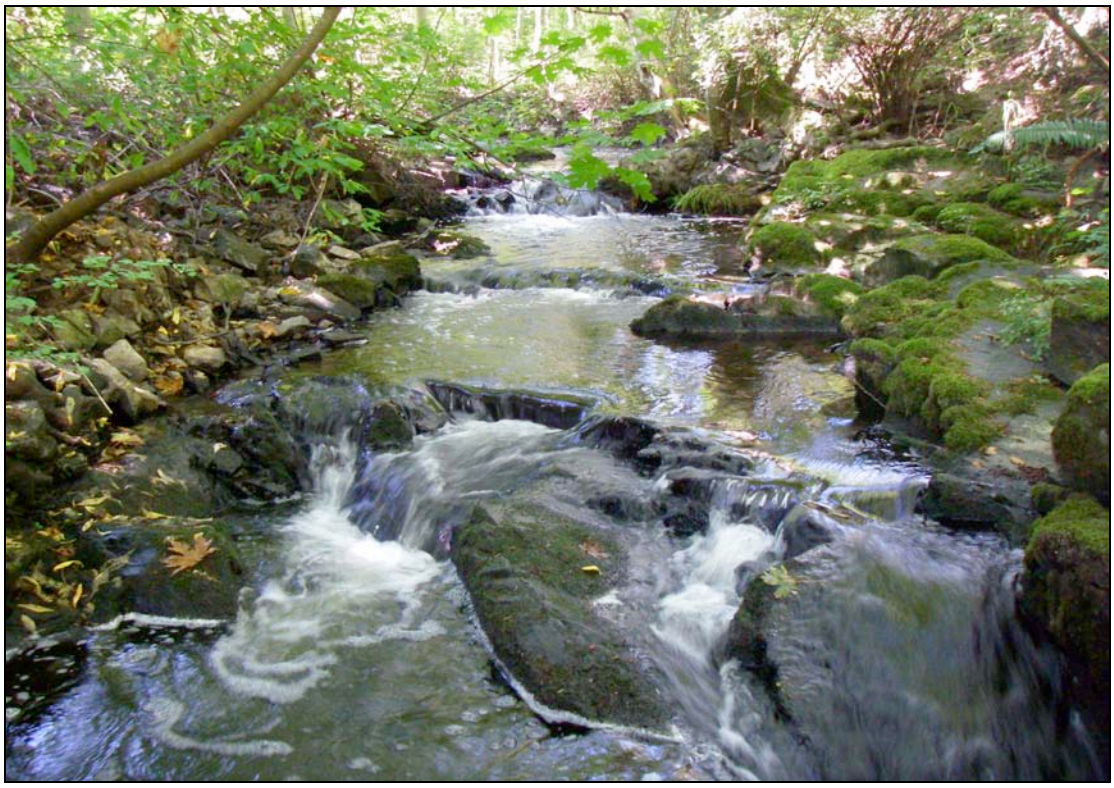
Colquitz River Watershed

Proper Functioning Condition Assessment

Appendices



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COOPERATIVE riparian RESTORATION

THE REAL ESTATE FOUNDATION OF BRITISH COLUMBIA

Federation of Canadian Municipalities

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Appendix 1. PFC Assessment Method

PFC: What It Is- What It Isn't

PFC is: A methodology for assessing the physical functioning of riparian-wetland areas. The term PFC is used to describe both the **assessment** process, and a defined, on-the-ground **condition** of a riparian-wetland area. In either case, PFC defines a minimum level or starting point for assessing riparian-wetland areas.

The PFC **assessment** provides a consistent approach for assessing the physical functioning of riparian-wetland areas through consideration of hydrology, vegetation, and soil/landform attributes. The PFC assessment synthesizes information that is foundational to determining the overall health of a riparian-wetland area.

The on-the-ground **condition** termed PFC refers to *how well* the physical processes are functioning. PFC is a state of resiliency that will allow a riparian-wetland area to hold together during a wind action, wave action, or overland flow event, sustaining that system's ability to produce values related to both physical and biological attributes.

PFC isn't: The sole methodology for assessing the health of the aquatic or terrestrial components of a riparian-wetland area.

PFC isn't: A replacement for inventory or monitoring protocols designed to yield information on the "biology" of the plants and animals dependent on the riparian-wetland area.

PFC can: Provide information on whether a riparian-wetland area is physically functioning in a manner that will allow the maintenance or recovery of desired values (e.g., fish habitat, neotropical birds, or forage) over time.

***PFC isn't*: Desired condition**. It is a prerequisite to achieving desired condition.

PFC can't: Provide more than strong clues as to the actual condition of habitat for plants and animals. Generally a riparian-wetland area in a physically nonfunctioning condition will not provide quality habitat conditions. A riparian-wetland area that has recovered to *proper functioning condition* would either be providing quality habitat conditions, or would be moving in that direction if recovery is allowed to continue. A riparian-wetland area that is functioning at-risk would likely lose any habitat that exists during a wind action, wave action, or overland flow event.

Therefore: To obtain a complete picture of riparian-wetland area health, including the biological side, one must have information on *both* physical status, provided through the PFC assessment, and biological habitat quality. Neither will provide a complete picture when analyzed in isolation. In most cases, proper functioning condition will be a prerequisite to achieving and maintaining habitat quality.

PFC is: A useful tool for prioritizing restoration activities. By concentrating on the "at-risk" systems, restoration activities can save many riparian-wetland areas from degrading to a nonfunctioning condition. Once a system is nonfunctional, the effort, cost, and time required for recovery is dramatically increased. Restoration of nonfunctional systems should be reserved for those situations where the riparian-wetland has reached a point where recovery *is possible*, when efforts are not at *the expense* of "at-risk" systems, or when unique opportunities exist. At the same time, systems that are properly functioning are not the highest priorities for restoration. Management of these systems should be continued to maintain PFC and further recovery towards desired condition.

PFC is: A useful tool for determining appropriate timing and design of riparian-wetland restoration projects (including structural and management changes). It can identify situations where structures are either entirely inappropriate or premature.

PFC is: A useful tool that can be used in watershed analysis. While the methodology and resultant data is "area based," the ratings can be aggregated and analyzed at the watershed scale. PFC, along with other watershed and habitat condition information helps provide a good picture of watershed health and the possible causal factors affecting watershed health. Use of PFC will help to identify watershed-scale problems and suggest management remedies and priorities.

PFC isn't: Watershed analysis in and of itself, or a replacement for watershed analysis.

PFC is: A useful tool for designing monitoring plans. By concentrating implementation monitoring efforts on the "no" answers, greater efficiency of resources (people, dollars, time) can be achieved. The limited resources of the local manager in monitoring riparian-wetland parameters can be prioritized to those factors that are currently "out of range" or at risk of going out of range. The role of research may extend to validation monitoring of many of the parameters. *PFC isn't:* Designed to be a long-term monitoring tool, but it may be an appropriate part of a well-designed monitoring program.

PFC isn't: Designed to provide monitoring answers about attaining desired conditions. However, it can be used to provide a thought process on whether a management strategy is likely to allow attainment of desired conditions.

PFC can: Reduce the frequency and sometimes the extent of more data- and labor-intensive inventories. PFC can reduce time and cost by concentrating efforts on the most significant problem areas first, thereby increasing efficiency.

PFC can't: Eliminate the need for more intensive inventory and monitoring protocols. These will often be needed to validate that riparian-wetland area recovery is indeed moving toward or has achieved desired conditions (e.g., good quality habitat) or simply to establish what the existing habitat quality is.

PFC is: A qualitative assessment based on quantitative science. The PFC assessment is intended for individuals with local, on-the-ground experience in the kind of quantitative sampling techniques that support the checklist. These quantitative techniques are encouraged in conjunction with the PFC assessment for individual calibration where answers are uncertain or where experience is limited. PFC is also an appropriate starting point for determining and prioritizing the type and location of the quantitative inventory or monitoring that is necessary.

PFC isn't: A replacement for quantitative inventory or monitoring protocols. PFC is meant to complement more detailed methods by providing a way to synthesize data and communicate results.

PFC Process and Checklist

Proper Functioning Condition (PFC) is a qualitative method for assessing the condition of riparian-wetland areas. The term PFC is used to describe both the assessment process and the condition of a riparian wetland area. The methodology was developed by a national interagency team and documented in a series of Technical References (TR 9 through 16) (Prichard, 1993 through 1999 *et al*.). See the PFC user's guides for more details on the PFC process http://www.or.blm.gov/nrst/Tech_References/tech_references.htm.

The process involves the following steps:

1. Review existing documents--including maps, files and aerial photos.
2. Analyze the PFC definition--assess riparian/wetland based on a riparian area's capability and potential.
3. Assess Functionality--through document and field review. The rating is based on team discussion.
4. Institute the process--incorporate the information collected into a management plan.

The minimum standards are achieved by using a standardized checklist. The PFC assessment, using the checklist, should work for most sites as long as the procedure is followed and definitions understood. This is because the PFC was founded from rigorous science and is performed in an interdisciplinary setting.

The lotic (stream/moving water) checklist contains 17 items, which are qualitatively assessed by the Team (see checklist below). The lentic (lake/wetland) checklist contains 20 items. The appropriate form is used by the ID Team to assess riparian-wetland conditions. Items on the checklist relate to stream channel stability and/or wetland functionality, and receive "yes" or "no" answers. In some cases, "not applicable" is used.

In addition to the checklist it is helpful to fill out the supplemental field form, developed by John Anderson (a copy of the form follows), which includes information on vegetation community type, restoration measures, stream bank conditions, geomorphology/soils, floodplain availability/size, and grazing.

In order to answer specific questions on the PFC checklist, bankfull stage and floodprone area must be determined. Figure 1 below illustrates the method used to determine their position relative to the stream channel.

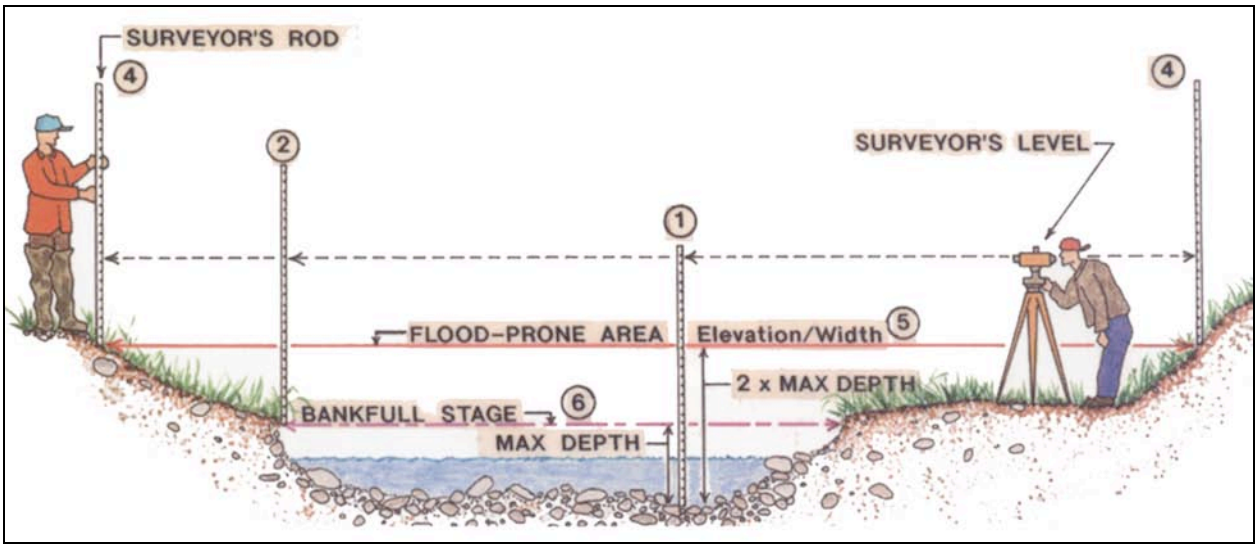


Figure 1. Illustration of the method used to define bankfull stage and flood-prone area for the purposes of calculating the width/depth ratio and entrenchment ratio (Rosgen, 1996).

The checklist and its summarization, which can be done quickly, are used to classify the health or state of physical processes of the riparian-wetland area or reach being studied into one of four categories:

Functional – At Risk (FAR)
Non-functional (NF)
Proper Functioning Condition (PFC)
Unknown

The preponderance of "yes" and "no" responses help the ID Team determine the proper classification, however there is no set number of "yes" and "no" answers to determine into which category a water body falls. Team discussion is an important part of classification.

The significance of the classification categories are:

PFC: The stream channel, floodplain, and/or wetland have the physical characteristics that provide stability through various frequency events. This resiliency allows an area to produce desired values such as fish and wildlife habitat over time.

A riparian-wetland area is considered to be in Proper Functioning Condition when adequate vegetation, landform, or large woody material is present to:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality;
- Filter sediment, capture bedload, and aid floodplain development;

- Improve flood-water retention and ground-water recharge;
- Develop root masses that stabilize stream banks against cutting action;
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses;
- Support greater biodiversity.

FAR: The stream or wetland is functioning but is lacking enough vegetation, soils or landform characteristics to withstand various frequency events without significantly damaging the riparian corridor. FAR is the only category that is further stratified by trend (up, down, not apparent). A downward trend rating indicates deteriorating conditions that could become NF. Deteriorated conditions can be transmitted both up and downstream. Trend that is not apparent requires further study.

NF: The stream or wetland is not stable because it lacks most of the stabilizing physical characteristics and may continue to deteriorate. The degraded area or reach cannot sustain long-term desired values and return to proper-functioning condition without intervention (change in management).

Unknown: Sufficient information to make a rating is lacking. Additional study or data collection is necessary.

The results of the PFC assessment will be analyzed and presented in a written report. The report will outline numbers of streams and wetlands in a particular category *i.e.*, PFC, FAR, NF, or Unknown.

Classification of reaches using the PFC method helps the local planning group establish a common vocabulary for discussing desired conditions to their key riparian-wetland landscape elements. The need, type and location of more detailed inventories (upland methods as well as riparian-wetland corridor methods) can be prioritized once the PFC assessment classifications are known in preparation for developing restoration and management alternatives.

Lotic Checklist

Name of Riparian-Wetland Area: _____

Date: _____ Segment/Reach ID: _____

ID Team Observers: _____

Potential Riparian-Wetland Vegetation. Potential Channel Characteristics: Rosgen = “ ” channel type

Yes	No	N/A	HYDROLOGICAL
			1) Floodplain above bankfull is inundated in "relatively frequent" events
			2) Where beaver dams are present are they active and stable
			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
			4) Riparian-wetland area is widening or has achieved potential extent
			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
			10) Riparian-wetland plants exhibit high vigor

			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
			14) Point bars are revegetating with riparian-wetland vegetation
			15) Lateral stream movement is associated with natural sinuosity s
			16) System is vertically stable (*not downcutting*)
			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

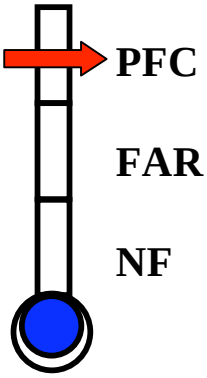
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

PFC Assessment
(Supplemental Form)

Reach Findings Field Narrative

Each Reach should have a narrative section in the final PFC report that summarizes the findings. This field form provides a logical sequence of questions that when answered will enable the report writer to quickly and consistently describe each reach assessed.

1. Reach Location: *Begin at GPS Way Point*_____ *end a GPS Way Point*_____
2. Verbal description of Reach start and end point:_____
_____

3. Allotment Name:_____

4. Length of Reach (*Km to nearest tenth*):_____._____

5. Rosgen channel type and:_____, **6. Valley form**: _____
_____

7. Potential Rosgen type:_____, **8. Historic Rosgen type**:_____
_____
_____|

9. Potential Vegetation Community Type:_____
_____

10. Historic Vegetation Community Type:_____
_____

11. Restoration Projects:_____
_____
_____

12. Vegetation Description:_____
_____
_____
_____

13. Stream Bank Conditions:_____
_____

14. Geomorphology/soils:_____
_____

15. Floodplain Availability/size:_____
_____

16. Grazing:_____
_____
_____

17. PFC Determination:_____, **18. Trend if FAR**_____

This form was developed by John Anderson, Coldstream Consulting.

Lentic Checklist

Name of Riparian-Wetland Area:

Date: Segment/Reach ID:

ID Team Observers:

Acres/Hectares:

Potential Riparian-Wetland Vegetation:

Yes	No	N/A	HYDROLOGICAL
			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
			2) Fluctuation of water levels is not excessive
			3) Riparian-wetland area is widening or has achieved potential extent
			4) Upland watershed is not contributing to riparian-wetland degradation
			5) Water quality is sufficient to support riparian-wetland plants
			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics

			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
			12) Riparian-wetland plants exhibit high vigor
			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
			14) Frost or abnormal hydrologic heaving is not present
			15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
			20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

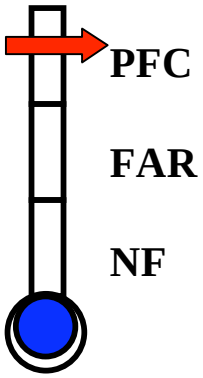
SUMMARY DETERMINATION

__Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

FIELD GUIDE FOR THE STANDARD CHECKLIST (LOTIC)

HYDROGEOLOGIC
1) Floodplain above bankfull inundated in "relatively frequent" events
Should this stream type have a floodplain? How wide should it be? How wide is it? Is the stream channel incised or over sized? Has widening begun? Are most terrace walls sloped indicating widening has stopped? Is there an upstream reservoir?
2) Where beaver dams are present they are active and stable
Are beaver dams currently acting as hydraulic modifiers? Are beavers present? Are beavers actively maintaining the dam? Is the dam self-sustaining, *e.g.*, significant vegetation is rooted in the dam? Is the beaver dam a single large dam? Are the beaver dams in a complex?
3) Sinuosity, W/D ratio, and gradient are in balance with the landscape setting (*i.e.*, landform, geology, and bioclimatic region).
Sinuosity—Is the stream actively eroding and building point bars? Are there indications of channel straightening? Does the sinuosity appear to be appropriate for the channel bottom type?
Width/depth ratio—Is the stream channel "U" shaped? Are the stream banks undercut and/or sloughing? Is the streambank trapezoidal in shape along straight reaches? Are the stream banks jagged (saw blade)? Is the flood plain the appropriate size?
Gradient—Is the channel incised? Does the channel appear straightened? Does the sinuosity appear to be appropriate for the valley bottom type?
4) Riparian wetland area is widening or has achieved potential extent.
Does the stream have the potential or capacity to make a riparian area? Is upland vegetation such as sage brush dying? Is the channel incised? Are riparian species present only because their established roots still reach the water table? Are riparian/wetland species regenerating? Are upland species invading the riparian area? Is the channel narrowing? Are pointbars increasing in size? Is the floodplain fully developed?
5) Upland watershed is not contributing to riparian degradation.
Is there evidence of sediment from the upland degrading the riparian area? Is there evidence of channel degradation because of increased flow from the watershed? Are there major changes in the watershed above this point such as logging, mining, agriculture, high road density, or vegetation manipulation? Is there sufficient precipitation to cause increased flow as a result of these changes?

VEGETATION
6) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery).
Are there two or more age classes of stabilizer (late seral) riparian/wetland species present within the riparian area?
7) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery).
Are there at least two stabilizer (late seral) riparian/wetland species present within the riparian area?
8) Species present indicate maintenance of riparian soil moisture characteristics.
Are stabilizing riparian/wetland species regenerating? Are upland species encroaching into the riparian/wetland area? Has the channel incised leaving remnant riparian/wetland vegetation on a terrace? Is there a water source independent of the stream?
9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high stream flow events.
Are there stabilizing (late seral) riparian species on the streambank?
10) Riparian-wetland plants exhibit high vigour.
Are the herbaceous stabilizer (late seral) species obvious individual plants? Are there new stabilizing herbaceous plants around the perimeter of the mat? Are the leaf blades of the sedges relatively wide? Are non-rhizomatous woody species short with over 10 stems at the base? Do woody species have a club look, multiple branching, at the end of the stems?
11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows.
Are the stream banks covered with sufficient stabilizing species to protect them from erosion (see Winward

2000, p34)? Is the stabilizing species vigorous (see question 10)?
12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery).
Is the reach capable of growing trees, *e.g.* cottonwood, aspen, and conifers? Is large or coarse debris a necessary hydrologic control? Is the site dominated by stabilizing shrub species? Has the site had the trees removed from the site? Are there trees growing within one tree height of the stream channel?

SOILS-EROSION DEPOSITION
13) Floodplain and channel characteristics (*i.e.*, rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy.
Is the floodplain fully developed (see question 1)? Are there sufficient overflow channels, vegetation, rocks, and woody debris to handle high flows without degrading? Is the floodplain capable of growing woody species? Are woody riparian species present on the floodplain and/or stream banks? Is the sinuosity and width/depth ratio appropriate for the site (see question 3)?
14) Point bars are revegetating with riparian/wetland vegetation.
Is there a distinct and relatively continuous line of stabilizing riparian vegetation on the point bar? Are there sprout and/or young woody species on the point bar? Are herbaceous stabilizing riparian species expanding?
15) Lateral stream movement is associated with natural sinuosity.
Do the stream banks have an adequate amount of stabilizing vegetation (see question 9&11)? Is there evidence of rapid point bar growth (see question 3)? Is the channel widening? Is the channel aggrading? Is the channel multi-threaded ("D" channel type)? Is sinuosity appropriate for the valley type (see question 3)?
16) System is vertically stable.
Is there a head cut capable of moving upstream within or below the reach? Are there hydrologic modifiers such as abandoned beaver dams, logs, or structures that have water moving under them? Is sediment or debris accumulation causing the water to flow out of the channel?
17) Stream is in balance with the water and sediment being supplied by the watershed (*i.e.*, no excessive erosion or deposition).
Is there evidence of increased water flow such as channel degradation or channel erosion (see question 5)? Are there mid-channel bars, sediment-filled pools, sand/silt/clay channel bottoms (see question 3)? Is there channel braiding? Are stream banks stable (see question 11)?

SUMMARY DETERMINATION	
Functioning Rating	**Apparent Trend for Functional – At Risk**
Are any questions answered "NO"?	Are woody species regenerating?
Are there "NO" attributes or processes important to the proper functioning of this riparian area?	Are herbaceous species reproducing?
Are most of the attributes answered "NO"	Are plants vigorous?
Is the apparent trend upward?	Is the channel degrading?
	Is the channel aggrading?
	Are most stream banks actively eroding?

This form was developed by Erv Cowley- Idaho Riparian Service Team

Appendix 2. PFC Checklists

Lotic Checklist

Name of Riparian-Wetland Area:	**Colquitz River**		
Date:	**2007-07-17**	Segment/Reach ID:	**Reach 1: From the Admirals Road bridge crossing Colquitz River to point where creek narrows and becomes less tidally influenced**
ID Team Observers:	**Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend**		

Potential Riparian-Wetland Vegetation: Estuary type area with mature coniferous forest, sedges, rushes, salt tolerant species, and riparian shrubs as an understory.

Potential Channel Characteristics: Rosgen = " NA (F morphology) " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics

√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
√			14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #49: N 48° 27' 30.6" W 123° 24' 31.8".

Potential channel type: NA because tidally influenced but has "F" morphology
Present channel type: NA because tidally influenced but has "F" morphology

Constraints:
Left hand bank is residential with lawns extending to water's edge causing erosion due to lack of native vegetation. Trampling at access points along the right bank and also upland off the main trail in Cuthbert Holmes Park has reduced and prevented growth of native riparian and upland plant species.

Potential Restoration:
Improvements to the reach would include invasive species removal and replanting using native species appropriate for the present habitat, the use of fences or sign within Cuthbert Holmes Park to reduce trampling off pathway, and a Greenshore program with residents and park officials.

Notes:
2. No beaver presence noted. There may have been beavers in the area historically.
3. No obvious erosion and deposition seems to be natural.
6. There are few young conifers present.
7. One would expect healthier conifers and other vegetation and more large, woody debris
12. There is not much wood present in the creek in this reach. If some of the trees fell in there would be little left standing to replace it. The conifers are dwindling, the age-class is not diverse and those present

are not as healthy as they should be. However, large woody debris may not be necessary in this reach.
14. Point bars are more like benches.

Vegetation:

Common Name	Scientific Name
Alaska alkali grass	*Puccinellia nutkaensis*
Arbutus	*Arbutus menziesii*
Black hawthorn	*Crataegus douglasii*
Black spruce	*Picea mariana*
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Cascara	*Rhamnus purshiana*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Ditch grass	*Ruppia maritima*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Entire-leaved gumweed	*Grindelia integrifolia*
European bittersweet	*Solanum dulcamara*
Garry oak	*Quercus garryana*
Geranium	*Geranium sp.*
Grand fir	*Abies grandis*
Grasses (non-native)	
Himalayan blackberry	*Rubus discolor*
Honeysuckle	*Lonicera sp.*
Indian plum	*Oemleria cerasiformis*
Lyngby's sedge	*Carex lyngbyei*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific crabapple	*Malus fusca*
Red osier dogwood	*Cornus stolonifera*
Salal	*Gaultheria shallon*
Saltmarsh rush	*Juncus gerardii*
Saskatoon	*Amelanchier alnifolia*
Seashore saltgrass	*Distichlis spicata var. spicata*
Silverweed	*Potentilla anserine ssp. pacifica*
Trailing blackberry	*Rubus ursinus*
Willow sp.	*Salix sp*

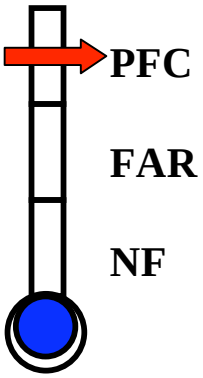
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√__
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
__√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	**Colquitz River**		
Date:	**2007-07-17**	Segment/Reach ID:	**Reach 2: From where the creek narrows past the second footbridge to first span of the Trans Canada Highway Bridge.**
ID Team Observers:	**Cori Barraclough, Sarah Buchanan, Daniel Hegg, Patrick Lucey, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend**		

Potential Riparian-Wetland Vegetation. Conifer dominated forest with native riparian shrub understory and sections of Garry Oak habitat.

Potential Channel Characteristics: Rosgen = "C" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point #: 49 N 48° 27.468' W 123° 24.025'

Potential channel type: Rosgen channel type "C".
Present channel type: Rosgen channel type "E" with some "C" characteristics and classic "C" sections.

Constraints:
The lower sections may have been excavated historically but the channel itself remains in its original location. Trampling along access points has lead to a loss of vegetation and subsequent erosion of the banks in some areas. Flow can be flashy but this may be related to remaining tidal influence as well as a high amount of effective impervious area in the upper watershed.

Potential Restoration:
Improvements can be made by removing invasive species and replanting with appropriate native vegetation, adding wood or rock to increase complexity of the channel, adding more tree canopy and allowing for succession. There is lots of area to work with in this reach and the addition of more complexity to the channel will make it a better habitat for fish.

Notes:
5. The stream is flashy and the water quality is poor.
6. There is little mature plant species other than in the upper section. This reach is dominated by shrubs and is still in an early successional stage.
7. There are a lot of invasive species present and there is a lack of big trees in the lower section. The shrubbery is solid and stable.
9. Areas of access have reduced the capability of plants to establish root masses strong enough for high flow events. For example, the turf grass used to fill in holes caused by trampling will wash away easily and is doing so already.
12. There are few trees to fall in and there may have been removal of trees from creek in the past.

13. The primary area of dissipation of energy is in the floodplains.
17. There is more water than there should be due to the high amount of effective impervious area (EIA).

Vegetation:

Common Name	Scientific Name
Alaska Alkali grass	*Puccinellia nutkaensis*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Cascara	*Rhamnus purshiana*
Common bulrush	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Garry oak	*Quercus garryana*
Grand fir	*Abies grandis*
Grasses (non-native)	
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus discolor*
Lyngby's sedge	*Carex lyngbyei*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Ornamental dogwood	*Cornus florida*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rushes sp.	*Juncaceae sp.*
Saskatoon	*Amelanchier alnifolia*
Sedges sp.	*Carex sp.*
Silverweed	*Potentilla anserine ssp. pacifica*
Small-flowered bulrush	*Scirpus microcarpus*
Verigated dogwood	*Cornus alba Elegantissima*
Weeping willow	*Salix babylonica*
Willow sp.	*Salix sp*

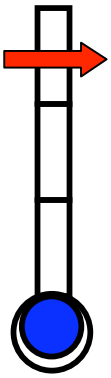
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√__
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√ Augmented flows (from upper watershed)
_√_ Other (private property, invasive species, water extraction)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	2007-07-18	Segment/Reach ID:	Reach 3: First span Trans Canada Highway bridge to the north end of the southernmost boardwalk bridge alongside Interurban Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with areas of Garry Oak and arbutus habitat.

Potential Channel Characteristics: Rosgen = "G1" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
		√	9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 18 (BLC): N 48° 27.509' W 123° 23.713'

Potential channel type: Rosgen channel type "G1". Bedrock controlled.
Present channel type: Rosgen channel type "G1". Bedrock controlled.

Constraints:
The channel is constrained by the bedrock walls on both sides with added immobility by the creation of the trail on the left bank.

Potential Restoration:
The only restoration possible due to the bedrock walls is invasive species removal to allow native vegetation to thrive with less competition.

