

### 3 Key Environmental Concerns

Many aspects of highway maintenance are routine, and carry little risk of environmental harm. However, some highway maintenance activities have the potential to cause negative physical, chemical and biological impacts to the surrounding environment. These impacts to fish and wildlife habitats and species, and water, air and soil quality can be significant and enduring. Site-specific factors such as proximity of the work site to environmentally sensitive areas, the scale of the work, and the type of materials used can influence the level of risk that a maintenance activity poses to the environment.

Maintenance and construction activities completed in and adjacent to watercourses are of particular concern because of their potential for wide-reaching effects on fish, wildlife and their habitats. Primary impacts are associated with inputs of pollutants, reductions in flow, and the physical alteration of channel banks, shorelines and adjacent vegetation. These may have direct effects (e.g., lethal) or indirect effects (e.g., barriers to movement) on fish and wildlife.

Table 3 provides a summary of some of the key environmental concerns related to highway maintenance activities. A variety of documents exist which provide further information related to assessing potential environmental impacts – several of these documents are listed in Section 11. One document produced by Fisheries and Oceans Canada (DFO), Road Maintenance Activities and *The Fisheries Act: A Guidance Document to Avoiding Conflict* (Stoneman et al, 1997), provides guidance regarding impacts to fish habitat resulting from a range of highway maintenance works.

How do you know what effects highway maintenance works may have on the environment? Table 4 contains a summary of potential environmental impacts for each type of maintenance activity described in this document.

**Table 3. Key environmental concerns related to highway maintenance activities.**

CONCERN		ACTIVITIES	SOURCES	CONDITION	IMPACT
Water Quality	<ul style="list-style-type: none"> <li>• Surface and structure maintenance</li> <li>• Clearing and grubbing</li> <li>• Debris removal</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbed soil</li> <li>• Culverts/ channels</li> <li>• Ineffective soil stabilization/site restoration</li> </ul>	Increased erosion and sedimentation	<ul style="list-style-type: none"> <li>• Spawning grounds become covered with sediment and made unusable; deposited eggs are covered and suffocate</li> <li>• Increases turbidity of the water; fish cannot see their prey (i.e., food items); food sources become buried or leave the area</li> <li>• Fish gills become clogged; decreased respiration; mortality</li> <li>• Turbidity decreases passage of light through the water column, affecting photosynthesis; aquatic plants do not grow as well</li> </ul>	
	<ul style="list-style-type: none"> <li>• Surface and structure cleaning and repair</li> <li>• Clearing and grubbing</li> <li>• Equipment use and servicing</li> <li>• Rest area maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Materials (concrete, chlorinated water)</li> <li>• Storage piles (de-icing compounds)</li> <li>• Equipment fluids and fuel</li> <li>• Water wells</li> <li>• Septic disposal fields</li> </ul>	Flow of contaminated material/runoff into a watercourse or potable water source	<ul style="list-style-type: none"> <li>• Contaminated material can impair water quality through a change in water chemistry (e.g., pH, dissolved oxygen) that may have direct or indirect effects on fish and aquatic life</li> <li>• Organic contaminants (e.g., phosphates) cause excessive growth of algae and decrease available dissolved oxygen to fish</li> <li>• Contamination of drinking water by bacteria can result in serious public health issues</li> </ul>	
Water Quantity	<ul style="list-style-type: none"> <li>• Vegetation removal</li> <li>• Soil compaction</li> </ul>	<ul style="list-style-type: none"> <li>• Uninterrupted overland flow</li> <li>• Reduced infiltration</li> </ul>	Increased runoff from surrounding areas	<ul style="list-style-type: none"> <li>• Increased water levels cause bank erosion, channel scour and affect riparian vegetation</li> <li>• Possible habitat destruction, fish populations suffer</li> <li>• “Flashy” hydrograph; reduction in base flows</li> </ul>	
	<ul style="list-style-type: none"> <li>• Worksite water management (isolation and diversion)</li> </ul>	<ul style="list-style-type: none"> <li>• Intercepted flow and redirection</li> </ul>	Decreased water volume (from small tributaries or ground water)	<ul style="list-style-type: none"> <li>• Downstream flows decreased</li> <li>• Possible habitat loss; populations suffer decreased volume in tributaries</li> <li>• Possible reduction in fish passage</li> <li>• Decreased quantity in waterway may increase temperature, causing fish to avoid the waterway; loss of species to that area</li> </ul>	

