

Appendix B

Twisp River

REI Metrics

REACH-BASED ECOSYSTEM INDICATORS (REI) ASSESSMENT

REI metrics provide a consistent means of evaluating biological and physical conditions of a watershed in relation to regional standards and known habitat requirements for aquatic biota. These metrics, along with other scientific evaluations, describe the current quality of stream biophysical conditions and can help guide restoration priorities and alternatives. The REI evaluation for the Twisp River watershed was conducted using field data, observations, and applicable studies produced for the Twisp River, the Methow Basin, and other regional watersheds. The indicators used in this REI assessment were adapted from previous assessments conducted by the BOR for the White Pine Reach of Nason Creek (2009) and from the Preston Reach of the Entiat River (2009). The complete list of REI Metrics and threshold values used in this assessment are included in Table 1.

A total of four REI general indicators were assessed at the tributary scale (Table 2). One metric was found to be in an 'adequate condition': effective drainage network and watershed road density. This rating might change if more data were available. Two metrics were in an 'unacceptable condition': stream flow and water temperature. Low flow conditions in the Twisp River, mainly attributed to irrigation diversion, impair habitat conditions for migrating, spawning, and rearing anadromous fish (KWA 2004, PWI 2003). The disturbance regime metric was in an at risk condition.

A total of 11 REI general indicators were assessed at the reach scale (Table 3). In Reach T1, six of the 11 indicators were in an 'unacceptable risk' condition including some habitat quality, channel dynamics, and riparian vegetation characteristics. This reach is completely within the town of Twisp and has undergone extensive floodplain development and channel modification. Two categories, habitat access and substrate, were found in 'adequate condition'. In Reach T2a, four indicators were rated as 'unacceptable condition' with the most impaired characteristics being channel dynamics and riparian vegetation. LWD and channel substrate were in 'adequate condition'. In Reach T2b, five indicators were rated in an 'unacceptable risk' condition. These fell in the habitat quality, channel dynamics, and riparian vegetation categories. Substrate characteristics were in an 'adequate condition' and all other characteristics were 'at risk'. In Reach T3a, there were only two 'unacceptable risk' conditions given: LWD and canopy cover. This reach was given seven 'adequate condition' ratings, the most of any reach in the study area. This is mainly due to natural confinement that limits human impacts on habitat and channel dynamics. In Reach T3b, eight 'unacceptable risk' ratings were given. This is the most impaired reach in the study area. Every category has some characteristics that were in an unacceptable condition. Every category in the channel dynamics and riparian vegetation categories was found to be unacceptable. There were no characteristics that were in an 'adequate condition'. Reach T3c was the only reach where no 'unacceptable condition' ratings were given, however, most categories were 'at risk', with only two 'adequate condition' ratings. Without some protection or restoration, many of these characteristics could be in 'unacceptable condition' in the near future.

Table 1. REI Metrics used in the Twisp River Assessment including criteria for condition ratings.