Notes:
1. It is a G-channel and in a canyon/gully.
4. This reach has attained its potential extent.
5. There is excess sediment on the bottom of the channel and there are high flows and major modifications in the upper watershed. But, no degradation has occurred due to the armoured bedrock walls.
6. Young conifers are present.
7. Invasive species are present.
8. However, there is limited riparian ground soil.
9. It is a bedrock channel.
12. This reach is bedrock controlled and does not need wood.
15. The sinuosity is constrained by the bedrock-armoured channel.
17. The creek is flashy due to imperviousness of surrounding watershed but no damage is occurring because of the bedrock.

Vegetation:

Common Name	Scientific Name
Arbutus	*Arbutus menziesii*
Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Cottonwood	*Populus balsamifera ssp. trichocarpa*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
Garry oak	*Quercus garryana*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus discolor*
Indian plum	*Oemleria cerasiformis*
Licorice fern	*Polypodium glycyrrhiza*
Mock orange	*Philadelphus lewisii*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Sedum	*Sedum sp.*
Small-flowered bulrush	*Scirpus microcarpus*
Sword fern	*Polystichum munitum*
Western redcedar	*Thuja plicata*
Willow species	*Salix sp.*

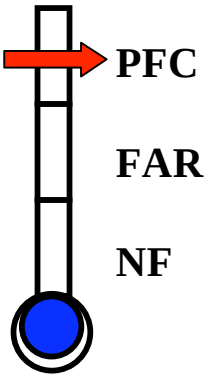
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√ (there are private properties on right bank)

If yes, what are those factors?
___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	2007-07-18	Segment/Reach ID:	Reach 4: North end of southernmost footbridge along Interurban Road to the north end of the northernmost footbridge by alder/poplar stands
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with riparian understory.

Potential Channel Characteristics: Rosgen = " B2 " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 19 (BLC): N 48° 27.587' W 123° 23.676'

Potential channel type: Rosgen channel type "B2".
Present channel type: Rosgen channel type "B2".

Constraints:
The channel is composed of cobble and boulder overlaying clay and bedrock making the creek constrained within its present path. Erosion is occurring in areas and there is a large amount of invasive species likely contributing to this as well as some trampling.

Potential Restoration:
Improvements can be made by embarking upon invasive species control, replanting with willow waddles and cottonwood in bare areas, and assessing the impact and liability of the concrete stepping stones.

Notes:
4. Much of the riparian area is overburdened with invasive species.
5. Yard waste may be contributing to invasive species.
7. Good variety, but the majority is non-native species.
9. Some erosion and bare spots occurring, some areas with more upland species than should be, lots of non-native species.
11. Some erosion is present in patches but not all throughout the reach.
12. There is not another age class behind the few conifers that are present.
13. It is constrained because it is a B channel but there is an adequate flood plain. Small rock and cobble present indicating energy is not enough to blow them out.

Vegetation:

Common Name	Scientific Name

Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Coastal strawberry	*Fragaria chiloensis*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Cottonwood	*Populus balsamifera ssp. trichocarpa*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus discolor*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Morning glory	*Ipomoea indica*
Oceanspray	*Holodiscus discolor*
Orchard grass	*Dactylis glomerata*
Oriental maple	
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Willow species	*Salix sp.*

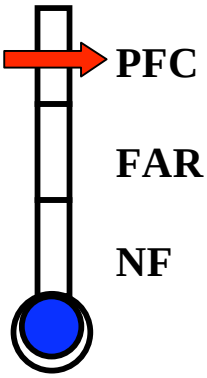
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√__
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√__ Augmented flows
_√__ Other (private landowners)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-18	Segment/Reach ID:	Reach 5: North end of northernmost boardwalk bridge by alder/poplar stand to upstream of large cement platforms under the overhead walkway.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Mature coniferous forest

Potential Channel Characteristics: Rosgen = a narrower "Bc6 " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 20: N 48° 27.663' W 123° 23.692'

Potential channel type: Rosgen channel type "Bc6" and narrow.
Present channel type: Rosgen channel type "Bc6".

Constraints:
Some portions of the reach have been armoured which may be related to the construction of the footbridge and park trail. The right bank is private property and lawns extend to the waters edge. There are rip-rapped walls along this bank indicating heavy erosion has already occurred. Channel may have been artificially altered and perhaps dug-out to provide fill for the railway bed that used to travel where Interurban Road does now. The upper portion of the reach may have been landscaped.

Potential Restoration:
Invasive species removal and control is required along with replanting of eroded areas. Landowner education about riparian vegetation would be prudent for all neighbours to the creek. To prevent trampling that leads to a loss in vegetation and subsequent erosion mowing should be altered on the creek side of the path to decrease easy access. The addition of large woody debris and rocks will add complexity improving dissipation of energy, increasing sinuosity, and creating a habitat more conducive to fish.

Notes:
3. Sinuosity, width/depth, and gradient were altered when the upper portion was artificially widened to create a pond.
4. Riparian-wetland area is at potential although erosion is taking away from the riparian area.
5. The watershed is contributing sediment, increased peak flows, and erosion is occurring; however, Panama Flats upstream is attenuating flows acting as a flow moderating body.
6. Young and mature deciduous trees present but so are lots of invasives.
7. Few conifers, lots of invasives, and lots of shrubbery.

8. Some riparian areas are overpopulated with upland species.
9. The right bank is eroding heavily and earns a 'No' while the left bank is "Yes".
11. Right bank 'No' because of heavy erosion, left bank is 'Yes'.
12. Not enough conifers present and deciduous trees small.
13. Floodplains are active but there is little large woody debris.
15. Some erosion is occurring.

While system is currently in its own balance, it is highly susceptible to damage and will fall apart if pushed too hard.

Vegetation:

Common Name	**Scientific Name**
Agronomic grasses	
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lesser duckweed	*Lemna minor*
Morning glory	*Ipomoea indica*
Oceanspray	*Holodiscus discolor*
Orchard grass	*Dactylis glomerata*
Ornamental maple	
Ornamentals	
Pacific water parsley	*Oenanthe sarmentosa*
Poplar sp.	*Populus sp.*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Small-flowered bulrush	*Scirpus microcarpus*
Trailing blackberry	*Rubus ursinus*
Water plantain	*Alisma plantago-aquatica*
Willow sp.	*Salix sp.*

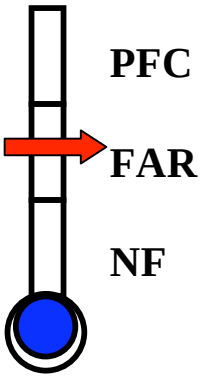
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-18	Segment/Reach ID:	Reach 6: From upstream of cement stepping stones under the overhead walkway to Interurban Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with deciduous pockets.

Potential Channel Characteristics: Rosgen = "Gc6" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 21: N 48° 27.801' W 123° 23.795'

Potential channel type: Rosgen channel "Gc6".
Present channel type: Rosgen channel "Gc6", constrained.

Constraints:
The creek flows in a deep gully and access to the creek bottom is almost impossible. The creek is highly constrained within this gully. This reach has also been artificially altered; hence, the historic Rosgen channel type cannot be determined.

Potential Restoration:
Invasive species removal and control should be conducted. Increasing channel complexity by the addition of rock and large woody debris would increase sinuosity and aid in the dissipation of energy. Access to this reach is limited due to its gully shape that provides protection to the creek.

Notes:
1. Gullies do not have floodplains.
3. The channel has likely been dug-out and it is constrained.
4. Has reached potential extent due to constrained gully-shape.
5. Panama Flats is attenuating flows otherwise we would be seeing more degradation.
6. More conifers present than in Reach #5.
7. Much of this diversity is due to a high number of invasive species.
12. There is only a narrow strip of vegetation along this reach and if the trees fall there is not enough vegetation to replace it.
13. Panama Flats upstream slows down the flow compensating for the lack of energy dissipating material in this reach.
15. There is little sinuosity but that is not unnatural for a gully.
17. Panama Flats is attenuating the high flows upstream.

Note: Reach 6 has a rating of PFC but it is a long way from its desired future condition.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Laburnum	*Laburnum anagyroides*
Maple sp.	*Acer sp.*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Poplar sp.	*Populus sp.*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*
Woodland strawberry	*Fragaria vesca*

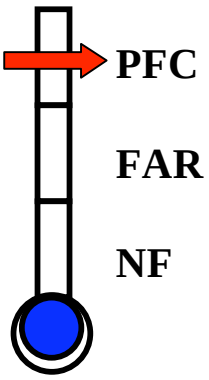
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-18	Segment/Reach ID:	Reach 7: Interurban Road to playground in Hyacinth Park
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Mature coniferous forest with some Garry Oak habitat and a riparian understory.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
√	√		14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 22: N 48° 27.928' W 123° 23.996'

Potential channel type: Rosgen channel "C6" with more sinuosity.
Present channel type: Rosgen channel "C6" but channel is too straight.

Constraints:
Trampling off of park trails and in picnic areas (near Violet Ave.) have created a loss of vegetation along the banks of the creek increasing erosion. Lots of material such as shopping carts and other garbage is thrown into the creek channel in numerous locations. Mowing of grass on the creek side of the path through Hyacinth Park is increasing access to riparian areas leading to trampling and subsequent loss of vegetation. Hydrogen sulphide and anoxic sediment found upstream of Marigold Avenue where concrete stepping-stones lead to a grassy platform. Colquitz Creek does not have a mobile bed.

Potential Restoration:
Restoration includes invasive species removal and control, adding complexity to the channel with rock and large wood, and halting mowing in areas that are not playing fields. Sinuosity and meander can be increased in the area just upstream of Marigold Avenue where there is a flat bench with weeping willows.

Notes:
3. Good balance in the system except for areas where fill was put in between Interurban Rd. and Violet Ave. Sinuosity is less than would be expected.
4. Riparian-wetland area has reached potential but it could be denser.
6. There are two age classes of cottonwood and willow but the rest of the vegetation is composed of young plants (may be in early succession as planting has occurred in the area of Hyacinth Park).
7. There are lots of invasive species.
9. There is little erosion but Panama Flats is attenuating flows upstream.
12. Most of the trees are deciduous and the few conifers present are not mature enough to provide wood to the creek.

13. Energy is dissipated by floodplains.
14. Few point bars seen and the bar area down concrete steps in Hyacinth Park is highly trampled and not revegetating.
15. However, the channel is too straight.

Note: While this reach is at PFC, it is not at its full potential.

Vegetation:

Common Name	Scientific Name
Alfalfa	*Medicago sativa*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Canada thistle	*Cirsium arvense*
Cattail-like plant	
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Fruit trees	
Garry oak	*Quercus garryana*
Grasses	
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Morning glory	*Ipomoea indica*
Mustard	*Brassica campestris*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific water parsley	*Oenanthe sarmentosa*
Pacific willow	*Salix lassiandra*
Queen Anne's lace	*Daucus carota*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Small-flowered bulrush	*Scirpus microcarpus*
Trembling aspen	*Populus tremuloides*
Vetch	*Vicia sp.*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*

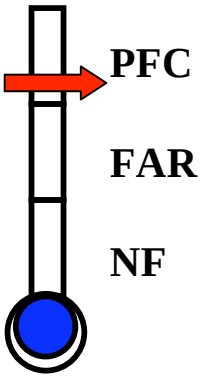
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-18	Segment/Reach ID:	Reach 8: Panama Flats from Hyacinth Park to Roy Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Treed wetland with majority of trees being deciduous (black cottonwood, red alder, big leaf maple) with patches of conifers.

Potential Channel Characteristics: Rosgen = " ditch " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
	√		15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point # 23: N 48° 28.127' W 123° 24.174'

Potential channel type: Rosgen channel "C" with a long term potential of a wetland "E" channel.
Present channel type: Ditch.

Constraints:
This channel is constrained on the right bank (looking downstream) by Interurban Road and residential property. On the left bank, the ditched creek is bordered by the trail and then, Panama Flats fields. The creek has been dug into a ditch and is heavily eroded at the lower end and downcut with oversteepened banks at the upper end. Panama Flats floods during the winter months and oftentimes resembles a small lake. There is no accessible floodplain until there is a very large flow when the water exits channel into the adjacent fields.

Potential Restoration:
Improvements can be made by recreating a C-channel via increasing meander and sinuosity especially in the upper portion of the reach. Invasive species removal and control, followed by an appropriate riparian vegetation planting scheme will also aid in preventing erosion. Improvements could also be made by creating wetlands, terraces, and by connecting Panama Hill Pond to Colquitz Creek. As a primary treatment to aid in the high flow problem, log weirs can be installed along the length of the channel.

Note: it is absolutely essential to protect the flood storage capacity of Panama Flats at all costs to prevent the flooding of everything downstream.

Notes:
1. Floodplains are not located in the channel but water does flood over banks to fields leaving the trail submerged. Under normal historical flow the channel would contain more than a 1.2-year event but impervious surfaces in the upper watershed have increased run-off.
3. It is a ditch although it is trying to spread out. The trail has to be resurfaced every year indicating a lack of balance.
4. The riparian-wetland area is not widening because it is being constrained. The vegetation around the ditch is riparian but a lot of upland species are also near or in the channel.

5. Banks are eroding and flows are high.
6. Few young conifers.
7. Not very abundant, narrow and patchy. Riparian vegetation is mixed with upland species.
8. Middle stretch with lots of willow is ok but upland species are vigorously competing for the riparian area. Vegetation is the problem, not the soil moisture.
10. What is present is healthy but there is not enough and much of it is not native.
11. Riparian vegetative cover is sparse, narrow, and patchy. Erosion is evident and clay banks are over-steepened. If the substrate was not clay the banks would likely have collapsed by now.
12. There are few conifers and only a small number of other large plant species.
13. Channel is eroding because of high velocity.
15. Channel is artificially straightened and constrained by clay banks.
16. System is only vertically stable because of clay substrate and low slope. It may have already down-cut to its equilibrium.
17. Peak flows are too high, the channel is the wrong shape, and energy is higher because it has been straightened.

Vegetation:

Common Name	Scientific Name
Alberta rose	*Rosa acicularis*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Canada thistle	*Cirsium arvense*
Clover	*Trifolium sp.*
Common snowberry	*Symphoricarpos albus*
Daisy	*Erigeron sp.*
Dock	*Rumex sp.*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Garry oak	*Quercus garryana*
Grand fir	*Abies grandis*
Grasses	
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Introduced poplar (Lombardy?)	*Populus nigra 'Italica'*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Queen Anne's lace	*Daucus carota*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Saskatoon	*Amelanchier alnifolia*
Scotch broom	*Cytisus scoparius*
Vetch	*Vicia sp.*
Weeping willow	*Salix babylonica*
Willow sp.	*Salix sp.*

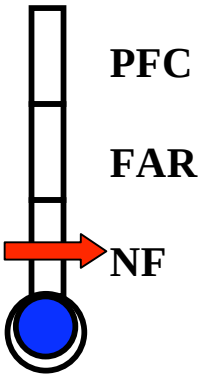
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-23	Segment/Reach ID:	Reach 9: Roy Road to upstream of Gabo Creek entrance in Rosee Grove.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: More conifers such as Douglas fir and cedar with deciduous patches.

Potential Channel Characteristics: Rosgen = "Gc6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point #25: N 48º 28.758' W 123º 24.408'

Potential channel type: Rosgen Gc6
Present channel type: Rosgen G6 with terraces, floodplains and wetlands (some "C" characteristics)

Constraints:
Large amounts of erosion and trampling have occurred. This system tends to see very high volumes of water throughout the winter. The system cannot move laterally as it would like due to the clay substrate lining the stream banks and bottom.

Potential Restoration:
Excavate areas out to create floodplains to dissipate flows and energy. Furthermore use bio-engineering to stabilize banks and re-vegetate with shade tolerant species. Create wetlands U/S of BC Hydro Property in order to create the detention of Durrell Creek to hold large amount of water thus dissipating the energy of large volumes of water. Place large amounts of woody debris in the system.

Notes:
1. Channel is entrenched and over-steepened.
3. Little sinuosity, width/depth ratio is inappropriate for channel type. Gradient is ok.
4. Little riparian vegetation to dissipate energy and thus erosion is occurring.
5. Large volumes of water has gone through the system and eroded banks.
6. No large age distribution in the conifers. More balanced with shrubs.
7. Composition of riparian vegetation is patchy and not very abundant. Upland species are growing in the riparian areas.
8. Some riparian species. Upland species are growing in the riparian areas. In the isolated floodplain soil moisture is maintained.
9. Lots of erosion occurring. If the base substrate was not clay, there would be considerably more damage occurring to the stream bed.

10. Riparian area is healthy. Surrounding trees are not.
11. Large amounts of erosion occurring. Very little cover below floodplain and floodplain is elevated, therefore, banks are bare.
12. Few conifers and deciduous trees noted in the area.
15. The system is trying to adjust laterally, but is limited in its movement due to the clay substrate.
17. Increased peak flows are present and too little sediment being deposited in the system.

Vegetation:

Common Name	**Scientific Name**
Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Black twinberry	*Lonicera involucrata*
Bracken fern	*Pteridium aquilinum*
Chestnut tree	*Castanea sp.*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
European bittersweet	*Solanum dulcamara*
Garry oak	*Quercus garryana*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Laurel sp.	*Prunus sp.*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Orchard grass	*Dactylis glomerata*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Pine sp.	*Pinus sp.*
Queen Anne's lace	*Daucus carota*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Sword fern	*Polystichum munitum*
Willow sp.	*Salix sp.*

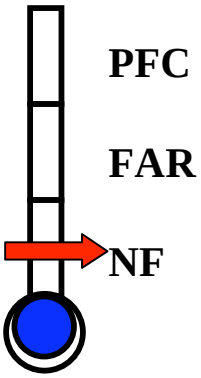
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√__
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
_√_ Other (Too much impervious area in upper watershed)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-23	Segment/Reach ID:	Reach 10a: Upstream of Gabo Creek entrance in Rosee Grove to small staked trail off Lindsay Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with mixed deciduous.
Potential Channel Characteristics: Rosgen = "F6 with some C characteristics" channel type

Yes	No	N/A	HYDROLOGICAL
√	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

√	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #27 (BLC): N 48º 29.074' W 123º 23.744'.

Potential channel type: Rosgen Cb6
Present channel type: Rosgen Cb6

Constraints:
The volume of water that is flowing from upstream is too much for the system and is causing large amounts of streambank erosion that is presently being held up by weakened and vulnerable root systems.

Potential Restoration:
Long-term invasive species removal program is required. Move trail upstream of Rosee Grove away from the stream and replant to re-stabilize and protect the streambanks. Add large wood to the system to dissipate the energy in the large flows.
The area just upstream of the footbridge in Rosee Grove should be fenced with thorny vegetation to stop the trampling.

Notes:
1. "F" type channels generally do not have floodplains but there are some isolated floodplains present here and they are being used.
3. Inappropriate (low) width/depth ratio to classified channel type (stream bank erosion occurring). Good sinuosity and gradient.
4. Isolated areas of trampling (near path) have occurred.
5. Due to the large amount of water that occurs throughout the reach, water is eroding banks at a very high rate. Banks have not collapsed as of yet due to the large root masses holding the banks together. These root masses have now been exposed and will eventually let go once more erosion occurs.
7. Large amounts of invasive species noted in the system.
9. Roots along banks are badly exposed.
11. Current trampling and location of trail are decreasing the amount of vegetation leaving very bare banks especially in lower portion of reach.
12. Large old conifers have been noted within the reach. Few, if any new confers are growing.
13. Large amounts of erosion occurring.

14. “F” channels do not typically have point bars. However, some point bars have developed in the system, but have not vegetated due to high flows within system.
17. Peak flows are too high. (Flows would not be as risky if the area was properly managed).

Vegetation:

Common Name	Scientific Name
Alberta rose	*Rosa acicularis*
Bamboo sp.	*Bambus sp.*
Big leaf maple	*Acer macrophyllum*
Birch sp.	*Betula sp.*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
False lily of valley	*Maianthemum dilatatum*
Geranium	*Geranium sp.*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Laurel sp.	*Prunus sp.*
Mixed grasses	
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Saskatoon	*Amelanchier alnifolia*
Skunk cabbage	*Lysichiton americanum*
Small-flowered bulrush	*Scirpus microcarpus*
Sword fern	*Polystichum munitum*

Common Name	Scientific Name
Thimble berry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

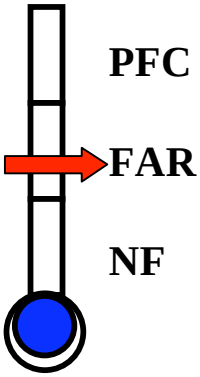
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-25	Segment/Reach ID:	Reach 10b: Wetland at Vanalman Avenue and Northridge Crescent
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
?	?		7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)

√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
√			15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
?	?		19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
		√	20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS way point # 28 (BLC): N 48º 29.265' W 123º 23.809'

Constraints:
Wetland-pond is surrounded by residential property.

Potential Restoration:
Invasive species removal and control.

Notes:
6. Wetland-pond may be unnatural and used for drainage. Flows are natural but are likely man-made or anthropocentrically altered.
7. Unknown as the activity of the inlet and outlet structures in unknown.
9. Lots of invasive species are present.
19. Unknown as history is unknown. It may have been a pond that is filling in.
20. No wind or wave events occur as it is too sheltered for high winds and too shallow for waves.

Note: Colquitz Creek enters and then immediately leaves the wetland-pond at the lower end farthest from Vanalman Avenue.

Vegetation:

Common Name	Scientific Name
Daphne (spurge laurel)	*Daphne laureola*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Morning glory	*Ipomoea indica*
Oregon ash	*Fraxinus latifolia*
Pacific ninebark	*Physocarpus capitatus*
Pacific water parsley	*Oenanthe sarmentosa*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Smartweed (Lady's thumb)	*Polygonum lapathifolium*
Weeping willow	*Salix babylonica*
Willow sp.	*Salix sp.*
Yellow flag iris	*Iris pseudacorus*

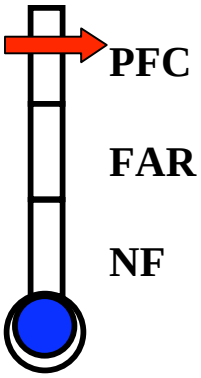
SUMMARY DETERMINATION

√ _Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√__(However, inlet and outlet unknown)

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-23	Segment/Reach ID:	Reach 11: Staked trail off Lindsay Road to the bridge at 4444 Wilkinson Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous dominated forest with deciduous patches.

Potential Channel Characteristics: Rosgen = "B1" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #30 (BLC): N 48º 29.468' W 123º 23.871'

Potential channel type: Rosgen B1
Present channel type: Rosgen B1

Constraints: Invasive Species

Potential Restoration:
Invasive species removal, replant with a mixed selection of coniferous and deciduous species. Compost and invasive species education for surrounding community.

Notes:
5. Local compost waste dumped upslope potentially contributing to invasive species.
7. Large amounts of invasive species.
11. Large amounts of rock in the system.
12. Big boulders and rock in reach. Very few conifers.
17. Quick's Bottom attenuates flows within this reach.

Vegetation:

Common name	Scientific Name
Arbutus	*Arbutus menziesii*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Cattail	*Typha latifolia*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Deer fern	*Blechnum spicant*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Garry oak	*Quercus garryana*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Laburnum	*Laburnum anagyroides*
Laurel	*Prunus sp.*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Small-flowered bulrush	*Scirpus microcarpus*
Sword fern	*Polystichum munitum*
Trailing blackberry	*Rubus ursinus*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Western red cedar	*Thuja plicata*
Western St. John's-wort	*Hypericum formosum*

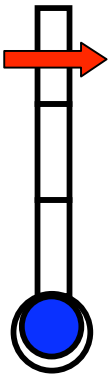
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



PFC

FAR

NF

Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√__

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-09-18	Segment/Reach ID:	Reach 12: The bridge at 4444 Wilkinson Road to footbridge at entrance to Quick's Bottom.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous dominated forest with deciduous trees and shrubby understory.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #50: N 48º 29.533' W 123º 24.040'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type undetermined due to extensive armouring.

Constraints:
This reach is armoured throughout on one or the other banks with rock, wood, and cement walls. Access to floodplain is intermittent and riparian vegetation is not abundant. Private property lines most of this reach.

Potential Restoration:
Continued planting with more riparian species on the recently planted slope along with invasive species removal will improve the vegetation. Removing the wood piling wall and constructing terraces will improve floodplain access and decrease the risk of that wall failing and causing flooding. Large woody debris will improve complexity and absorb high flow energy.

Notes:
1. Floodplain is intermittent. The armoured walls are a no while unarmoured portions are a yes.
3. Gradient is in balance but sinuosity and width/depth ratio are not.
4. Lawn is present and the banks are steep in places.
6. One upslope piece is planted but not with riparian species.
7. Numerous upland species are present but there are few riparian species. Invasive species also exist.
8. Few riparian plants exist and the presence of upland species indicate reduced soil-moisture characteristics.
9. The wrong community type is present.
11. Banks are armoured and there is little riparian vegetation.
12. **There should be more wood in the system.**
15. The majority of the banks are armoured hence there is no movement.

17. Quick's Bottom attenuates flows upstream.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
Hardhack	*Spirea douglasii ssp. douglasii*
Himalayan blackberry	*Rubus armeniacus*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oak	*Unknown species (non-native)*
Ornamental fruit trees	
Reed canary grass	*Phalaris arundinacea*
Sitka Mountain-Ash	*Sorbus sitchensis*
Willow species	*Salix sp.*
Yellow flag iris	*Iris pseudacorus*

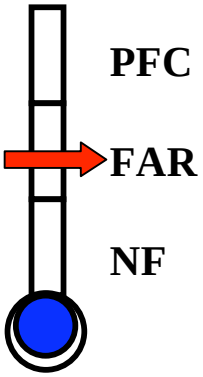
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	08-06-12	Segment/Reach ID:	Reach 13: Quick's Bottom
ID Team Observers:	Sarah Buchanan, Lehna Malmkvist, Lise Townsend		

Acres/Hectares: 18.8 ha

Potential Riparian-Wetland Vegetation: Coniferous forest on the outskirts with shrubby plants and aquatic species down to the waters edge.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)

√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
		√	15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
		√	20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

GPS: N 48º 29' 49.9" W 123º 24' 7.9".

Constraints:
Reed canary grass is encroaching upon the wetland and is choking the channels that were restored between 2000 and 2004. Additionally, Quick's Bottom is surrounded by agriculture and urban land use.

Potential Restoration:
Planting with shade forming trees such as willow, cottonwood, and alder would shade out the reed canary grass and create a more complex habitat for organisms living in Quick's Bottom. Planting should be conducted successionally starting with the species noted above and the doing a second planting after a couple of years with other species such as cedar.

Notes:

3. The reed canary grass is causing riparian-wetland area widening creating a marsh as compared to a tree/shrub swamp.
4. Water quality may be affected by the upland watershed.
5. Reed canary likes high concentration of nutrients suggesting Quick's Bottom has a high nutrient content.
7. A weir structure is located at the outlet. It can accommodate stop logs but is not used anymore. The gradient is low downstream hence there is no concern for wetland drainage.
8. The vegetation is aged within a couple of years of each other. Planting would create a more diverse age group.
9. There is a monoculture of canary grass where planting was not conducted in previous restoration efforts.
15. Quick's Bottom does not require specific microsite conditions to function properly.
16. Nutrient loading and reed canary grass are issues affecting plant productivity.
20. Quick's Bottom does not require rock to dissipate energy along its shoreline.

Vegetation:

Common Name	**Scientific Name**
Alberta rose	*Rosa acicularis*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
English hawthorn	*Crataegus monogyna*
Cattails	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Garry oak	*Quercus garryana*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Nootka rose	*Rosa nutkana*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Silverweed	*Potentilla anserine ssp. pacifica*
Western white pine	*Pinus monticola*
Willow sp.	*Salix sp.*
Yellow flag iris	*Iris pseudocorus*

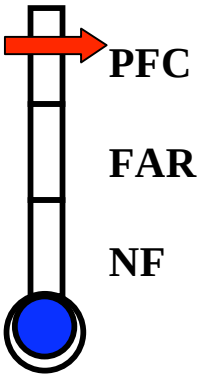
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-25	Segment/Reach ID:	Reach 14: Quick's Bottom pedestrian bridge to footbridge at 4654 West Saanich Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: More wetland species, cottonwood, willow, hardhack, conifers in drier areas.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #51(CLB): N 48° 29'38.0''. W 123° 24'4.0''

Potential channel type: Rosgen channel "C6".
Present channel type: Rosgen channel "C6".

Constraints:
Saanich Parks has not followed prior recommendations to plant up reach that runs parallel to Quick's Bottom, nor have they placed the large wood (already on-site) in the system.

Potential Restoration:
Restoration work is minimal and should consist of removing the current reed canary grass, lay down mulch, drop the large pieces of wood (already on site) in the channel and plant with various willow cuttings.

Notes:
4. The desired future condition is decreasing due to the encroaching reed canary grass.
9. Patches of invasive species present.
12. Weirs are present, but system requires more wood.
13. Stream can access floodplain and overflow channels.
15. Stream does have natural sinuosity, except in the ditched area.

Vegetation:

Common name	Scientific Name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common horsetail	*Equisetum arvense*
Common rush	*Juncus effusus*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Deer fern	*Blechnum spicant*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Garry oak	*Quercus garryana*
Grand fir	*Abies grandis*
Grasses	
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Lady fern	*Athyrium filix-femina*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Pacific water parsley	*Oenanthe sarmentosa*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rush sp.	*Juncus sp.*
Scouring rush	*Equisetum hyemale*
Smartweed (Lady's thumb)	*Polygonum lapathifolium*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*
Yellow flag iris	*Iris pseudacorus*

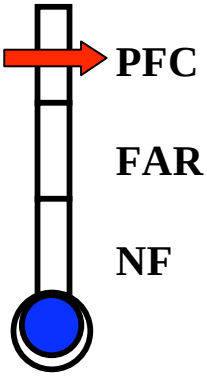
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√__

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-25	Segment/Reach ID:	Reach 15: Footbridge at 4654 West Saanich Road Property to the West Saanich Road crossing
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with shrubby understory, deciduous patches (cedar, red alder, skunk cabbage, salal, big leaf maple, grand fir, Douglas fir).

