the study area, is low in wood density in comparison to undisturbed conditions. An overarching goal of all of these placements is to re-establish natural LWD loading and provide the habitat complexity and cover that is generated by LWD. At the upstream end of this project site, there are two locations with high eroding banks where streambank log jams would enhance habitat cover and complexity. At the downstream end of the project area, there is a mid-channel bar and riffle-pool sequence that provides a location for a bar apex jam and large wood complexes in the downstream pool to enhance lateral connectivity (i.e. encourage split flow) and habitat.		View to the northwest in the upstream direction at an example of a potential streambank LWD jam project location near RM 17.97. A similar location is found on the opposite bank near RM 17.98 (November 2009).







Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
9	Project RM 18.05L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	The river turns due south near RM 18.15 and flows directly against the hillslope. There is a road on the slope and riprap at the toe. Riprap could be replaced or enhanced with several log jams and root wads placed along the left bank between RM 18.15 and 18.05.	 <p>View to the southeast in the downstream direction at riprap along the toe of the river-left bank near RM 18.05 (November 2009).</p>
9	Project RM 18.34L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This project site has the potential for installation of several channel-spanning log jams along the river-left bank between RM 18.33 and 18.35. Riparian vegetation is in good condition but the channel lacks cover and habitat complexity. LWD would serve to provide these features to this portion of the channel.	 <p>View to the north in the upstream direction at the river left bank near RM 18.34 (November 2009).</p>
9	Project RM 18.4L	Outer Zone 4 (OZ-4)	Off-Channel Habitat Enhancement	Wetland habitat enhancement	A small floodplain pond is located near RM 18.4. This feature is groundwater-fed, but does not appear to be actively connected to channel processes. There is a channel that traces the toe of the alluvial fan along the east margin of the floodplain. This channel could be excavated to create a groundwater gallery increasing flow to the wetland. The wetland's capacity could also be increased and a passable downstream outlet created. Log jams along the inner-zone margin at the upstream end of the floodplain channel could increase the high-flow connectivity of the entire floodplain.	 <p>View to the east at a wetland located near RM 18.4 (November 2009).</p>



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
9	Project RM 18.5C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This project area includes several log jams along both sides of the channel with the goal of increasing habitat complexity and lateral dynamics in the active channel. The stretch of river between RM 18.6 and 18.45 is relatively complex with large stable bars, active split flow, and moderate amounts of LWD. This area presents the opportunity to install multiple habitat features. At the upstream end of the project area near RM 18.6, there is an existing bar apex jam that could be enhanced to move more water into the seasonally dry river-right channel. Near RM 18.55, LWD could be added along the left bank to enhance existing root masses and overhanging trees to increase cover in a pool. Another bar apex jam opportunity exists at RM 18.5. There is a significant amount of wood that is naturally racking up on the bar and across the left channel of the split flow around the bar. The bar forms a riffle and a high quality pool in the right side-channel. LWD added along the bank would enhance cover. Downstream at RM 18.45 there is a location along river-left where LWD recruitment is taking place. Addition of some large wood jams across the channel could increase the rate of recruitment and add complexity to the channel.	 <p>View to the north in the upstream direction at a river-right side-channel near RM 18.6 (November 2009).</p>
9	Project RM 18.65L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	This location has some bank erosion and exposed root masses that could be enhanced to provide greater cover and available habitat along the bank. The channel morphology is currently a glide. Large wood jams along this bank would enhance cover and likely establish quality pool habitat.	 <p>View to the east at the river-left bank near RM 18.65 (November 2009).</p>
9	Project RM 18.75R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Riprap removal or modification	Around the mid-channel bar described in Project RM 18.81, there are riffle-glide sequences on both sides of the split flow. The right side flows against riprap at the toe of the road embankment. LWD placed along the bank would provide cover and increase habitat complexity. There is also the potential for scour to form pools over time.	 <p>View to the northwest in the upstream direction at the river-right bank near RM 18.75 (November 2009).</p>