General Characteristics	General Indicators	Specific Indicators	Adequate Condition	At Risk Condition	Unacceptable Risk Condition
<i>Tributary Scale</i>					
Watershed condition	Effective Drainage Network and Watershed Road Density	Increase in Drainage Network/Road Density	Zero or minimum increases in active channel length correlated with human caused disturbance. And road density <1 miles/miles ²	Low to moderate increase in active channel length correlated with human caused disturbances. And road density <1 miles/miles ²	Greater than moderate increase in active channel length correlated with human caused disturbances. And road density >2.4 miles/miles ²
	Disturbance Regime	Natural/Human Caused	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.	Scour events, debris torrents, or catastrophic fires are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbance is moderate.	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents, or high probability of catastrophic fire exists throughout a major portion of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels. Natural processes are unstable.
Flow/ Hydrology	Streamflow	Change in Peak/Base Flows	Magnitude, timing, duration, and frequency of peak flows within a watershed are not altered relative to natural conditions of an undisturbed watershed of similar size, geology, and geography.	Some evidence of altered magnitude, timing, duration, and/or frequency of peak flows relative to natural conditions of an undisturbed watershed of similar size, geology, and geography.	Pronounced changes in magnitude, timing, duration, and/or frequency of peak flows relative to natural conditions of an undisturbed watershed of similar size, geology, and geography.
Water Quality	Temperature	Daily maximum, and 7-day mean maximum temperatures	Bull Trout: Incubation 2-5°C, rearing: 4-10°C, spawning: 1-9°C. Salmon and Steelhead: Spawning June-Sept 15°C, Sept-May 12°C; rearing 15°C, migration 15°C, adult holding 15°C. Or 7-day daily maximum temperature performance standards: Salmon spawning 13°C, core summer salmonid habitat 16°C. Salmonid spawning, rearing and migration 17.5°C. Salmonid rearing and migration only 17.5°C.	MWMT in reach during the following life history stages: Incubation <2°C or >6°C; rearing <4°C or >13-15°C; spawning <4°C or >10°C. Temperatures in areas used by adults during the local spawning migration sometimes exceed 15°C. Or 7-day average daily maximum temperature standards exceeded by ≤15%.	MWMT in reach during the following life history stages: Incubation <1°C or >6°C; rearing >15°C; spawning <4°C or >10°C. Temperatures in areas used by adults during the local spawning migration sometimes exceed 15°C. Or 7-day average daily maximum temperature standards exceeded by >15%.
	Turbidity	Turbidity NTU's	Performance Standard: Acute <70 NTU Chronic <50 NTU For streams that naturally exceed these standards: Turbidity should not exceed natural baseline levels at the 95% CL. <15% exceedance., Or Turbidity shall not exceed: 5 NTU over background when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU (WDOE -173-201A-200).	15-50% exceedance.	>50% exceedance.



Table 1 continued.

General Characteristics	General Indicators	Specific Indicators	Adequate Condition	At Risk Condition	Unacceptable Risk Condition
	Chemical Contamination/ Nutrients	Metals/ Pollutants, pH, DO, Nitrogen, Phosphorous	Low levels of chemical contamination from landuse sources, no excessive nutrients, no CWA 303d designated reaches., Or Washington State Department of Ecology standards - 173-201A-200.	Moderate levels of chemical contamination from landuse sources, some excess nutrients, one CWA 303d designated reach.	High levels of chemical contamination from landuse sources, high levels of excess nutrients, more than one CWA 303d designated reach.
Reach-Scale					
Habitat Access	Physical Barriers	Main Channel Barriers	No man-made barriers present in the mainstem that limit upstream or downstream migration at any flow.	Man-made barriers present in the mainstem that prevent upstream or downstream migration at some flows that are biologically significant.	Man-made barriers present in the mainstem that prevent upstream or downstream migration at multiple or all flows.
Habitat Quality	Substrate	Dominant Substrate/Fine Sediment	Gravels or small cobbles make-up >50% of the bed materials in spawning areas. Reach embeddedness in rearing areas <20%. ≤12% fines (<0.85mm) in spawning gravel or 12% surface fines of ≤6mm	Gravels or small cobbles make-up 30-50% of the bed materials in spawning areas. Reach embeddedness in rearing areas 20-30%. 12-17% fines (<0.85mm) in spawning gravel or 12-20% surface fines of ≤6mm	Gravels or small cobbles make-up <30% of the bed materials in spawning areas. Reach embeddedness in rearing areas >30%. >17% fines (<0.85mm) in spawning gravel or >20% surface fines of ≤6mm
	LWD	Pieces per Mile at Bankfull	>20 pieces/mile >12" diameter > 35 ft length; and adequate sources of woody debris available for both long- and short-term recruitment.	Currently levels are being maintained at minimum levels desired for "adequate", but potential sources for long-term woody debris recruitment is lacking to maintain these minimum values.	Current levels are not at those desired values for "adequate", and potential sources of woody debris for short- and/or long-term recruitment are lacking.
	Pools	Pool Frequency and Quality, presence of large pools.	Pool frequency: Number of pools/mile for a given channel width. Channel width between 30-35 ft = 18 pools/mile. Channel width 35-40 ft = 10 pools per mile. Pool have good cover and cool water and only minor reduction in pool volume by fine sediment. Each reach has many large pools >1 m deep with good fish cover.	Pool frequency is similar to values in "functioning adequately", but pools have inadequate cover/temperature and/or there has been a moderate reduction of pool volume by fine sediment. Reaches have few large pools (>1m) present with good fish cover.	Pool frequency is considerably lower than values for "adequate condition", also cover/temperature is inadequate, and there has been a major reduction of pool volume by fine sediment. Reaches have no deep pools (>1m) with good fish cover.
	Off-Channel Habitat	Connectivity with Main Channel	Reach has many ponds, oxbows, backwaters, and other off-channel areas with cover, and side channels are low energy areas. No manmade barriers present along the mainstem that prevent access to off-channel areas.	Reach has some ponds, oxbows, backwaters, and other off-channel areas with cover, and side channels are high energy areas. Manmade barriers present that prevent access to off-channel habitat at some flows that are biologically significant.	Reach has few or no ponds, oxbows, backwaters, and other off-channel areas. Manmade barriers present that prevent access to off-channel habitat at multiple or all flows.