**Table 3. Key environmental concerns related to highway maintenance activities continued**

CONCERN		ACTIVITIES		SOURCES		CONDITION		IMPACT	
Stream Habitat Alterations	<ul style="list-style-type: none"> <li>Instream construction and maintenance activities</li> <li>Vegetation or debris removal</li> </ul>	<ul style="list-style-type: none"> <li>Watercourse crossings and ditches</li> <li>New or modified structures</li> <li>Access road construction</li> </ul>	<ul style="list-style-type: none"> <li>Alteration, disruption or destruction of instream habitat</li> </ul>	<ul style="list-style-type: none"> <li>Loss of instream and channel structure (e.g., boulders, woody debris, root systems) reduces habitat complexity and overall habitat value; productive capacity of habitat reduced; habitat enhancement or compensation required to off set loss</li> <li>Alterations to habitat have potential to hydraulically affect other reaches of the watercourse</li> </ul>					
	<ul style="list-style-type: none"> <li>Project design, construction and maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Diversions to accommodate infrastructure</li> <li>Bank stabilization measures</li> </ul>	<ul style="list-style-type: none"> <li>Alteration of natural channel flow (blockage by debris dams, culverts, etc)</li> </ul>	<ul style="list-style-type: none"> <li>Fish passage is affected; fish may not be able to access upper reaches of waterways or spawning grounds; ecological balance may be upset by removal of fish from an area where they acted as predators or prey</li> </ul>					
Riparian Habitat Alterations	<ul style="list-style-type: none"> <li>Clearing and grubbing</li> <li>Access to watercourse crossing structures</li> </ul>	<ul style="list-style-type: none"> <li>Riparian zone disturbance or alteration</li> </ul>	<ul style="list-style-type: none"> <li>Alteration of riparian vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Critical functions (i.e., erosion control, filtering function, climate control) provided by riparian vegetation are lost; altered function affects quality and value of fish habitat; productive capacity decreases</li> <li>Surface flow rate increases causing potential for bank scour</li> </ul>					
Invasive Plants	<ul style="list-style-type: none"> <li>Vegetation removal, transport, and disposal</li> <li>Soil disturbance, removal and transport</li> </ul>	<ul style="list-style-type: none"> <li>Disturbance or movement of soils</li> <li>Equipment</li> <li>Gravel pits</li> </ul>	<ul style="list-style-type: none"> <li>Contributes to the spread of noxious weeds and invasive plants</li> </ul>	<ul style="list-style-type: none"> <li>May contribute to the spread of noxious weeds if material is improperly handled or disposed of.</li> <li>May displace native vegetation</li> </ul>					
Wildlife	<ul style="list-style-type: none"> <li>Clearing and grubbing</li> <li>Roadside vegetation management</li> <li>Wildlife exclusion fencing maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Disturbance of habitat and movement corridors</li> </ul>	<ul style="list-style-type: none"> <li>Habitat loss and fragmentation</li> </ul>	<ul style="list-style-type: none"> <li>Loss or alteration of viable wildlife habitat and movement corridors</li> <li>Impact to wildlife species at risk</li> </ul>					

**Table 4. Summary of routine highway maintenance activities and their potential environmental impacts.**

Maintenance Activity	Potential Impacts to Human Health			Water Quality				Water Quantity	
	Instream Habitat Alteration	Vegetation Removal / Alteration	Invasive Plant Management	Sediment Release	Concrete Leachate Release	Other Contaminants Release	De-icing Compounds Use / Release	Disruption of Flow	Withdrawal of Water
Highway Surface Management				✓	✓	✓	✓		
Gravel Surface Management			✓	✓		✓			✓
Dust Management			✓	✓		✓			✓
Debris Removal			✓	✓		✓	✓		
Ditch and Watercourse Management	✓	✓		✓		✓		✓	
Drainage Appliance Management	✓	✓	✓	✓	✓	✓		✓	
Shore, Bank and Watercourse Management	✓	✓	✓	✓		✓		✓	
Engineered Wetland and Water Quality Management			✓	✓		✓			
Winter Road Management		✓		✓		✓	✓		
Roadside Vegetation Management		✓	✓	✓		✓			
Rest Area and Roadside Facilities Management			✓			✓			
Bridge Structure Management	✓	✓		✓	✓	✓	✓	✓	✓
Retaining Structure Management	✓	✓		✓	✓	✓	✓	✓	
Multiplate Structure Management	✓	✓		✓	✓	✓		✓	
Highway Incident and Vandalism Response				✓		✓			
Roadside Fence Maintenance	✓	✓	✓	✓	✓				
Gravel Pit Operations		✓	✓	✓		✓			