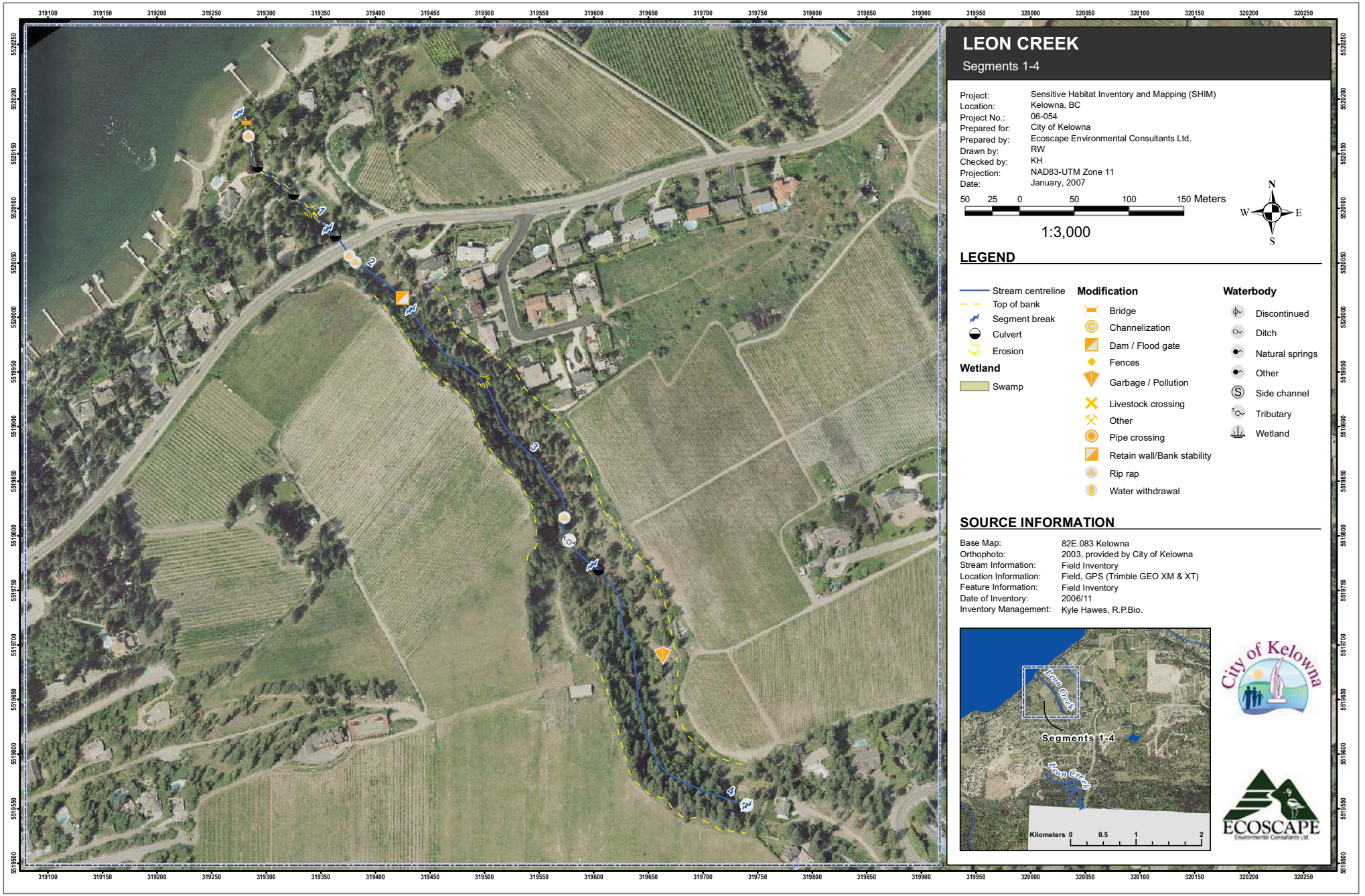


LEON CREEK

Segments 1-4

Project:	Sensitive Habitat Inventory and Mapping (SHIM)
Location:	Kelowna, BC
Project No.:	06-054
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	RW
Checked by:	KH
Projection:	NAD83-UTM Zone 11
Date:	January, 2007