Table 1 continued.

General Characteristics	General Indicators	Specific Indicators	Adequate Condition	At Risk Condition	Unacceptable Risk Condition
Channel	Dynamics	Floodplain Connectivity	Floodplain areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession.	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession.	Sever reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly.
		Bank Stability/Channel Migration	Channel is migrating at or near natural rates.	Limited amount of channel migration is occurring at a faster/slower rate relative to natural rates, but significant change in channel width or planform is not detectable; large woody debris is still being recruited.	Little or no channel migration is occurring because of human actions preventing reworking of the floodplain and large woody debris recruitment; or channel migration is occurring at an accelerated rate such that channel width has at least doubled, possibly resulting in a channel planform change, and sediment supply has noticeably increased from bank erosion.
		Vertical Channel Stability	No measurable trend of aggradation or incision and no visible change in channel planform.	Measureable trend of aggradation or incision that has the potential to, but not yet caused, disconnection of the floodplain or a visible change in channel planform (e.g. single thread to braided)	Enough incision that the floodplain and off-channel habitat areas have been disconnected; or, enough aggradation that a visible change in channel planform has occurred (e.g. single thread to braided).
Riparian Vegetation	Condition	Structure	>80% species composition, seral stage, and structural complexity are consistent with potential native community.	50-80% species composition, seral stage, and structural complexity are consistent with potential native community.	<50% species composition, seral stage, and structural complexity are consistent with potential native community.
		Disturbance (Human)	>80% mature trees (medium-large) in the riparian buffer zone (defined as a 30 m belt along each bank) that are available for recruitment by the river via channel migration; <20% disturbance in the floodplain (e.g., agriculture, residential, roads, etc.); <2 mi/mi ² road density in the floodplain.	50-80% mature trees (medium-large) in the riparian buffer zone (defined as a 30 m belt along each bank) that are available for recruitment by the river via channel migration; 20-50% disturbance in the floodplain (e.g., agriculture, residential, roads, etc.); 2-3 mi/mi ² road density in the floodplain.	<50% mature trees (medium-large) in the riparian buffer zone (defined as a 30 m belt along each bank) that are available for recruitment by the river via channel migration; >50% disturbance in the floodplain (e.g., agriculture, residential, roads, etc.); >3 mi/mi ² road density in the floodplain.
		Canopy Cover	Trees and shrubs within one site potential tree height distance or 10 m buffer zone have >80% canopy cover that provides thermal shading to the river.	Trees and shrubs within one site potential tree height distance or 10 m buffer zone have 50-80% canopy cover that provides thermal shading to the river.	Trees and shrubs within one site potential tree height distance or 10 m buffer zone have <50% canopy cover that provides thermal shading to the river.

Table 2. REI Ratings for Tributary-Scale Metrics.

