

Appendix G

Identification of primary limiting factors and threats, objectives, and habitat actions for each listed species within each subbasin

(Table 1 begins on the next page.)

Appendix G: Habitat Matrices

Table 1 List of habitat actions (and classes) that address primary limiting factors and threats within each assessment unit in the Wenatchee subbasin. Management objectives are identified for each species (CS = Chinook salmon; ST = steelhead; BT = bull trout) as well as the contribution of restoration actions to VSP (A/P = abundance/productivity; SS/D = spatial structure/diversity) for each species (X = large effect; x = small effect). Effect time indicates the amount of time it will take before the effects of the restoration action translate to changes in VSP parameters (S = 1-5 years; M = 6-20 years; L = >20 years)

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Wenatchee (Category 2)	Habitat diversity and quantity; Channel stability	Roads/railways; Agriculture; Residential development	Improve riparian habitat conditions. CS: Increase juvenile overwinter survival. ST: Increase juvenile and adult overwinter survival and spawning habitat. BT: Increase sub-adult and adult overwinter survival and spawning area.	Riparian restoration	All actions may be appropriate	CS ST BT	x x X		L
			Increase off-channel habitat. CS: Increase juvenile overwinter survival ST: Increase juvenile and adult overwinter survival. BT: Increase sub-adult and adult overwinter survival	Side-channel reconnection	All actions may be appropriate	CS ST BT	x x X	X	M
				Floodplain Restoration	All actions may be appropriate	CS ST BT	x x X	X	M
			Increase habitat diversity. CS: Increase juvenile overwinter survival and adult holding areas. ST: Increase juvenile and adult overwinter survival and adult holding areas. BT: Increase sub-adult and adult overwinter survival and adult holding areas.	Large woody debris restoration	All actions may be appropriate	CS ST BT	x x X		S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Wenatchee (Category 2)	Water quantity	Agriculture	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	Actions 1-6, 9-12, and 14-19	CS ST BT	x x X	X	S
	Water quality	Agriculture; Residential development	Reduce summer water temperatures. CS: Increase juvenile and adult survival and passage. ST: Increase juvenile and adult survival and passage. BT: Increase sub-adult and adult survival and passage.	Water quality restoration	Actions 1-3, and 6-30	CS ST BT	x x X	x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Mission Creek (Category 3)	Obstructions	Diversions; Culverts	Increase connectivity. CS: Improve adult and juvenile passage, increase high-flow refugia for juveniles, and increase access to spawning and rearing habitat. ST: Improve adult and juvenile passage, increase high-flow refugia for juveniles, and increase access to spawning and rearing habitat.	Obstruction restoration	Actions 1-4, and 6	CS	x	x	S
						ST	x	x	
	Sediment	Agriculture; Roads	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success.	Riparian Restoration	All actions may be appropriate	CS	x		L
				Road maintenance	All actions may be appropriate	CS	x	x	M
	Habitat diversity and quantity	Agriculture; Channelization; Residential development	Restore floodplain and off-channel habitat. CS: Increase juvenile survival. ST: Increase juvenile and adult survival.	Floodplain restoration	All actions may be appropriate	CS	x		M
				Side channel reconnection	All actions may be appropriate	CS	x		M
				Instream structures	All actions may be appropriate	CS	x		S
						ST	x		

