



You are here : [Home](#) > [River](#) > [Water and Sediment Quality](#) > [Factors Affecting Water and Sediment Quality](#) > **Winter Conditions**

[RAMP](#)[RIVER](#)[PEOPLE](#)[RESOURCES](#)[ENVIRONMENTAL MANAGEMENT](#)

## Factors Affecting Water and Sediment Quality: Winter Conditions

Annual ice cover is significant on the Athabasca River because of its ability to shape the landscape and alter chemical and biological processes during the freeze up, main winter and melt phases (Prowse 2001). Lower water flows, or the elimination of flow, can occur where inflows and outflows have been blocked by ice or the entire depth of water has frozen.

Winter low flows can accumulate high concentrations of chemical substances simply because there is less water for dilution. Decreased water flows can also result in deposition of fine sediments that would remain suspended in more turbulent waters. Ice cover blocks the exchange of gases between water and the atmosphere, reducing [dissolved oxygen](#) in the water and sometimes producing winter fish kills in lakes.

### Melting and Flooding

The most physically dynamic phase is the melt phase. The melt phase has been known to dramatically alter the river landscape, eroding and straightening meander bends where sediments would be deposited under slower flow conditions, and diverting the river into new reaches.

During the melt phase, flooding is of great concern because the Athabasca River runs from south to north—the warmer temperatures in the south cause the ice to melt upstream earlier than downstream. This creates an [ice jam](#) downstream that the upstream flow cannot pass, causing water to flood over the banks. The floods and ice movement can also erode the river banks and bed, clear riparian vegetation, and flatten sand and gravel bars.

From a chemical perspective the melt phase can move large amounts of sediment, which increases turbidity and can increase the concentration of metals if they are attached to fine sediments. Rain water and flood water can also pick up any airborne pollutants that have been deposited on land and on ice during the winter months, causing a sudden surge of acidifying pollutants.

[Next page: Factors Affecting Water and Sediment Quality: Soils, Landscape, and Erosion](#) ►

[Website Terms Of Use](#)