LEFTHAND WATERSHED oversight group

Monitoring and Assessment Framework

	Key Questions	Category	Monitoring Parameters	Monitoring Method Description	Monitoring Frequency	Location	Performance Standard	Management Trigger	Suggested Management Actions	Monitoring Personnel
Flow Regime										
	Are there adequate flushing flows to reduce vegetation enroachment and to maintain pool depths?	Flow Regime	Stream stage and flow (and relate to surveyed cross sections, embeddedness, and riparian conditon)	Characterization of the timing and magnitude of flows. Includes analysis of flow in relation to recurrence interval and percent of time exceeded.	Continuous (every 15 minutes to 1 hour)	Several locations as appropriate to represent longitudinal variation in flow from upstream to downstream.	Flushing flows occur with enough frequency that encroachment of vegetation is not occurring. Overbank flows are sufficient to support floodplain vegetation. Low flows are sufficient to support fish passage. Additional standards to be determined as part of the Stream Management Plan and fish passage study.	Significant dry up points, vegetation encroaches into channel, hydrograph too flashy. Additional triggers to be determined as part of the Stream Management Plan and fish passage study.	- Flow augmentation (per Stream Management Plan recommendation) - Active management of encroaching vegetation - Watershed management to encourage infiltration if warranted	2 - Technical or Professional
	Is channel and floodplain conveying flows per the design?	Floodplain Connectivity	Width of river at a given recurrence interval (pin flag method) (and relate to surveyed cross sections, and species distribution in floodplain.)	Observe and record width of floodplain flows over several years to determine floodplain width in relation to flows and corresponding stages compared to design.	Observe floodplain flow during sporadic high flows	At surveyed cross sections and selected additional important locations in the floodplain.	Width of floodplain at a given recurrence interval is appropriate for the landscape location.	Width of floodplain at a given recurrence interval is inappropriate for the landscape location.	- Reconfigure channel to reconnect floodplain - Create floodplain benching - Reestablishment of wetland hydrology - Continue observations of riparian condition	2 - Technical
Stream Form and Function										
	What channel dimensions within each watershed zone lead to the highest functioning sites? (Help build database to inform future restoration projects.)	Channel Dimension	Channel and floodplain dimensions (and relate to flow and ecological community) .	CWCB SOP for X-section monitoring. Relate to ecological measurements below.	Annually	At least 3 locations per watershed zone representing the variety of channel forms including pools, riffles, runs, and bends. Select locations where conveyance and/or vegetaion composition is important.	No evidence of excessive instability, incision, over-widening, scour, or deposition over time. Channel dimensions are appropriate for the flow regime and trending in appropriate direction when evaluating in context of the channel evolution model.	Dimensions are not appropriate for the flow regime and trending in appropriate direction compared to channel evolution model. Evidence of excessive instability, incision, over-widening, scour, or deposition.	- Improve channel geometry - Address incision, instability or sedimentation	2 - Technical
	Are the installed features functioning as intended? --- *Are brush trenches trapping sediment and creating micro-topography as intended?* - --- *Is there diversity and complexity present in stream form and riffle-pool sequence?*	Planform / Lateral Stability	Bank and channel cross section condition	Primarily photo monitoring, SVAP (bank condition) and facies mapping. Can include cross sections as appropriate or as budget allows.	Annually	Adjacent to assets at risk or features of interest.	Stressors may be present but patterns of deposition, scour, and migration appear to be mostly natural. Lateral migration and bank erosion are minimal in areas of concern (e.g. adjacent to structures). SVAP score for bank condition improves or stays same year after year.	Excessive deposition, scour, migration, or bank erosion are detected. SVAP score for bank condition is <5, or goes down 2 points or more in one year.	- Investigate stream form changes upstream - Structural Bank Protection or stabilization - Livestock fencing - Address instability - Reduce bank erosion - Increase riparian vegetation	2 - Technical
		Long Profile / Vertical Stability	Channel (long profile) condition	Primarily photo monitoring and facies mapping and SVAP Channel Condition score. Can include long profile as appropriate or as budget allows. SVAP score for channel condition and pools. Carry a GPS unit while surveying the longitudinal profile along the thalweg will provide information needed to map the thalweg.	Annually or Every 2 years	In areas where conveyance or pool depth or sedimentation is a particular concern.	No evidence of excessive incision or sedimentation in pools over time. SVAP score for channel condition and pools improves or stays same year after year.	Significant deposition, scour, incision, or headcutting. Pool habitat reduced significantly. SVAP score for channel condition and pools is <5, or goes down 2 points or more in a category in one year.	- Install Grade Control structures - Structural Bank Protection - Investigate local gradient impacts - Livestock fencing - Revegetate riparian zone - Reconfigure/regrade banks	2 - Technical
		Instream Structures and Features	Installed features functional score	Photo monitoring using CWCB SOP; Feature-Function checklist.	Annually	At selected structures or features in the study reach. Aim to get good representation of all features installed.	Features functioning as intended (see check list)	Features not functioning as intended.	- Varies depending on feature.	1 -Community
	Are there adequate flushing flows to maintain pool depths?	Streambed Composition and Function	Embeddedness Score and Streambed composition	Wolman's pebble count, SVAP embeddedness score.	Annually or every 2 years.	At selected cross sections (or nearest downstream riffle if x-section is not on riffle).	Embeddedness <=20% (for cobble/gravel streams). Pebble counts do not show a consistent multi-year trend toward increasing proportions of fine sediment.	Embeddedness >= 30% (for cobble/gravel streams)	- Install Large Woody Structures - Investigate and address sources of fine sediment/sand - adjust channel dimensions - Construct Pool Riffle sequence	1 - Community