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Mission Creek (Category 3)	Habitat diversity and quantity	Agriculture; Channelization; Residential development	Improve riparian habitat conditions. CS: Increase juvenile survival and adult holding area. ST: Increase juvenile survival and adult holding area.	Riparian restoration	All actions may be appropriate	CS ST	x x		L
			Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Large woody debris restoration	All actions may be appropriate	CS ST	x x		S
				Instream structures	All actions may be appropriate	CS ST	x x		S
	Water quantity	Agriculture; Residential development	Increase instream flows. CS: Increase juvenile and adult passage and survival. ST: Increase juvenile and adult passage and survival.	Water quantity restoration	Actions 1-6, and 9-19	CS ST	x x	x x	S
	Water quality	Agriculture; Residential development	Decrease summer temperatures and improve water quality. CS: Increase juvenile and adult survival. ST: Increase juvenile and adult survival.	Water quality restoration	Actions 1-3; and 6-30	CS ST	x x	x x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Peshastin Creek (Category 2)	Habitat diversity and quantity	Roads; Agriculture; Channelization; Residential development	Improve riparian habitat condition. CS: Increase juvenile survival and adult holding and spawning areas. ST: Increase juvenile and adult survival and adult holding and spawning areas. BT: Increase juvenile, sub-adult, and adult survival and adult holding areas.	Riparian restoration	All actions may be appropriate	CS ST BT	x x X		L
			Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning areas. ST: Increase juvenile and adult survival and adult holding and spawning areas. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning areas.	Large woody debris restoration	All actions may be appropriate	CS ST BT	x x X	X X X	S
				Instream structures	All actions may be appropriate	CS ST BT	x x X	X X X	S
			Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding, and high-flow refugia. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x X	X X X	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	X X X	M
				Road maintenance	All actions may be appropriate	CS ST	x x		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
						BT	X		

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Peshastin Creek (Category 2)	Obstructions	Diversions; Culverts	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	Actions 1-3, and 6	CS ST BT	x x x	X X X	S
	Water quantity	Diversions; Agriculture; Roads	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile and adult survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	Actions 1-6, 9-17, and 19	CS ST BT	x x X	X X X	S
	Water quality	Agriculture; Diversions; Residential development	Decrease summer temperatures. CS: Increase juvenile and adult survival. ST: Increase juvenile and adult	Water quality restoration	Actions 1-3, and 6-30	CS ST BT	x x X	X X X	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
			survival. BT: Increase juvenile, sub-adult, and adult survival.						

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time			
							A/P	SS/D				
Chumstick Creek (Category 3)	Obstructions	Culverts; Diversions	Increase connectivity. CS: Improve adult and juvenile passage and increase access to spawning and rearing habitat. ST: Improve adult and juvenile passage and increase access to spawning and rearing habitat.	Obstruction restoration	Actions 1-3, and 6	CS	x	X	S			
			ST			x	X					
	Habitat diversity and quantity	Roads/railroad; Agriculture; Residential development	Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Large woody debris restoration	All actions may be appropriate	CS	x		S			
			ST			x						
			Restore floodplain and off-channel habitat conditions. CS: Increase juvenile survival, adult holding areas, and incubation success. ST: Increase juvenile and adult survival, adult holding areas, and incubation success			Road maintenance	All actions may be appropriate	CS		x		M
			ST			x						
	Water quantity	Roads/railroad; Agriculture; Residential development	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile and adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	Actions 1-6, 9-17, and 19	CS	x	X	S			
ST			x			X						