Potential Channel Characteristics: Rosgen = "C3b" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS Waypoint # 32 (BLC): N 48°29.908' W 123°23.969'

Potential channel type: Rosgen channel "C3b".
Present channel type: Rosgen channel "Cb".

Constraints:
It was noted that the homeowner has mowed lawn considerably close to the channel, thus does not allow for the growth of riparian vegetation.

Potential Restoration:
Restoration of this reach would be to plant the channel with more conifers and removal of invasive species. Furthermore, adding the wood and large rock to the channel would create more complexity and areas for species habitat.

Notes:
4. Mowed lawn on the right hand bank
9. No major erosion noted within system. Noted areas of mowed lawn and blackberries that could be subject to erosion.
11. Except for mowed areas.
12. Not great. Requires more conifers in the reach.

Vegetation:

Common name	Scientific name
Big leaf maple	*Acer macrophyllum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
English hawthorn	*Crataegus monogyna*
Geranium	*Geranium sp.*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lilac	*Syringa sp.*
Mock orange	*Philadelphus lewisii*
Morning glory	*Ipomoea indica*
Orchard grass	*Dactylis glomerata*
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Salmonberry	*Rubus spectabilis*
Weeping willow	*Salix babylonica*

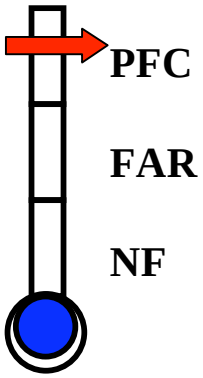
SUMMARY DETERMINATION

_√_ Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (mowed lawn)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 16: West Saanich Road crossing to 4521 Cheeseman Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "B1" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS way point #33 (BLC): N 48° 29.963' W 123° 23.826'.

Potential channel type: Rosgen channel type "B1".
Present channel type: Rosgen channel type "B1".

Constraints:
Invasive species are encroaching upon the riparian area.

Potential Restoration:
This reach is in good shape but invasive species should be removed and controlled in order to maintain this section. Furthermore, large woody debris should be left within the creek to increase habitat complexity, maintain bank stability, and aid in dissipating energy from high flows.

Notes:
5. There is a small weir just upstream of this reach and there is also a weir at the Beaver Lake outlet where flow is controlled.
6. Young and old conifers are present as well as variously aged shrubs an red alder; very diverse.
7. Lots of invasive species are present.
9. Some soil still present on bank, tree fallen over is holding bank, but bedrock controlled system is stable.
12. Conifers are at hand and those in creek should remain so for habitat complexity.
14. There is a small gravel deposit.

Vegetation:

Common Name	Scientific Name
Ash sp.	*Fraxinus sp.*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Chestnut tree	*Castanea sp.*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Fringecup	*Tellima grandiflora*
Grand fir	*Abies grandis*
Grasses (non-native)	
Gunnera	*Gunnera sp.*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Ivy sp.	*Hedera sp.*
Laburnum	*Laburnum anagyroides*
Laurel	*Prunus sp.*
Morning glory	*Ipomoea indica*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rush sp.	*Juncus sp.*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Trailing blackberry	*Rubus ursinus*
Trailing ornamental plant (invasive)	
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

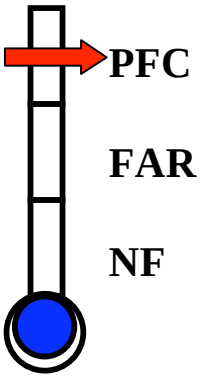
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_(invasive species are a problem though)

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 17: From 4521 Cheeseman Road to the waterfall upstream of the pond at 4525 Cheeseman Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "A1" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #6 (CLB): N 48° 30.032' W 123° 23.791'.

Potential channel type: Rosgen channel type "A1".
Present channel type: Rosgen channel type "A1".

Constraints:
Walls of rip-rap are found on the last 30m of the right hand bank at the lawn area and on both banks surrounding the pond. A concrete weir slows water flow and the downstream end of the pond. Lawns from private residences extend to the waters edge. Invasive species, some from garden plantings are located within the reach.

Potential Restoration:
This reach has the potential for bioengineering, using willow waddles and wood, along the right bank where the rip-rap wall is located. Invasive species removal and control can also help with increasing the vitality of the riparian and native vegetation present. Additionally, homeowner education could help in invasive species control and restoring riparian areas.

Notes:
4. There is room for improvement in the lawn area as there is no riparian area for the last 30m of the right bank.
6. Although there are some young red alders, more conifers and other trees of varied age class are needed.
7. Some invasive species are present such as yellow-flag iris, reed canary grass, and laurel-leafed daphne.
9. The right bank has no riparian vegetation and is armoured but the left bank is fine.
11. There is no vegetative cover on right bank but there is on the left.
12. Lots of rock present therefore wood not needed but it would be good for habitat complexity.

13. The creek has split into a number of different channels downstream of weir.

Vegetation:

Common Name	Scientific Name
Ash sp.	*Fraxinus sp.*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Laurel	*Prunus sp.*
Ornamental rock garden	
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Rhododendron	*Rhododendron macrophyllum*
Salmonberry	*Rubus spectabilis*
Scots pine	*Pinus sylvestris*
Thimbleberry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Water-cress	*Rorippa nasturtium-aquaticum*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Yellow flag iris	*Iris pseudacorus*

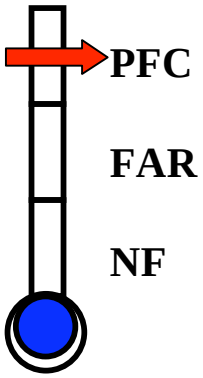
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 18: From the waterfall at 4525 Cheeseman Road to the cascade at 4650 Pipeline Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "Bc6" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #8 (CLB): N 48° 30.076' W 123° 23.766'.

Potential channel type: Rosgen channel type "Bc6".
Present channel type: Rosgen channel type "Bc6".

Constraints:
The channel is entrenched and the left bank is steep, bare, and heavily eroded especially on the outside bend. English ivy is invading the entire reach choking out the native vegetation integral to maintaining the stability of the bank and the function of the creek.

Potential Restoration:
This reach has the potential for bioengineering, using willow waddles and wood, along the left bank at some properties such as 4642 Pipeline Road. Invasive species removal and control, especially of the English ivy is necessary for restoring this reach to its full potential. Additionally, homeowner education could help in invasive species control and the restoration of riparian areas on private property.

Notes:
4. There is too much English ivy present for widening the riparian-wetland area. Too many upland species in riparian zone.
5. Invasive species are causing most of the problems not the upper watershed.
6. The few young trees present are a risk due to the English ivy infestation.
7. There are more than 2 species present but vegetation is dominated by invasive species, particularly ivy.
8. Upland species are encroaching and out-competing native species.
9. Outside bend on the left bank is steep and not vegetated.
10. Invasive species (English ivy especially) are more vigorous and are taking over.
11. The left bank is vertical, eroding, and bare of vegetation.
12. There are conifers present but they are at risk from the English ivy. No healthy younger trees were

observed.
13. Little large wood and no rock found in the creek.
17. Erosion on the left bank is severe. A mid-channel bar, a structure not expected in this type of channel is indicative of excess sediment deposition likely from eroding bank.

Note: If this reach loses its function, it will damage what is currently in relatively good condition downstream.

Vegetation:

Common Name	**Scientific Name**
Big leaf maple	*Acer macrophyllum*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English ivy	*Hedera helix*
False Solomon's-seal	*Smilacina racemosa*
Field grasses	
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Morning glory	*Ipomoea indica*
Oceanspray	*Holodiscus discolor*
Red alder	*Alnus rubra*
Red elderberry	*Sambucus racemosa ssp. pubens*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

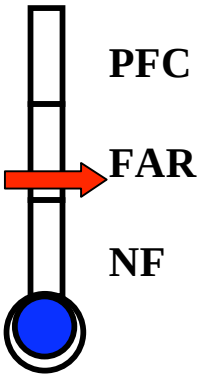
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward

_√__ Downward

___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___

No _√_(The English ivy may be out of control).

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 19: From the cascade at 4650 Pipeline Road to the waterfall adjacent at 4656 Pipeline Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a shrubby sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "A1" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #9 (CLB): N 48° 30.115' W 123° 23.750'.

Potential channel type: Rosgen channel type "A1".
Present channel type: Rosgen channel type "A1".

Constraints:
The channel is entrenched and the dominant substrate is bedrock which constrains the channel. Private property lines the creek on both sides. Lawn extends to the waters edge on the left bank while the right bank is crowded by invasive species.

Potential Restoration:
Invasive species removal and control and creek neighbour education would help in improving this reach. Plant appropriate native riparian-wetland species where erosion happening in clay/sandy areas.

Notes:
4. Lawn extends to the edge of the creek.
6. There are not many trees, which would be expected. Invasive species dominate.
7. Little riparian vegetation present, mostly upland species.
8. Mostly invasive species, but not much soil moisture anyway because of dominant bedrock.
9. Erosion is occurring where bedrock is not present and erosion is likely out of sight under the Himalayan blackberries.
10. There are few wetland-riparian species.
11. Erosion is occurring where bedrock not present.
13. Rocks are the only energy dissipating structures. Isolated erosion is occurring at exposed clay soils.
17. To prevent erosion in areas of no rock plant appropriate native vegetation.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common snowberry	*Symphoricarpos albus*
Garry oak	*Quercus garryana*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lawn	
Ornamental cedar	
Pacific ninebark	*Physocarpus capitatus*
Pacific water parsley	*Oenanthe sarmentosa*
Reed canary grass	*Phalaris arundinacea*
Willow sp.	*Salix sp.*

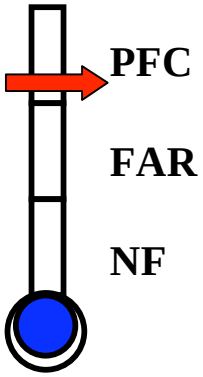
SUMMARY DETERMINATION

√ _Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
__ Downward
___Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 20: From the waterfall at 4656 Pipeline Road to the riffle upstream of 4674 Pipeline Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a shrubby sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
	√		14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS: N 48º 30' 7.4" W 123º 23' 46.8".

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type "C6".

Constraints:
The channel is bordered on both banks by private residential property with lawn or bare banks extending to the waters on both banks upstream of Goyette Road and on the left bank downstream. The banks are eroding and are undercut particularly upstream of Goyette Road. Currently, the channel is too wide and too shallow and invasive species are more abundant than native vegetation.

Potential Restoration:
Invasive species removal and control and creek neighbour education would help in improving this reach. The addition of large woody debris and the use of a drop log to create a trout pool are also options for this creek. Replanting the lawn areas with riparian-wetland vegetation would help the creek narrow up and deepen to become a more functional "C" channel.

Notes:
3. Width/depth ratio is off with the creek being too wide and too shallow.
4. Almost no riparian zone exists. It may be trying to widen inward but with little success.
6. Few mature trees exist, there are sporadic shrubs, ferns, and Himalayan blackberries. The rest of the reach consists of herbaceous species or bare soil.
7. Same comments as 6.
8. Not enough riparian area at all.
9. Banks are being undercut.
11. Banks are being undercut but not as badly as would be expected suggesting grassy areas may be stabilizing a little bit.
12. The reach would benefit from the addition of large woody debris.

13. Some floodplain is present but there are no channel characteristics. More wood is needed. Erosion is occurring on both sides indicating too much energy for the channel.
14. It is attempting to create point bars with little success. Normal meander pattern is not happening.
15. It is trying to become more naturally sinuous.
17. Erosion upstream is creating depositional areas downstream.

Note: This is an area to watch to see what changes occur overtime to determine if creek is healing itself.

Vegetation:

Common Name	Scientific Name
Bamboo sp.	*Bambus sp.*
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Creeping buttercup	*Ranunculus repens*
Deer fern	*Blechnum spicant*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
Grasses	
Himalayan blackberry	*Rubus armeniacus*
Lady fern	*Athyrium filix-femina*
Morning glory	*Ipomoea indica*
Pacific water parsley	*Oenanthe sarmentosa*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Sword fern	*Polystichum munitum*
Weeping willow	*Salix babylonica*
Yellow flag iris	*Iris pseudacorus*

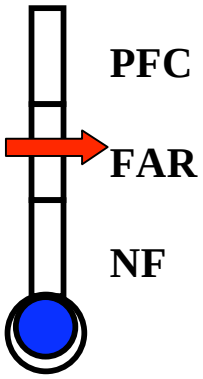
SUMMARY DETERMINATION

_Proper Functioning Condition

_√ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
__ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 21: From the riffle upstream of 4674 Pipeline Road to the 2nd footbridge with a weir in Beaver/Elk Lake Park.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous and a shrubby sword fern/salal understory.

Potential Channel Characteristics: Rosgen = "Bc3" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #11: N 48° 30.205' W 123° 23.800'.

Potential channel type: Rosgen channel type "Bc3".
Present channel type: Rosgen channel type "Bc3".

Constraints:
The channel is constrained on the right bank by Pipeline trail and the pipeline itself in Beaver/Elk Lake Park. Trampling along the trail is putting the vegetation on the right bank at risk which may lead to bank erosion in the future if it is allowed to continue.

Potential Restoration:
Invasive species removal and control would strengthen the ability of native riparian and upland vegetation to thrive even more. Trampling in the area could be controlled by fences to protect the vegetation in the narrow strip located on the right bank. Additionally, any wood that is in the creek or that falls in the creek should be left to allow for habitat complexity and to increase sinuosity as much as can be in this constrained channel.

Notes:
4. Trampling is damaging the vegetation along the right bank.
5. A weir is present under the second footbridge and at Beaver Lake outlet.
7. Invasive species are present.
8. Right bank has a narrow riparian zone because of trail and pipeline. Upland species are at the top of the bank.
10. The roots are preventing and reducing erosion.
11. The peak flows may not be as natural because of the weir controls.
12. Not very many young conifers are present but wood is not needed to function. However, more wood would be good for habitat complexity.
15. Channel is confined but is not incurring much damage because of this.

Vegetation:

Common Name	Scientific Name
Agricultural cherry tree	*Prunus sp.*
Assorted grasses	
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Dull Oregon-grape	*Mahonia nervosa*
English ivy	*Hedera helix*
Evergreen blackberry	*Rubus laciniatus*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Licorice fern	*Polypodium glycyrrhiza*
Mock orange	*Philadelphus lewisii*
Nootka rose	*Rosa nutkana*
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Salmonberry	*Rubus spectabilis*
Skunk cabbage	*Lysichiton americanum*
Stinging nettle	*Urtica dioica*
Sword fern	*Polystichum munitum*
Western red cedar	*Thuja plicata*

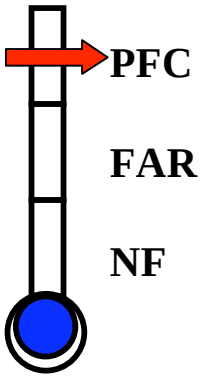
SUMMARY DETERMINATION

√ _Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
__ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Colquitz River		
Date:	07-07-30	Segment/Reach ID:	Reach 22: 2nd pedestrian bridge with weir in Elk/Beaver Lake Park to the outlet at Beaver Lake.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Daniel Hegg, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with deciduous patches and more swampy vegetation.

Potential Channel Characteristics: Rosgen = "Bc2-3 " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #12 (CLB): N 48° 30.273' W 123° 23.768'

Potential channel type: Rosgen channel type "Bc2-3" and narrower.
Present channel type: Rosgen channel type "Bc2-3.

Constraints:
In this reach, Colquitz Creek is lined with an old pipe and beyond it a trail follows the creek. Trampling from users of the trail has caused the trail to widen and encroach upon the vegetation lining the banks. The channel is constrained by the pipe on the right bank and bedrock on the left bank. Water flow is constrained by a weir at the Beaver Lake outlet.

Potential Restoration:
Plant the edge of the trail to reduce the trampling occurring. Planting more conifers and adding large woody debris will help stabilize the banks and create more habitat complexity. The addition of gravel deposits at the upper end may also improve habitat for insects and fish. Instead of having a constant flow, pulsing the water through could allow for more flushing of the channel reducing silt accumulation and turbid water. Narrow the channel with hydrologic jumps. Invasive species removal and control will also improve this reach. If any wood falls into the creek it should be allowed to remain there.

Notes:
1. Flow is controlled but there is some floodplain accessible.
3. The channel is highly constrained, straightened and blasted out.
4. Has achieved potential extent but now at risk due to trampling.
7. Few young conifers were observed and invasive species are present.
8. Riparian area narrower on right bank.
9. The rock substrate prevents erosion.
10. Young conifers are lacking.
11. Densely covered but trail cuts of vegetation. Bare bedrock is present.

12. Wood present around channel but not in, hence, it may have been removed.
15. It is a bedrock controlled channel, hence, no lateral movement.
17. Flow is controlled by the lake and weir upstream.

Vegetation:

Common Name	**Scientific Name**
Big leaf maple	*Acer macrophyllum*
Cherry tree	*Prunus sp.*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Dull Oregon-grape	*Mahonia nervosa*
English ivy	*Hedera helix*
Fringecup	*Tellima grandiflora*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Pacific ninebark	*Physocarpus capitatus*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Salmonberry	*Rubus spectabilis*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Thimbleberry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*

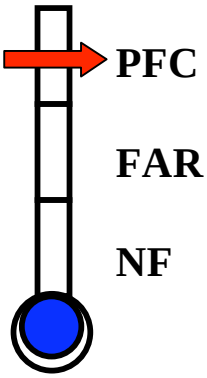
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

_√_ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 1: Violet Avenue to upstream end 763 Daisy Avenue
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with patch of deciduous species.

Potential Channel Characteristics: Rosgen = " C4" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

√	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
√			14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 9 (CLB): N 48º 28.009' W 123º 24.039'

Potential channel type: Rosgen channel type "C4".
Present channel type: Rosgen channel type "C4" but shallower than would expect.

Constraints:
The channel is bordered on the left bank by a park trail and on the right bank by private residential property. A utility pipe crosses the creek directly in the channel and a spill absorption boom is also present suggesting previous contamination.

Potential Restoration:
Invasive species removal and control with subsequent replanting of appropriate native vegetation will prevent invasive species from taking over the area (they are minimal at the moment). Wood could be added to create more weirs and step pools for habitat complexity purposes. Any large wood that falls into the channel should be left there to create meander and reduce flow energy.

Notes:
5. There is a pipe and excess debris and garbage present but they are not causing problems yet.
7. Invasive species are present although in minor abundance.
10. Some trampling is occurring in places preventing riparian plant growth.
12. More wood would be expected in a system like this. Only large red alder are present and no conifers.
13. Major scouring and/or undercutting were not observed.

Vegetation:

Common Name	Scientific Name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Common horsetail	*Equisetum arvense*
Creeping buttercup	*Ranunculus repens*
English hawthorn	*Crataegus monogyna*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Laurel	*Prunus sp.*
Pacific water parsley	*Oenanthe sarmentosa*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*

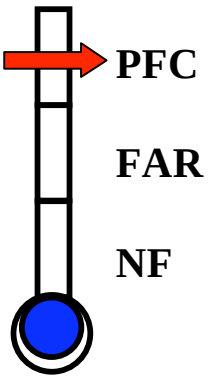
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 2: From upstream end of 763 Daisy Avenue to the upstream end of mountain biking area
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous vegetation.

Potential Channel Characteristics: Rosgen = " Gc6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 13 (CLB): N 48º 28.018' W 123º 23.987'
Mountain biking area GPS: N 48º 28.018' W 123º 23.777'

Potential channel type: Rosgen channel type "Gc6" with more "C" features.
Current channel type: Rosgen channel type "Gc6" with poor bank conditions.

Constraints:
The channel is confined within a gully of varying depth. Upstream of Daisy Rd. the right bank is armoured with rip-rap. The channel is experiencing major erosion, undercutting, and scouring along its banks. Furthermore, the banks are vertical and bare of vegetation. Trampling caused by mountain biking is preventing the growth of vegetation near the upper portion of this reach along the right bank.

Potential Restoration:
Log weirs could be implemented in order to raise the channel up so it can access and utilize its floodplain. Invasive species removal and control especially Himalayan blackberries. In some sections, floodplain and terraces could be created. Bioengineering is also a possibility in this reach. Signage and fencing should be used in the mountain biking area.

Notes:
1. The reach is downcut (or dugout), and has very little accessible floodplain.
3. It is not in balance horizontally and the outside bends are eroding.
4. There is very little riparian area. Upland vegetation extends to the top of bare and vertical banks.
5. The upper watershed is urbanized and peak flows are increased. Areas of biking wash silt into the creek. A hydrocarbon smell is present. Swan Lake is attenuating flows.
6. Conifers and other trees do have diverse age-class but the riparian species are few.
7. Riparian vegetation is sparse and patchy.
8. The water table is lowered because the channel is dugout.
9, 10, 11. No vegetation is present on the vertical banks except for a few locations with some red alder

roots.
12. More wood would be good for the sake of improved function.
13. The creek is undercutting the bank.
15. Lateral movement is being constrained by the gully shape. Banks are being eroded on the outside but this is associated with an attempt to fix itself.
16. System is in equilibrium now but has downcut or was dug historically.
17. Erosion of the banks is occurring.

Note: This reach is in poor shape.

Vegetation:

Common Name	**Scientific Name**
Assorted grasses	
Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Cascara	*Rhamnus purshiana*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Douglas maple	*Acer glabrum*
Duckweed	*Lemna minor*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Maple sp. (non-native)	*Acer sp.*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Common Name	**Scientific Name**

Rose sp.	*Rosa sp.*
Salal	*Gaultheria shallon*
Scotch broom	*Cytisus scoparius*
Sword fern	*Polystichum munitum*
Tall Oregon-grape	*Mahonia aquifolium*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

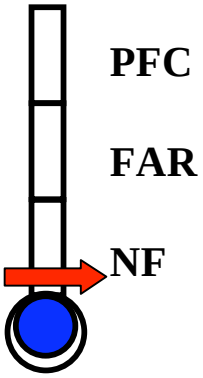
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows (increased peak flow and frequency)
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 3: Upstream end of mountain biking area to the McKenzie Avenue overpass
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous trees, shrubs, ,and swampy vegetation.

Potential Channel Characteristics: Rosgen = " E6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
	√		15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 15 (CLB): N 48º 28.011' W 123º 23.987'

Potential channel type: Rosgen channel "C6".
Present channel type: Rosgen channel "E6".

Constraints:
The presence of a reed canary grass (*P. arundinacea*) monoculture prevents the growth of appropriate native riparian vegetation. The channel has been dredged and straightened.

Potential Restoration:
Invasive species removal and control with subsequent replanting with willows (*Salix sp.*) and other riparian vegetation will improve the functioning of this reach. The addition of wood and opportunities for bioengineering would aid in creating more meander and sinuosity that would be expected in the potential Rosgen channel type of "C6".

Notes:
2. Beaver dam is present upstream in Swan Lake.
3. Sinuosity is out of balance and it is limited by dredging; however, there is no major erosion visible.
4. The riparian-wetland area is composed of invasive reed canary grass.
5. There is more floodplain present than the previous reach and erosion is not visible due to dense vegetation.
6, 7. The riparian vegetation is dominated by reed canary grass.
12. There are no large trees present.
15. The creek has been dredged and straightened in this reach.

Note: While this reach is in Proper Functioning Condition, it is a long way from its potential.

Vegetation:

Common Name	Scientific Name
Black hawthorn	*Crataegus douglasii*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Duckweed	*Lemna minor*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Nootka rose	*Rosa nutkana*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

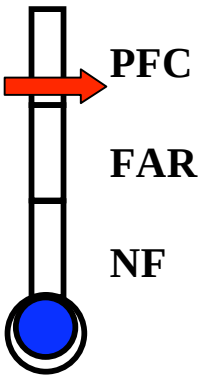
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 4: McKenzie Avenue overpass to where the creek becomes lined with a rock wall downstream of Carey Road
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous trees and other shrubby species.

Potential Channel Characteristics: Rosgen = "C6 " channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 16 (CLB): N 48° 27.994' W 123° 23.719'

Potential channel type: Rosgen channel "C6".
Present channel type: Rosgen channel "C6".

Constraints:
The beginning of the reach is armoured by rock walls beneath the McKenzie Avenue overpass. Residential property lines the right bank and the creek has been dredged in the past. Areas of trampling prevent the growth of vegetation and water quality is reduced by garbage disposed of in the channel.

Potential Restoration:
Access in this area would be relatively easy, hence, bioengineering is a possibility along with the creation of wetlands and/or terraces, log and rock weirs, and channel widening all for the purpose of increasing channel complexity and reducing the impact of peak flows. Furthermore, invasive species removal and control is recommended with subsequent plating with willow waddles and other native riparian and tree species to protect and maintain bank stability. Signage in the areas of major trampling may also help bring back vegetation in these areas.

Notes:
3. The sinuosity is out of balance and the system is not at its true potential even though it is not falling apart.
5. As is, the reach can handle peak flows but the water quality is not very good. Note that Swan Lake attenuates flows upstream.
6. This reach is not fully mature yet.
7. Most of the vegetation present is planted with ornamental and invasive species present.
12. There are pockets of reed canary grass and cattails and more large wood would benefit the creek.
14. The channel has been straightened so point bars are lacking but they should be present.
15. The creek is attempting to create meanders. It has been dredged and straightened in the past.

17. Swan Lake is attenuating flow hence it is receiving less than a true peak flow.

Note: The water quality in this reach is very poor as revealed by the smell of hydrocarbons, visible oil sheens, and excess garbage.

Vegetation:

Common Name	Scientific name
Assorted grasses	
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Douglas fir	*Pseudotsuga menziesii*
Duckweed	*Lemna minor*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Orchard grass	*Dactylis glomerata*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scouring rush	*Equisetum hyemale*
Shore pine	*Pinus contorta var. contorta*
Silverweed	*Potentilla anserine ssp. pacifica*
Small-flowered bulrush	*Scirpus microcarpus*
Trailing blackberry	*Rubus ursinus*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

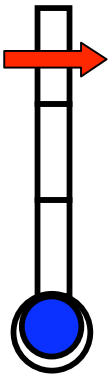
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



PFC

FAR

NF

Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
___ Other (water quality)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	09-01-28	Segment/Reach ID:	Reach 5: Downstream of Carey Road where rock wall starts to Glanford Road crossing.
ID Team Observers:	Sarah Buchanan, Patrick Lucey, Lehna Malmkvist, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with patches of deciduous species.

Potential Channel Characteristics: Rosgen = "Bc6" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
?	?	?	10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 17 (CLB): N 48º 27.935' W 123º 23.480'

Potential channel type: Rosgen channel type "Bc6" with improved vegetation.
Present channel type: Rosgen channel type "B6".

Constraints:
The channel is constrained by McKenzie Avenue, Glanford Avenue, and Carey Road. The banks are steep and there is no existing floodplain accessible by the creek in this reach. Invasive species are the dominant vegetation preventing the growth and succession of riparian and native vegetation important for good creek function.

Potential Restoration:
Invasive species removal followed by the dense planting of native riparian vegetation is the only feasible option for restoration due to the lack of space.

Notes:
1. B channels do not require floodplain. A rock wall confines the channel at the downstream end.
3. Sinuosity, width/depth ratio, and entrenchment are suitable for a B channel.
4. It has reached its potential extent as it is constrained and has nowhere else to move.
5. The channel is capable of handling flows because of size. There is no evidence of sediment loading, or channel degradation. Clay banks are not highly erodable and provide stability. The upstream watershed has a high density of road networks.
6. There is sparse riparian vegetation and an abundance of reed canary grass. Communities of multiple age classes do not exist.
7. Riparian vegetation is sparse other than reed canary grass. The grass could be shaded out by replanting with native shrubs and trees.
9. The gradient is low and Swan Lake upstream attenuates flow hence, there is not a high velocity and the root masses present can withstand flow events. Reed canary grass is dominant.
10. Yes if reed canary grass is considered riparian; no if it is not considered a riparian species.
11. There is no evidence of any open bank.
12. There are no large trees present and consequently no wood.

13. Floodplain and channel characteristics are not present but, the channel is stable. There is sufficient vegetation present although it is primarily reed canary grass.

Vegetation:

Common name	Scientific name
Assorted grasses	
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Canada thistle	*Cirsium arvense*
Cattails	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Laburnum	*Laburnum anagyroides*
Nootka rose	*Rosa nutkana*
Ornamental poplar	*Populus sp.*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Scots pine	*Pinus sylvestris*
Weeping willow	*Salix babylonica*

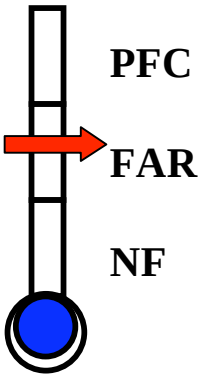
SUMMARY DETERMINATION

___Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

___ Upward
___ Downward
_√_ Not Apparent (will stay the same unless planting occurs)

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
_√_ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (poor water quality)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 6: From Glanford Road to McKenzie Avenue
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest mixed with large communities of deciduous trees.
Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point # 18(CLB): N 48º 28.044' W 123º 23.296'

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type "C6".

Constraints:
Subdivisions border both sides of Swan Lake Creek in this section constraining the amount of floodplain and channel movement that can occur.

Potential Restoration:
Invasive species removal and control followed by replanting with native riparian vegetation will fill in trampled areas and provide bank stability. Upstream of Glanford Road is a large area of grass that would also benefit from being planted with native vegetation.

