



ALBERTA'S RIVER ECOSYSTEMS

The Athabasca River undergoes both natural and man-made changes in water quality along its course. Examples of some naturally occurring changes in its water and ecosystem are illustrated in Figure 3.5. At the river's origin, meltwater from the Columbia Glacier begins its journey to the Peace-Athabasca Delta 1375 km to the northeast. This journey takes approximately 38 days, depending on the volume of water and the rate of flow. The cold glacial meltwater bears suspended material that has been finely ground by the glacier, making the water turbid and milky blue in appearance. Passing over falls and down the steep mountain gradient, the river picks up high levels of dissolved oxygen. Tributary streams add high levels of sulphate from mountain springs.

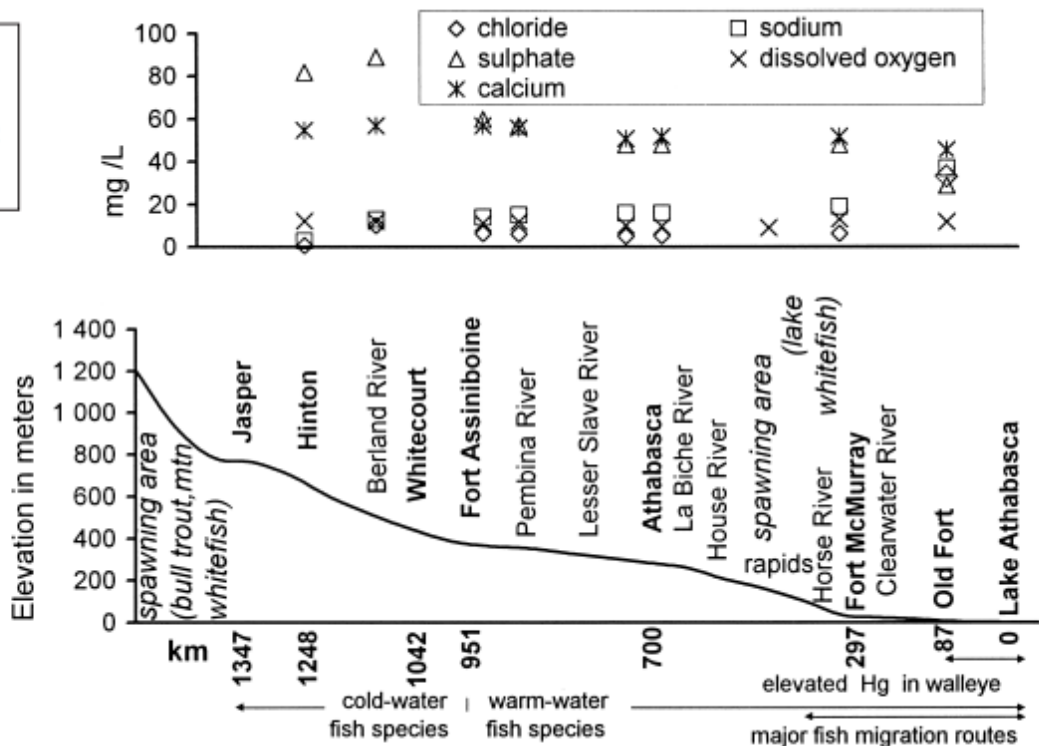
**THIS CASE STUDY
WILL BE USED IN
THE FOLLOWING
ASSESSMENTS.**

**SECTION 1
ASSIGNMENT**

UNIT B TEST

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FIGURE 3.5
LONGITUDINAL
PROFILE OF THE
ATHABASCA RIVER
 source: Adapted from 1992
 Winter Synoptic Survey



Bull trout, needing high oxygen and cold temperatures for their eggs to develop, spawn in the headwaters. Other coldwater species such as mountain and lake whitefish, the rare pygmy whitefish, and grayling are also present in the mountain and foothills reaches. The colourful harlequin duck nests near fast-flowing streams in this drainage. On the forested plains, the gradient flattens and the river slows. Tributaries swell its volume, adding sediment, nutrients, and dissolved minerals such as sodium and chloride, while at the same time diluting the sulphate content of the water. Near the confluence with the Berland River, there is a transition from coldwater to coolwater fish species. Below this point, water temperatures can reach 23°C in summer, and coolwater species such as walleye and goldeye prevail.

In winter, dissolved oxygen levels decline gradually from Hinton downstream, becoming quite low, until a series of rapids upstream of Fort McMurray re-aerate the river, adding as much oxygen as the water can hold. Additional natural substances enter the river in the reach between Fort McMurray and the Peace-Athabasca Delta. Hydrocarbons from natural oil sands deposits near Fort McMurray seep or erode into the river. Between the city and the delta, streams draining vast areas of peatlands add dissolved organic matter to the river, turning it reddish-brown. Fish from Lake Athabasca migrate to streams along this lower reach to spawn. Up to one million lake whitefish migrate from Lake Athabasca each year to spawn in the river near the rapids.

In the lower reaches of the Athabasca River, mercury is present in the tissues of some larger predatory fish such as walleye. Health guidelines have been developed for consumption of these fish. Although the mercury is mainly from soils within the drainage basin, a small percentage is from man-made sources.