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Chumstick Creek (Category 3)	Water quality	Roads/railroad; Diversion; Agriculture; Timber harvest; Residential development	Improve riparian habitat condition. CS: Increase juvenile survival and adult holding and spawning areas. ST: Increase juvenile and adult survival and adult holding and spawning areas.	Riparian restoration	All actions may be appropriate	CS ST	x x		L
			Improve water quality. CS: Increase juvenile and adult survival. ST: Increase juvenile and adult survival.	Water quality restoration	Actions 1-3, and 6-30	CS ST	x x	x x	M
Lower Icicle Creek (mouth to boulder field) (Category 2)	Obstructions	Diversion	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	Actions 1-4, and 6	CS ST BT	x X X	x X X	S
	Sediment	Agriculture; Roads; Residential development; Fires	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Icicle Creek (mouth to boulder field) (Category 2)	Sediment	Agriculture; Roads; Residential development; Fires	Restore floodplain and off-channel habitat. CS: Increase juvenile survival. ST: Increase juvenile and adult survival. BT: Increase juvenile, sub-adult, and adult survival.	Floodplain restoration	All actions may be appropriate	CS ST BT	x x x		M
	Habitat diversity and quantity	Roads; Agriculture; Residential development	Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Side channel restoration	All actions may be appropriate	CS ST BT	x x x	x	M
	Water quantity	Agriculture; Residential development	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile and adult survival, adult holding areas, passage, and spawning success. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	Actions 1-6, and 9-19	CS ST BT	x x x	x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Upper Icicle Creek (upstream from boulder field) (Category 2)	Water quantity	Diversions	Increase instream flows. ST: Increase juvenile and adult survival, adult holding areas, passage, and spawning success. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	Actions 1-6, and 9-19	ST BT	x x	x	S
	Sediment	Roads	Reduce sediment load. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	ST BT	x x		M
Middle Wenatchee (Tumwater Canyon) (Category 1)	None	None	None	None	None	CS ST BT			
Upper Wenatchee (upstream from Tumwater Canyon) (Category 1)	Habitat quantity	Roads; Residential development; Timber harvest	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x X x		L
				Side channel reconnection	All actions may be appropriate	CS ST BT	x X x		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Chiwaukum (includes Skinney Creek) (Category 2)	Habitat diversity	Roads; Campgrounds	Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x X x		L
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x X x	M
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x X x		S
	Obstructions	Roads	Increase connectivity. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	Actions 1-3, and 6	ST BT	x x	X X	S

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							A/P	SS/D	
Chiwawa River (Category 1)	Habitat quantity	Residential development	Increase habitat diversity. CS: Increase juvenile and adult survival. ST: Increase juvenile and adult survival. BT: Increase juvenile, sub-adult, and adult survival.	Riparian restoration	All actions may be appropriate	CS ST BT	x X x		L
	Sediment	Roads	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	x x x		M
	Obstructions	Culverts	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	Actions 1-4, and 6	CS ST BT	x X X	x X X	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Nason Creek (Category 2)	Channel stability; Habitat diversity	Roads/railroad	Increase habitat diversity and natural channel stability. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	X X X		L
				Side channel restoration	All actions may be appropriate	CS ST BT	X X X		M
				Floodplain restoration	All actions may be appropriate	CS ST BT	X X X		M
				LWD restoration	All actions may be appropriate	CS ST BT	X X X		S
	Sediment	Timber harvest; Roads/railroad; Residential development	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	X X X		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Nason Creek (Category 2)	Water quality	Timber harvest; Roads/railroad; Residential development	Decrease summer temperatures. CS: Increase juvenile and adult survival. ST: Increase juvenile and adult survival. BT: Increase juvenile, sub-adult, and adult survival.	Water quality restoration	Actions 2, 7-11, 14, 15, 16, and 19	CS ST BT	X X X	X	M
	Obstructions	Roads/railroad; Culverts	Increase connectivity. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	Actions 1-3, and 6	ST BT	X X	X X	S
Lake Wenatchee (Category 1)	None	None	None	None	None	CS ST BT			
Little Wenatchee (Category 1)	Sediment	Roads; Timber harvest	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	X X X		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
White River (Category 1)	Habitat diversity	Timber harvest; Roads	Increase habitat diversity. CS: Increase juvenile, adult holding areas, and spawning habitat. ST: Increase juvenile and adult survival, adult holding areas, and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, and spawning habitat.	Floodplain restoration	Action 4 and 5	CS ST BT	x x x		M

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Table 2 List of habitat actions (and classes) that address primary limiting factors and threats within each assessment unit in the Entiat subbasin. Management objectives are identified for each species (CS = Chinook salmon; ST = steelhead; BT = bull trout) as well as the contribution of restoration actions to VSP (A/P = abundance/productivity; SS/D = spatial structure/diversity) for each species (X = large effect; x = small effect). Effect time indicates the amount of time it will take before the effects of the restoration action translate to changes in VSP parameters (S = 1-5 years; M = 6-20 years; L = >20 years)