Notes:
4. Riparian-wetland area is widening.
5. Some erosion is occurring in the lower portion near Glanford Road. Half of Willowbrook subdivision drains into the stormwater pond.
7. Invasive species, especially Himalayan blackberries, are present.
11. There are isolated areas of trampling and erosion and a vertical bank on the inside bend on the left bank.
12. Trees are present but are too young. Wood was placed in the channel during the restoration project.
15. Channel design was based upon natural parameters.

Vegetation:

Common name	Scientific name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Hooker's willow	*Salix hookeriana*
Indian plum	*Oemleria cerasiformis*
Laurel	*Prunus sp.*
Nootka rose	*Rosa nutkana*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scouler's willow	*Salix scouleriana*
Sitka willow	*Salix sitchensis*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

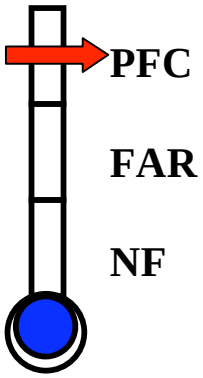
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional – At Risk

___ Nonfunctional

___ Unknown



Trend for Functional – At Risk:

__ Upward
__ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No __

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (Water quality)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 7: From McKenzie Avenue to pedestrian bridge at Kent Road
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Shrubby wetland with more deciduous trees and cedar and Douglas fir on outer edge.

Potential Channel Characteristics: Rosgen = "C6" channel type with associated wetlands.

Yes	No	N/A	HYDROLOGICAL
	√		17) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√?	√?		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√?	√?		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #19 (CLB): N 48º 28.052' W 123º 23.132'.

Potential channel type: Rosgen channel type "C6" with associated wetlands.
Present channel type: Rosgen channel type ditched "Gc6".

Constraints:
The channel is ditched and banks are steep. Erosion is suspected but access was not possible.

Potential Restoration:
The implementation of meander bends on the grassed area adjacent to the creek between Ralph and Kent streets to dissipate energy and restore "C" channel characteristics. Invasive species removal will allow for the growth and succession of appropriate native riparian species capable of stabilizing the banks and preventing erosion.

Notes:
3. The channel is a ditch.
4. The riparian area is not wide enough and a proper greenline is not present. Vegetation is thick but it is invasive.
5. Swan Lake attenuates flow upstream. Water quality is also an issue due to surrounding densely urbanized area.
8. Upland species are at edge of channel in some areas.
9. Yes because Swan Lake attenuates flow and the gradient is low. However, determining if erosion was occurring was not possible due to dense vegetation.
11. It looks like there is enough but unable to determine due to lack of access for observing if erosion is occurring.
12. Few trees are present. Large wood would be good for the system.
13. The channel is flat and examination for erosion was hindered due to dense vegetation on banks.
15. Recall that the channel is artificially straightened and ditched.

17. Channel has reached equilibrium but it is not healthy.

Note: The system is non-functional and the only reason why there are "yes's" is because of the low gradient and attenuation of peak flows by Swan Lake upstream. This is a great location for restoration.

Vegetation:

Common name	Scientific name
Agricultural grasses	
Black hawthorn	*Crataegus douglasii*
Black twinberry	*Lonicera involucrata*
Canada thistle	*Cirsium arvense*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
Duckweed	*Lemna minor*
English hawthorn	*Crataegus monogyna*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Nootka rose	*Rosa nutkana*
Ornamental poplar	*Populus sp.*
Pacific willow	*Salix lassiandra*
Purple loosestrife	*Lythrum salicaria*
Red osier dogwood	*Cornus stolonifera*
Red-flowering currant	*Ribes sanguineum*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Tall Oregon-grape	*Mahonia aquifolium*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

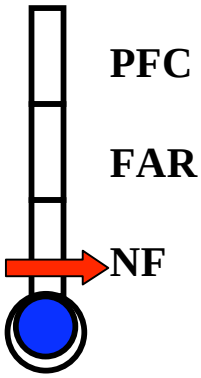
SUMMARY DETERMINATION

__Proper Functioning Condition

__ Functional - At Risk

_√ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
__ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√
No __

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (water quality)

Lotic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 8: From pedestrian bridge at Kent Road to the Patricia Bay Highway.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Shrubby wetland with more deciduous trees and a coniferous fringe.

Potential Channel Characteristics: Rosgen = "Cc-6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS way point #20 (CLB): N 48º 27.847' W 123º 22.941'

Potential channel type: Rosgen channel "Cc-6" or wetland with or without an "E" channel.
Present channel type: a ditch.

Constraints:
The reach is constrained on both sides by the Saanich Allotment Gardens in the upper section and by residential property in the lower section. Garden waste and compost are encroaching upon the banks in some areas and invasive species such as purple loosestrife (*Lythrum sp.*), Himalayan blackberry (*R. discolor*), and reed canary grass (*P. arundinacea*) are present. The water quality of this reach is impacted by the surrounding gardens and urbanized watershed while Swan Lake attenuates flows upstream. Additionally, the Patricia Bay highway has altered drainage patterns by acting as a dam at the upstream portion of the reach.

Potential Restoration:
Invasive species removal and control with subsequent and additional planting of native riparian species will benefit this reach. Take special care to ensure the purple loosestrife (*Lythrum sp.*) is removed immediately. A 15m setback could also be created in the allotment gardens to allow for terracing and the creation of a meander to construct a "C" channel. Education about the importance of the riparian area and the impact of garden waste on the stream would also improve the reach.

Notes:
1. Flooding occurs every year in the allotment gardens.
3. Sinuosity is out of balance because it is a ditch.
4. Widening outwards is not occurring because of the gardens encroaching upon and constraining the creek. However, vegetation is widening into the channel.
5. Gardens are encroaching and constraining the creek as well as supplying compost and invasive species.

7. More shrubs and trees should be present. Invasive species exist as well as a monoculture of reed canary grass at the top end.
11. There are areas where the bank is steep and bare in the lower section where floodplain is not accessible.
15. Recall that the reach has also been channelized and straightened.

Note: The allotment gardens are required to be organic.

Vegetation:

Common name	Scientific name
Black hawthorn	*Crataegus douglasii*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Duckweed	*Lemna minor*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Morning glory	*Ipomoea indica*
Mountain ash	*Sorbus aucuparia*
Nootka rose	*Rosa nutkana*
Purple loosestrife	*Lythrum salicaria*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Willows sp.	*Salix sp.*
Yellow flag iris	*Iris pseudacorus*

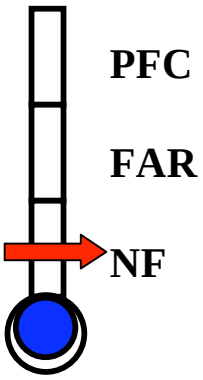
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?
___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows

_√_ Other (water quality and flow attenuation from Swan Lake)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Swan Creek		
Date:	07-08-06	Segment/Reach ID:	Reach 9: Swan Lake
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Acres/Hectares: 9.79 hectares.

Potential Riparian-Wetland Vegetation: Shrubby wetland species as it is but with more trees and less invasive species.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
	√		4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√	√		6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)

√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
		√	15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
	√		16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
√			20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS waypoint #21 (CLB): N 48º 27.753' W 123º 22.807'.

Constraints:
Historic dumping of sewage and winery effluent directly into the lake have created a highly eutrophic condition. Pollution from current agricultural activity and stormwater associated with urbanization is adding to poor water quality and the high nutrient load in the lake currently. The restoration capabilities of the Swan Lake Christmas Hill Nature Sanctuary are reduced due to high costs and a small budget.

Potential Restoration:
Invasive species removal and replanting with native riparian vegetation will improve the health and function of this lake. Water quality must be improved at the watershed level perhaps with the addition of BMPs to treat the stormwater entering the lake. Water quality testing is suggested to determine trends and the contaminants of highest abundance and concern. Absorbent booms at the entry points of

stormwater into Swan Lake may help reduce surface pollutants such as hydrocarbons. Biomanipulation using bacteria or other organisms and aeration may aid in breaking down the excess organic material present eventually decreasing the amount of organics present.

Notes:
2. The riparian vegetation is maintained.
3. Potential extent has been achieved.
4. Water quality is an issue from past and current activity and urbanization. Hydrological changes have occurred.
5. Riparian-wetland plant community is likely altered from the historic community due to increased eutrophication. The lake was likely oligotrophic historically.
6. It receives high peak flows from increased impervious area and water quality is poor because of historic effluent dumping.
7. Constricted at outlet by collapsed culvert.
9. Reed canary grass forms a dominant monoculture in much of the wetland area.
16. Excessive nutrients are present causing highly eutrophic conditions.
18. Marine clay is underneath the wetland. Peat depth varies between 2-8m.

Note: While this reach is at Proper Functioning Condition, it is in an altered state from its historic condition. It is not at its full potential because of pollution and eutrophication.

Vegetation: Reach 9a Vegetation (Swan Lake – south side)

Common name	Scientific name
Agricultural grasses	
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Duckweed	*Lemna minor*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Pacific willow	*Salix lassiandra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scouler's willow	*Salix scouleriana*
Sitka willow	*Salix sitchensis*
Small-flowered bulrush	*Scirpus microcarpus*
Weeping willow	*Salix babylonica*
Yellow water lily	*Nuphar polyseplum*

Reach 9b Vegetation (Swan Lake – north side)

Common name	Scientific name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black twinberry	*Lonicera involucrata*
Bulrush	*Scirpus sp.*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Manna grass	*Glyceria grandis*
Purple loosestrife	*Lythrum salicaria*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rush sp.	*Juncus sp.*
Stinging nettle	*Urtica dioica*
Trembling aspen	*Populus tremuloides*
Willow sp.	*Salix sp.*

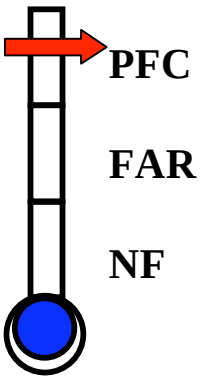
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (water quality and urban pollution)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Blenkinsop Creek		
Date:	09-01-28	Segment/Reach ID:	Reach 1: From the pedestrian bridge at the Swan Lake inlet to the upstream end of the Swan Lake Trestle.
ID Team Observers:	Sarah Buchanan, Patrick Lucey, Lehna Malmkvist, Lise Townsend		

Potential Riparian-Wetland Vegetation: Riparian shrubs with deciduous trees and conifers on the perimeter.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
	√		14) Point bars are revegetating with riparian-wetland vegetation
	√		15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 36 (CLB): N 48º 27.886' W 123º 22.091'

Potential channel type: Rosgen channel "C6".
Present channel type: A Ditch.

Constraints:
The channel has been ditched and straightened. It receives flashy flows due to the highly impervious area Blenkinsop Creek drains. Invasive species are abundant.

Potential Restoration:
Creating a wetland upstream of the Swan Lake Trestle where the open land sections is while improve floodplain access. Planting using a two-phase system starting with vegetation that will shade out the invasives species (willow, black cottonwood, red alder) followed by planting the understorey with sedges, conifers, skunk cabbage, and sword fern.

Notes:
1. The floodplain is above where it should be for a "C" channel as the reach is entrenched. The floodplain is not accessible except for during extreme events that happen more frequently in this urban system as a result of higher effective impervious area. However, given the increased number of large events the creek should be accessing its floodplain more than it is currently.
3. The channel is too straight and too ditch-like.
4. The floodplain is not fully developed. The channel is not narrowing but is eroding effectively narrowing the riparian area. However, the planted vegetation nearby is vigorous suggesting that there is the potential for improvement. This adjacent riparian area is as a result of ground water and Leeds Creek in the vicinity.
5. Floodplain utilization is less because it is dug-out and the vertical banks are exposed to erosion during peak flows. Increased, flash flows are a result of impervious areas upstream.
6. While the species present are indicative of variety, there is only one age class. This class is a mature copse but is not regenerating

7. Invasive species are present such as Himalayan blackberry and English ivy.
9. Roots at the top of the bank are functioning in stability but no vegetation grows down the banks. Stabilizer species are present but there are not enough of them. One large tree is having the bank eroded out from under the roots at the upstream end of the reach. Soils are bare except for ivy.
11. Clay soils and plants at the top of the bank are stabilizing the banks to a certain extent but are not enough as erosion is occurring.
12. There is little to no regeneration of stabilizer species. More would be expected for a creek in this location.
13. Appropriate channel characteristics do not exist. Banks are eroding around some stabilizer species.
14. Point bars would be expected for a "C" channel but there are none present now in this ditch.
15. The channel is widening although not at a quick rate.
16. Clay substrate provides vertical stability.
17. The channel is not falling apart quickly. It conveys water well as it has already eroded or has been dug to meet expectations. Erosion is actively occurring although it is not rapid. The cohesive nature of the soils is the reason erosion is slow.

Vegetation:

Common name	**Scientific Name**
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Poison hemlock	*Conium maculatum*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Salmonberry	*Rubus spectabilis*
Scouring rush	*Equisetum hyemale*
Stinging nettle	*Urtica dioica*
Weeping willow	*Salix babylonica*
Willow sp.	*Salix sp.*

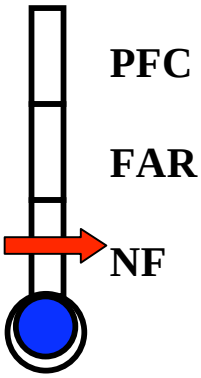
SUMMARY DETERMINATION

___Proper Functioning Condition

___ Functional - At Risk

_√__ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

___ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
_√_ Other (water quality, built form of the watershed)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Blenkinsop Creek		
Date:	07-08-08	Segment/Reach ID:	Reach 2: From the upstream end of Lochside Trail Trestle to the box culvert downstream of Quadra Street.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Mixed coniferous and deciduous trees and shrubs.

Potential Channel Characteristics: Rosgen = "B2" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #37 (CLB): N 48º 27.905' W 123º 21.932'

Potential channel type: Rosgen channel type "B2" with more sinuosity and floodplain.
Present channel type: Rosgen channel type "B2" constrained with little floodplain and straight.

Constraints:
The channel is constrained by the old railway bed where the trail now exists and by its gully shape. Near the residential properties, the banks have been armoured with rip-rap, concrete sandbags, and wire enclosed rock walls. Peak flows are high in this location due to a large degree of imperviousness upstream. Trampling is reducing riparian vegetation in some locations and invasive species are present. Erosion is obvious in places as well as scour.

Potential Restoration:
The addition of large wood and rock weirs will cause some meander and will dissipate some of the energy of the peak flows. Bioengineering in locations where erosion and trampling are occurring will mitigate these activities. A viewing platform with educational information boards could provide a nice view of the creek without causing trampling of the riparian vegetation along the banks. Removal of invasive species with subsequent replanting with native riparian vegetation will stabilize the banks further. Homeowner education and possible covenants regarding the riparian area at the residential areas downstream may also aid in reducing the degradation occurring along this reach.

Notes:
3. Landscape has been altered by fill. The channel is straighter than it should be and would meander more if fill were not present.
4. Banks are armoured downstream and banks are eroding throughout the reach.
5. Peak flows are causing erosion immediately upstream of the culverted section under the path.
6. There is not an abundance of regenerating vegetation but lots of young big leaf maples are present.

7. Few conifers are present except for areas high up on the slope. Invasive species such as knotweed, English ivy, and Himalayan blackberry are at hand.
8. More species would be beneficial.
9. Some areas have lots of roots but other areas are heavily armoured or lack enough vegetation.
10. Trampling is limiting their vigour.
11. Eroding banks and armouring indicate areas where there is not enough vegetative cover. Other areas are sufficiently vegetated.
12. There is a lot of wood present to fall in but not many conifers. No wood is lying across creek suggesting it may have been cleared. Large wood should stay in the creek.
13. Rocks in middle of the channel do dissipate energy but there is no dissipating structure at or on the banks.
15. Lateral movement is constrained by the railway bed.
17. Peak flows are causing erosion at the banks.

Vegetation:

Common name	**Scientific name**
Big leaf maple	*Acer macrophyllum*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Knotweed	*Polygonum sp.*
Lady fern	*Athyrium filix-femina*
Laurel	*Prunus sp.*
Mock orange	*Philadelphus lewisii*
Morning glory	*Ipomoea indica*
Oceanspray	*Holodiscus discolor*
Pacific water parsley	*Oenanthe sarmentosa*
Purple loosestrife	*Lythrum salicaria*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

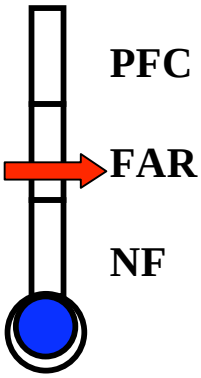
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward

_√_ Downward

___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_

No ___

If yes, what are those factors?

___ Flow regulations

___ Mining activities

___ Upstream channel conditions

___ Channelization

___ Road encroachment

___ Oil field water discharge

_√_ Augmented flows

_√_ Other (railway bed constrains channel)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Blenkinsop Creek		
Date:	07-08-08	Segment/Reach ID:	Reach 4: Where creek daylights downstream of Quadra Street to the Blenkinsop Greenway pedestrian bridge.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Dominantly deciduous trees with riparian shrubs.

Potential Channel Characteristics: Rosgen = "G" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #38 (CLB): N 48º 27.984' W 123º 807'

Potential channel type: Rosgen channel type "G".
Present channel type: Ditch with gully characteristics.

Constraints:
Channel is constrained within a culvert in places where it travels underneath roads. Between Quadra St. and McKenzie Avenue a parkade wall forms the upper right bank. The area has been blasted and lowered in order to create a channel draining from Blenkinsop Lake to Swan Lake that was not present historically. A dam is located upstream of Elsie Place off of Lochside Drive.

Potential Restoration:
Improving the vegetation behind the Saanich Center where the parkade wall is will allow for more riparian vegetation to stabilize the steep banks. Willow waddles may also be used in this location. Rocks weirs and stone lines will help in dissipating the energy of peak flows. Floodplain terraces could be created in some areas.

Notes:
1. Channel has been dug down and it is artificial.
3. The landscape is manufactured.
4. Riparian-wetland area is constrained.
5. Degradation cannot occur because it is armoured. Water quality may be affected by agricultural activity upstream.
6. Little riparian vegetation is present.
7. Riparian vegetation is sparse and invasive and upland species go to the edge of the banks.
9. Channel is armoured and there are few appropriate plants.
10. Little to no riparian plants.
11. There are few plants present but rock, armour, or culvert all prevent erosion.

12. No large wood is present at all.
13. No natural channel characteristics are present. Erosion is at a minimum due to artificial armouring.
15. Channel is constrained and does not jump out of its channel.
16. Clay substrate makes this channel vertically stable.
17. Channel receives large peak flows but no deposition or erosion is occurring because the channel is hardened.

Vegetation:

Common name	**Scientific name**
Agricultural grasses	
Alberta rose	*Rosa acicularis*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
Duckweed	*Lemna minor*
English ivy	*Hedera helix*
European bittersweet	*Solanum dulcamara*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lombardy poplar	*Populus nigra 'Italica'*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific willow	*Salix lassiandra*
Queen Anne's lace	*Daucus carota*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Scots pine	*Pinus sylvestris*
Weeping willow	*Salix babylonica*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

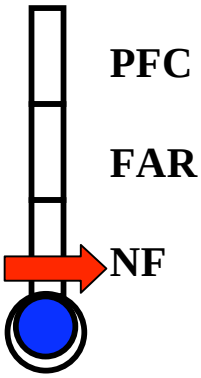
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Blenkinsop Creek		
Date:	07-08-08	Segment/Reach ID:	Reach 5: Cumberland dam to Blenkinsop Lake
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Riparian, shrubby, deciduous, and herbaceous species.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

√	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #40 (CLB): N 48º 28.560' W 123º 21.557'

Potential channel type: Rosgen channel "C6".
Present channel type: Rosgen channel "C6".

Constraints:
The reach is constrained by the agricultural fields on the left bank and the Lochside Trail on the right bank. Blenkinsop Lake attenuates flow upstream and a dam downstream controls flow out of the reach sometimes causing flooding. Water quality may be affected by land uses such as agriculture, industry, and urban development.

Potential Restoration:
Invasive species removal and control especially on the right bank along Lochside Trail. A phase 2 planting of the upstream portion of the restoration area to increase the variety of native riparian species present.

Notes:
1. Flooding occurs above the floodplain terrace and into the fields because of the controlled dam downstream of the reach.
4. Floodplain is limited for widening outwards because it is constrained by fields and trail.
5. Increasing urban development upstream has increased flow tearing apart fields and roads. Water quality may also be impacted by the upper watershed.
6. Mature cottonwoods are present but the majority of vegetation along the channel was planted and is only 5 years. Along the trail the vegetation is older.
7. Invasive species are present and concentrated along the trail-side bank.
9. Plants are young but channel has a low gradient and Blenkinsop Lake attenuates flow upstream.
11. Energy is also dissipated by the lake upstream and large wood within the channel that is not visible.
12. Wood was placed in the channel during restoration but the plants are too young now to act as a wood source.
15. Channel was designed as a "C" but is constrained by the farm and the trail.
16. Clay substrate.

Vegetation:

Common name	Scientific name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Bulrush	*Juncus sp.*
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Duckweed	*Lemna minor*
English hawthorn	*Crataegus monogyna*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Mock orange	*Philadelphus lewisii*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific ninebark	*Physocarpus capitatus*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red elderberry	*Sambucus racemosa ssp. pubens*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Sedges	*Carex sp.*
Trailing blackberry	*Rubus ursinus*
Trembling aspen	*Populus tremuloides*
Willow sp.	*Salix sp.*

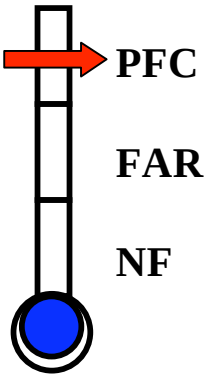
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes __√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
_√_ Other (private property, upstream land use, agriculture and urbanization)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Blenkinsop Creek		
Date:	07-08-08	Segment/Reach ID:	Reach 6: Blenkinsop Lake
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Acres/Hectares: 7.24 hectares.

Potential Riparian-Wetland Vegetation: As is with more conifers and fewer invasive species.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics

√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
		√	15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
√			20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS waypoint #41 (CLB): N 48º 28.821' W 123º 21.590'

Constraints:
The lake is highly eutrophic and is surrounded by urban and agricultural activity. Bullfrogs and invasive plant species are present. A weir at the outlet of the lake controls water flow out and hence, the volume of water in Blenkinsop Lake.

Potential Restoration:
Invasive species removal and control and planting more coniferous trees will improve the lake. Aeration and harvesting of the duckweed for fertilizer may help combat the high nutrient content in the lake. The existence of bullfrogs also needs to be managed.

Notes:
4. The upland watershed is contributing to degradation from the water quality perspective (eutrophic conditions).
6. Upper watershed is urban but less so than the Swan Lake watershed.

7. A control weir is located at the outlet of the lake.
9. Invasive species are present. Lots of European bittersweet.

Note: The present eutrophic conditions may have altered the vegetative community that existed historically into what it is today.

Vegetation:

Common name	Scientific name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Bracken fern	*Pteridium aquilinum*
Cascara	*Rhamnus purshiana*
Cattail	*Typha latifolia*
Douglas fir	*Pseudotsuga menziesii*
Duckweed	*Lemna minor*
European bittersweet	*Solanum dulcamara*
Evergreen blackberry	*Rubus laciniatus*
Hardhack	*Spiraea douglasii*
Hard-stemmed bulrush	*Scirpus lacustris ssp. glaucus*
Himalayan blackberry	*Rubus armeniacus*
Mountain ash	*Sorbus aucuparia*
Pacific water parsley	*Oenanthe sarmentosa*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red elderberry	*Sambucus racemosa ssp. pubens*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Salal	*Gaultheria shallon*
Swamp birch	*Betula pumila var. glandulifera*
Sword fern	*Polystichum munitum*
Western hemlock	*Tsuga heterophylla*
Willow sp.	*Salix sp.*
Yellow water lily	*Nuphar polyseplum*

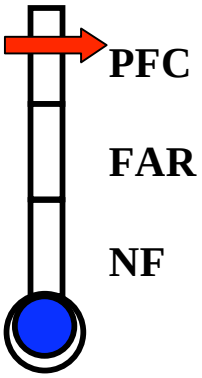
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (water quality and upstream land use)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-01	Segment/Reach ID:	Reach 1: Quick's Bottom to Markham Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Deciduous-dominated forest with riparian shrubs and conifers toward the upper end.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

GPS: N 48° 29' 45.3" W 123° 24'12.1" to N 48° 29' 47.0" W 123° 24' 19.0"

Potential channel type: Rosgen channel "C6" with more sinuosity and meander.
Present channel type: Rosgen channel "C6" that has been artificially straightened.

Constraints:
The channel has been ditched, dug-out, and straightened.

Potential Restoration:
The addition of wood into the channel will increase channel complexity. An excavator could be used in this location to create meander and sinuosity to bring it up to its full potential of a "C" with more sinuosity. Invasive species management will maintain the reach in the good condition it is now with respect to invasive species encroachment.

Notes:
3. The channel has been artificially straightened hence, sinuosity is not in balance. The channel is narrower than would be expected but the gradient is good.
7. Some invasive species are present especially English hawthorn (*Crataegus monogyna*) but is in better condition than most other reaches assessed throughout the Colquitz watershed.
9. Lots of roots were observed.
12. Not a lot of wood is present and it needs more to be a good "C" channel.
13. Floodplains are accessible.

Vegetation:

Common Name	Scientific Name
Aster sp.	*Aster sp.*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Common snowberry	*Symphoricarpos albus*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Nootka rose	*Rosa nutkana*
Pacific willow	*Salix lassiandra*
Queen Anne's lace – trail	*Daucus carota*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Saskatoon	*Amelanchier alnifolia*
Willows sp.	*Salix sp.*

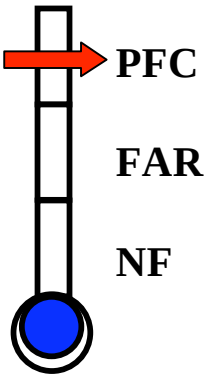
SUMMARY DETERMINATION

√ _Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-08	Segment/Reach ID:	Reach 2a: From Markham Road to where tributary enters upstream of 4484 Markham Road.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Mixed coniferous-deciduous forest.

Potential Channel Characteristics: Rosgen = "G3" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #8 (CLB): N 48º29.782' W 123º 24.317'.

Potential channel type: Rosgen channel type "G3" with more vegetation and wood.
Present channel type: Rosgen channel type "G3" lacking large riparian area.

Constraints:
There is only a narrow riparian vegetation section along this reach and erosion of the banks is occurring. Private property lines both sides of the creek in this reach except for a small section at the top where the tributary enters. A head cut in the tributary is providing an excessive sediment load to reach 2a. Two weirs located upstream at the outlet from Viaduct Flats control the amount of water flowing through Viaduct Creek and flows are lower than experienced in the past.

Potential Restoration:
Adding large woody debris and planting more riparian vegetation will create habitat complexity and help buffer the eroding banks from peak water flows. Invasive species removal and control especially of the Himalayan blackberries will allow for the succession of native riparian species. The head cut occurring at the upstream tributary must be stabilized and prevented from getting larger. To accomplish this, gabion mattresses, rock, rebar, and wood may help.

Notes:
4. The riparian area is being lost due to bank erosion.
5. The head cut upstream is supplying excessive sediment and has created a large depositional area in the creek on 4484 Markham Road.
7. Actual riparian zone is narrow and upland species are found close to the edge of the banks. Invasive species are abundant.
8. Riparian species are present but in a narrow strip and upland species are close to the edge.
9. The banks are oversteepened and erosion is occurring on the outside bends.
11. Erosion is occurring on the banks.

13. Erosion is occurring because energy dissipating channel characteristics are not present.
17. Excessive deposition from the head cut upstream and the erosion downstream of the depositional area indicate the stream is not in balance. Further, weirs upstream may be preventing low flow in this reach.

Vegetation:

Common Name	Scientific Name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Canada thistle	*Cirsium arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Stinging nettle	*Urtica dioica*
Sword fern	*Polystichum munitum*

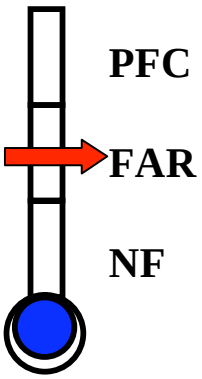
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private control of weirs upstream and private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-01	Segment/Reach ID:	Reach 2b: From where tributary enters upstream of 4484 Markham Road to weirs at the outlet of Viaduct Flats.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with deciduous patches and a shrubby understory.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 1 (CLB): N 48º 29.757' W 123º 24.528'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type a ditched and dug-out "Gc6".

Constraints:
Heavy erosion is occurring along the banks especially in the lower section. The riparian zone is sparse. The head cut in the tributary is providing excess sediment to Viaduct Creek. Trampling is reducing the amount and preventing the growth of riparian vegetation that should be stabilizing the banks. Private property and agricultural activity lines the left bank. The channel has been ditched, dug, and straightened.

Potential Restoration:
Invasive species removal and control especially with regard to thistles and reed canary grass will allow for the planting and succession of riparian and other native species which will help stabilize banks. V-shaped weirs can be inserted to drag the water into the centre of the channel reducing amount of energy hitting the banks. Other small weirs could be used to trap sediment and raise the channel bed up so it can access its floodplain. Fencing and signage along the lower section of the reach where all the trampling is occurring will prevent trampling and educated trail users. Finally, the tributary head cut must be managed.