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
9	Project RM 18.81C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance lateral connectivity	This project involves constructing a bar apex log jam to maintain and enhance split flow and provide complexity and cover at higher flows. The location is on a small mid-channel bar.	 View to the south in the downstream direction at a mid-channel bar near RM 18.81 (November 2009).
9	Project RM 18.9L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	The left bank is the toe of a large alluvial fan that has delivered boulders to the Chewuch valley during high energy debris torrent events. Boulder substrate is not easily moved by the Chewuch once it enters the river, resulting in coarse uniform bed morphology with relatively little habitat complexity. To enhance habitat complexity, several large log jams could be placed in the left bank glide.	 View to the southeast in the downstream direction at the river-left bank near RM 18.9 (November 2009).
9	Project RM 18.9R	Outer Zone 3 (OZ-3)	Off-Channel Habitat Enhancement	Off-channel/side-channel habitat enhancement	At this project site, there is a high-flow channel along the hillslope margin the entire length of the sub-unit. This channel has clean cobble substrate that suggests relatively frequent conveyance of high-flow. Farther downstream, flood flow becomes dispersed on the floodplain and the channel loses definition. Connectivity between the active channel and this floodplain channel could be increased through excavation and log jam construction at the inflow. A backwater pool could be created at the downstream end, which would also require excavation.	 View to the south in the downstream direction at a high-flow channel on river-right near RM 18.9 (November 2009).
9	Project RM 19C	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Abandoned bridge abutment removal and LWD enhancement	This project involves using LWD to enhance several areas on both sides of the channel between RM 18.96 and 19.1. Near the upstream end of this stretch at RM 19.1, there is a pool on river-left with overhanging vegetation that provides a moderate amount of cover. A log jam along the bank would improve habitat quality. A glide near RM 19.05 provides an opportunity for log jams on both sides of the river to instigate pool formation. At the downstream end of this project area near RM 18.96, there is an old bridge pier in the channel and an abutment on the bank. The old bridge concrete could be removed or kept in place to form the foundation of a large log jam that would increase cover and extend the size and depth of the existing pool feature.	 View to the east at the river-left bank near RM 19.1 (November 2009).

Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
9	Project RM 19.05R	Outer Zone 3 (OZ-3)	Off-Channel Habitat Enhancement	Off-channel/side-channel habitat enhancement.	Between RM 18.96 and 19.1, there is an old high flow channel that runs along the toe of the hillslope the entire length of the sub-unit. Geomorphic evidence suggests little connectivity between this floodplain feature and channel processes. A well-connected side-channel or groundwater-fed off-channel could be created here. At the downstream end, a backwater surface connection could also be excavated. This project could be combined with the previously presented mainstem log jam work at the island apex. The extent of side-channel excavation versus large wood additions to establish flow down the side-channel would be determined during conceptual project development and following preliminary hydraulic analysis.	 <p>View to the south in the downstream direction at an abandoned high-flow channel along river-right near RM 19.05 (November 2009).</p>
9	Project RM 19.25R	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	Enhance side-channel habitat connectivity	This area of the inner zone is very active with mid-channel bar formation, split-flow, and LWD recruitment along river-left where the channel is eroding the toe of an alluvial fan. A bar apex jam has naturally formed on the mid-channel bar. This feature could be enhanced to maintain split flow and habitat complexity. The apex jam could be designed to encourage LWD recruitment along the river-left bank downstream. To the far river-right there is a high flow channel that extends between RM 19.1 and 19.35, with a well-connected off-channel backwater at its downstream end. The apex jam would maintain flow through this feature, and several smaller log jams could be placed to add habitat and cover to the backwater. Upstream of the apex jam near RM 19.2 is a bank log jam opportunity on the outside of a slight bend in the river where there is slow water that could be enhanced to provide better habitat. There is very little habitat in the main channel upstream of the side-channel. Large logs could be placed to provide cover and potentially drive scour-and-fill to form a pool and provide substrate smaller than the cobbles and boulders that dominate now.	 <p>View to the southeast in the downstream direction at erosion of the river-left bank near RM 19.25 (November 2009).</p>  <p>View to the south in the downstream direction at a bar apex log jam near RM 19.25 (November 2009).</p>
9	Project RM 19.4R	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	At the bottom of the riffle just downstream of Project RM 19.45L, there is a relatively large pool on the outside of a bend. The river flows directly against the hillslope and there is a road above. The outlet of an active side-channel is at the top of the pool. This project would place a large log jam in the pool, and at the outlet of the side-channel to increase cover and scour that will maintain pool depth and side-channel connectivity.	 <p>View to the north in the upstream direction at a pool and side-channel outlet on river-right near RM 19.4 (November 2009).</p>



Reach	Project Number	Sub-Unit	Strategy Category	Project Name	Description	Photo
9	Project RM 19.45L	Inner Zone 2 (IZ-2)	In-Stream Habitat Enhancement	LWD enhancement	The goal of this project is to provide cover and increase scour in a short glide. A gravel bar creates a riffle just upstream that orients flow towards the river-left bank creating a short glide where the riffle tails out. Velocity soon increases into another riffle just downstream. LWD would enhance cover and potentially create a scour pool along the bank.	 <p>View to the south at the river-left bank near RM 19.45 (November 2009).</p>
9	Project RM 19.6L	Inner Zone 2 (IZ-2)	Reconnect Stream Channel Processes	LWD placement to enhance side-channel connectivity	The main channel in this vicinity provides very little habitat. The channel is plane-bed morphology and there is no LWD. This project would place LWD along the left bank to increase local cover and habitat complexity. As an extension of this work, a larger scale log jam would be constructed at the head of a large forested island. By occluding flow in the mainstem at the island apex, the log jam would enable more water to flow down a western side channel (valley right). Within this side channel 2-3 large log jams along the right bank would be constructed to protect the existing valley bottom road and enhance habitat.	 <p>View to the southeast in the downstream direction at the river-left bank near RM 19.6 (November 2009).</p>