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Entiat (Category 2)	Habitat diversity and quantity	Channelization; Riprap and dikes; Roads; Wild fires; Historic timber harvest; Historic dams; Agriculture; Residential development;	Increase habitat diversity and off-channel habitat. CS: Increase juvenile overwinter survival, high-flow refugia, and adult holding areas;	Large woody debris restoration	All actions may be appropriate	CS ST BT	X X X	x x x	S
			ST: Increase juvenile and adult overwinter survival, high-flow refugia, and adult holding areas. BT: Increase sub-adult and adult overwinter survival, high-flow refugia, and adult holding areas.	Instream structures	All actions may be appropriate	CS ST BT	X X X	x x x	S
				Side channel reconnection	All actions except 3	CS ST BT	X X X	x x x	M
			Improve riparian habitat conditions. CS: Increase juvenile overwinter survival and rearing habitat. ST: Increase juvenile and adult overwinter survival and rearing habitat. BT: Increase sub-adult and adult overwinter survival and adult holding and spawning area.	Riparian restoration	All actions may be appropriate	CS ST BT	X X X		L

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Entiat (Category 2)	Excessive artificial channel stability	Channelization; Riprap and dikes; Agriculture; Residential development;	Reduce artificial channel stability and restore width:depth ratio. CS: Increase juvenile and adult holding and rearing habitat. ST: Increase juvenile and adult holding and rearing habitat. BT: Increase sub-adult and adult holding and rearing habitat.	Floodplain restoration	All actions may be appropriate	CS ST BT	X X X	x x x	M
	Water quantity	Agriculture; Residential development	Protect and when feasible enhance instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions except 6, 7, 8, 14, 15, 18, and 19	CS ST BT	x x x	x x x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Middle Entiat (Category 1)	Habitat diversity	Roads; Wild fires; Riprap; Residential development	Increase habitat diversity. CS: Increase juvenile and adult survival and adult holding and spawning areas. ST: Increase juvenile and adult survival and adult holding and spawning areas. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning areas.	Large woody debris restoration	All actions may be appropriate	CS ST BT	X X X	x x x	S
			Improve riparian habitat condition. CS: Increase juvenile survival and adult holding and spawning areas. ST: Increase juvenile and adult survival and adult holding and spawning areas. BT: Increase juvenile, sub-adult, and adult survival and adult holding areas.	Riparian restoration	All actions may be appropriate	CS ST BT	X X X		L
	Obstructions (Stormy Creek)	Culverts	Increase connectivity. CS: Improve juvenile access to rearing habitat. ST: Improve juvenile access to rearing habitat. BT: Improve juvenile and sub-adult access to rearing habitat.	Obstruction restoration	Actions 1 and 2	CS ST BT	x x x	X X X	S
Upper Entiat (Category 1)	None	None	Investigate presence or absence of resident bull trout.			BT			

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Mad River (Category 1)	Habitat diversity and quantity (lack of habitat diversity and spawning habitat in the lower 4 miles of the Mad River)	Roads; Residential development	Increase riparian habitat conditions and natural channel stability. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	X X X		L
				Road maintenance	All actions may be appropriate	CS ST BT	X X X		M
			Increase habitat diversity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Instream structures	Actions 1 and 4	CS ST BT	X X X	x X X	S
				Large woody debris restoration	Actions 4, 8, and 9	CS ST BT	X X X	x X X	S

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Table 3 List of habitat actions (and classes) that address primary limiting factors and threats within each assessment unit in the Methow subbasin. Management objectives are identified for each species (CS = Chinook salmon; ST = steelhead; BT = bull trout) as well as the contribution of restoration actions to VSP (A/P = abundance/productivity; SS/D = spatial structure/diversity) for each species (X = large effect; x = small effect). Effect time indicates the amount of time it will take before the effects of the restoration action translate to changes in VSP parameters (S = 1-5 years; M = 6-20 years; L = >20 years)

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Methow (Category 2)	Habitat diversity and quantity; Excessive artificial channel stability	Roads; Riprap; Residential development; Agriculture	Improve riparian habitat conditions. CS: Increase juvenile overwinter survival. ST: Increase juvenile and adult overwinter survival and spawning habitat. BT: Increase sub-adult and adult overwinter survival.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
			Increase off-channel habitat. CS: Increase juvenile overwinter survival ST: Increase juvenile and adult overwinter survival. BT: Increase sub-adult and adult overwinter survival	Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x x x	M
	Water quantity	Agriculture; Residential development	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult	Water quantity restoration	All actions may be appropriate	CS ST BT	x x x	x x x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
			holding areas and passage.						