50 25 0 50 100 150 Meters

1:3,000

N W E S

LEGEND

- Stream centreline
- Top of bank
- Segment break
- Culvert
- Erosion

Wetland

- Swamp

Modification

- Bridge
- Channelization
- Dam / Flood gate
- Fences
- Garbage / Pollution
- Livestock crossing
- Other
- Pipe crossing
- Retain wall/Bank stability
- Rip rap
- Water withdrawal

Waterbody

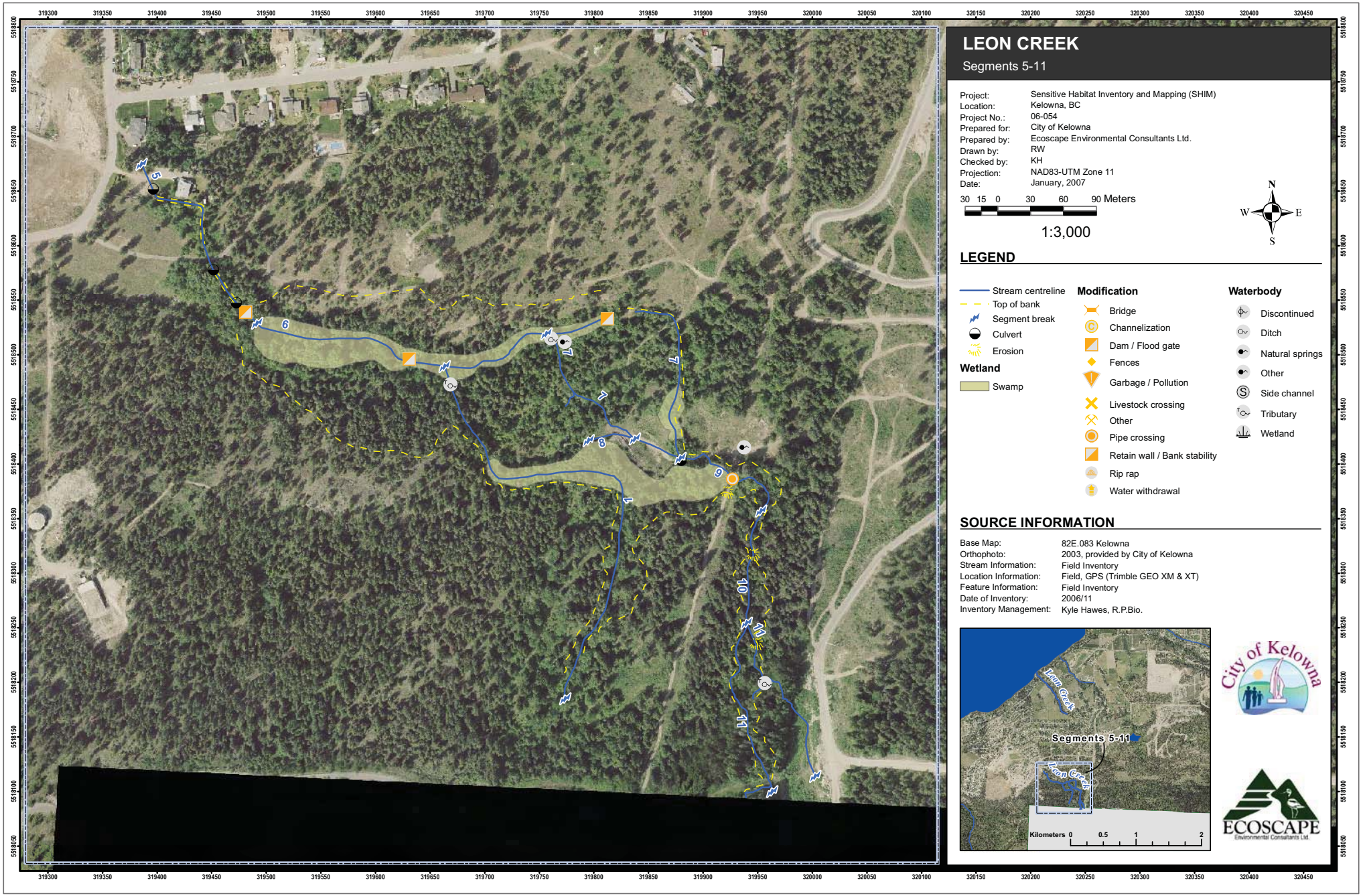
- Discontinued
- Ditch
- Natural springs
- Other
- Side channel
- Tributary
- Wetland