Notes:
1. Upper portion of reach has slightly more accessible floodplain, the lower section is fully entrenched. Viaduct Flats does attenuate flow.
2. A beaver and lodge were present where the weirs have been placed as recently as 1995.
3. The width/depth is off because the channel is a ditch, sinuosity is not what would be expected because it has been straightened. Gradient is ok.
4. Bare banks and down-cutting are present in the lower section and riparian area should be widening into the channel.

5. Layritz Park tributary head cut is supplying an increased sediment load.
6. Young and old conifers are present along with variously aged shrubs but, the riparian area should be wider.
9. Erosion is occurring and there is less than 50% cover along the greenline.
12. The lower section has more large wood available but is not in the channel yet.
13. Banks are eroding.
15. The channel is constrained.
16. This channel is stable vertically but the tributary channel is not.
17. Flow of water is controlled by the weirs downstream of Viaduct Flats.

Note: The upper section is in better shape where planting has been done. The lower section on the other hand, is in poor condition and is falling apart.

Vegetation:

Common Name	**Scientific Name**
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Common snowberry	*Symphoricarpos albus*
Duckweed	*Lemna minor*
Dull Oregon-grape	*Mahonia nervosa*
English hawthorn	*Crataegus monogyna*
English hawthorn	*Crataegus monogyna*
Fringecup	*Tellima grandiflora*
Geranium sp.	*Geranium sp.*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Oceanspray	*Holodiscus discolor*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Saskatoon	*Amelanchier alnifolia*
Spruce	*Picea sp.*
Stinging nettle	*Urtica dioica*
Sword fern	*Polystichum munitum*
Thimbleberry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Water plantain	*Alisma plantago-aquatica*
Common Name	**Scientific Name**
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

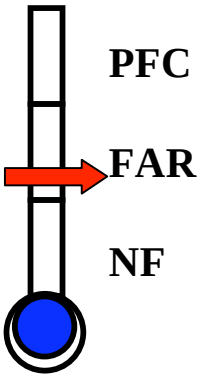
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

___ Upward

_√_ Downward

___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___

No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-01	Segment/Reach ID:	Reach 3: Viaduct Flats
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lehna Malmkvist, Kevin O'Riordan		

Acres/Hectares: 9.06 ha

Potential Riparian-Wetland Vegetation: Coniferous forest on the outskirts with shrubby plants and aquatic species down to the waters edge.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics

√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
√			15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
√			20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS way point # 4 (CLB): N 48º 29.823' W 123º 24.763'.

Constraints:
There are no major constraints, although, Viaduct Flats is bordered by Vancouver Island Technology Park, Camosun College, and Glendale Gardens and Woodlands.

Potential Restoration:
Adding large wood and root masses will provide more habitat complexity creating cover for fish and perches for birds within the open stretch of water. Left over wood from another project can be found at Quick's Bottom. Continuing with invasive species management and planting will aid in maintaining this site in its current good condition.

Vegetation:

Common Name	Scientific Name

Arrow root	*Maranta arundinacea*
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Cattail	*Typha latifolia*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Honeysuckle sp.	*Lonicera sp.*
Indian plum	*Oemleria cerasiformis*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific willow	*Salix lassiandra*
Polyganum sp.	*Polyganum sp.*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rushes	*Juncus sp.*
Saskatoon	*Amelanchier alnifolia*
Scotch broom	*Cytisus scoparius*
Sedge sp.	*Carex sp.*
Tall Oregon-grape	*Mahonia aquifolium*
Unknown aquatic plant	
Water plantain	*Alisma plantago-aquatica*
Willow sp.	*Salix sp.*
Yellow water lily	*Nuphar polyseplum*

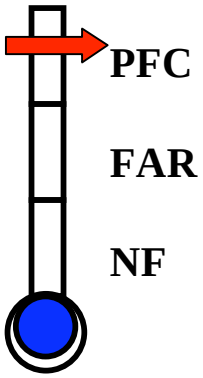
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-01	Segment/Reach ID:	Reach 4: From the upstream end of Viaduct Flats to Interurban Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest with deciduous patches, and shrubby, wetland species closer to Viaduct Flats.

Potential Channel Characteristics: Rosgen = "C6 " channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start downstream of GPS waypoint #7 (CLB): N 48º 29.802' W 123º 25.119'.

Potential channel type: Rosgen channel type "C".
Present channel type: Ditch.

Constraints:
Upstream of the gravel parking lots bridge, the channel is armoured by rock along the bottom of the channel. Interurban Road borders the channel on the right bank.

Potential Restoration:
Continuing with the planting along the edge of the channel will protect the area from invasive species via shading and from erosion. In some sections, terraces could be created to allow for a little more sinuosity in the channel and more floodplain accessibility especially upstream of the parking lot bridge.

Notes:
1. The area is ditched but does flood near the mouth of Viaduct Flats at times.
3. The channel has been straightened and it is too deep, hence, the sinuosity and width/depth ratio are out of balance.
6. Everything except for the reed canary grass and Himalayan blackberry is planted.
9. The alders are capable of withstanding high streamflow events but in between the alders there is very little vegetation and some evidence of erosion.
11. There is some vegetation present so not too much erosion was observed. However, there is not enough vegetative cover for high flows and scour is evident about 1m up the left bank.
12. New conifers have been planted but even the deciduous trees present are too young to provide large wood.
13. It is a ditch and only conveys water.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Morning glory	*Ipomoea indica*
Nootka rose	*Rosa nutkana*
Pacific willow	*Salix lassiandra*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scouring rush	*Equisetum hyemale*
Small-flowered bulrush	*Scirpus microcarpus*
Willow sp.	*Salix sp.*

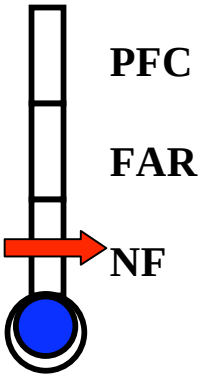
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:
___ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?
___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 5: Interurban Road to the wooden plank footbridge at 478 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with shrubby native riparian vegetation.

Potential Channel Characteristics: Rosgen = "C4" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
	√		14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
	√		16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #22 (CLB): N 48° 29.959' W 123° 25.159'.

Potential channel type: Rosgen channel type "C4".
Present channel type: Rosgen channel type "C4" in poor condition.

Constraints:
The channel is armoured with riprap along both banks in the lower section. Extensive erosion is occurring and the creek has downcut. High peak flows seem to be causing this erosion. A log weir is present but failing. A concrete weir has brought the channel up in the upper section of the reach, allowing for improved floodplain access and reduced erosion. The banks are oversteepened and bare in sections.

Potential Restoration:
Implementing bed stabilization bars in the lower section of the reach similar to the concrete weir will raise the channel up. Bioengineering can be used in the areas where banks are bare and eroding heavily especially in the lower section near the driveway and lawn area. Planting the area with native conifers and riparian vegetation will stabilized banks further but can only be accomplished when the channel itself has stabilized. Invasive species removal and control and homeowner education can also improve the reach. Adding large woody debris will also dissipate energy.

Notes:
1. In the areas where the channel has downcut, floodplain access and utilization is limited.
2. Beavers may have been active in the area historically.
3. Except for the section in the lower portion that is downcut.
4. Channel is overly entrenched in the lower section. Channel is constrained on the right bank by a steep bank and residential property. First 1/3 of the channel has little riparian zone but improves as move upstream.
5. High peak flows have caused degradation.
6. Only one age class is present.
7. Invasive ivy and Daphne present.
8. Upland species are in the creek and bare banks are visible. Downcut sections and scouring flows decrease growth.

9. The trees are good but there are upland species within the riparian area whose root systems are not as suitable.
10. Recall that riparian-wetland plants are sparse.
11. Erosion is occurring and upland species are within the riparian area.
12. Few young conifers are coming up and creek has likely been cleaned out.
13. Artificial weirs are present that stabilize the channel and have created a floodplain.
16. Vertical stabilization in the upper section because of concrete weir but the lower section is down cut and actively eroding.
17. Erosion is heavy and peak flows are high.

Vegetation:

Common Name	**Scientific Name**
Assorted lawn grasses	
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Oceanspray	*Holodiscus discolor*
Ornamental ground cover (invasive)	
Pacific water parsley	*Oenanthe sarmentosa*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Salmonberry	*Rubus spectabilis*
Small-flowered bulrush	*Scirpus microcarpus*
Sword fern	*Polystichum munitum*
Western red cedar	*Thuja plicata*

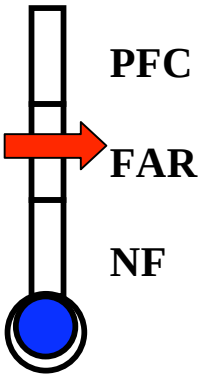
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 6: From the footbridge at 478 Viaduct Avenue West to the fence at 458 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan., Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with native shrubby riparian vegetation.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
	√		16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 23 (CLB): N 48° 29.981' W 123° 25.221'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type "C6" that is eroded and down cut.

Constraints:
The channel is constrained on the right bank by residential properties. The channel is heavily eroded and is downcutting. It is possible that historically the channel was deepened anthropocentrically and then has eroded further. High peak flows are also likely causing erosion as there are no channel characteristics to dissipate the energy. There is little riparian vegetation and English ivy is further reducing the native species present in this reach.

Potential Restoration:
The implementation of log weirs in series will dissipate the energy of high flows and also aid in raising the channel by creating an area where sediment can be dropped upstream of the weir. Creating terraces and floodplain will increase floodplain accessibility also decreasing the energy of the flow. Invasive species removal and control will allow for the full succession and survival of native riparian species that can stabilize the banks with their root systems.

Notes:
1. The channel is downcut.
3. The width/depth ratio is too deep. Some sinuosity is present.
4. Lots of English ivy is present and there is little riparian vegetation.
6,7. There is little riparian vegetation. Most of the vegetation present is upland or invasive.
9. Erosion is heavy and there are few riparian plants.
10. There are few riparian plants.
11. There is little riparian vegetation and the banks are heavily eroding.
12. Some big trees are there but threatened by the English ivy and no young trees were observed.

16. The channel is downcut.
17. Lots of erosion is occurring.

Vegetation:

Common Name	Scientific Name
Bracken fern	*Pteridium aquilinum*
Canada thistle	*Cirsium arvense*
Common horsetail	*Equisetum arvense*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English ivy	*Hedera helix*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Lady fern	*Athyrium filix-femina*
Morning glory	*Ipomoea indica*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Sword fern	*Polystichum munitum*
Western red cedar	*Thuja plicata*

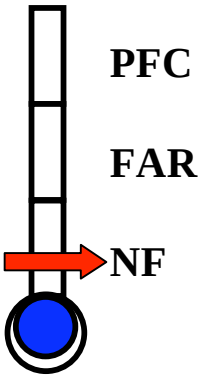
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No __

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
___ Other (specify)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 7: From the fence at 458 Viaduct Avenue West to the footbridge at 458 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend.		

Potential Riparian-Wetland Vegetation: A cattail and sedge wetland with surrounding coniferous forest.

Potential Channel Characteristics: Rosgen = " G6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #: Not accessible but downstream of waypoint 24

Potential channel type: Rosgen channel type "E" in a wetland or a wetland.
Present channel type: Rosgen channel type "G6" created by ditching.

Constraints:
Private property lines both banks and mowing occurs to the edge. The channel has been dug out and is infiltrated by reed canary grass. A wetland area just upstream attenuates flow.

Potential Restoration:
Restoration opportunities include bioengineering, cutting back or mulching the reed canary grass to provide room for native species to grow. Once the invasive species are shaded out, a second phase of planning should then be initiated with sedges and cattails.

Notes:
1. The channel is dug down and cannot access floodplain.
3. Channel has been ditched and dug-out.
4. The majority of the riparian-wetland area is narrow and full of invasive species.
6. No young trees coming up. Mowing prevents recruitment.
7. Only a few riparian species are present. Vegetation now is primarily invasive.
8. It is a narrow riparian zone.
11. The majority of the vegetation is composed of invasive species and the wetland attenuates flow.
12. There is no wood source and none is required.
13. No floodplain is present or accessible but it is not eroding.
15. The channel is dug out.

Vegetation:

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Common horsetail	*Equisetum arvense*
Creeping buttercup	*Ranunculus repens*
Himalayan blackberry	*Rubus armeniacus*
Morning glory	*Ipomoea indica*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*

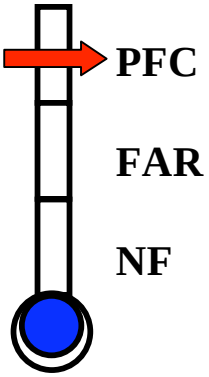
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No __

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 8: From the footbridge at 458 Viaduct Avenue West to the confluence of Excelsior and Viaduct Creeks at 414 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Acres/Hectares: 0.897 ha

Potential Riparian-Wetland Vegetation: Herbaceous and shrub mix with willow, cattail, red osier dogwood, red alder, and hard hack.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)

√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics
		√	11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√	√		12) Riparian-wetland plants exhibit high vigor
		√	13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
	√		15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
		√	20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS waypoint #24 (CLB): N 48° 30.016' W 123° 25.344'.

Constraints:
This wetland has been ditched through 439 Green Mountain Road. Upstream of this property, a cow paddock and then a horse pasture are located alongside the wetland depression and severe trampling and hoof action is occurring. This area is constrained by private property and agricultural activity.

Potential Restoration:
In the area of the ditch, a weir could be used to back up the water in order to re-establish the previous hydrology of this section. Native plantings along the reach will shade out the invasive species improving the riparian-wetland area. Exclusionary fencing along the wetland depression where the paddock and pasture are will reduce trampling and excess nutrients from manure. A bridge or boardwalk could be constructed so animals can still cross the creek.

Notes:
1. Area floods in the winter.
3. Riparian-wetland area is limited by mowing, trampling, and grazing.
5. Manure in the area that floods in the winter could affect water quality downstream.
6. The wetland is ditched and has been drained. Horse and cow paddocks/pasture has cause excessive trampling and grazing of riparian vegetation.
8. Shrubs are limited upstream because of grazing. Downstream mowing has removed shrubs.
9. The vegetation community is likely different than historically because of ditch, drainage, and grazing.
10. Riparian zone likely smaller though.
12. Plants are vigorous downstream along the ditch but upstream trampling and grazing has reduced the riparian plant community.
13. Flooding does occur in the winter.
15. Haying, grazing, and other farm activity do not maintain microsite conditions.
17. Soil saturation is altered by ditch in the lower section and grazing/trampling upstream.
19. Erosion is occurring from trampling.
20. There are no wind and wave events and it is not an open water system.

Vegetation:

Common Name	**Scientific Name**
Canada thistle	*Cirsium arvense*
Cattail	*Typha latifolia*
Common rush	*Juncus effusus*
English hawthorn	*Crataegus monogyna*
European bittersweet	*Solanum dulcamara*
Hardhack	*Spiraea douglasii*
Reed canary grass	*Phalaris arundinacea*
Rush sp.	*Juncus sp.*
Silverweed	*Potentilla anserine ssp. pacifica*
Small-flowered bulrush	*Scirpus microcarpus*
Smartweed sp.	*Polygonum sp.*
Terrestrial grasses	
Water plantain	*Alisma plantago-aquatica*
Weeping willow	*Salix babylonica*
Willow sp.	*Salix sp.*

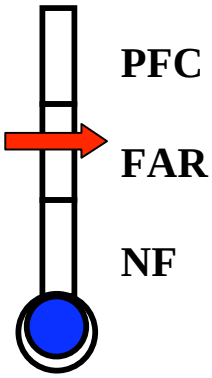
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (Farming activity, grazing/trampling.)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 9: From the confluence of Excelsior and Viaduct creeks to Viaduct Avenue West crossing
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: A transition from wetland to upland including coniferous forest, western red cedar and native riparian shrubs.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor

	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
	√		16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 25 (CLB): N 48º 30.114' W 123º 25.534'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type "G6" that is heavily eroded and ditch-like.

Constraints:
The channel is constrained on both banks by private property. Furthermore, the banks are heavily eroded and downcutting. The water table has dropped reducing the amount of vegetation growing adjacent to and down the banks causing destabilization. High peak flows and road run-off are adding to the erosion problem.

Potential Restoration:
Adding log weirs to dissipate energy, aid in raising the channel back up, and allow the creation of floodplains within the channel. Large woody debris is absent in this reach and would be beneficial for stabilization and energy dissipation functions. Constructing meander and floodplain will create some characteristics of the potential Rosgen "C" channel.

Notes:
1. The channel has been ditched and straightened and cannot access floodplain.
3. Channel has been ditched and straightened.
4. There is little riparian vegetation and banks are bare.
5. Run-off from the road and high peak flows are causing degradation.
6. Riparian zone is almost non-existent.
7. Vegetation is sparse and high peak flows and a lowered water table means plants have difficulty growing in the channel and along the banks.
8. Water table has been lowered by ditching.
9. Streambank vegetation is sparse and heavy erosion is occurring.
11. Riparian vegetation is almost non-existent and erosion is occurring.

12. Large woody debris would be useful in this system for stabilization purposes.
13. No channel characteristics exist and erosion is occurring.
15. Recall sinuosity is not in balance due to trenching and straightening.
16. Channel is downcutting.
17. Excessive erosion is degrading the banks.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
English hawthorn	*Crataegus monogyna*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Scouler's Willow	*Salix scouleriana*
Western red cedar	*Thuja plicata*

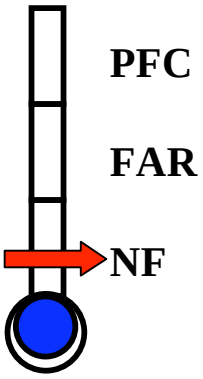
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
_√_ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 10: From Viaduct Avenue West crossing to headcut upstream of 389 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with mixed deciduous such as big leaf maple and red alder, and riparian species.

Potential Channel Characteristics: Rosgen = "B" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 26 (CLB): N 48º 30.038' W 123º 25.582'.

Potential channel type: Rosgen channel type "B".
Present channel type: Rosgen channel type "B".

Constraints:
Some erosion is occurring on outside bends. Private property does surround this reach.

Potential Restoration:
The addition of large woody debris in the lower section upstream of the culvert will dissipate the energy of high peak flows and aid in protecting the degraded reach downstream.

Notes:
7. There are very few invasive species.
11. Vegetative cover is capable of protecting banks except at the headcut.
16. A headcut is found at the end of the reach.

Vegetation:

Common Name	Scientific Name
Baldhip rose	*Rosa gymnocarpa*
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Grand fir	*Abies grandis*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Marsh skullcap	*Scutellaria galericulat*
Mock orange	*Philadelphus lewisii*
Oceanspray	*Holodiscus discolor*
Pacific water parsley	*Oenanthe sarmentosa*
Red huckleberry	*Vaccinium parvifolium*
Reed canary grass	*Phalaris arundinacea*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Sedge sp.	*Carex sp.*
Skunk cabbage	*Lysichiton americanum*
Small-flowered bulrush	*Scirpus microcarpus*
Stinging nettle	*Urtica dioica*
Sword fern	*Polystichum munitum*
Tall Oregon-grape	*Mahonia aquifolium*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*

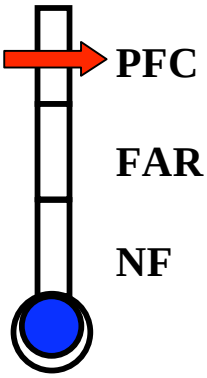
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 11: From the headcut upstream of 389 Viaduct Avenue West to the bedrock outcrop downstream of 365 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with mixed deciduous and more large trees than present.

Potential Channel Characteristics: Rosgen = "Bc6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #27 (CLB): N 48º 30.001' W 123º 25.699'.

Potential channel type: Rosgen channel type "Bc6".
Present channel type: Rosgen channel type "Bc6".

Constraints:
A headcut is present at the beginning of this reach.

Potential Restoration:
Installing large boulders in front of the headcut will prevent it from moving upstream by providing a buffer between the water and the eroding channel.

Notes:
11. As the creek gets closer to its headwaters, the high flows become less.
16. System is vertically stable except for the headcut.

Vegetation:

Common Name	Scientific Name
Baldhip rose	*Rosa gymnocarpa*
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Daphne (spurge laurel)	*Daphne laureola*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Marsh skullcap	*Scutellaria galericulat*
Oceanspray	*Holodiscus discolor*
Red alder	*Alnus rubra*
Red huckleberry	*Vaccinium parvifolium*
Reed canary grass	*Phalaris arundinacea*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Tall Oregon-grape	*Mahonia aquifolium*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*

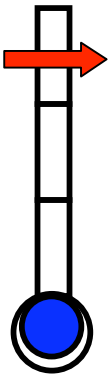
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



PFC

FAR

NF

Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (private property)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 12: From the bedrock outcrop downstream of 365 Viaduct Avenue West to the driveway at 353 Viaduct Avenue West
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous and deciduous forest with a shrubby riparian zone.

Potential Channel Characteristics: Rosgen = "C6" channel type

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√	√		4) Riparian-wetland area is widening or has achieved potential extent
	√		5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #28 (CLB): N 48º 29.970' W 123º 25.729'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Rosgen channel type "C6" but straightened and widened.

Constraints:
The downstream section has been removed of all vegetation. Erosion is occurring in places throughout the reach. Private property lines the creek. An attempt to cross the creek upstream to build a driveway has changed the system. The channel has been widened and straightened.

Potential Restoration:
Construct a smaller channel in the middle to restore the width/depth ratio. Terraces could be created inside the channel increasing the availability and utilization of floodplain. Planting with appropriate native riparian species should be conducted along the edge of the creek. Invasive species removal and control, especially of the Himalayan blackberries and bamboo at the downstream section. Replanting these areas with fast-growing willow and red alder will shade out the invasive species. Homeowner education is important in this reach.

Notes:
3. The channel has been straightened and widened.
4. The lower portion has little riparian area but the upper portion is good.
5. Major disturbance at 335 Viaduct Ave. W. and lots of silt visible in the channel.
6. The lower section has a non-existent riparian area but the upper section is good.
7. Lower section is a no, upper section is a yes.
8. Soil moisture is present in the lower section but no riparian vegetation present because it is a manicured area. But, the upper portion of the reach indicates good soil moisture for this reach.
9. Downstream portion no, upper section yes.
10. Vegetation removed in lower section but what is present is vigorous.

11. Lower section no, upper section yes.
12. No wood in lower section and upper section could use more.
13. Upper portion is good but lower section is devoid of channel characteristics.
15. Lower section has been straightened.
17. Lower section of the reach has a poor channel condition because of the lack of vegetation.

Vegetation:

Common Name	Scientific Name
Assorted lawn grasses	
Bamboo sp	*Bambus sp.*
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Cattail	*Typha latifolia*
Chestnut tree	*Castanea sp.*
Common horsetail	*Equisetum arvense*
Common snowberry	*Symphoricarpos albus*
Corkscrew willow	*Salix babylonica var. pekinensis*
Creeping buttercup	*Ranunculus repens*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
Grand fir	*Abies grandis*
Hardhack	*Spiraea douglasii*
Himalayan blackberry	*Rubus armeniacus*
Oceanspray	*Holodiscus discolor*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Rush sp.	*Juncus sp.*
Salmonberry	*Rubus spectabilis*
Scotch broom	*Cytisus scoparius*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

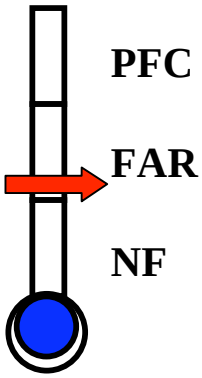
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward

_√__Downward

___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_

No ___

If yes, what are those factors?

___ Flow regulations

___ Mining activities

___ Upstream channel conditions

___ Channelization

___ Road encroachment

___ Oil field water discharge

___ Augmented flows

_√_ Other (private property)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 13: From the driveway at 353 to the property boundary between 335 Viaduct Avenue West and Logan Park.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Acres/Hectares: 0.23 ha

Potential Riparian-Wetland Vegetation: Horsetail, salmonberry, red alder, and other riparian-wetland plants with a coniferous fringe.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
	√		3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
	√		6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
	√		7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics

		√?	11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
		√?	13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
√			15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
?	?	?	17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
		√	20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS waypoint #29 (CLB): N 48° 29.294' W 123° 25.800'.

Constraints:
A large excavation has occurred recently (spring 2007) and has led to the creation of berms as well as a large cur through the centre of the wetland area. It is unknown what the long term effects of this will be.

Potential Restoration:
Immediate mitigation for erosion and sediment control over the short term. Restoration via planting of native riparian species over the long term. Filling in the large cut with soil from the berms and additional organic material will create a location fit for plant growth.

Notes:
3. Riparian-wetland area is narrowed due to excavation.
5. Silt is present from the disturbance that could affect water quality.
6. Driveway construction has altered surface drainage.

7. Excavation has created a berm and surface drainage is changed.
9. Vegetation is diverse except where excavation has occurred.
11. There is uncertainty surrounding how overland flows have been affected by the degradation.
12. Vegetation is vigorous except where excavation has taken place.
13. Overland flows may cause problems due to excavation.
15. Microsites destroyed in areas due to the excavation.
17. Saturation of soils is unknown because the area has been dug up.
19. The degradation may have changed the riparian-wetland balance between water and sediment.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common horsetail	*Equisetum arvense*
Creeping buttercup	*Ranunculus repens*
Douglas fir	*Pseudotsuga menziesii*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Salmonberry	*Rubus spectabilis*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Willow sp.	*Salix sp.*

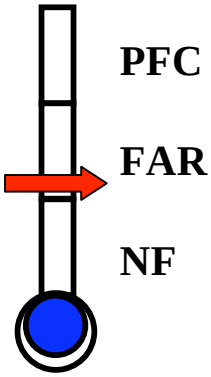
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
_√_ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 14: From the edge of wetland to upstream of the pond near 235 Hector Road
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with appropriate riparian vegetation..

Potential Channel Characteristics: No channel with overland and subsurface flow.

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #31 (CLB): N 48º 29.865' W 123º 25.858'.

Potential channel type: No channel with overland and subsurface flow.
Present channel type: Rosgen channel type "E6" with no sinuosity.

Constraints:
Channels were created out of wheel ruts.

Potential Restoration:
The addition of large woody debris will aid in breaking up the channels by causing water to flow outside of the channels.

Notes:
3. There is no sinuosity due to channel origin as wheel ruts.
9. Vegetation is beginning to grow in some of the channels, therefore, reach is recovering.
13. Floodplain and some wood is present.
16. Substrate is clay preventing downcutting.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Common snowberry	*Symphoricarpos albus*
Creeping buttercup	*Ranunculus repens*
False lily of the valley	*Maianthemum dilatatum*
Fringecup	*Tellima grandiflora*
Himalayan blackberry	*Rubus armeniacus*
Lady fern	*Athyrium filix-femina*
Marsh skullcap	*Scutellaria galericulat*
Red alder	*Alnus rubra*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Sedge sp.	*Carex sp.*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*
Willow sp.	*Salix sp.*

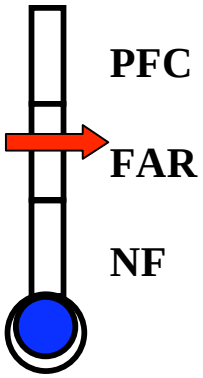
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

_√_Upward
__ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 15: From the upstream boundary of 335 Viaduct Avenue West to culvert under the trail in Logan Park.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan		

Potential Riparian-Wetland Vegetation: Coniferous forest

Potential Channel Characteristics: Rosgen = "G3" channel type

Yes	No	N/A	HYDROLOGICAL
		√	1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
√			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√			6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor

√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)
√			12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start at point where an obvious channel enters the wetland at 335 Viaduct Avenue West

Potential channel type: Rosgen channel type "G3".
Present channel type: Rosgen channel type "G3".

Constraints:
The channel is constrained on the left bank by Viaduct Avenue W. and on the right bank by bedrock.

Potential Restoration:
Invasive species monitoring and removal of Himalayan blackberries (*R. discolor*).

Notes:
3. The landscape is adjusted by the presence of the road to create a "G" rather than a historic "B".
5. The trail at the upstream end is creating a dam attenuating flow.
9. Root masses are holding the system in place.
13. Large woody debris is aiding in energy dissipation.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Bracken fern	*Pteridium aquilinum*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
Dull Oregon-grape	*Mahonia nervosa*
Grand fir	*Abies grandis*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Lady fern	*Athyrium filix-femina*
Marsh skullcap	*Scutellaria galericulat*
Oceanspray	*Holodiscus discolor*
Red alder	*Alnus rubra*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Thimbleberry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*

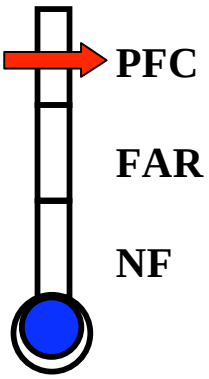
SUMMARY DETERMINATION

_√ Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lentic Checklist

Name of Riparian-Wetland Area:	Viaduct Creek		
Date:	07-08-14	Segment/Reach ID:	Reach 16: From the culvert under the trail at Logan Park upstream to the end of the wetland area.
ID Team Observers:	Sarah Buchanan, Daniel Hegg, Brian LaCas, Lehna Malmkvist, Kevin O'Riordan.		

Acres/Hectares: 0.44 ha

Potential Riparian-Wetland Vegetation: Coniferous forest with riparian shrubs.