Characteristics	General Indicators	Specific Indicators	Rating	Discussion
Watershed Condition	Effective Drainage Network and Watershed Road Density	Increase in Drainage Network/Road Density	<i>Adequate Condition</i>	There are 220 miles of roads in the watershed, 70 miles of which are within 200 ft of the mainstem or tributary streams creating a road density of 0.28 miles/miles ² (USFS 2005). This includes paved primary transportation roadways, as well as unpaved roads providing residential, recreational, logging, and mining access throughout the watershed. A study of the effects of road density on the effective length of the active channel has not been completed for the Twisp Watershed. The determination of an increase in effective drainage network due to road density would change this rating.
	Disturbance Regime	Natural/Human Caused	<i>At Risk Condition</i>	Anthropogenic disturbance is present throughout the watershed in the form of roads, riparian clearing, logging, mining, grazing, agriculture, and residential development. These activities have been shown to create channel instability, and also decrease the ability of the system to respond to natural disturbance regimes such as fire or floods. The watershed has a naturally frequent fire regime, annual snowmelt flooding and infrequent rain-on-snow floods, and active tributary alluvial fans (BOR 2008 App J, L and N). The channel has a documented decrease in complexity and floodplain connection, and is shown to be incising in some areas and aggrading in others (PWI 2003, NWP and C 2000).
Flow/Hydrology	Streamflow	Change in Peak/Base Flows	<i>Unacceptable Risk Condition</i>	Low flows are adversely affected by the 7 irrigation diversions found on the Twisp River (NWCandP 2000). This is especially true on the receding limb of the hydrograph that coincides with irrigation season. Some years withdrawals can account for up to 60% of the total flow during irrigation season (PWI 2003). The Twisp River was placed on the Washington State 303(d) list in 1998 for insufficient flow and temperature exceedance (NWC and P 2000). A significant change in peak flow frequency, duration, magnitude, or timing cannot be determined from the streamflow record that exists for the Twisp River (PWI 2005). However, many of the land-use activities and channel alterations affecting the Twisp have been shown to change one or all of the above mentioned attributes of peak flows in other basins.
Water Quality	Temperature	Daily maximum, and 7-day mean daily maximum temperatures	<i>Unacceptable Risk Condition</i>	Two excursions above temperature threshold limits in 1989 resulted in the original listing of the Twisp River on the 1996 Washington state 303(d) list (NWC and P 2000). The Twisp is currently listed as "waters of concern" by the Department of Ecology. More recent measurements show that the Twisp River continues to have high temperatures throughout the summer months. Near the mouth of the Twisp the highest 7-day average daily maximum temperature recorded during the summer exceeded 16°C by about 26% in 2001 and 30% in 2005. Threshold criterion were also exceeded by over 15% at two other locations in those years (BOR 2009 App I). Temperature data from 2008 and 2009 show 7-day average daily maximum temperatures with over 15% exceedance of 16°C consistently from mid-July through mid-September.
	Turbidity	Turbidity NTU's	N/A	Data was unavailable.
	Chemical Contamination/Nutrients	Metals/ Pollutants, pH, DO, Nitrogen, Phosphorous	N/A	Data was unavailable.



Table 3. REI Metrics for Reach-Scale Metrics.