SOURCE INFORMATION

Base Map:	82E.083 Kelowna
Orthophoto:	2003, provided by City of Kelowna
Stream Information:	Field Inventory
Location Information:	Field, GPS (Trimble GEO XM & XT)
Feature Information:	Field Inventory
Date of Inventory:	2006/11
Inventory Management:	Kyle Hawes, R.P.Bio.

City of Kelowna

ECOSCAPE Environmental Consultants Ltd.



LEON CREEK

Segments 5-11

Project:	Sensitive Habitat Inventory and Mapping (SHIM)
Location:	Kelowna, BC
Project No.:	06-054
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	RW
Checked by:	KH
Projection:	NAD83-UTM Zone 11
Date:	January, 2007

30 15 0 30 60 90 Meters

1:3,000

N W E S

LEGEND

- Stream centreline
- Top of bank
- Segment break
- Culvert
- Erosion

Wetland

- Swamp

Modification

- Bridge
- Channelization
- Dam / Flood gate
- Fences
- Garbage / Pollution
- Livestock crossing
- Other
- Pipe crossing
- Retain wall / Bank stability
- Rip rap
- Water withdrawal

Waterbody

- Discontinued
- Ditch
- Natural springs
- Other
- Side channel
- Tributary
- Wetland

SOURCE INFORMATION

Base Map:	82E.083 Kelowna
Orthophoto:	2003, provided by City of Kelowna
Stream Information:	Field Inventory
Location Information:	Field, GPS (Trimble GEO XM & XT)
Feature Information:	Field Inventory
Date of Inventory:	2006/11
Inventory Management:	Kyle Hawes, R.P.Bio.

City of Kelowna

ECOSCAPE Environmental Consultants Ltd.

Leon Creek
Segment(s): 1 - 4

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Comment Class
1.0	Modified	Ephemeral	140.244	Cascade	9.0	1-20%	Unknown	
2.0	Modified	Ephemeral	107.649	Cascade	5.0	1-20%	Unknown	Channel poorly defined.
3.0	Modified	Ephemeral	296.460	Cascade	13.0	41-70%	Unknown	Ravine with poorly developed riparian association. Intermittent stream flows.
4.0	Natural	Ephemeral	288.097	Cascade	17.0	71-90%	Unknown	Ravine with fir/pine canopy and mixed shrub thicket over stream channel.

	Substrates (%) [a]						Channel (m)				
Segment	O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Comment Substrates/Channel
1.0	0	10	40	40	10	0	0.00	2.20	0.00	0.60	Rip rap cobble/boulder channel armouring in lower 60-m of segment.
2.0	0	90	2	6	2	0	0.00	1.00	0.00	0.30	Rip rap aprons and armoured road fill slope/cascade. Channel poorly defined.
3.0	0	40	10	30	15	0	0.00	1.00	0.00	0.25	Minor down cutting through gully/ravine among loose rip rap armouring.
4.0	0	90	5	4	1	0	0.30	2.00	0.01	0.10	

a. Substrate codes: O=organics; F=silt/sand; G=gravel; C=cobble; B=boulder; R=bedrock

	Left Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Coniferous forest	Urban_Residential	mature forest	34-66%	No	<5	Medium	channel down cutting
2.0	Herbs/grasses	Urban_Residential	low shrubs <2m	<5%	No	No	High	Concrete structure in upper 30m.
3.0	Coniferous forest	Natural	mature forest	5-33%	No	No	Medium	Stream channel follows left ravine bank slope toe.
4.0	Coniferous forest	Natural	young forest	5-33%	No	No	Medium	Ravine with fir/pine canopy and mixed shrub thicket over stream channel.