Yes	No	N/A	HYDROLOGICAL
√			1) Riparian-wetland area is saturated at or near the surface or inundated in "relatively frequent" events
√			2) Fluctuation of water levels is not excessive
√			3) Riparian-wetland area is widening or has achieved potential extent
√			4) Upland watershed is not contributing to riparian-wetland degradation
√			5) Water quality is sufficient to support riparian-wetland plants
√			6) Natural surface or subsurface flow patterns are not altered by disturbance (i.e. hoof action, dams, dikes, trails, roads, rills, gullies, drilling activities)
√			7) Structure accommodates safe passage of flows (e.g., no headcut affecting dam or spillway)

Yes	No	N/A	VEGETATION
√			8) There is a diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			9) There is a diverse composition of riparian-wetland vegetation (for maintenance/recovery)
√			10) Species present indicate maintenance of riparian-wetland soil moisture characteristics

√			11) Vegetation is comprised of those plants or plant communities that have root masses capable of withstanding wind events, wave flow events, or overland flows (e.g. storm events, snowmelt)
√			12) Riparian-wetland plants exhibit high vigor
√			13) Adequate riparian-wetland vegetative cover is present to protect shoreline/soil surface and dissipate energy during high wind and wave events or overland flows
√			14) Frost or abnormal hydrologic heaving is not present
√			15) Favorable microsite condition (i.e. woody material, water temperature, etc.) is maintained by adjacent site characteristics

Yes	No	N/A	EROSION DEPOSITION
√			16) Accumulation of chemicals affecting plant productivity/composition is not apparent
√			17) Saturation of soils (i.e. ponding, flooding frequency, and duration) is sufficient to compose and maintain hydric soils
√			18) underlying geologic structure/soil material/permafrost is capable of restricting water percolation
√			19) Riparian-wetland is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)
√			20) Islands and shoreline characteristics (i.e. rocks, coarse and/or coarse woody material) are adequate to dissipate wind and wave event energies

Remarks

Start GPS waypoint #30 (CLB): N 48º 29.884' W 123º 25.942'.

Constraints:
Viaduct Avenue W. lines the left bank while bedrock lines the right bank.

Potential Restoration: None.

Notes:
6. The 800cm culvert at the trail is not causing any problems.

Note: This reach is protected in Logan Park and is very healthy.

Vegetation:

Common Name	Scientific Name

Big leaf maple	*Acer macrophyllum*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
Himalayan blackberry	*Rubus armeniacus*
Indian plum	*Oemleria cerasiformis*
Marsh skullcap	*Scutellaria galericulat*
Oceanspray	*Holodiscus discolor*
Salal	*Gaultheria shallon*
Salmonberry	*Rubus spectabilis*
Sedge sp.	*Carex sp.*
Skunk cabbage	*Lysichiton americanum*
Sword fern	*Polystichum munitum*
Thimbleberry	*Rubus parviflorus*
Trailing blackberry	*Rubus ursinus*
Western red cedar	*Thuja plicata*

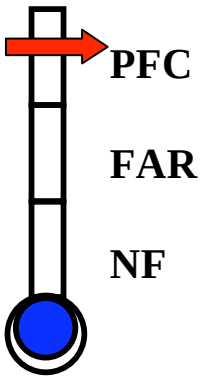
SUMMARY DETERMINATION

_√_Proper Functioning Condition

__ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
__ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√__

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
____ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Durrell Creek		
Date:	07-09-18	Segment/Reach ID:	Reach 1: Confluence with Colquitz Creek at Loenholm Road to Wilkinson Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Increased riparian shrubs

Potential Channel Characteristics: Rosgen = “small C6” channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
	√		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint # 42: N 48º 29.018' W 123º 24.332'.

Potential channel type: Rosgen channel type "C6".
Present channel type: Ditch

Constraints:
Banks are vertical and bare. Floodplain accessibility is minimal if at all. Erosion is actively occurring and the vegetation present is not capable of reducing erosional forces.

Restoration:
Terracing or regrading will improve access to floodplain while narrowing the channel adding wood and rock will increase channel complexity. The banks should be planted with native riparian vegetation and invasive species should be removed.

Notes:
5. There is no excess water or sediment to indicate degradation caused by upland watershed.
6. Red osier dogwood is the only species with multiple age levels. The conifers are all old trees.
7. Invasive species are present.
8. Upland species dominate suggesting a drier riparian zone.
9. Banks are bare and they are falling apart.
11. Erosion is actively occurring.
12. Wood should be present in this system.
13. Active erosion is occurring despite typically receiving low flows.
16. This reach has been channelized and the bed is lower than in the past but there is no evidence of downcutting presently.
17. Excessive erosion is occurring.

Vegetation:

Common Name	Scientific Name

Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
Garry oak	*Quercus garryana*
Himalayan blackberry	*Rubus armeniacus*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pea	
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Willow sp.	*Salix sp.*

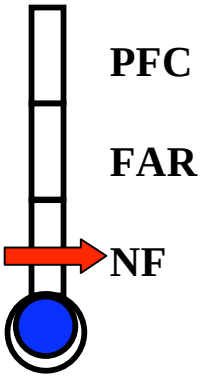
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Durrell Creek		
Date:	07-09-18	Segment/Reach ID:	Reach 2: Wilkinson Road to Charlton Road.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Conifers and smaller tree and shrub communities

Potential Channel Characteristics: Rosgen = "C" channel type

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #43: N 48º 29.034' W 123º 24.417'.

Potential channel type: Rosgen channel type "C".
Present channel type: ditch

Constraints:
The power lines restrict the growth of vegetation based upon height requirements. Additionally, the Vancouver Island Regional Correctional Centre will also have specific needs that must met in terms of restoration options. The banks of the channel are extremely steep preventing growth of vegetation that would aid in stabilization.

Restoration:
Terracing back the banks and ponds will reduce the steepness of the banks and create accessible floodplain. Subsequent planting of these terraces will stabilize the soils. This planting should be initiated with fast growing, shade producing species to prevent growth of invasive species.

Notes:
3. The channel is too straight and the banks too steep.
4. Riparian vegetation is present in the channel but the bed is dug down so far the banks have upland species.
6. Mostly young, planted willow.
7. Supplementation would be beneficial. Invasive species are present.
8. Vegetation is within the channel but not on the banks.
9. Banks are bare with upland species at the top.
10. Willows are small.
11. Banks are bare.
12. There is no wood present and riparian vegetation is young.
17. No active erosion or deposition.

Vegetation:

Common Name	Scientific Name
Big leaf maple	*Acer macrophyllum*
Black hawthorn	*Crataegus douglasii*
Bracken fern	*Pteridium aquilinum*
Bur-reed	*Sparganium sp.*
Canada thistle	*Cirsium arvense*
Common rush	*Juncus effusus*
Common snowberry	*Symphoricarpos albus*
Douglas fir	*Pseudotsuga menziesii*
Duckweed	*Lemna sp.*
English hawthorn	*Crataegus monogyna*
English ivy	*Hedera helix*
Garry oak	*Quercus garryana*
Hardhack	*Spirea douglasii spp. douglasii*
Himalayan blackberry	*Rubus armeniacus*
Nootka rose	*Rosa nutkana*
Oceanspray	*Holodiscus discolor*
Pacific willow	*Salix lassiandra*
Purple loosestrife	*Lythrum sp.*
Red alder	*Alnus rubra*
Red osier dogwood	*Cornus stolonifera*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Smartweed (Lady's thumb)	*Polygonum lapathifolium*
Water-plantain	*Alisma plantago-aquatica*
Willow sp.	*Salix sp.*

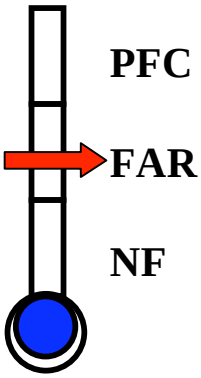
SUMMARY DETERMINATION

__Proper Functioning Condition

_√_ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
_√_ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Durrell Creek		
Date:	07-09-18	Segment/Reach ID:	Reach 3- From Charlton Road to Interurban Road
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Coniferous forest with Garry Oak copses.

Potential Channel Characteristics: Rosgen = " Bc6"

Yes	No	N/A	HYDROLOGICAL
	√		1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	√		4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	√		7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
	√		8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	√		9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
	√		10) Riparian-wetland plants exhibit high vigor
	√		11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

	√		12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
	√		13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #46: N 48º 29.005' W 123º 24.756'.

Potential channel type: Rosgen channel type "Bc".
Present channel type: rock-lined, rip-rapped ditch.

Constraints:
This reach travels right through a private property and is lacking any vegetation. Paddocks and grass back right to the edge of the creek and a bridge crosses it. The banks are steep and bare. The channel is constrained by rock and rip-rap.

Restoration:
Plant the banks with native riparian vegetation. If the property is put up for sale, the District of Saanich should purchase the property in order for complete restoration. In the advent of redevelopment, the creek should be regarded, terraced, and planted and a covenant should be instated.

Notes:
3. Channel is straightened, deepened, and ditched.
4. No riparian vegetation is present.
7-12. There are no riparian plants, or any other vegetation.
13. Rip-rap and rock walls prevent banks from falling into channel.
15. The channel is armoured in place.

Vegetation:

Common Name	Scientific Name
Duckweed	*Lemna sp.*
Fruit trees	
Water-plantain	*Alisma plantago-aquatica*

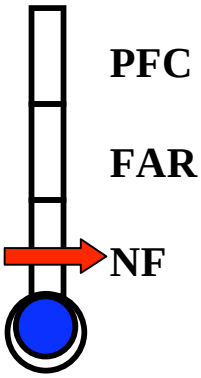
SUMMARY DETERMINATION

__Proper Functioning Condition

___ Functional - At Risk

_√_ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes ___
No _√_

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
___ Other (specify)

(Revised 1998) (7/12/04)

Lotic Checklist

Name of Riparian-Wetland Area:	Durrell Creek		
Date:	07-09-18	Segment/Reach ID:	Reach 4: Interurban Road to Granville Avenue.
ID Team Observers:	Cori Barraclough, Sarah Buchanan, Lise Townsend		

Potential Riparian-Wetland Vegetation: Wetland community with riparian shrubs dominating.
Potential Channel Characteristics: Rosgen = wetland with "E" or "C" channel.

Yes	No	N/A	HYDROLOGICAL
√			1) Floodplain above bankfull is inundated in "relatively frequent" events
		√	2) Where beaver dams are present are they active and stable
	√		3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
√			4) Riparian-wetland area is widening or has achieved potential extent
√			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
√	√		6) Diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
√			7) Diverse composition of riparian-wetland vegetation (for maintenance/recovery) (*species present*)
√			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
√			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events (*community types present*)
√			10) Riparian-wetland plants exhibit high vigor
√			11) Adequate riparian-wetland vegetative cover present to protect banks and dissipate energy during high flows (*enough*)

		√	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION DEPOSITION
√			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) adequate to dissipate energy
		√	14) Point bars are revegetating with riparian-wetland vegetation
√			15) Lateral stream movement is associated with natural sinuosity s
√			16) System is vertically stable (*not downcutting*)
√			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Start GPS waypoint #47: N 48º 29.014' W 123º 872'.

Potential channel type: Rosgen channel "E" or "C" within a wetland.
Present channel type: a ditch with a planting regime in attempted restoration.

Constraints:
Reach 4 is a ditched, straightened channel. The surrounding area is actively farmed.

Restoration:
Construct a series of ponded wetlands with "C" or "E" channels connecting them. Ultimately, the property should be purchased by the District of Saanich if the opportunity arises in order to recreate a wetland habitat. A nature park/bird habitat could be established like that at Viaduct Flats.

Note:
The planting that has been done in this reach previously is vigorous despite the invasive species that are present.

Vegetation:

Common Name	Scientific Name
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Canada thistle	*Cirsium arvense*
Duckweed	*Lemna sp.*
Himalayan blackberry	*Rubus armeniacus*
Hooker's willow	*Salix hookeriana*
Pacific willow	*Salix lassiandra*
Purple loosestrife	*Lythrum sp.*
Red alder	*Alnus rubra*
Reed canary grass	*Phalaris arundinacea*
Scotch broom	*Cytisus scoparius*
Sitka willow	*Salix sitchensis*
Smartweed (Lady's thumb)	*Polyganum lapathifolium*
Water-plantain	*Alisma plantago-aquatica*
Willow sp.	*Salix sp.*

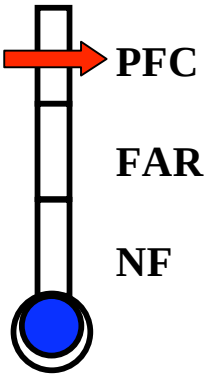
SUMMARY DETERMINATION

_√_Proper Functioning Condition

___ Functional - At Risk

___ Nonfunctional

___ Unknown



Trend for Functional - At Risk:

__ Upward
___ Downward
___ Not Apparent

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _√_
No ___

If yes, what are those factors?

___ Flow regulations
___ Mining activities
___ Upstream channel conditions
___ Channelization
___ Road encroachment
___ Oil field water discharge
___ Augmented flows
_√_ Other (agricultural lands)

(Revised 1998) (7/12/04)

Appendix 3A Photo Record- Colquitz River

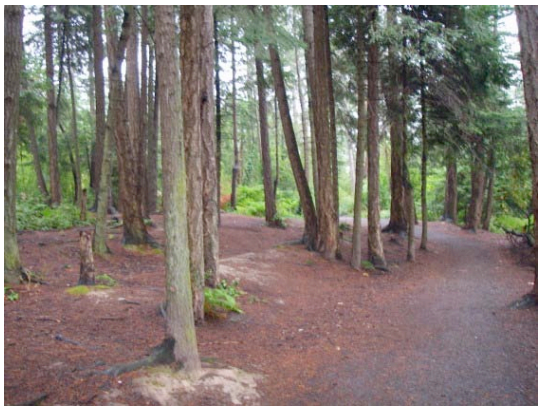
Colquitz River Watershed PFC Assessment July-September, 2007.

Colquitz River Reach 1, Photo 1, 2007-07-17. Facing upstream from Portage Inlet. The left hand bank consists mostly of residential lawns and little vegetation capable of handing high flows.

Colquitz River Reach 1, Photo 2, 2007-07-17. Facing the pedestrian bridge crossing closest to the Inlet. Noted erosion occurring adjacent to the bridge. In addition, residential stormwater drainage is entering the creek (top-left in picture).

Colquitz River Reach 1, Photo 3, 2007-07-17. Small tributary entering Colquitz Creek. Area is subject to tidal fluctuations.

Colquitz River Reach 1, Photo 4, 2007-07-17. Facing upstream. Reach is highly vegetated on both sides.



Colquitz River Reach 1, Photo 5, 2007-07-17. Large amount of off-path trampling is noted above; Area is at risk for considerable top-soil erosion leading to further reduced vegetation.

Colquitz River Reach 1, Photo 6, 2007-07-17. Facing upstream near the end of the reach.

Colquitz River Reach 2, Photo 1, 2007-07-17. Upstream of the second footbridge in Cuthbert Holmes Park. Although there are large amounts of vegetation along this reach, the streambanks are eroding due to high seasonal flows.

Colquitz River Reach 2, Photo 2, 2007-07-17. The trail is a considerable distance from the creek, thus very little vegetation trampling occurs, other than areas the municipality mows.

Colquitz River Reach 2, Photo 3, 2007-07-17. As seen above, large amount of streambank erosion has occurred within this reach.

Colquitz River Reach 2, Photo 4, 2007-07-17. Stormwater treatment pond in foreground. Cineplex Odeon in the background.

Colquitz River Reach 2, Photo 5, 2007-07-17. Facing upstream within reach.

Colquitz River Reach 2, Photo 6, 2007-07-17. A fish fence and staff gauge has been installed in this reach. Recent storms have felled trees allowing for large woody debris to enter the channels.

Colquitz River Reach 2, Photo 7, 2007-07-17. Looking downstream towards the recently installed pedestrian bridge adjacent to the Tillicum Mall area. Large amounts of vegetation has grown over the channel.

Colquitz River Reach 2, Photo 8, 2007-07-17. Stormwater from Tillicum Mall parking lot enters into the stormwater wetland seen above and then drains into Colquitz Creek.

Colquitz River Reach 3, Photo 1, 2007-07-17. Facing downstream, below the Trans Canada Highway bridge. Channel banks consist largely of bedrock (as seen in the photo).

Colquitz River Reach 3, Photo 2, 2007-07-17. Concrete weir installed to control water flow in the reach.

Colquitz River Reach 3, Photo 3, 2007-07-18. Facing upstream. Channel underneath bridge has been completely armoured with rock and concrete.

Colquitz River Reach 3, Photo 4, 2007-07-18. Facing upstream, large amounts of natural bedrock on the left and a pedestrian walkway on the right.

Colquitz River Reach 3, Photo 5, 2007-07-18. Facing downstream looking towards Trans Canada Highway bridge.

Colquitz River Reach 4, Photo 1, 2007-07-18. Concrete steeping stones have been previously installed to allow trail users to cross the creek.

Colquitz River Reach 4, Photo 2, 2007-07-18. Facing downstream from pedestrian bridge.

Colquitz River Reach 4, Photo 3, 2007-07-18. Looking downstream. Although the reach is heavily vegetated, its composition mainly consists of invasive species.

Colquitz River Reach 4, Photo 4, 2007-07-18. Facing upstream. Large amounts of reed canary grass (left) and Himalayan blackberries (right) noted.

Colquitz River Reach 5, Photo 1, 2007-07-18. Facing East towards residential property consisting of grass that is mowed right to the bank. Banks are armoured with blast rock.

Colquitz River Reach 5, Photo 2, 2007-07-18. Installation of raised concrete path has led to trampling and erosion of the streambank.

Colquitz River Reach 5, Photo 3, 2007-07-18. Looking upstream.

Colquitz River Reach 5, Photo 4, 2007-07-18. Continued encroachment of vegetation within channel may lead to low DO levels and change the hydrology of the reach.

Colquitz River Reach 5, Photo 5, 2007-07-18. The area my have been dug out to install the raised paths. This portion of the reach appears to be forming into a pond or pool.

Colquitz River Reach 6, Photo 2, 2007-07-18. Reach is heavily inundated with invasive species such as English Ivy (background) and Himalayan Blackberries (foreground).

Colquitz River Reach 6, Photo 3, 2007-07-18. Facing downstream on Interurban Road bridge crossing.

Colquitz River Reach 7, Photo 1, 2007-07-18. Facing upstream towards the Violet Ave bridge. Floodplain present on the right hand side.

Colquitz River Reach 7, Photo 2, 2007-07-18. Facing upstream. Noted large amount of invasive species present.

Colquitz River Reach 7, Photo 3, 2007-07-18. Due to the concrete path and trampling, some streambank erosion has occurred on the right bank. Large Willow trees alongside channel are preventing riparian plant growth.

Colquitz River Reach 7, Photo 4, 2007-07-18. Vegetation is encroaching on channel.

Colquitz River Reach 7, Photo 5, 2007-07-18. Hyacinth Park. Channel forms into a ditch. As seen above streambank erosion is occurring.

Colquitz River Reach 7, Photo 6, 2007-07-18. Off path trampling is leading to streambank erosion. Left side of the bank is armoured with large rocks.

Colquitz River Reach 8, Photo 1, 2007-07-18. Channel is on the West side of Panama Flats. Area is over-grown with Himalayan Blackberries and is difficult to access.

Colquitz River Reach 8, Photo 2, 2007-07-18. Armoured channel connected to the isolated stormwater pond (Photo's 3&4). This system is not believed to be connected to the Colquitz.

Colquitz River Reach 8, Photo 3, 2007-07-18. Isolated stormwater pond.

Colquitz River Reach 8, Photo 4, 2007-07-18. Isolated stormwater pond.

Colquitz River Reach 8, Photo 5, 2007-07-18. As seen above the channel is a ditch and is inundated with invasive species.

Colquitz River Reach 8, Photo 6, 2007-07-18. Channel is a dug out ditch with gully characteristics. Facing downstream.

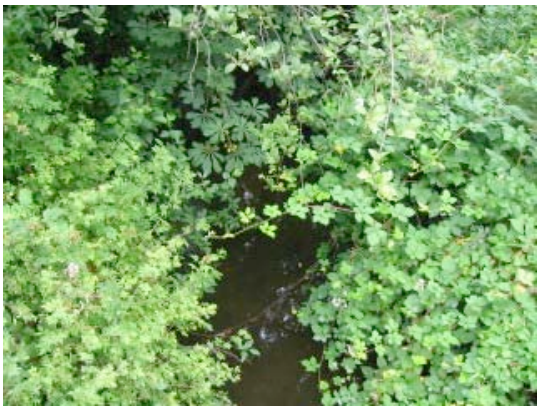
Colquitz River Reach 9, Photo 1, 2007-07-23. Streambank is eroding and downcutting.

Colquitz River Reach 9, Photo 2, 2007-07-23. Creek is entrenched and is eroding.

Colquitz River Reach 9, Photo 3, 2007-07-23. Streambank erosion and invasive species noted.

Colquitz River Reach 9, Photo 4, 2007-07-23. Clearing of the property (corner of Grange and Gerda Road) and deposition of material is preventing vegetation growth and is accelerating bank erosion.

Colquitz River Reach 9, Photo 5, 2007-07-23. Gravel bridge at Copley Park entrance. Roadside debris and bank erosion is entering creek.



Colquitz River Reach 9, Photo 6, 2007-07-23. Facing downstream at the gravel bridge. Area is heavily vegetated with invasive species.

Colquitz River Reach 9, Photo 7, 2007-07-23. Copley Park residence. Trampling from residence has led to decreased vegetation and erosion. Banks have been armoured with rock.

Colquitz River Reach 9, Photo 8, 2007-07-23. Copley Park. As seen at the right side of the photo, the streambank is inundated with invasive species.

Colquitz Creek Reach 9, Photo 9, 2007-07-25. Copley Park, facing upstream. Right bank is over-steepened. The left bank allows for some floodplain access and dissipation of energy.

Colquitz Creek Reach 9, Photo 10, 2007-07-25. Copley Park. The bank is over-steepened and eroded.

Colquitz River Reach 9, Photo 11, 2007-07-23. Facing upstream at the Rosee Grove pedestrian bridge.

Colquitz River Reach 9, Photo 12, 2007-07-23. Rosee Grove. Standing downstream from the pedestrian bridge. Seen above, trampling in the residential backyard is accelerating erosion.

Colquitz River Reach 9, Photo 13, 2007-07-23. Facing downstream from the Vanalman Avenue bridge.

Colquitz River Reach 10a, Photo 1, 2007-07-23. Rosee Grove facing upstream. Note large wood.

Colquitz River Reach 10a, Photo 2, 2007-07-23. High flows have severely eroded the right bank. The left bank has had some floodplain access to dissipate energy.

Colquitz River Reach 10a, Photo 3, 2007-07-23. Trampling has aggravated the erosion occurring from high seasonal flows.

Colquitz River Reach 10a, Photo 4, 2007-07-23. Large flows have eroded and down-cut the banks, exposing the root base.

Colquitz River Reach 10a, Photo 5, 2007-07-23. Severe erosion and trampling is occurring.

Colquitz River Reach 10a, Photo 6, 2007-07-23. Two large culverts discharge stormwater directly into the creek thus increasing the volume of water and negatively impacting the hydrology.

Colquitz River Reach 10a, Photo 7, 2007-07-23. Rosee Grove, facing upstream. Tree root is acting as a weir, channeling water to the middle and aiding in controlling flows to an extent.

Colquitz River Reach 10a, Photo 8, 2007-07-23. Gravel material likely placed in creek after building pedestrian bridge. The deposit is not revegetating.

Colquitz River Reach 10a, Photo 9, 2007-07-23. Facing downstream. Dense vegetation has buffered the banks against high flows and erosion.

Colquitz River Reach 10b, Photo 1, 2007-07-23. A small vegetated wetland, adjacent to creek.

Colquitz River Reach 10b, Photo 2, 2007-07-23. Wetland is located to the right (Vanalman Avenue and Northridge Crescent).

Colquitz River Reach 11, Photo 1, 2007-07-23. Facing upstream, creek is lined with large rocks able to dissipate energy and reduce erosion that occurs with high flows.

Colquitz River Reach 11, Photo 2, 2007-07-23. Facing downstream. The hydrology of the creek is altered (hence the reach break) at this point due to the change in substrate.

Colquitz River Reach 11, Photo 3, 2007-07-23. Adjacent to Lindsay Road, residences have been dumping yard waste.

Colquitz River Reach 11, Photo 5, 2007-07-25. Residential backyard maintenance (i.e. mowing, non-riparian species) is encroaching on the riparian plant growth.

Colquitz River Reach 12, Photo 1, 2007-09-18. Facing downstream from 4450 Wilkinson Road. Note the presence of floodplain on the left bank.

Colquitz River Reach 12, Photo 2, 2007-09-18. Vertical concrete and wood wall constraining the creek channel.

Colquitz River Reach 12, Photo 3, 2007-09-18. Facing upstream toward Quick's Bottom. Invasive species are abundant.

Colquitz River Reach 13, Photo 1, 2007-07-23. Vantage point from the bird blind in Quick's Bottom.

Colquitz River Reach 13, Photo 2, 2007-07-25. Quick's Bottom wetland.

Colquitz River Reach 14, Photo 1, 2007-07-25. Creek runs adjacent to Quick's Bottom wetland (left side). Creek is heavily vegetated and reed canary grass encroachment is narrowing channel.

Colquitz River Reach 14, Photo 2, 2007-07-25. Property of 4654 West Saanich Road. The creek is heavily vegetated with large trees.

Colquitz River Reach 14, Photo 3, 2007-07-25. Facing upstream on the property of 4654 West Saanich Road.

Colquitz River Reach 15, Photo 1, 2007-07-25. Standing on pedestrian bridge facing upstream.

Colquitz River Reach 15, Photo 2, 2007-07-25. Stranding on driveway of 4654 West Saanich Road facing downstream. Concrete weir is installed.

Colquitz River Reach 15, Photo 3, 2007-07-25. Facing downstream on the property of 4624 West Saanich Road. Residential lawn and lawn maintenance has encroached upon riparian vegetation.

Colquitz River Reach 15, Photo 4, 2007-07-25. Facing upstream on the property of 4634 West Saanich Road.

Colquitz River Reach 16, Photo 1, 2007-10-30. Facing upstream from West Saanich Road crossing. Vegetation is abundant in the channel.

Colquitz River Reach 16, Photo 2, 2007-10-30. Facing downstream at 4641 West Saanich Road. Note pump station in the background.

Colquitz River Reach 16, Photo 3, 2007-10-30. Facing downstream at 4641 West Saanich Road. Large wood still has root wad attached.

Colquitz River Reach 16, Photo 4, 2007-10-30. Facing upstream at 4641 West Saanich Road just below Hunt's Falls.

Colquitz River Reach 17, Photo 1, 2007-07-30. Facing downstream. The channel is dominated by bedrock and contains small cascades, waterfalls and pools.

Colquitz River Reach 17, Photo 2, 2007-07-30. Facing upstream towards pedestrian crossing. Left bank is armoured with rip-rap and a manicured lawn is set right to the waters edge.

Colquitz River Reach 17, Photo 3, 2007-07-30. Facing upstream. An old stop-log dam manages the flows of the water.

Colquitz River Reach 17, Photo 4, 2007-07-30. Upstream of stop-log damn. Due to the dam a small pond exists. Both sides are armoured with rip-rap. Lots of silt present at bottom of pond.

Colquitz River Reach 17, Photo 5, 2007-07-30. Facing downstream with the 4525 Cheeseman Road property to the right. Note armoured banks with grass are eroding due to high flows and inappropriate vegetation.

Colquitz River Reach 18, Photo 1, 2007-07-30. Facing upstream. The creek is entrenched with a vertical left bank. High flows have heavily eroded the outside bend.

Colquitz River Reach 18, Photo 2, 2007-07-30. Saanich parkland adjacent to the property of 4533 Cheeseman Road. English Ivy has over-run the park. The homeowners continually manage the English Ivy from encroaching.

Colquitz River Reach 18, Photo 3, 2007-07-30. Facing downstream. Woody debris has lined the channel providing some protection from erosion.

Colquitz River Reach 18, Photo 4, 2007-07-30. Upstream from the property, facing downstream. Heavily vegetated upper banks, but erosion is occurring underneath the cover.

Colquitz River Reach 19, Photo 1, 2007-07-30. Facing downstream. The creek is heavily vegetated with invasive species on the right. Opposite this is a lawn right up to the waters edge.

Colquitz River Reach 19, Photo 2, 2007-07-30. Facing upstream. The reach break occurs at this point due to the changes in hydrology.

Colquitz River Reach 20, Photo 1, 2007-07-30. Facing downstream at the beginning of reach 20.

Colquitz River Reach 20, Photo 2, 2007-07-30. Facing upstream. The right bank consists of a manicured lawn right to the waters edge. The opposite side is heavily vegetated with invasives.

Colquitz River Reach 20, Photo 3, 2007-07-30. Small point bar formation due to erosion and deposition processes.

Colquitz River Reach 20, Photo 4, 2007-07-30. Facing downstream. Streambank consists of lawn on both sides.

Colquitz River Reach 20, Photo 5, 2007-07-30. Facing upstream. Streambank consists of lawn on both sides with undercutting and erosion occurring along both banks.

Colquitz River Reach 20, Photo 6, 2007-07-30. Facing upstream. Property owners appear to be pumping water from the creek.

Colquitz River Reach 20, Photo 7, 2007-07-30. On pedestrian bridge facing upstream. Banks are eroding and under-cut. Channel is forming an island from upstream erosion.

