



Athabasca
WATERSHED COUNCIL

STREAM CROSSINGS

Effect on Fish, Wildlife & Water Quality

Many of Alberta's native fish need to travel up and down streams and their tributaries to find mates, to spawn, to grow, to eat, and to rest. Therefore, it is important that watercourse crossing structures (culverts and bridges) allow for the passage of fish and other aquatic organisms to maintain connectivity. In addition to stream connectivity, fish may also require certain stream flow velocities and water temperatures at different stages of life. Changes in flow, temperature or water depth (which can lead to changes in flow and temperature) from watercourse crossing structures can affect the survival of fish and other aquatic species.

A bridge allows stream connectivity to be maintained and has less impact on the riparian corridor (the land that borders streams), allowing uninterrupted passage for both aquatic and terrestrial wildlife.



As stream connectivity allows for the passage of fish, riparian corridors allow for uninterrupted passage of terrestrial wildlife. Thus, it is important for watercourse crossing structures to maintain intact riparian corridors for the safe passage of animals that otherwise would have to cross over the road, risking collision with vehicles. The maintenance of wildlife corridors also allows different wildlife populations to connect, which maintains genetic diversity and healthier populations.



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Active or recent soil excavations and construction of **stream crossing structures** can result in **sediments** and/or **contaminants** entering a stream. This can be **minimized** by using **beneficial practices** to control runoff and erosion, like silt fences, dams, and re-vegetation.



The mouth of this culvert has eroded over time and is no longer allowing fish to move upstream. Culverts that are too narrow or too wide can change stream properties, particularly flow velocity but also water depth and temperature.

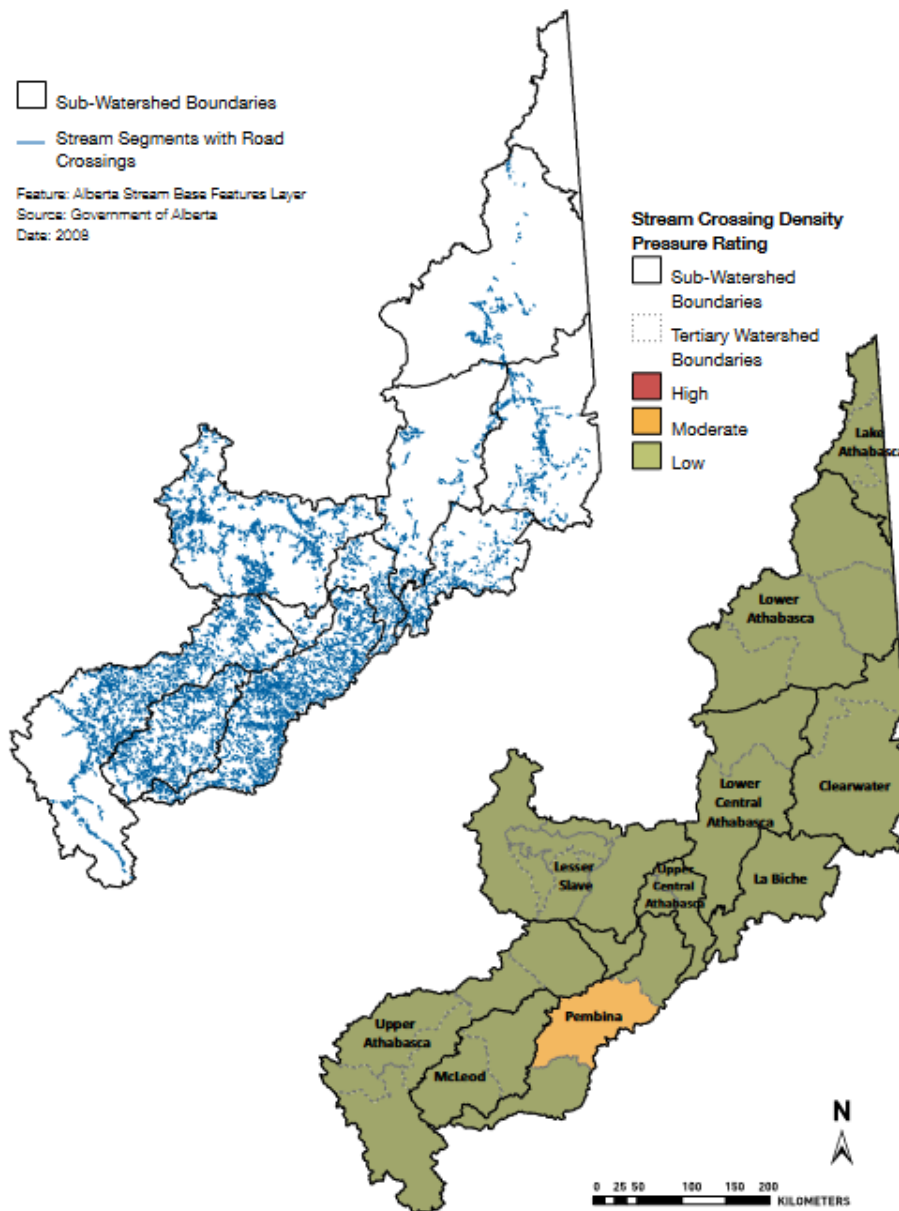
A newly installed arch culvert with silt fences and narrow bands of naturally re-established vegetation. Silt fences are used to help limit the amount of sediment reaching the stream in stormwater runoff.