LEFTHAND WATERSHED oversight group

Monitoring and Assessment Framework

Sediment Regime										
	Where are the main sediment source locations in the watershed? (NOT a project specific question)	Sediment from Watershed	Map of sediment sources	Trace turbidity sources (this will tell us if there's a problem first), assess extent of bare or disturbed areas, and identify erosion in tributaries if there's a problem identified	Annually during storm events	Watershed-wide	No significant sources of sediment are detected.	Areas are contributing significant sediment into the watershed.	- Terracing - Revegetation - Post Fire restoration -Sediment Basins -Fencing of livestock	2 - Technical
	Are banks in our project area contributing to sediment in the water column?	Sediment from Banks	Bank condition, water turbidity	Cross sections and visual assessment, as budget allows grab samples during storm events up and downstream of project site of concern. Erosion pins as appropriate. Use CWCB SOP.	Annually	Areas where bank stablity is a concern.	Channel banks in normal or stable condition with vegetation and little bare soil	Significant or excessive erosion	- Increase riparian vegetation - Install livestock fencing - Draft bank stabilization projects - Inspect upstream sources of instability (channelization, increased stream power) -Add instream structures to dissipate energy	1 - Community or Technical
	Are there adequate flushing flows to transport sediment?	Sediment Transport Continuity	Sediment accumulation	Photo monitoring using CWCB SOP. Review longitudinal profiles to assess whether a channel structure is blocking the flow of sediment at certain locations.	Annually	Areas of concern.	No signs of significant deposition or scour. Impediments to sediment transport exist, but they are not significant.	Major impediments to sediment transport exist causing significant deposition and/or significant scour exists within stream reach.	-Remove blockage and seek ways to improve sediment transport	1 - Community or Technical
Ecological Community										
	Is the floodplain functioning as indended? --- *Are brush trenches trapping moisture and increasing native plant diversity?* --- *Is the site maintaining or improving habitat diversity and quantity year to year?*	Riparian Condition	Quantity and quality of riparian habitat, percent bare ground, species composition, and percent non-natives.	Use same plot collection methodology as CWCB's monitoring team, but collect species-specific data instead. Partner with university member to assess key quesitons in more depth.	Annually	At least 3 locations per watershed zone representing the variety of floodplain types, include variety of features such as brush trenches and wood installations, include areas where conveyence is a concern.	Trending in the general direction of more native species. Wetland species present in floodplain. Bare ground is reduced except in areas that are geomorphically appropriate. Age class distribution is geomorphically appropriate.	Significant encroachment by trees into the channel is occurring. Significant bare ground on banks. Significant presence of invasive plant species. Absence of wetland species in floodplain.	- Invasive species management strategy - Fencing sensitive areas - Planting - Grazing/ burrowing animal management - Reduce barren ground/exposed soil - Reestablish of wetland hydrology - Active management of encroaching trees	3 - Professional