General Characteristics	General Indicators	Specific Indicators	Reach 1 Condition	Reach 2a Condition	Reach 2b Condition	Reach 3a Condition	Reach 3b Condition	Reach 3c Condition
Habitat Access	Physical Barriers	Main Channel Barriers	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			There are no anthropogenic barriers in the main channel in Reach 1. However, connectivity is adversely affected by critically low-flow conditions due to upstream irrigation diversions.	Irrigation diversion at RM 1.5 poses a potential barrier at low flow. Riprap has cut off connectivity between side channel and main channel habitats.	No barriers in the reach, though downstream barriers limit access to this reach.	There are no physical barriers in Reach 3a, though downstream barriers limit access in this reach.	Irrigation diversion at RM 6.5 blocks low flow access to side-channel, push-up levee at RM 6.6 and riprap at RM 6.3 block side-channel and off-channel access.	Channel-spanning fish collection wier at RM 7.25 creates a potential low flow barrier, an irrigation diversion at RM 7.35 creates a side-channel barrier.
Habitat Quality	Substrate	Dominant Substrate/Fine Sediment	<u>Adequate Condition</u>	<u>Adequate Condition</u>	<u>Adequate Condition</u>	<u>Adequate Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>
			Based on pebble counts, gravel and cobble are the dominant substrate (92 - 96%), while sand makes up <5% of surface sediment.	Based on pebble counts, >50% of the bed substrate is in the gravel or small cobble size classes (D50 64-43 mm). At one site there was 7% sand and 88% gravel/cobble composition.	Based on pebble counts, sand comprises only 9% of bed sediments, while gravel and cobble account for 78%.	Based on pebble counts, 63 - 72% of the bed substrate is in the gravel or cobble size classes, and 2 - 8% sand was found.	Based on pebble counts, 65% of the bed substrate is in the gravel or cobble size classes and sand composition is 14%.	Based on pebble counts, 67% of the bed substrate is in the gravel or cobble size classes and sand composition is 10%.
	LWD	Pieces per Mile at Bankfull	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>
			A total of 73 pieces/mile were found (3 large, 11 medium, and 59 small pieces/mile). The majority of the wood was small, and due to the urbanization of the historic floodplain, recruitment sources are limited in this reach.	6 pieces per mile large wood, 24 pieces per mile medium wood, 86 pieces per mile are small. Total 30 pieces per mile medium or larger wood with limited potential for future recruitment of large pieces.	65 pieces per mile large wood, 2 large pieces/mile, 5 medium pieces/mile and 58 small pieces/mile.	8 pieces per mile large wood, 11 pieces per mile medium wood, 76 pieces per mile small wood. Total 19 pieces per mile medium or larger wood with moderate recruitment sources.	A total of 105 pieces of wood per mile, composed of 85 pieces per mile small, 15 pieces of medium, 5 pieces per mile large wood. Total 20 pieces per mile medium or larger wood with limited potential for future recruitment.	180 pieces per mile small wood, 51 pieces medium, but no large wood. Riparian conditions allow for limited potential recruitment of LWD
	Pools	Pool Frequency and Quality	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Adequate Condition</u>
			There is a less than adequate amount of pool habitat: 15.7 pools/mile.	15 pools per mile, adequate for a 40 ft wetted width.	8.9 pools per mile, Unacceptable for an average 49 ft wetted width. 57% of pools have residual depths of less than 2 ft.	23.7 pools per mile, adequate for an average 51 ft wetted width.	8.5 pools per mile, which is less than minimum of 10 pools per mile for wetted width of 41 ft.	12.7 pools per mile, adequate for 42 ft average wetted width.



Table 3 continued.

General Characteristics	General Indicators	Specific Indicators	Reach 1 Condition	Reach 2a Condition	Reach 2b Condition	Reach 3a Condition	Reach 3b Condition	Reach 3c Condition
Habitat Quality	Off-Channel Habitat	Connectivity with Main Channel	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			The side channels are largely limited to the Twisp - Methow confluence, three of which are likely disconnected at base flow. <30% of the reach has side channel habitat, which is due to the urbanization along the river corridor in this reach.	Five side channels are present, however diversion ditches and riprap have reduced their accessibility to fish.	Eight side channels observed during the habitat survey, half of which were dry. It is possible that downcutting has decreased connectivity between the main channel and off-channel habitats.	There are naturally limited side channel habitats due to the canyon character of this reach. There is one high flow side channel, and one low flow side channel.	There is one side-channel that is active at low flow. There are three other side-channels that are connected at higher-flows. Levees and riprap block extensive side-channel networks.	There are 11 side channels in the reach. Three are active at all flow levels. Six are active only at higher flows. The longest side-channel contains large wetlands, but is blocked at the upstream end by a road and an irrigation diversion.
Channel	Dynamics	Floodplain Connectivity	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			54% of the floodplain has been disconnected due to a variety of alterations to the land surface and river system.	72% of the floodplain has been disconnected.	Also 65% of the floodplain has been disconnected due to a variety of alterations to the land surface and river system.	100% of the floodplain is connected, although due to the confined nature of this reach, the lateral extent of the floodplain is limited.	53% of the floodplain has been disconnected by a variety of modifications to the land surface and river system.	26% of the floodplain is disconnected due to alteration of the land surface, road construction, levees, etc.
		Bank Stability/Channel Migration	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
		Only 2% of banks are eroding, due to the high level of bank protection that has been installed.	Riprap, boulders, concrete and rock gabions have been installed to prevent erosion. Moderate LWD recruitment may be driven by cottonwood stands.	Channel migration is limited by extensive bank protection on the outside of most large bends. Only 3% of banks in the reach are eroding.	Despite riprap installed upstream of the Poorman Cut Off Rd. bridge, the majority of the banks in this reach have not been armored to limit erosion. The natural rate of channel migration is likely very low due to the level of confinement.	Historical trends indicate sinuosity in the reach is decreasing, there are long sections of bank protection and levees in the upstream half of the reach that limit meander migration.	The upstream half of the reach is laterally dynamic and has the potential for long-term wood recruitment. However, there are levees and riprap in the downstream half of the reach that limit meander migration.	