	Right Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Herbs/grasses	Urban_Residential	low shrubs <2m	5-33%	No	<5	Medium	Remnant veteran firs at bottom of segment with lawn under. Right bank predominantly open/cleared.
2.0	Herbs/grasses	Urban_Residential	low shrubs <2m	<5%	No	No	High	Concrete structure in upper 30m.
3.0	Coniferous forest	Disturbed	low shrubs <2m	5-33%	No	No	Medium	Old trail follows right bank.
4.0	Coniferous forest	Disturbed	mature forest	5-33%	No	No	Low	Old trail follows right bank.

Segment	Comment - Flora	Comment - Flora
1.0	Ponderosa pine;fir;cottonwood;red-osier dogwood;willow sp.	
2.0	Ponderosa pine;fir;elm;graminoids;burdock;thistle.	
3.0	Ponderosa pine;fir;nightshade;water birch.	
4.0	Fir;willow sp.;red-osier dogwood;Oregon grape;feather moss.	

	Level of Impact [c]		Enhancement Opportunity	
Segment	Rating	Comment	Rating	Comment
1.0	Both_banks_low	lawn	Moderate	Riparian restoration to mitigate channel down-cutting
2.0	Both_banks_high		Low	
3.0	1_bank_low	Old trail disturbance through gully along right bank.	Low	
4.0	1_bank_low		Low	

c. Impact rating: 6=nil; 5 = 1-bank low; 4 = 1-bank moderate; 3 = 1-bank high; 2 = both banks low; 1 = both banks moderate; 0 = both banks high









City of Kelowna

ECOSCAPE Environmental Consultants Ltd.

Leon Creek
Segment(s): 5 - 11

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Comment Class
1.0	Natural		441.067	Cascade	15.0	21-40%	Unknown	Small stream flow through defined channel parallel to east predominant Leon Creek flow. Fire disturbance and salvage logging.
5.0	Channelized		199.535	Riffle/Pool	2.0	0	Unknown	Channelized through constructed rip rap channel devoid of riparian vegetation.
6.0	Modified	Wetland	350.090	Riffle/Pool	1.5	1-20%	Unknown	Cottonwood floodplain association/swamp through ravine with riffle pool channel character.
7.0	Modified		77.178	Cascade	15.0	1-20%	Unknown	Cascade over moist slope with broadleaf/riparian vegetation
8.0	Modified		117.031	Riffle/Pool	2.0	1-20%	Unknown	Modified channel/mud bog/following across and down roads and trails. Part wetland but down cutting since fire and other disturbance has seriously impaired this area.
9.0	Modified		91.010	Riffle/Pool	4.0	1-20%	Unknown	Shallow channel in young riparian forest association. Riparian communities with high weed invasion of thistle.
10.0	Modified		106.904	Cascade/Pool	28.0	1-20%	Unknown	Incised channel steeper gradient. Heavy burn and salvage logging. Narrow riparian band.
11.0	Modified	Other	171.997	Cascade	10.0	1-20%	Unknown	Seg. 11 splits into 2 channels/mix of closed shrub thicket and burned. Dense herb. cover over water

	Substrates (%) [a]						Channel (m)				
Segment	O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Comment Substrates/Channel
1.0	1	45	25	25	3	1	0.90	1.80	0.02	0.15	
5.0	0	0	25	60	15	0	0.80	2.00	0.07	0.30	Constructed rip rap channel
6.0	18	80	0	1	1	0	1.20	2.50	0.07	0.20	Wetland/floodplain in bottom of ravine.
7.0	18	80	0	1	1	0	1.20	2.50	0.07	0.20	
8.0	10	88	2	0	0	0	0.60	1.30	0.02	0.20	
9.0	10	88	2	0	0	0	0.60	1.30	0.02	0.20	Very shallow channel over fine substrates.
10.0	0	55	30	5	5	5	0.60	2.00	0.02	0.30	Eroded down to more coarse substrates and bedrock. Down cutting exceeding 1-m depth in channel.
11.0	5	15	25	25	5	25	1.00	2.00	0.02	0.10	

a. Substrate codes: O=organics; F=silt/sand; G=gravel; C=cobble; B=boulder; R=bedrock