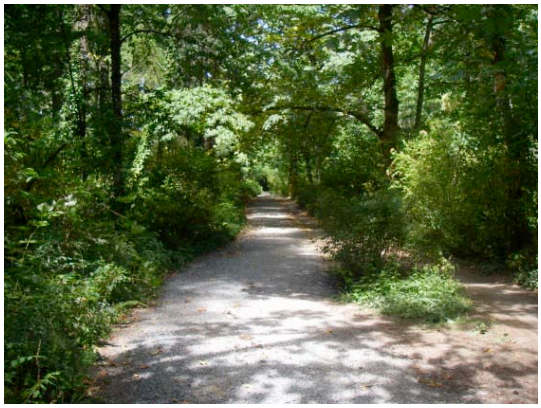
Colquitz River Reach 21, Photo 1, 2007-07-30. Facing upstream. Channel consists mainly of bedrock and silt/clay banks.

Colquitz River Reach 21, Photo 2, 2007-07-30. Standing on first pedestrian bridge (nearest Pipeline Road), facing downstream towards entrance of park. Note fence crossing channel.

Colquitz River Reach 21, Photo 3, 2007-07-30. Standing on second pedestrian bridge (with weir underneath) facing downstream.

Colquitz River Reach 22, Photo 1, 2007-07-16. Concrete weir at the second pedestrian bridge.

Colquitz River Reach 22, Photo 2, 2007-07-16. Standing on the second pedestrian bridge facing upstream. Channel is armoured due to pipeline installation (on right) and bedrock on the left.



Colquitz River Reach 22, Photo 3 2007-07-16. Facing north next to 2nd pedestrian bridge. Trampling of vegetation and trail widening has occurred due to misuse of the trail by horses.

Colquitz River Reach 22, Photo 4, 2007-07-16. Facing east towards creek. Trampling and trail formation through the creek is due to horses.

Colquitz River Reach 22, Photo 5, 2007-07-16. Facing northeast. Lack of riparian vegetation growth and soil erosion is due to trampling.

Colquitz River Reach 22, Photo 6, 2007-07-16. Facing northeast. Horse feces left next to the creek.

Colquitz River Reach 22, Photo 7, 2007-07-16. Facing upstream towards Beaver Lake outlet at the entrance to the trail and parking.

Appendix 3B Photo Record- Swan Creek

Swan Creek PFC Assessment August 2007.

Swan Creek Reach 1, Photo 1, 2007-08-06. Facing downstream towards Violet Avenue bridge.

Swan Creek Reach 1, Photo 2, 2007-08-06. On Violet Avenue facing upstream. Area is heavily vegetated.

Swan Creek Reach 1, Photo 3, 2007-08-06. Facing downstream toward Violet Avenue bridge. Floodplain is available and accessible.

Swan Creek Reach 1, Photo 4, 2007-08-06. Facing upstream. Noted pipeline crossing was either installed in the creek bed itself or surrounding material has eroded and exposed the pipe.

Swan Creek Reach 1, Photo 5, 2007-08-06. Facing upstream. An aging spill boom was noted still in place.

Swan Creek Reach 2, Photo 1, 2007-08-06. Banks are eroding and downcutting.

Swan Creek Reach 2, Photo 2, 2007-08-06. Facing downstream. Lack of vegetation and high flows are eroding the banks.

Swan Creek Reach 2, Photo 3, 2007-08-06. Facing downstream. Channel has down-cut and is eroding throughout.

Swan Creek Reach 2, Photo 4, 2007-08-06. Bike users are modifying off trail areas for jumps and bike paths creating areas capable of being easily eroded.

Swan Creek Reach 3, Photo 1, 2007-08-06. Facing downstream. Reach is inundated with reed canary grass.

Swan Creek Reach 3, Photo 2, 2007-08-06. Facing downstream beneath McKenzie Road overpass. Channel is lined with rocks and is over-grown with Himalayan blackberries.

Swan Creek Reach 4, Photo 1, 2007-08-06. Facing upstream underneath McKenzie Road overpass. Channel underneath overpass is completely lined with concrete.

Swan Creek Reach 4, Photo 2, 2007-08-06. Facing downstream. Large amount of debris has been piled up from prior year storms.

Swan Creek Reach 4, Photo 3, 2007-08-06. Facing upstream. A culvert is discharging nearby stormwater into the creek.

Swan Creek Reach 4, Photo 5, 2007-08-06. Streambed and riparian vegetation have been trampled.

Swan Creek Reach 4, Photo 6, 2007-08-06. Facing downstream under large willow tree. Trash has been dumped in the channel and along the banks.

Swan Creek Reach 4, Photo 6, 2007-08-06. Facing downstream.

Swan Creek Reach 4, Photo 8, 2007-08-06. Facing upstream toward Carey Road. Reach is heavily vegetated.

Swan Creek Reach 5, Photo 1, 2007-08-06. Facing east toward channel. Channel is armoured on both sides with cement and rock.

Swan Creek Reach 5, Photo 2, 2007-08-06. Upstream of Carey Avenue facing north. Creek is heavily vegetated and banks are steep.

Swan Creek Reach 5, Photo 3, 2007-08-06. Facing West (Glanford Avenue and McKenzie Avenue crossroads). Area is heavily vegetated with invasive species.

Swan Creek Reach 5, Photo 4, 2007-08-06. Facing east toward Willowbrook subdivision (Glanford Avenue and McKenzie Avenue crossroads).

Swan Creek Reach 6, Photo 1, 2007-08-06. Isolated trampling is occurring off the gravel path bordering Willowbrook subdivision.

Swan Creek Reach 6, Photo 2, 2007-08-06. Facing downstream towards the Willowbrook subdivision. Area was restored using the PFC approach in 2003.

Swan Creek Reach 7, Photo 1, 2007-08-06. Jolly Place Culvert Crossing. Facing downstream towards McKenzie Ave. Channel is inundated with invasive species.

Swan Creek Reach 7, Photo 2, 2007-08-06. Jolly Place Culvert Crossing. Facing upstream towards the allotment gardens.

Swan Creek Reach 7, Photo 3, 2007-08-06. Ralph Street Culvert Crossing. Facing downstream. Garbage noted in channel.

Swan Creek Reach 7, Photo 4, 2007-08-06. Ralph Street Culvert Crossing. Facing upstream. Channel is heavily vegetated with duckweed and algae.

Swan Creek Reach 7, Photo 5, 2007-08-06. Kent Road pedestrian bridge facing downstream. Noted elevated pipe crossing parallel to the bridge. Area is inundated with invasive species.

Swan Creek Reach 8, Photo 1, 2007-08-06. Kent Road pedestrian bridge facing upstream. Purple loosestrife in foreground subsequently removed by the District of Saanich.

Swan Creek Reach 8, Photo 2, 2007-08-06. Allotment gardens. Banks are steepened and bare in spots.

Swan Creek Reach 8, Photo 3, 2007-08-06. Facing upstream on the Allotment gardens 2nd pedestrian bridge. Channel is heavily vegetated with reed canary grass.

Swan Creek Reach 8, Photo 4, 2007-08-06. Facing downstream on the Allotment gardens 2nd pedestrian bridge. Channel surface is overgrown with duckweed.

Swan Creek Reach 8, Photo 5, 2007-08-06. Upstream of the allotment gardens facing east toward the Patricia Bay Highway.

Swan Creek Reach 9, Photo 1, 2007-08-06. Facing upstream on trail towards Swan Lake. Outlet is inundated with duckweed.

Swan Lake Reach 9, Photo 2, 2007-08-06. Swan Lake has a very high nutrient load and thus has become eutrophic.

Swan Lake Reach 9, Photo 3, 2007-08-06. Large amounts of algae and duckweed exist in the lake.

Appendix 3C Photo Record- Blenkinsop Creek

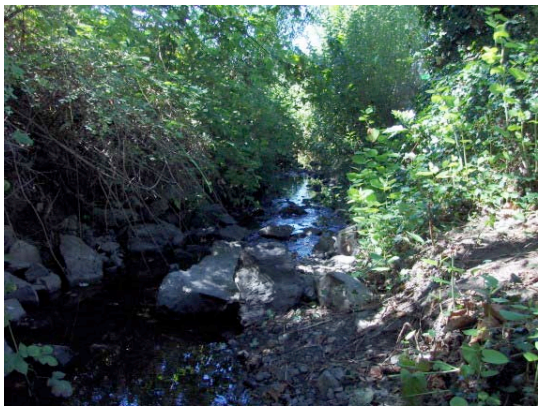
Blenkinsop Creek PFC Assessment August 2007.

Blenkinsop Creek Reach 1, Photo 1, 2007-08-08. Upstream of Swan Lake on pedestrian bridge. Low vegetation in foreground due to trampling and high flows (see Photo 2 for close-up).

Blenkinsop Creek Reach 1, Photo 2, 2007-08-08. Upstream of Swan Lake on pedestrian bridge. Continual trampling and high flows has led to vegetation loss and streambank erosion.

Blenkinsop Creek Reach 1, Photo 3, 2007-08-08. Facing south on Swan Lake Trestle. Blenkinsop Creek connects with Leeds Dr. residential stormwater management wetlands.

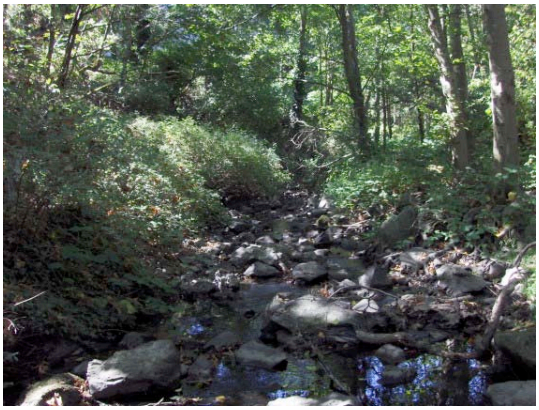
Blenkinsop Creek Reach 1, Photo 4, 2007-08-08. Facing south on Swan Lake Trestle (Saanich Road). Blenkinsop Creek in the center foreground.



Blenkinsop Creek Reach 2, Photo 1, 2007-08-08. Upstream of Swan Lake Trestle. Large rocks have been placed along the banks to prevent erosion. Residential yards back onto the creek.

Blenkinsop Creek Reach 2, Photo 2, 2007-08-08. High flows have eroded the stream banks even though they have been armoured with rock.

Blenkinsop Creek Reach 2, Photo 3, 2007-08-08. Facing downstream, the creek passes underneath Lochside trail through two large culverts. Streambed is full of blast rock material.



Blenkinsop Creek Reach 2, Photo 4, 2007-08-08. Facing Blenkinsop Creek upstream towards Quadra Street. Channel is full of rock but banks lack energy dissipating structures.

Blenkinsop Creek Reach 3, Photo 1, 2007-08-08. The reach is currently in a culvert below the building. The site (SW corner of Quadra and McKenzie) is being examined for redevelopment.

Blenkinsop Creek Reach 3, Photo 2, 2007-08-08. Facing South on Lochside Trail. Area proposed for development is to the left. Daylighting the creek has been suggested.

Blenkinsop Creek Reach 4, Photo 1, 2007-08-08. On Quadra property, above is the day-lighted portion of creek. Surrounding street drainage (Quadra St.) enters into the creek at this location.

Blenkinsop Creek Reach 4, Photo 2, 2007-08-08. Upstream of McKenzie, behind London Drugs, the creek is heavily entrenched, constrained, and the banks are covered in invasive species.

Blenkinsop Creek Reach 4, Photo 3, 2007-08-08. Facing downstream, standing on McKenzie Ave (London Drugs is to the right). Banks are heavily overgrown with invasive species.

Blenkinsop Creek Reach 4, Photo 4, 2007-08-08. Creek is culverted from McKenzie and daylights again at Lochside Trail (adjacent to Lochside sub-station). Area has been ditched and lined with blast rock.

Blenkinsop Creek Reach 4, Photo 5, 2007-08-08. Blenkinsop Creek Dam. The dam controls flows and leads to flooding of upstream areas in the winter months.

Blenkinsop Creek Reach 4, Photo 6, 2007-08-08. Looking upstream of dam. Area has been ditched and offers little in regards to diversity of vegetation.

Blenkinsop Creek Reach 5, Photo 1, 2007-08-08. Facing North looking upstream with the Galey's farm in the background. Creek was restored from a ditch in 2000.

Blenkinsop Creek Reach 5, Photo 2, 2007-08-08. Facing downstream towards Cumberland Creek. The pond was created as a part of the restoration to dissipate high-energy flows and detain water.

Blenkinsop Creek Reach 6, Photo 1, 2007-08-08. Facing north on Lochside Trail. Blenkinsop Lake appears to have a high nutrient load (ie. excessive algae and duckweed) growth and is eutrophic.

Blenkinsop Creek Reach 6, Photo 2, 2007-08-08. Facing north on Lochside Trail.

Appendix 3D Photo Record- Viaduct Creek

Viaduct Creek PFC Assessment August 2007.

Viaduct Creek Reach 1, Photo 1, 2007-08-01. Quick's Bottom Park pedestrian bridge, facing downstream. Reach is heavily vegetated.

Viaduct Creek Reach 1, Photo 2, 2007-08-01. Quick's Bottom Park pedestrian bridge, facing upstream. Some floodplain is noted.

Viaduct Creek Reach 1, Photo 3, 2007-08-01. Markham Street Bridge facing downstream.

Viaduct Creek Reach 2a, Photo 1, 2007-08-08. Facing upstream on property of 4484 Markham Road. Large woody debris has piled up due to high flows.

Viaduct Creek Reach 2a, Photo 2, 2007-08-08. Lack of vegetation and peak water flows has eroded and negatively impacted the stream banks.

Viaduct Creek Reach 2a, Photo 3, 2007-08-08. Property of 4484 Markham Road. Historically, a ponding area, but due to upstream erosions it is now filling up with sediment.

Viaduct Creek Reach 2a, Photo 4, 2007-08-08. Pond area filled in with sediment and has re-vegetated.

Viaduct Creek Reach 2a, Photo 5, 2007-08-08. VITP Property. Facing downstream. Layritz Park tributary headcut has deposited a large sidebar and has begun to fill in the channel with sediment.

Viaduct Creek Reach 2a, Photo 6, 2007-08-08. Layritz Park tributary, facing upstream. Tributary has head-cut and has eroded the clay banks. Trees have collapsed into the stream bed.

Viaduct Creek Reach 2a, Photo 7, 2007-08-08. Layritz Park tributary, facing upstream. Tributary has downcut.

Viaduct Creek Reach 2a, Photo 8, 2007-08-08. Layritz Park tributary, facing upstream. Tributary has down-cut severely.

Viaduct Creek Reach 2a, Photo 9, 2007-08-08. Facing upstream. Viaduct and Layritz Park tributary confluence. Layritz Park tributary enters into Viaduct creek.

Viaduct Creek Reach 2b, Photo 1, 2007-08-01. Pond area, facing downstream toward VITP. Vegetation in this area consists mainly of reed canary grass and thistles.

Viaduct Creek Reach 2b, Photo 2, 2007-08-01. Facing downstream toward rock weir. Gardens and Woodland Group has installed the rock weir and restored a portion of the area.

Viaduct Creek Reach 2b, Photo 3, 2007-08-08. Standing at rock weir, facing upstream.

Viaduct Creek Reach 2b, Photo 4, 2007-08-01. Pond area, facing downstream.

Viaduct Creek Reach 3, Photo 1, 2007-08-01. Viaduct Flats, facing upstream.

Viaduct Creek Reach 3, Photo 2, 2007-08-01. Viaduct flats. Picture taken from concrete bird blind.

Viaduct Creek Reach 3, Photo 3, 2007-08-01. Viaduct flats. Picture taken from concrete bird blind.

Viaduct Creek Reach 4, Photo 1, 2007-08-01. Viaduct creek enters into Viaduct flats. Facing downstream, picture taken from bird blind.

Viaduct Creek Reach 4, Photo 2, 2007-08-01. Viaduct park entrance, facing upstream. Creek is inundated with reed canary grass.

Viaduct Creek Reach 4, Photo 3, 2007-08-01. Upstream of Viaduct park entrance. Very low water levels noted.

Viaduct Creek Reach 5, Photo 1, 2007-08-16. Property of 478 Viaduct Avenue, facing upstream. Stream banks are armoured with rip-rap and contain little riparian vegetation.

Viaduct Creek Reach 5, Photo 2, 2007-08-16. Facing downstream toward concrete weir. Stream is armoured throughout as an attempt to stop the continued erosion.

Viaduct Creek Reach 5, Photo 3, 2007-08-16. Facing upstream toward pedestrian bridge and confluence with Goward Springs A.

Viaduct Creek Reach 6, Photo 1, 2007-08-16. Standing on pedestrian bridge, facing upstream. Erosion is undercutting the bank.

Viaduct Creek Reach 6, Photo 2, 2007-08-16. Standing on pedestrian bridge, facing upstream towards the Goward Springs and Viaduct Creek confluence.

Viaduct Creek Reach 6, Photo 3, 2007-08-16. Viaduct Creek, upstream of confluence.

Viaduct Creek Reach 6, Photo 4, 2007-08-16. Facing downstream, property line of 458 Viaduct Ave. Channel has eroded.

Viaduct Creek Reach 7, Photo 1, 2007-08-16. Property of 458 Viaduct Ave, facing downstream. Channel is heavily vegetated with reed canary grass.

Viaduct Creek Reach 7, Photo 2, 2007-08-16. Property of 458 Viaduct Ave, pedestrian bridge. Channel has been ditched and over-grown with reed canary grass.

Viaduct Creek Reach 7, Photo 3, 2007-08-16. Property of 458 Viaduct Ave. As seen in the background, channel has been ditched.

Viaduct Creek Reach 8, Photo 1, 2007-08-16. Property of 455 Green Mountain Road. A ditch has been dug through the wetland to allow for drainage and usage of the surrounding farmland.

Viaduct Creek Reach 8, Photo 2, 2007-08-16. Facing downstream towards property of 424 Viaduct Avenue. Area dries up in the summer and is grazed/trampled by cattle.

Viaduct Creek Reach 8, Photo 3, 2007-08-16. Facing upstream on the property of 414 Viaduct Avenue. Area dries up in the summer and is grazed/trampled by horses.

Viaduct Creek Reach 8, Photo 4, 2007-08-16. Facing upstream on the property of 414 Viaduct Avenue. Area is trampled by horses.

Viaduct Creek Reach 8, Photo 5, 2007-08-16. Property of 414 Viaduct Avenue. Channel is apparent and is completely dry. Noted horse manure in the dry channel bed.

Viaduct Creek Reach 9, Photo 1, 2007-08-16. Property of 402 Viaduct Avenue. Facing the Viaduct Creek and Excelsior Creek confluence. Due to the lack of trampling, the channel has re-established itself.

Viaduct Creek Reach 9, Photo 1, 2007-08-16. Property of 414 Viaduct Avenue. Upstream of the Viaduct Creek and Excelsior Creek confluence. Viaduct Creek is heavily down-cut and eroded.

Viaduct Creek Reach 9, Photo 2, 2007-08-16. Facing upstream on the property of 414 Viaduct Avenue. Creek has seriously down-cut from large flows.

Viaduct Creek Reach 9, Photo 3, 2007-08-16. Property of 414 Viaduct Avenue. Current property owners have placed a large compost pile next to the creek.

Viaduct Creek Reach 10, Photo 1, 2007-08-16. Facing downstream on Viaduct Avenue crossing. Creek crosses underneath road and enters into the 414 Viaduct Avenue Property.

Viaduct Creek Reach 10, Photo 2, 2007-08-16. Facing downstream towards Viaduct Avenue. Noted large substrate and bedrock at culvert crossing.

Viaduct Creek Reach 10, Photo 3, 2007-08-16. Facing upstream. Creek is well vegetated, has some erosion on the outside bends and has access to a developed floodplain.

Viaduct Creek Reach 10, Photo 4, 2007-08-16. Facing upstream, creek appears to have down-cut due to a head-cut upstream.

Viaduct Creek Reach 10, Photo 5, 2007-08-16. End of Reach 10 due to a headcut approximately 60cm in depth.

Viaduct Creek Reach 11, Photo 1, 2007-08-14. At headcut, facing upstream.

Viaduct Creek Reach 11, Photo 2, 2007-08-16. Facing upstream, channel is heavily vegetated and a large floodplain area is present.

Viaduct Creek Reach 12, Photo 1, 2007-08-14. Facing upstream towards property of 365 Viaduct Avenue. Beginning of reach 12.

Viaduct Creek Reach 12, Photo 2, 2007-08-14. On property of 365 Viaduct Avenue, facing downstream. Creek-bed is completely dry and has limited riparian vegetation.

Viaduct Creek Reach 12, Photo 3, 2007-08-14. On property of 365 Viaduct Avenue, facing upstream. Noted chickens grazing in the channel. Channel is too straight and too wide.

Viaduct Creek Reach 12, Photo 4, 2007-08-14. Facing upstream with the driveway behind the photographer. Creek-bed has some vegetation in the channel.

Viaduct Creek Reach 12, Photo 5, 2007-08-14. Facing upstream past property line. Some stream bank erosion noted. A working water pump was noted to the left.

Viaduct Creek Reach 13, Photo 1, 2007-08-14. Facing property of 335 Viaduct Avenue. In 2007, 335 property owners attempted to dig a driveway to by-pass the driveway of property 345 Viaduct Ave.

Viaduct Creek Reach 13, Photo 2, 2007-08-08. The riparian wetland area has been narrowed up and bermed, changing the hydrology of the creek.

Viaduct Creek Reach 13, Photo 3, 2007-08-14. Facing Viaduct Avenue, the driveway extends from the road and connects to the driveway of 345 Viaduct Avenue.

Viaduct Creek Reach 13, Photo 4, 2007-08-14. New driveway connecting to the existing driveway of 345 Viaduct Avenue.

Viaduct Creek Reach 14, Photo 1, 2007-08-14. Facing upstream toward Logan Park.

Viaduct Creek Reach 14, Photo 2, 2007-08-14. There are multiple small, narrow channels that seem to have likely been initiated by an old road whose ruts collected surface flow.

Viaduct Creek Reach 14, Photo 3, 2007-08-14. Facing upstream, pond near 235 Hector Road. Bullfrogs were observed in this pond.

Viaduct Creek Reach 15, Photo 1, 2007-08-14. Logan Park. Facing downstream.

Viaduct Creek Reach 15, Photo 2, 2007-08-14. Facing downstream from Logan Park trail culvert crossing. Channel is well vegetated with riparian vegetation.

Viaduct Creek Reach 16, Photo 1, 2007-08-14. Facing upstream from Logan Park trail culvert crossing. A definitive channel no longer exists.

Viaduct Creek Reach 16, Photo 2, 2007-08-14. Upstream from culvert trail crossing. Channel becomes a moist forested wetland.

Appendix 3E Photo Record- Durrell Creek

Durrell Creek PFC Assessment September 2007.

Durrell Creek Reach 1, Photo 1, 2007-09-18. Facing downstream, toward its confluence with Colquitz Creek near Loenholm Road.

Durrell Creek Reach 1, Photo 2, 2007-09-18. Facing upstream toward Wilkinson Road. Banks are bare and muddy.

Durrell Creek Reach 1, Photo 3, 2007-09-18. The banks are oversteepened and erosion is evident. Note the presence of English ivy.

Durrell Creek Reach 1, Photo 4, 2007-09-18. Looking downstream from Wilkinson Road at the end of reach 1. Himalayan blackberry and a variety of pea are in the forefront.

Durrell Creek Reach 2, Photo 1, 2007-09-18. Culvert where the stream travels downstream under Wilkinson Road.

Durrell Creek Reach 2, Photo 2, 2007-09-18. Upstream of Wilkinson Road. Banks are vegetated and some floodplain is present on the left bank.

Durrell Creek Reach 2, Photo 3, 2007-08-08. Facing downstream, standing on McKenzie Ave (London Drugs is to the right). Banks are heavily overgrown with invasive species.

Durrell Creek Reach 2, Photo 4, 2007-09-18. Looking upstream toward Wilkinson Road Correctional Centre. Note presence of reed canary grass and young willow.

Durrell Creek Reach 2, Photo 5, 2007-09-18. Small man-made pond adjacent to power tower. Banks are oversteepened.

Durrell Creek Reach 2, Photo 6, 2007-09-18. Looking upstream from Wilkinson Road Correctional Centre. Mowing occurs near to the edge of the channel.

Durrell Creek Reach 2, Photo 7, 2007-09-18. The channel through Wilkinson Road Correctional Centre. Clay banks are steep and bare.

Durrell Creek Reach 2, Photo 8, 2007-09-18. One of the man-made ponds within the correctional centre property. Banks are vertical and bare.

Durrell Creek Reach 3, Photo 1, 2007-09-18. Looking upstream from Wilkinson Road Correctional Centre. There is little vegetation present.

Durrell Creek Reach 3, Photo 2, 2007-09-18. Paddock area borders the left bank of the stream.

Durrell Creek Reach 3, Photo 3, 2007-09-18. Downstream end of reach 3. Banks are armoured with rock. No vegetation is present other than grass on the right bank.

Durrell Creek Reach 3, Photo 4, 2007-09-18. Facing downstream from Interurban Road. Channel is armoured and there is little vegetation.

Durrell Creek Reach 4, Photo 1, 2007-09-18. Facing upstream from Interurban Road. Channel located in the middle of agricultural fields.

Durrell Creek Reach 4, Photo 2, 2007-09-18. Looking upstream. Channel is heavily vegetated.

Durrell Creek Reach 4, Photo 3, 2007-09-18. Facing downstream, from green trestle bridge. The channel is located within the line of vegetation in the background.

Durrell Creek Reach 4, Photo 4, 2007-09-18. Facing upstream from the green trestle.

Durrell Creek Reach 4, Photo 5, 2007-09-18. Facing upstream of Granville Avenue. Small, terraced floodplain at left bank. Horse and cow paddocks line both banks.

Durrell Creek Reach 4, Photo 6, 2007-09-18. Looking downstream from Granville Avenue. Flow is low and vegetation is encroaching upon the channel.

Appendix 4. Rosgen Stream Type Classification

The physical processes that define the geomorphic character of streams and rivers are universally observable. The objective of classifying streams on the basis of channel morphology is to set categories of discrete stream types so that consistent, reproducible descriptions and assessments of condition and potential can be developed. The Rosgen classification scheme is a uses a hierarchical assessment of stream channel morphology to:

1. Predict a river's behavior from its appearance;
2. Develop specific hydraulic and sediment relationships for a given stream type and its state;
3. Provide a mechanism to extrapolate site-specific data to stream reaches having similar characteristics; and
4. Provide a consistent frame of reference for communicating stream morphology and condition among a variety of disciplines and interested parties (Rosgen, 1996).

Level I classification

A Level I classification in the Rosgen system describes the geomorphic characteristics that result from integrating basin relief, landform, and valley morphology. The dimension, pattern, and profile of rivers are used to delineate geomorphic types at a coarse scale (Rosgen, 1996). This procedure is typically conducted through the evaluation of topographic maps, aerial photographs, and field verification. A Level I stream classification serves the following four primary functions:

1. It integrates basin characteristics, valley types, and landforms with respect to the morphology of the stream system;

2. It provides a framework for organizing and communicating river information;

3. It provides the information for prioritizing the need for detailed assessments or companion inventories; and

4. It provides information that can be used to correlate similar general level inventories such as fisheries habitat, boating categories, riparian habitat, etc.

The information derived from a Level I evaluation is the least specific, but it provides a rapidly-obtainable starting point from which a detailed evaluation can be drawn. Through a Level I characterization, valley types and landforms are evaluated, and the study stream is then categorized as one of the following nine stream types: Aa+, A, B, C, D, DA, E, F, and G (Figure 3 and Figure 2). The reader is referred to Rosgen (1996) for a comprehensive treatment of all stream and valley types.

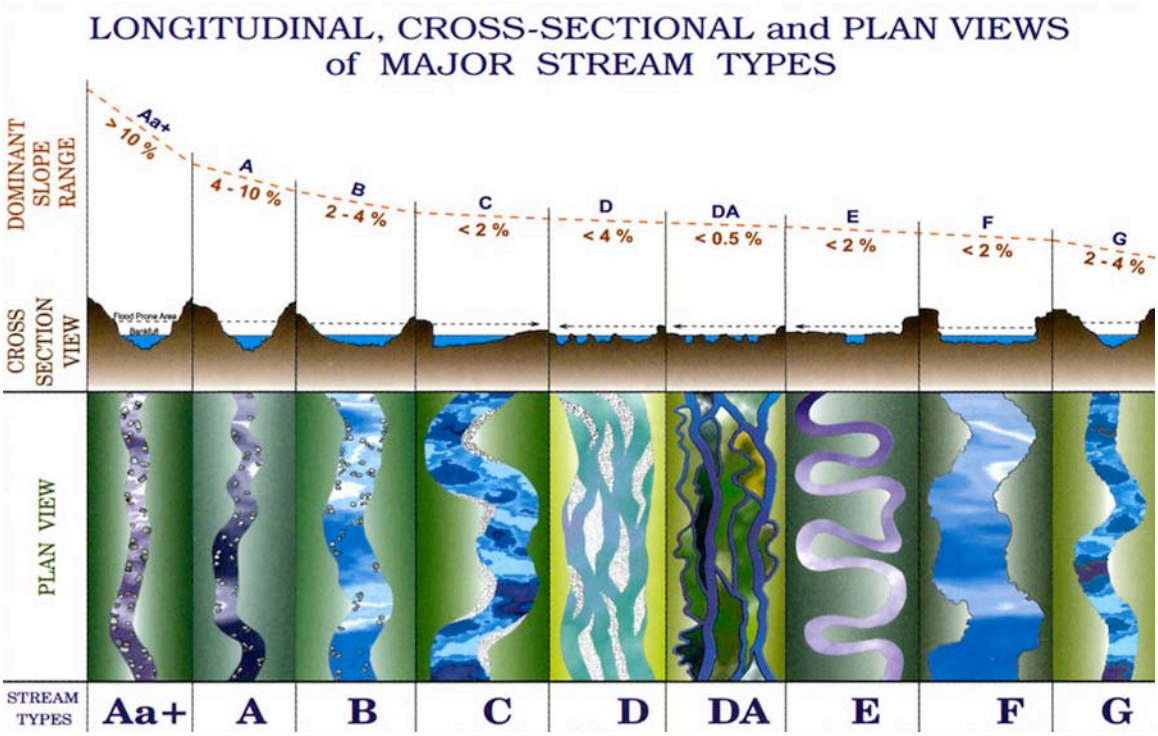


Figure 2. Broad level stream classification delineation showing longitudinal, cross-sectional, and plan views of major stream types (Rosgen and Silvey, 1998).