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Middle Methow (Category 2)	Habitat diversity and quantity; Excessive artificial channel stability	Roads; Riprap; Residential development; Agriculture	Improve riparian habitat conditions. CS: Increase juvenile overwinter survival. ST: Increase juvenile and adult overwinter survival and spawning habitat. BT: Increase sub-adult and adult overwinter survival and spawning area.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
			Increase off-channel habitat. CS: Increase juvenile overwinter survival ST: Increase juvenile and adult overwinter survival. BT: Increase sub-adult and adult overwinter survival	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x	x x x	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x x x	M
			Increase habitat diversity. CS: Increase juvenile overwinter survival and adult holding areas. ST: Increase juvenile and adult overwinter survival and adult holding areas. BT: Increase sub-adult and adult overwinter survival and adult holding areas.	Instream structures	All actions may be appropriate	CS ST BT	x x x		S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Middle Methow (Category 2)	Water quantity	Agriculture; Residential development	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	x x x	x x x	S
Upper-Middle Methow (Category 2)	Habitat quantity and diversity	Roads; Riprap; Residential development; Agriculture	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Side-channel reconnection	All actions may be appropriate	CS ST BT	x x x	x x x	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x x x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Upper-Middle Methow (Category 2)	Water quantity	Residential development; Agriculture	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	X X X	X X X	S
Upper Methow/Early Winters/Lost River (Category 1)	Water quantity	Residential development; Agriculture	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	x x x	X x	S
	Sediment	Fires; Timber harvest; Roads	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	x x x		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Upper Methow/Early Winters/Lost River (Category 1)	Habitat diversity and quantity	Roads; Diking; Channelization	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Instream structures	All actions may be appropriate	CS ST BT	x x x		S
				Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Side-channel reconnection	All actions may be appropriate	CS ST BT	x x x	x x x	M
Black Canyon/Squaw Creek (Category 3)	Habitat diversity and quantity	Roads; Riprap; Residential development	Increase habitat diversity and quantity. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
				Large woody debris restoration	All actions may be appropriate	ST	x		S
				Instream structures	All actions may be appropriate	ST	x		S

Appendix G: Habitat Matrices

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Black Canyon/Squaw Creek (Category 3)	Excessive artificial channel stability	Channelization	Reduce artificial channel stability and restore off-channel habitat conditions. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	ST	x		M
				Floodplain restoration	All actions may be appropriate	ST	x		M
	Water quantity	Agriculture	Increase instream flows. ST: Increase juvenile survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	ST	x	x	S
	Obstructions	Diversions; Culverts	Increase connectivity. ST: Improve adult and juvenile passage and access to spawning and rearing habitat.	Obstruction restoration	All actions except 5 may be appropriate	ST	x	x	S