		Habitat Condition	SVAP Score	Assess the quality and quantity of instream habitat using the Stream Visual Assessment protocol (SVAP).	Annually	Throughout study reach.	SVAP score stays the same or increases each year.	SVAP score <5, or goes down 2 points or more in a category in one year.	- Install Instream Structures and habitat features - Revegetation -Weed Removal -Increase instream habitat structure -Bank stabilization -Side Channel and Off Channel Habitat	1 - Community
		Biotic Structure	Presence of benthic macroinvertebrates, algae, macrophytes, and fish.	Assess abundance and diversity of aquatic plants and animal communities. The species list for benthic macroinvertebrates can be used to calculate the Index of Biological Integrity (IBI) score, which can be used to quantitatively relate the aquatic habitat score of the stream to those of others.	Fish & Wildlife presence (opportunistically). BMI every two or three years.	Throughout study reach.	Distribution, age structure, overall biomass, and functional guilds are appropriately represented. IBI Score compares favorably to similar streams and is trending higher with time.	Macroinvertebrates: Exotic invasions, severely limited feeding guilds, IBI scores that are low or trending lower. Algae: Healthy periphyton community absent from streambed rocks. Aquatic macrophytes: Characteristic plant cover is absent, or plant cover is dominated by invasive aquatic macrophytes. Shading of stream channel by trees is minimal. Animals and Fish: Typical species severely limited, exotic infestations, keystone species absent.	- Revegetate - Increase shade - instream habitat (e.g. large wood, boulders). - Prohibit Further Channelization - Improve connectivity of quality habitat - Maintain healthy riparian plant communities - Wetland creation	2 - Technical or Professional
	Is the revegetation effort meeting warrenty/EWP requirements?	Plant Survival	Counts of dead installed plants.	Count dead plants at revegetation sites	Annually	All sites	Meets EWP requirements per contract.	Does not meet EWP requirements.	Replant	1 - Community
	Is the site maintaining or improving water quality year to year? (NOT restoration project site specific)	Water Quality	A variety of observed and measured physical, chemical, and microbiological parameters. Examples are listed in appendix.	Water quality pertains to physical, chemical, and microbiological characteristics of the water. These characteristics are important determinants of stream function for aquatic habitat, and for serving as a source of drinking and irrigation water. Local governments are interested in ensuring that the stream provides these functions, and that water quality improvement is sufficient to remove the stream from the State's list of impaired waters.	Variable: monthly, quarterly, annually	Currently at 7 primary sampling locations in the mountain reaches, representing various degrees of influence from mining sites. Could expand to the plains.	The stream's water quality does not significantly limit its ability to perform the functions of providing aquatic habitat and serving as a source of drinking water and irrigation water. Key water quality parameters included in the TMDL for the creek are trending toward levels that will allow removal of the creek from the list of impaired waters in a reasonable time.	The stream's water quality does significantly limit its ability to perform the functions of providing aquatic habitat and serving as a source of drinking water and irrigation water. Key water quality parameters included in the TMDL for the creek are not trending toward levels that will allow removal of the creek from the list of impaired waters in a reasonable time.	- Chemical Management Plans - Investigate upstream sources of pollutant (water quality/ pollution investigation) - Wetland creation - Runoff management - Public Education Programs - Debris (trash) removal	2 - Technical