Table 3 continued.

General Characteristics	General Indicators	Specific Indicators	Reach 1 Condition	Reach 2a Condition	Reach 2b Condition	Reach 3a Condition	Reach 3b Condition	Reach 3c Condition
Channel	Dynamics	Vertical Channel Stability	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			Current bed elevation has been influenced by channel simplification and armoring of banks, forcing stream energy down into the bed rather than laterally across the floodplain.	A rock dam and a constructed log jam influence vertical channel stability in this reach. There are some high, eroding banks that suggest that incision may be ongoing. However, there are several connecte side-channels.	Bedrock outcrops control grade and vertical stability at several points in the downstream half of the reach. In the upstream half, bank protection has decreased flood attenuation and concentrated energy in the channel at higher flows. This creates the potential for downcutting.	Bedrock and other boundaries that confine Reach 3a make the reach naturally more likely to incise rather than migrate laterally.	Evidence of incision exists in the historical aerial photo record that shows meander straightening at the downstream end of the reach. Also, there are several side channels that were connected in older aerial photos, and are not connected now.	Though there are several well-connected side-channels, some of the larger side channels are no longer connected. There is very little channel/floodplain connection. However, there are no indications of increased rates of aggradation or incision.
Riparian Vegetation	Condition	Structure	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			Intact riparian areas have <50% species composition, seral stage, and low complexity compared with the potential of the native community	A narrow band of riparian vegetation is present, providing little shading. There is <50% species composition, seral stage, and low complexity compare with the potential of the native community.	Intact riparian areas have <50% species composition, seral stage, and low complexity compared with the potential of the native community	There is naturally limited with for riparian forest growth and development. Aside from a recently burned area, the existing riparian habitats are consistent with adequate conditions.	Intact riparian areas have <50% species composition, seral stage, and low complexity compared with the potential of the native community	Intact riparian areas have 5-80% species composition, seral stage, and low complexity compared with the potential of the native community
		Disturbance (Human)	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	<u>At Risk Condition</u>	<u>Adequate Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>
			>50% disturbance in the riparian area due to roads, bridges, and development. The majority of riparian habitats have been converted to other land uses, and more than 40% has been hydrologically disconnected.	<50% disturbance in the riparian area from roads, bridges and development.	>40% disturbance in the floodplain.	<30% disturbance in the floodplain.	>50% disturbance in the riparian area due to roads and development.	<40% disturbance in the floodplain due to development and road construction.
	Canopy Cover	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>Unacceptable Condition</u>	<u>At Risk Condition</u>	
		<20% canopy cover is provided by trees and shrubs producing minimal thermal shading to the river.	<40% canopy cover is provided by trees and shrubs producing minimal thermal shading to the river.	<50% canopy cover is provided by trees and shrubs producing some thermal shading to the river.	<50% canopy cover is provided by trees and shrubs producing some thermal shading to the river.	<50% canopy cover is provided by trees and shrubs producing minimal thermal shading to the river.	>50% canopy cover is provided by trees and shrubs producing minimal thermal shading to the river.	