Appendix G: Habitat Matrices

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Gold/Libby Creek (Category 3)	Habitat diversity and quantity	Roads; Residential development	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S
				Instream structures	All actions may be appropriate	CS ST BT	x x x		S
	Water quantity	Agriculture	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	X X X	X X X	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Gold/Libby Creek (Category 3)	Excessive artificial channel stability	Channelization	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding, and high-flow refugia. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x	x x x	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	X X X	X X X	M
	Obstructions	Diversions; Culverts	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	All actions except 5 may be appropriate	CS ST BT	X X X	X X X	S
Beaver/Bear Creek (Category 3)	Habitat diversity and quantity	Roads; Residential development; Fires; Agriculture	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Beaver/Bear Creek (Category 3)	Habitat diversity and quantity	Roads; Residential development; Fires; Agriculture	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Instream structures	All actions may be appropriate	CS ST BT	x x x		S
	Sediment	Roads; Agriculture	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	x x x	x x x	M
	Excessive artificial channel stability	Channelization; Riprap	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding, and high-flow refugia. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia. BT: Increase juvenile, sub-adult, and adult survival, adult holding areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x	x x x	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x x x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Beaver/Bear Creek (Category 3)	Water quantity	Agriculture	<p>Increase instream flows.</p> <p>CS: Increase juvenile survival, adult holding areas, passage, and spawning success.</p> <p>ST: Increase juvenile survival, adult holding areas, passage, and spawning success.</p> <p>BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.</p>	Water quantity restoration	All actions may be appropriate	CS ST BT	X X X	X X X	S
	Obstructions	Diversions; Culverts	<p>Increase connectivity.</p> <p>CS: Improve adult and juvenile passage and access to spawning and rearing habitat.</p> <p>ST: Improve adult and juvenile passage and access to spawning and rearing habitat.</p> <p>BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.</p>	Obstruction restoration	All actions except 5 may be appropriate	CS ST BT	x x x	x x x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Twisp (Category 2)	Habitat diversity and quantity	Roads; Residential development	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S
				Instream structures	All actions may be appropriate	CS ST BT	x x x		S
	Excessive artificial channel stability	Channelization; Riprap	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding, and high-flow refugia. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia. BT: Increase juvenile, sub-adult, and adult survival, adult holding and spawning areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	X X X	X X X	M
				Floodplain restoration	All actions may be appropriate	CS ST BT	X X X	X X X	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Twisp (Category 2)	Water quantity	Forest management; Agriculture	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	X X X	X X X	S
	Obstructions	Diversions; Culverts	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve juvenile, sub-adult, and adult passage and access to spawning and rearing habitat.	Obstruction restoration	All actions except 5 may be appropriate	CS ST BT	X X X	X X X	S
Upper Twisp (Category 1)	Sediment	Timber harvest; Fires; Roads	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	x x x	x x x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Upper Twisp (Category 1)	Habitat diversity and quantity	Roads; Riprap and diking; Mining	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x	x x	M
Lower Chewuch (Category 2)	Habitat diversity and quantity	Roads; Riprap; Residential development	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S
				Instream structures	All actions may be appropriate	CS ST BT	x x x		S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Chewuch (Category 2)	Excessive artificial channel stability	Channelization; Riprap	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding/spawning areas, and high- flow refugia, ST: Increase juvenile and adult survival, adult holding/spawning areas, and high-flow refugia, BT: Increase juvenile, sub-adult, and adult survival, adult holding/spawning areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x		M
				Floodplain restoration	All actions may be appropriate	CS ST BT	X X X	x x x	M
	Sediment	Fires; Agriculture; Roads; Residential development	Reduce sediment load. CS: Improve spawning and incubation success. ST: Improve spawning and incubation success. BT: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	CS ST BT	x x x		M
	Water quantity	Agriculture; Roads; Residential development	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase sub-adult survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	X X X	X X X	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Chewuch (Category 2)	Water quality	Agriculture; Fires; Roads; Timber harvest; Residential development	Decrease summer temperatures. CS: Increase juvenile and adult survival and spawning habitat. ST: Increase juvenile and adult survival and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and spawning habitat.	Water quality restoration	Actions 1-3, and 6-30	CS ST BT	x x x	x x x	M
Upper Chewuch (Category 1)	Habitat diversity and quantity; Sediment	Timber harvest; Fires; Roads; Channelization; Riprap; Agriculture	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Road maintenance	All actions may be appropriate	CS ST BT	x x x	x x x	M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Wolf/Hancock Creek (Category 2)	Habitat diversity and quantity	Roads; Agriculture; Riprap	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile, sub-adult, and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S
				Instream structures	All actions may be appropriate	CS ST BT	x x x		S
	Excessive artificial channel stability	Channelization; Riprap	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding and spawning areas, and high- flow refugia. ST: Increase juvenile and adult survival, adult holding and spawning areas, and high-flow refugia. BT: Increase juvenile, sub-adult, and adult survival, adult holding and spawning areas, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x		M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Goat/Little Boulder Creek (Category 3)	Habitat diversity and quantity	Roads; Riprap; Residential development	Increase habitat diversity and quantity. CS: Increase juvenile survival and adult holding and spawning habitat. ST: Increase juvenile and adult survival and adult holding and spawning habitat. BT: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	CS ST BT	x x x		L
				Large woody debris restoration	All actions may be appropriate	CS ST BT	x x x		S
				Instream structures	All actions may be appropriate	CS ST BT	x x x		S
	Excessive artificial channel stability	Channelization; Riprap	Reduce artificial channel stability and restore off-channel habitat conditions. CS: Increase juvenile survival, adult holding, and high-flow refugia. ST: Increase juvenile and adult survival, adult holding areas, and high-flow refugia. BT: Increase juvenile survival, adult holding, and high-flow refugia.	Side channel reconnection	All actions may be appropriate	CS ST BT	x x x		M
				Floodplain restoration	All actions may be appropriate	CS ST BT	x x x		M