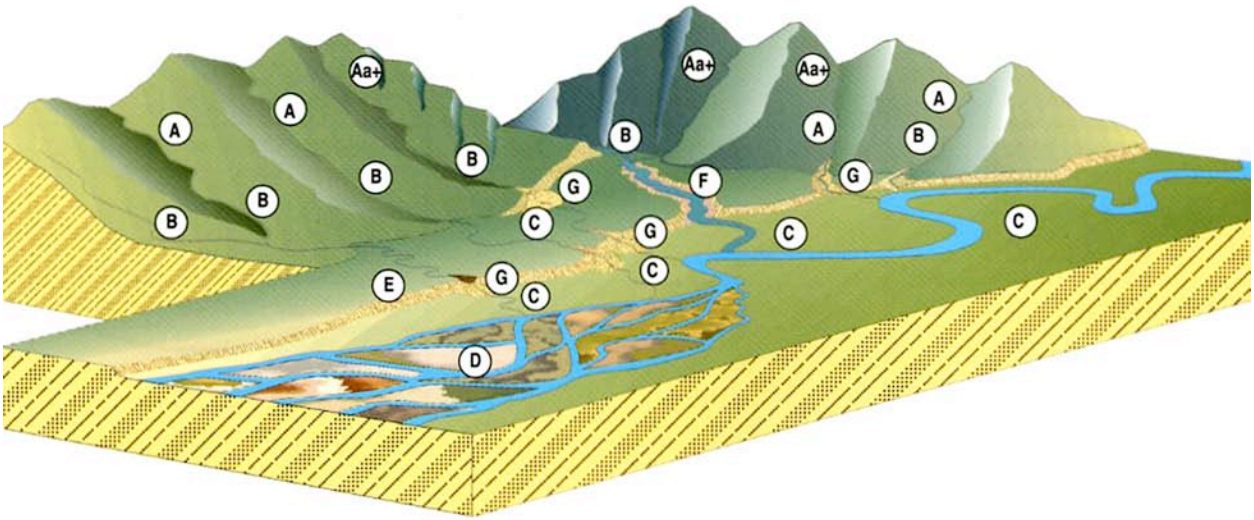


Figure 3. Example of broad level delineation of stream types at Level I (Rosgen and Silvey, 1998)

Level II classification

"River and stream morphology is determined by the interplay of the forces acting to create channel dimensions versus the forces resisting that action. River bed features, dimensions, and patterns for rivers influenced by structural controls are naturally different from those systems influenced by alluvial patterns of deposition. While Level I stream types are distinguished primarily on the basis of the valley landforms and channel dimensions observable on aerial photos and maps, Level II stream types are determined with field measurements from specific channel reaches and fluvial features within the river's valley" (Rosgen, 1996).

Level II stream type delineation criteria are based on:

Channel cross-section:

- Entrenchment Ratio: A computed index value which is used to describe the degree of vertical containment of a river channel (width of the flood-prone area at an elevation twice the maximum bankfull depth/bankfull width) (see Figure 1).
- Width/Depth Ratio: An index value which indicates the shape of the channel cross-section (ratio of bankfull width/mean bankfull depth)
- Dominant Channel Materials: A selected particle size index value, the D50, representing the most prevalent of one of six channel material types or size categories, as determined from a channel material size distribution analysis.

Longitudinal profile:

- Slope: Slope of the water surface averaged for 20-30 channel widths.
- Bed Features: Secondary delineative criteria describing channel configuration in terms of riffle/pools, rapids, step/pools, cascades and convergence/divergence features which are inferred from channel plan form and gradient.

Plan-form (pattern) features as measured and computed from collected field data:

- Sinuosity: defined as stream length/valley length or valley slope/channel slope.
- Meander width: A secondary delineative criterion defined as meander belt width/bankfull width that describes the degree of lateral channel containment, and is primarily used is assisting aerial photo delineation of stream types (Rosgen, 1996).

The Level II classification is summarized in Figure 4.

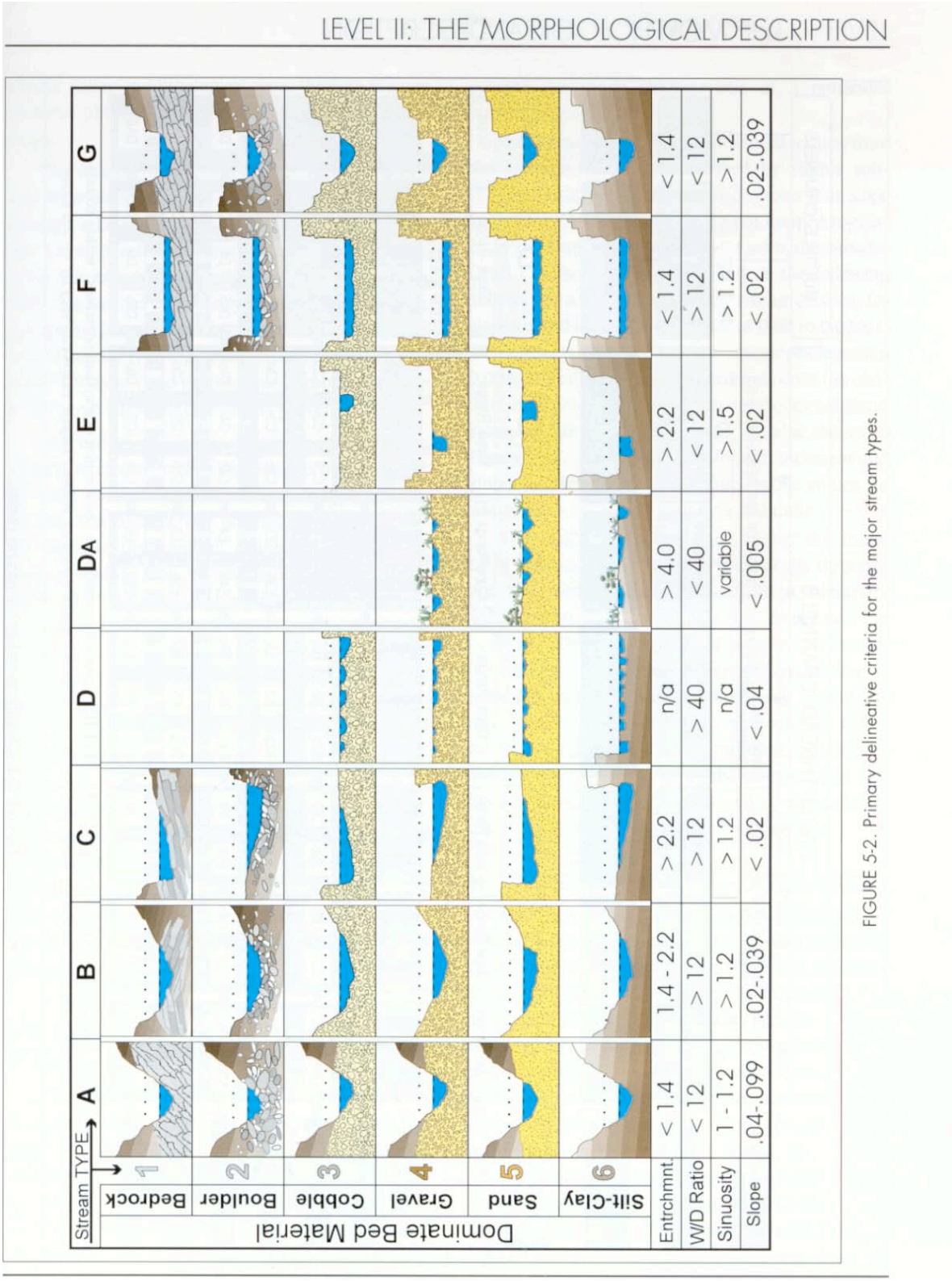


Figure 4. Delineative criteria for the major stream types in Rosgen's stream classification system (Rosgen, 1996).

Appendix 5. Photopoint Monitoring

Photopoint Monitoring Field Procedures

Photopoint Photographs

Photopoint photographs are standardized pictures that are taken of 10 meter transects containing target resources at the selected monitoring site. The prime objective is not to capture every square meter of the sample site on film, but rather to give a representative view of the site conditions and resources of management concern. All photopoint photographs contain a meter board that is placed at a standard distance of 10 meters from the camera point. When possible, the meter board is placed in the center of each picture and the focal point (cross hairs) of the camera is centered on the 1 meter mark (1M) of the meter board (in unique circumstances, the 0M and 2M are also acceptable focal points). The meter board serves three important functions:

1. to embed a standard scale within each photograph so that features in close proximity to the meter board can be measured;

2. to provide a focal point for the camera so that repeat photography can be achieved; and

3. to provide a scale for the purposes of grid sampling analysis.

Both the location of the camera and the meter board are permanently marked so that precise replication of the photopoint can be achieved provided the camera height and focal point are known (Figures 1 and 2). Placing the meter board at a standard distance of 10 meters from a 35 mm camera with a 50 mm lens was established by Hall (2001) to ensure at least 25% of the overall photograph height was captured by the meter board.

It is important to note that although the distance between the camera point and meter board is 10 meters, only approximately 7 meters are depicted on the resulting photograph due to optical limitations of a 35 mm camera with a 50 mm camera lens. To overcome this limitation, a second photopoint can be taken in which the locations of the camera and meter board are swapped. Establishing a second photopoint in the opposite direction of the first photopoint ensures that the entire 10 meter transect between the two permanent marker pins is captured on film. The contents of these photopoints can then be compared with other quantitative data collection techniques that are conducted between the two permanent marker pins (*e.g.* transect profiles and vegetation intercept samples).

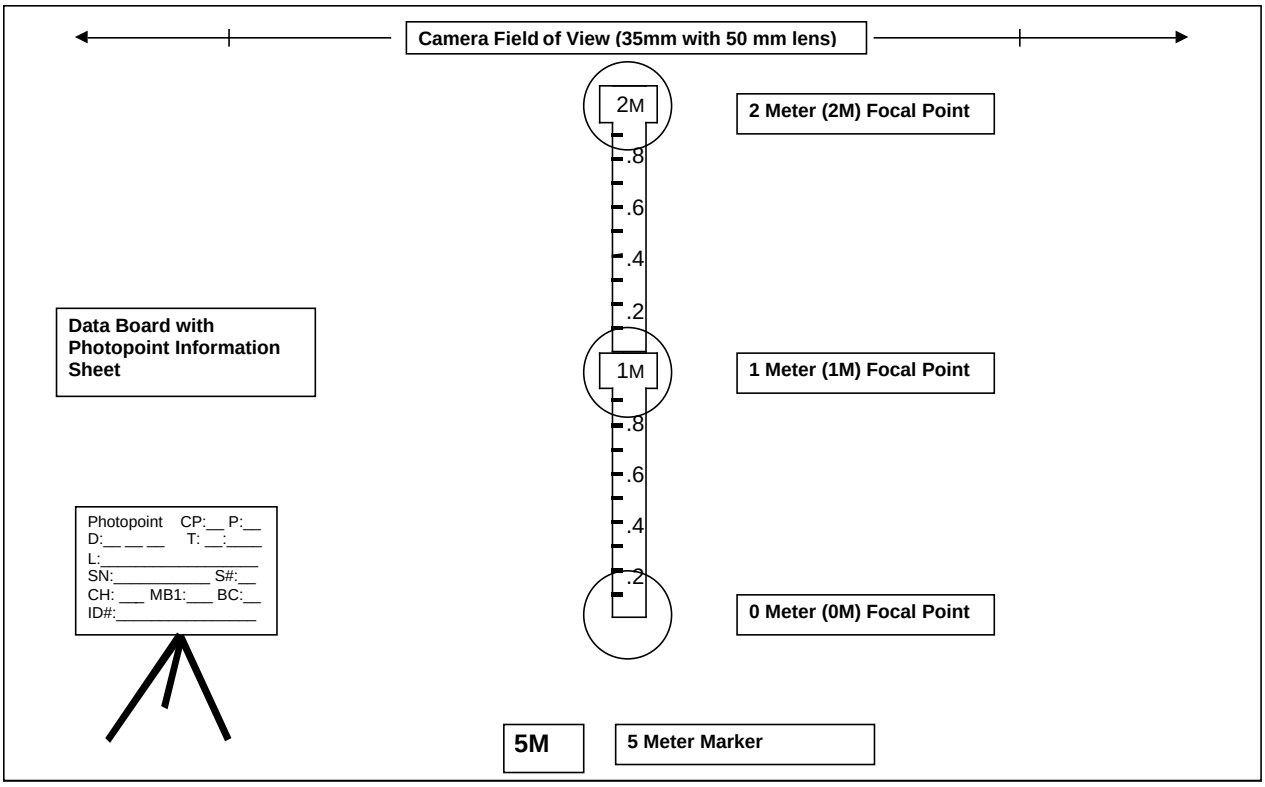


Figure 5. Schematic of meter board, data board and 5 meter marker within a photopoint photograph. 0M, 1M and 2M focal point options are also depicted.

Figure 6. Typical photopoint setup (left) and replication of the photopoint (right) showing 90-100% overlap in field of view.

Technique

The following guidelines outline the procedure for shooting photopoint photographs:

1. Prior to entering the field, determine day-specific field objectives, assemble appropriate field resources (maps, site locations, etc.), check weather reports and assign work positions to crew members. For a three person crew, positions include 1. data recorder 2. meter board, data board and distance measurement technician; and 3. photographer / compass operator.

2. Use maps, aerial photographs and /or GPS to locate study site. Review site monitoring objectives and conduct a site assessment to identify target resources that require monitoring.

3. Identify the location name (broad geographic area), sample site name (specific area) and sample site number. A sample site is defined as not exceeding 1 hectare in total area. Each successive sample site is sequentially numbered (provided that the location name remains constant) and named according to a distinguishable feature contained within or adjacent to the site. If a new location name is selected, site numbering reverts to 1.

Example:

Location Name: Cherry Creek
Site Name: Day use picnic area
Site Number: 1

Location Name: Mark Creek
Site Name: Main bridge
Site Number: 1

Location Name: Cherry Creek
Site Name: Day use picnic area
Site Number: 2

Location Name: Mark Creek
Site Name: Upstream of wetlands
Site Number: 2

4. Identify a representative 10 meter linear transect at the sample site. More than one transect may be required to capture the target resources at a specific site. When selecting an appropriate transect, consideration must also be given to accessibility based on current and future vegetation and soil conditions, and absence of such safety hazards as snags, avalanche chutes and steep slopes. <u>Selecting a representative transect is the most challenging and subjective component of the entire photopoint process</u>. Transect selection is significantly improved by sighting through the camera at each potential transect location. What may appear to be a good transect to the human eye, may prove inadequate when viewed through a camera lens. In general, transect selection cannot be random as the site conditions (slope and vegetation) limit where photopoints can be taken.

5. Measure the selected 10 meter linear transect with a fiberglass measuring tape or a pre-measured piece of string. The measuring tape should be leveled and held approximately 1 meter above the ground. Always ensure that the measuring tape is oriented so that the 0 meter mark is on the end point that is associated with the minimum azimuth (compass

bearing value closest to 0°) and the 10 meter mark is on the end point that is associated with the maximum azimuth (bearing value closest to 360°). Orienting the transect line in this manner standardizes transect orientation and eliminates inconsistencies in labeling camera points. All azimuths are recorded to true north.

6. Load the camera(s) with film. Be sure to check that the film is securely attached to the take up spool: the winder knob should turn as the film advance lever is depressed. Advance the film to frame number 1.

7. Immediately take a photo of the film information sheet. Be sure that the correct information (ASA/ISO and roll #) is recorded for each camera separately as slide and print film will normally be different speeds (ASA).

8. Place the camera on the tripod. A quick release foot is very useful and makes switching to another camera, without disturbing the setup, much easier.

9. Center the camera tripod over the 0 meter mark of the transect line and adjust camera height until transect and target resources are in field of view. Standard camera heights range from 1 to 1.5 meters depending on site topography and configuration of target resources. Designate this camera location as camera point A. When the camera and meter board locations are swapped to do the next photo for the transect, the next position of the camera will be labelled camera point B. These two photos complete one transect. If a second transect is established at the sample site, label the third camera location camera point C (0 meter mark) and the fourth camera point D (10 meter mark). In other words, each unique camera location is given a unique letter. If a camera location is reused it retains its original letter. It is uncommon to install more than 4 camera points at a single sample site. Use the same camera point labeling process at each successive sample site, starting with the letter A.

10. Install a meter board at the 10 meter mark of the transect. The location of the meter board is photopoint 1. Ensure the meter board is level and is centered in the camera field of view. The camera is always oriented in the landscape position (long axis of photo is horizontal). Select 0M, 1M or 2M as the camera focal point (1M is the preferred focal point).

11. On the 10 meter transect between the camera and the meter board, locate the 5 meter mark and place the 5 meter marker 5 cm from the transect line. The 5 meter marker provides a spatial scale within the photopoint and also serves as a focal point for landscape photographs (See Figure 1).

12. Fill out the field data form. Sketch a map and include all bearings and distances. Record the photo number as appropriate for each roll of film (colour print, black & white, slide).

13. Fill out the photopoint information sheet. Photopoint photographs are coded according to the following procedure:
    YY MM DD - First 3 letters of site name - camera location and photopoint number.

For example, photopoint 1, taken at the site named Creek Mount, from camera point A on December 31, 1999 would be coded 99 12 31-CRE-A1.

14. Attach photopoint information sheet to the data board and install the data board at 5 meters from the camera (maximum distance of 6 meters if necessary due to obstacles etc.) Ensure that the data board is not obscuring any of the target resources and is evenly illuminated (either total shade or total sunlight, but a mix of illumination should be avoided). The data board is placed in the camera field of view and is used to imbed site information into each photopoint photograph including: date, time, location, site name, site number, camera height, camera point, photopoint, photocode and distance / bearing of meter board from camera location. The information contained on photopoint information sheets is for photographic identification, replication and database storage purposes. Embedding detailed site information into each photograph eliminates the need to maintain a separate site information database.

15. Check to ensure the camera aperture is set to a standardized F-stop of 16 or 22. This standardizes the depth of field to ensure that all features which are beyond the 5 meter marker are in focus. Also check to ensure that the correct film speed (ISO level) has been set.

16. Read the light meter and adjust the shutter speed accordingly. If the shutter speed cannot be set to optimize the lighting conditions, a photographic bracketing procedure may have to be used in which 3 photographs are taken over the appropriate range of shutter speeds. To bracket a photograph, select a shutter speed which represents the ideal light level according to the light meter. Take one photograph at the optimum speed, one photograph at the next highest speed and one photograph at the next lowest speed. Use a cable release at shutter speeds of 1/60 sec. or slower.

17. Focus the camera on the meter board focal point (0M, 1M or 2M) and alert the crew that camera is ready It is important to note that the contents of data board will not necessarily be in focus in the view finder. If the correct f-stop has been used the data board will be in focus in the final photo. In rare circumstances, it may not be possible to capture all of the target resources in a single photopoint photograph. In such situations, 2 photopoint photographs are taken in which the meter board is first aligned on the right hand side of the field of view, and then aligned on the left hand side. Subsequent to developing, the photographs can be overlapped along the meter board to obtain a complete image of all target resources.

18. Shoot the photopoint with all three film types (depending on number of film types being used). Use quick release bases on each camera to increase speed of camera swapping on the tripod. Ensure that the field of view and focal point remain constant between cameras.

19. Install permanent marker pins at the camera and meter board locations (0 meter and 10 meter marks). Use case-hardened sidewalk stakes if locations are on soil (requires a sledge hammer) and use brass survey pins if locations are on bedrock (requires a Hilty rock drill ™, generator and rock grout). Permanently marking the location of the camera and meter board ensures precise photopoint replication provided that the camera height

and focal point are also recorded. In addition, the marker pins can be used for other non-photopoint purposes such as transect profile surveys and point intercept samples. If the possibility exists that the permanent marking pins may be removed by a natural or human caused disturbance, it may be necessary to select a witness point to aid in camera point relocation. If a witness point is designated, then the location and bearing of all camera points must be measured to the witness site. The witness point must also be marked with a permanent marker pin and tagged.

To complete the transect:

20. Swap the location of the camera and the meter board by placing the camera on the 10 meter mark (camera point B) and the meter board on the 0 meter mark (camera point A). Adjust camera height until the transect and target resources are in the field of view. Ensure that the meter board is level and is centered in the camera field of view. Select 0m, 1m or 2m as the camera focal point. Record the true north bearing from the camera location to the meter board (should be original bearing plus 180°).

21. Add the appropriate data to the original field data form and create a new photopoint information sheet.

22. Attach the photopoint information sheet to the data board and install the data board at a maximum distance of 6 meters from the camera. Ensure that the data board is not obscuring any of the target resources.

23. Turn the 5 meter marker to face the camera.

24. Shoot photopoint with all three film types. The first photopoint taken at a camera location is labeled 1. Each successive photopoint taken from the same camera location is incremented by one. (e.g. A-1, A-2, A-3 designates 3 photos all taken with the camera at exactly the same location (“A”) but facing three different photopoints or targets (“1”, “2” and “3”)).

25. Confirm that all the necessary site data has been recorded by means of a check list.

Location: _____ Site Name: _____ Site #: _____

Lat./ Long. or UTM: _____

Date (YYYY/MM/DD)_____ Time (HH:MM) _____ Data Recorder:_____

SLD#: _____

BW#: _____

CLR#: _____

compass declination ___ E/W

Map Checklist:

O North Arrow
O Camera Locations (A H)
O Photopoint Locations (#)
O Landscape Location (L)
O Site Setup Location (S)
O Veg. Plot Locations (V)
O Meter Boards (MB)
O Direction of Trail
O Transect
O Predominant Vegetation
O Landmarks

PHOTO INFORMATION							DISTANCE (M)		Bearing (True North –19.35°E in Victoria)			
CAM LOC	PHOTO POINT#	SLD #	B/W F#	CLR F#	CH (M)	FOCAL POINT	CAM TO MB1	WIT TO CAM	CAM TO MB1	CAM TO MB2	FOCAL BEARING	WIT TO CAM

FILM INFORMATION

ROLL: _____ ISO/ASA: ___

DATE (Y/M/D): ____ ___ ____

CP= CAMERA POINT D= DATE (Y/M/D)

P=PHOTOPOINT # T=TIME

L=LOCATION NAME SN=SITE NAME

CH=CAMERA HEIGHT S#=SITE NUMBER

MB1/MB2= 1ST/2ND METER BOARD DISTANCE

CB°= COMPASS BEARING FROM CAMERA TO METER BOARD

FB= FOCAL BEARING FP=FOCAL POINT

ID= PHOTOGRAPH IDENTIFICATION NUMBER

PHOTOPOINT CP___P___

D___ ___ ___ T___ : ___

YEAR (YY) MONTH (MM) DAY (DD) HOUR(HH) MINUTE (MM)

L _____

SN _____ S# _____

CH _____ MB1 ___ CB° _____

Camera Height (m) Distance Camera to Meterboard (m) Compass bearing Camera to Meterboard

ID #

Appendix 6. Glossary

Key Terms

Abiotic– of or related to non-living things; independent of life of living organisms.

Adfluvial—species or populations of fish that do not go to sea, but live in lakes and enter streams to spawn.

Aggradation–a modification of the earth's surface in the direction of uniformity of grade by deposition.

Alluvial– Deposited by running water.

Alluvial fan channel–streams generally located on foot slope landforms in a transitional area between valley floodplains and steep mountain slopes where a fan-shaped deposit of sand, gravel and fine material is formed.

Alluvium– material deposited by rivers and streams including sediment laid down in river beds, flood plains, lakes, and at the foot of mountain slopes and estuaries.

Anadromous– fish that ascend from the sea to breed in freshwater streams.

Bedload– sand, silt and gravel, or soil and rock debris rolled along the bottom of a stream by moving water.

Biotic- of or related to living things; caused or produced by living organisms

Bog– a wetland which has poorly drained, acidic, organic soils materials that support vegetation that can be either sphagnum moss or herbaceous plants or sedges, rushes, and forbs or may be a combination of sphagnum moss and herbaceous plants.

Buffer strip– an area adjacent to a stream or water body that is retained for ecological function.

Capability–the highest ecological status a riparian-wetland area can attain given political, social or economic constraints. These constraints are also referred to as limiting factors.

Channel types– stream section classifications based on physical attributes such as channel gradient, channel pattern, stream bank incision and containment, and riparian plant community composition.

Cirque– A semicircular feature found in glaciated mountains which is characterized by a steep, nearly vertical headwall, a concave floor, and a lip or threshold at the entrance.

Debris torrent—mass erosion process which occurs when a debris avalanche enters a high gradient stream channel, mixes with water, and continues downstream as a slurry of mud, large woody debris and water. Debris torrents are usually confined within the stream channel until they reach the valley floor where the debris spreads out, inundating vegetation and forming a broad surface deposit.

Delta– a nearly flat alluvial deposit between diverging branches of the mouth of a river, often triangular in shape.

Discharge– the volume of water transported by a stream over a given period of time.

Ecosystem– a complete, interacting system of organisms together with their environment (for example a bog, forest, or lake).

Ephemeral—a stream that flows in direct response to rainfall and snowmelt but not during dry seasons. Its channel is above the level of the water table.

Estuarine– deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but which have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is diluted by freshwater runoff.

Estuary– relatively flat, intertidal, and upland area where saltwater meets freshwater, as at the heads of bays and the mouths of streams.

Fen– a wetland of slow-moving, nutrient rich, often alkaline water with sedge peat forming the substrate.

Floodplain– A relatively flat landform adjacent to a stream that is composed of primarily unconsolidated depositional material derived from the stream and that is subject to periodic flooding.

Glacial till– gravel, boulders, sand, and finer materials transported and deposited by a glacier.

Hydric– of, pertaining, or adapted to a wet or moist environment.

Hydrophytic vegetation– plants typically found in wetlands and dependent upon wetland moisture regimes for growth and reproduction.

Intermittent– A stream or body of water that does not flow continuously.

Interrupted– A stream with discontinuities in *space*.

Karst—A type of topography that develops in areas underlain by soluble rocks, primarily limestone. Features may include sinkholes, collapsed channels or caves.

Large Woody Debris (LWD) – any large piece of relatively stable woody material having a diameter of at least 4 inches and a length greater than 3 feet that intrudes into a stream channel; also called Large Organic Debris (LOD) or Large Woody Material (LWM).

Lentic—pertaining to or living in still water (lakes, ponds, etc.)

Lotic—pertaining to or living in moving water (streams, rivers, etc.)

Mitigation– measures designed to counteract environmental impacts or to make impacts less severe.

Muskeg—a common term used in Southeast Alaska to collectively describe wetlands dominated by sphagnum moss (bogs).

Potential- the highest ecological status a riparian-wetland area can attain given no political, social or economic constraints: it is often referred to as the "potential natural community" (PNC).

Potential Plant Community (PPC) - Represents the seral stage the botanical community would achieve if all successional sequences were completed without human interference under the present environmental conditions.

Potential Natural Community (PNC) - The biotic community that would become established if all successional sequences were completed without interferences under the present environmental conditions.

Perennial stream—A stream that has year round flow.

Process group—broad stream classification groups which describe the interrelationship between watershed runoff, landform relief, geology, and glacial or tidal influences on fluvial erosion and deposition processes.

Proper Functioning Condition- Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to: dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity.

Resident fish– non-migratory fish that complete their entire life cycle in freshwater.

Riparian area– the area including a stream channel, lake or estuary bed, the water itself, and the plants that grow in and on the land next to the water.

Riparian ecosystem– land next to water where plants that are dependent upon a perpetual source of water grow.

Riparian-wetland area– An area that is saturated or inundated at a frequency and duration sufficient to produce vegetation typically adapted for life in saturated soil conditions. It is also the transitional area between permanently saturated wetlands and upland areas often referred to as a riparian area. This transition area has vegetation or physical characteristics reflective of permanent surface or subsurface water influence.

Runoff—water which travels over the ground surface, through the upper soil layers and/or within the water table.

Sediment—solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Seral stage– One of a series of plant communities that follows another in time on a specific site.

Soil productivity– capacity of a soil, in its normal environment, to produce plant growth, due to the soil's inherent chemical, physical, and biological properties.

Stream order—First order streams are the smallest unbranched tributaries; second order streams are initiated by the point where two first order streams meet; third order streams are initiated by the point where two second order streams meet, and so on.

Sub-basin—area that contributes to a drainage or stream within a watershed.

V-notch—a very steep, deeply incised stream channel which is usually situated on steep mountain slopes or hill slopes. Has a characteristic ``V" shaped cross-section.

Watershed– area that contributes water to a drainage or stream.

Wetlands– areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wind throw– areas where trees are uprooted, blown down, or broken off (windsnap) by storm winds.

Appendix 7. Watershed Map Showing PFC Ratings