	Left Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Mixed forest		low shrubs <2m	34-66%	>=5	No	Medium	
5.0	Herbs/grasses	Urban_Residential		<5%	No	No	High	Bare ground/grass herb riparian with severe encroachment.
6.0	Broadleaf forest	Disturbed	tall shrubs 2-10m	67-100%	>=5	No	High	Burned broadleaf floodplain association.
7.0	Broadleaf forest	Disturbed	tall shrubs 2-10m	67-100%	>=5	No	High	Moist ravine slope with seepage and riparian association - burned.
8.0	Broadleaf forest	Disturbed	young forest	67-100%	>=5	No	Medium	intermittent unburned-burned /modified broadleaf riparian association.
9.0	Broadleaf forest	Disturbed	young forest	67-100%	>=5	No	Medium	
10.0	Herbs/grasses	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	
11.0	Herbs/grasses	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	Fire and salvage logging. Water birch and cottonwood snags.

	Right Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Mixed forest	Disturbed	low shrubs <2m	34-66%	>=5	No	Medium	Fire and salvage logging. Vigorous regeneration of aspen cottonwood and riparian shrubs.
5.0	Herbs/grasses	Urban_Residential		<5%	No	No	High	Bare ground/grass herb riparian with severe encroachment.
6.0	Broadleaf forest	Disturbed	tall shrubs 2-10m	67-100%	>=5	No	Medium	Burned broadleaf floodplain association.
7.0	Broadleaf forest	Disturbed	tall shrubs 2-10m	67-100%	>=5	No	Medium	Moist ravine slope with seepage and riparian association - burned.
8.0	Broadleaf forest	Disturbed	young forest	67-100%	>=5	No	Medium	intermittent unburned-burned /modified broadleaf riparian association.
9.0	Broadleaf forest	Disturbed	young forest	67-100%	>=5	No	Medium	
10.0	Herbs/grasses	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	Some bed rock areas with high channel stability but other areas with instability.
11.0	Herbs/grasses	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	Fire and salvage logging. Water birch and cottonwood snags.

Segment	Comment - Flora	Comment - Flora
1.0	Cottonwood;aspen;fir;Oregon grape;thistle.	
5.0		
6.0	Cottonwood;waterbirch (regen);reed canary grass;cattail;red-osier dogwood.	
7.0	Cottonwood;waterbirch (regen);reed canary grass;cattail;red-osier dogwood.	
8.0	Cottonwoodt;aspen;dogwood;rose;willow;alder	songbirds;White-tail deer; Chorus frogs, long-toed salamanders (tadpoles), Columbian Spotted Frog
9.0	Cottonwood;aspen;dogwood;rose;willow;alder	songbirds;White-tail deer; Chorus frogs, long-toed salamanders (tadpoles), Columbian Spotted Frog
10.0	Cottonwood;aspen;dogwood;rose;willow;alder;fireweed;thistle;snowberry	songbirds;White-tail deer; Chorus frogs, long-toed salamanders (tadpoles), Columbian Spotted Frog
11.0	Fireweed;willow;elderberry;Doug. maple;alder;cottonwood;aspen;dogwood;rose	

	Level of Impact [c]		Enhancement Opportunity	
Segment	Rating	Comment	Rating	Comment
1.0	Both_banks_mod	Salvage logging and altered hydrology.	High	Preserve and restore. Entire broadleaf community along hill slope is high ecological significance.
5.0	Both_banks_high		High	Riparian restoration
6.0	1_bank_low	Natural fire disturbance/regenerating. Altered hydrology.	Very_high	Preserve ravine from top of bank to top of bank and allow to regenerate.
7.0	1_bank_low	Natural fire disturbance/regenerating. Altered hydrology.	Very_high	Preserve ravine from top of bank to top of bank and allow to regenerate.
8.0	Both_banks_mod	Fire and salvage logging	Very_high	Restore down-cut channel. Prohibit access.
9.0	Both_banks_mod	Fire and salvage logging.	Very_high	restore down cut channel and riparian areas.
10.0	Both_banks_high	Fire and salvage logging	Very_high	Restore channel establish buffer and restore riparian communities.
11.0	Both_banks_mod		Very_high	Restore channel conditions add LWD. Build up channel using riffles and LWD. Weed control.

c. Impact rating: 6=nil; 5 = 1-bank low; 4 = 1-bank moderate; 3 = 1-bank high; 2 = both banks low; 1 = both banks moderate; 0 = both banks high