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Goat/Little Boulder Creek (Category 3)	Water quantity	Agriculture;	Increase instream flows. CS: Increase juvenile survival, adult holding areas, passage, and spawning success. ST: Increase juvenile survival, adult holding areas, passage, and spawning success. BT: Increase juvenile survival, adult holding areas, passage, and spawning success.	Water quantity restoration	All actions may be appropriate	CS ST BT	x x x	x x x	S
	Obstructions	Diversions; Culverts	Increase connectivity. CS: Improve adult and juvenile passage and access to spawning and rearing habitat. ST: Improve adult and juvenile passage and access to spawning and rearing habitat. BT: Improve adult and juvenile passage and access to spawning and rearing habitat.	Obstruction restoration	All actions except 5 may be appropriate	CS ST BT	x x x	x x x	S

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Table 4 List of habitat actions (and classes) that address primary limiting factors and threats within each assessment unit in the Okanogan subbasin. Management objectives are identified for steelhead (ST) as well as the contribution of restoration actions to VSP (A/P = abundance/productivity; SS/D = spatial structure/diversity) (X = large effect; x = small effect). Effect time indicates the amount of time it will take before the effects of the restoration action translate to changes in VSP parameters (S = 1-5 years; M = 6-20 years; L = >20 years)

Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Lower Okanogan (Category 2)	Habitat diversity and quantity	Dams; Agriculture	Improve riparian habitat conditions. ST: Increase juvenile and adult overwinter survival and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
	Obstructions	Diversions	Screen irrigation diversions. ST: Increase juvenile survival.	Obstruction restoration	Action 1	ST	x		S
	Water quality	Agriculture; Residential development; Diversions and dams	Reduce summer water temperatures. ST: Increase juvenile and adult survival and passage (eliminate thermal block).	Floodplain restoration	All actions may be appropriate	ST	x	x	S
				Side-channel reconnection	All actions may be appropriate	ST	x	x	S
Middle Okanogan (Category 2)	Sediment	Agriculture; Residential development	Reduce sediment load. ST: Improve spawning and incubation success.	Floodplain restoration	All actions may be appropriate	ST	x	x	S
	Water quality	Agriculture; Diversions and dams; Residential development	Reduce summer water temperatures. ST: Increase juvenile and adult survival and passage (eliminate thermal block).	Floodplain restoration	All actions may be appropriate	ST	x	x	S
				Side-channel reconnection	All actions may be appropriate	ST	x	x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Upper Okanogan (Category 2)	Habitat diversity and quantity	Channelization; Agriculture; Riprap and dikes; Residential development	Increase habitat diversity. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
	Water quality	Dams and diversions; Agriculture; Residential development	Reduce summer water temperatures. ST: Increase juvenile and adult survival and passage (eliminate thermal block).	Floodplain restoration	All actions may be appropriate	ST	x	x	S
				Side-channel reconnection	All actions may be appropriate	ST	x	x	S
	Sediment	Agriculture; Residential development	Reduce sediment load. ST: Improve spawning and incubation success.	Floodplain restoration	All actions may be appropriate	ST	x	x	S
Loup-Loup Creek (Category 4)	Habitat diversity and quantity	Channelization; Agriculture; Residential development; Roads	Increase habitat diversity. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
