

# Resource Management FACTSHEET



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COLUMBIA

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## WATER QUALITY EVALUATION OF AGRICULTURAL RUNOFF IN THE LOWER FRASER VALLEY

This factsheet is intended to help professional advisors decide if agricultural runoff is a pollution concern or not. The factsheet was produced with input from Fisheries and Oceans Canada, Environment Canada, BC Ministry of Environment, Lands and Parks (BCMELP) and BC Ministry of Agriculture and Food (BCMAF).

Pollution occurs when substances or contaminants are discharged into the environment that substantially alter or impair the usefulness of the environment. The following water uses should be considered in evaluating water quality concerns: human health, drinking water, aquatic environment (mainly fish), irrigation and recreation/aesthetics.

A number of parameters should be evaluated when looking at agricultural runoff water quality. The table on the back side of this factsheet shows parameter levels that are not likely to be a concern.

### GENERAL EVALUATION FOR WATER QUALITY CONCERNS

For most pristine watercourses, a change of 20 percent in any parameter from upstream to downstream of a point or diffuse source should be viewed with concern. In some cases where streams are already impacted, a change of 20 percent could be critical.

For runoff water that meets the *water quality objectives* for that watercourse, the runoff is likely not causing a concern. *Water quality objectives* are published for Fraser River and tributaries from Hope to Kanaka Creek, south of the Fraser River; Boundary Bay and its tributaries; and Kanaka Creek and the Brunette, Coquitlam and Pitt River.

Other documents that can be used when assessing water quality include *Canadian Water Quality Objectives*, Canadian Council of Ministers of the Environment (CCME), and *Approved and Working Criteria for Water Quality 1994*, BCMELP. The *Pollution Control Objectives for Food Processing, Agriculturally Orientated, and Other Miscellaneous Industries*, BCMELP, provides information on acceptable levels for discharges.

Fisheries and Oceans Canada has a publication, *A Biophysical Survey of Thirty Lower Fraser Valley Streams*, that may be useful when reviewing fisheries concerns.

### SAMPLING STRATEGIES

Sample at the beginning of rain events when runoff starts. The first heavy rains in the fall (first flush) will usually have the highest concentration of contaminants.

Suggest the following sampling and testing strategy at any agricultural site:

field	dissolved oxygen (D.O)
field	temperature
field or lab pH	pH
lab	NH <sub>4</sub> -N (calculate NH <sub>3</sub> -N from tables p H and temperature)
lab	acidity @ pH 8.3 if woodwaste is a concern

If any of the above are at levels that will likely be a concern, also check the following parameter for contamination from:

- Woodwaste – Fe and resin acids (TRA)
- Manure – Fecal coliform, and NO<sub>3</sub>-N
- Unknown - COD and/or BOD

Refer to the *1993 Recommended Guidelines for Wastewater Characterization in the Fraser River Basin, Volume II, Draft Methods Manual*, Environment Canada, for sampling procedures

<b>PARAMETER FOR WATER QUALITY EVALUATION OF AGRICULTURAL RUNOFF</b>				
<b>PARAMETER</b>	<b>OTHER FACTORS</b>	<b>LEVELS THAT ARE NOT LIKELY A CONCERN</b>	<b>LEVELS THAT ARE LIKELY A CONCERN</b>	<b>CONCERNS RELATED TO PRIMARY (SECONDARY)</b>
<b>Acidity (using buffer @ pH 8.3)</b>	If from woodwaste		> 15 mg/L	Fisheries
<b>Bacteria – fecal coliform</b>		< 100 CFU/cL	> 200 CFU/cL	Irrigation
		0 CFU/cL	> 0 CFU/cL	Drinking water
<b>Bioassay (96 hr)</b>		10% or less die	50% or more die	Fisheries
<b>BOD</b>	Big stream	< 40 mg/L	> 60 mg/L	Fisheries
	Small stream	< 20 mg/L	> 40 mg/L	
<b>COD</b>	Should also consider D.O.	< 30 mg/L	> 100 mg/L	Fisheries
<b>Chlorine</b>	Total residual chlorine	< 2µ/L	> 100 µ/L	Fisheries
<b>Colour</b>	Related to Fe and woodwaste			Irrigation aesthetics
<b>D.O. (of watercourse)</b>		> 8 mg/l	< 6.5 mg/l	Fisheries
<b>Metals</b> - total Fe - total Zn total Cu		< 0.3 mg/L	> 3 mg/L	Aesthetic (human and aquatic)
		< 0.03 mg/L	> 0.3 mg/L	
		< 2.0 µ/L	< 20 µ/L	
<b>NH<sub>3</sub>-N + HN<sub>4</sub>-N</b>	Temp. & pH		< 10 to 15 mg/L	Fisheries
<b>NO<sub>2</sub>-N</b>	Chloride < 2 mg/L	< 0.06 mg/L	> 1.0 mg/L	Fisheries
<b>NO<sub>3</sub>-N</b>		< 5 mg/L	> 10 mg/L	Human Health
<b>Nutrients – organic N &amp; C</b>			Formation of fungal and bact. Mats	Fisheries Recreation
<b>Nutrients – inorganic N &amp; P</b>	Depends on receiving water quality	Very low levels if receiving water has good quality		Fisheries Recreation
<b>Pesticides</b>		Not detectable	Pesticide specific	Fisheries Human Health
<b>pH</b>		6.0 to 8.5	< 5.0 or > 10.0	Irrigation Fisheries
<b>Solids = TSS</b> <b>Organic solids = VS</b>	TSS @ 105 <sup>0</sup> C	< 10 mg/L	> 75 mg/L	Fisheries
	VS @ 550 <sup>0</sup> C	< 10% increase	> 20% increase	
<b>Tannin &amp; lignin (resin acids)</b>	At pH 6.5 to 8.5	TRA < 9 µg/L	Do a Bioassay	Fisheries
		DHA < 4 µg/L	DHA < 80 µg/L	
<b>Temperature</b>		< 15 <sup>0</sup> C	< 19 <sup>0</sup> C	Fisheries

CFU = colony forming unit acid

TRS = total resin acids

DHA – Dehydroabietic

**FOR FURTHER INFORMATION CONTACT**

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