				Large woody debris restoration	All actions may be appropriate	ST	x		S
				Instream structures	All actions may be appropriate	ST	x		S
	Water quantity	Diversions; Agriculture	Increase instream flows. ST: Increase juvenile and adult passage and survival.	Water quantity restoration	All actions may be appropriate	ST	x	x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Loup-Loup Creek (Category 4)	Obstructions	Culverts	Increase connectivity. ST: Improve adult and juvenile passage, increase high-flow refugia for juveniles, and increase access to spawning and rearing habitat.	Obstruction restoration	Actions 1-4, and 6	ST	x	x	S
Lower Salmon Creek (Category 3)	Water quantity	Diversions; Agriculture	Increase instream flows. ST: Increase juvenile and adult passage and survival.	Water quantity restoration	All actions may be appropriate	ST	x	x	M
				Side channel reconnection	All actions may be appropriate	ST	x	x	S
				Floodplain restoration	All actions may be appropriate	ST	x	x	S
	Obstructions	Physical barriers	Increase connectivity. ST: Improve adult and juvenile passage, increase high-flow refugia for juveniles, and increase access to spawning and rearing habitat.	Obstruction restoration	Actions 1-4, and 6	ST	x	x	S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Omak and Tributaries (Category 2)	Habitat diversity and quantity; Channel stability	Channelization; Agriculture; Residential development	Increase habitat diversity. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
				Large woody debris restoration	All actions may be appropriate	ST	x		S
				Instream structures	All actions may be appropriate	ST	x		S
	Sediment	Roads	Reduce sediment load. ST: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	ST	x	x	S
	Obstructions	Impediment at Mission Falls	Increase connectivity. ST: Improve adult and juvenile passage and increase access to spawning and rearing habitat.	Obstruction restoration	Action 2	ST	x	x	M
Small Tributary Systems (Category 4)	Habitat diversity and quantity; Channel stability	Roads; Channelization; Agriculture; Residential development	Increase habitat diversity. ST: Increase juvenile and adult survival and adult holding and spawning habitat.	Riparian restoration	All actions may be appropriate	ST	x		L
				Large woody debris restoration	All actions may be appropriate	ST	x		S
				Instream structures	All actions may be appropriate	ST	x		S
	Obstructions	Culverts	Increase connectivity. ST: Improve adult and juvenile passage and increase access to spawning and rearing habitat.	Obstruction restoration	All actions may be appropriate	ST	x	x	S
	Sediment	Roads	Reduce sediment load. ST: Improve spawning and incubation success.	Road maintenance	All actions may be appropriate	ST	x		S

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Assessment Unit (Prioritization Category)	Primary Limiting Factor	Primary Causal Factor/Threat	Management Objective	Appropriate Restoration Class	Specific Restoration Action (see Table 5.9)	Species Affected	Contribution to VSP		Effect Time
							A/P	SS/D	
Small Tributary Systems (Category 4)	Water quantity	Diversions; Agriculture	Increase instream flows. ST: Increase juvenile and adult passage and survival.	Water quantity restoration	All actions may be appropriate	ST	x	x	M
Similkameen (Category 3)	Sediment	Mining; Agriculture	Reduce sediment load. ST: Improve spawning and incubation success.	Side-channel reconnection	All actions may be appropriate	ST	x	x	S
				Floodplain restoration	All actions may be appropriate	ST	x	x	M
	Water quality	Mining	Improve water quality. ST: Increase juvenile and adult survival.	Water quality restoration	Actions 3, 4, and 6	ST	x		M