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The Athabasca Watershed Council's State of the Watershed Phase 2 Report (Fiera 2012) identified **Stream Crossing Density** as an indicator of a land use pressure affecting watershed health. The indicator includes all stream segments with road crossings. Stream crossing density (number of road crossings per square kilometer) thresholds were derived from the scientific literature with low (<0.4), moderate ($>0.4 - 0.6$) and high pressure (>0.6) modeled.



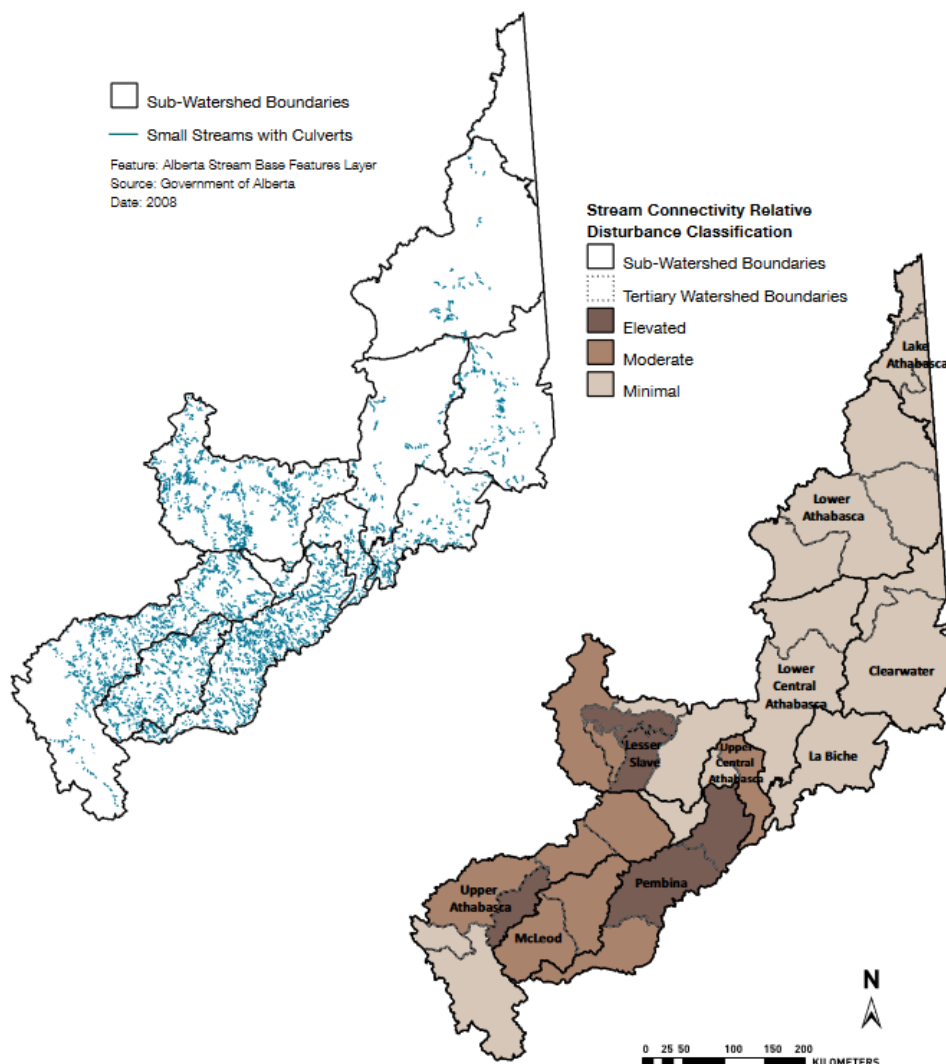
In the Athabasca Watershed Council's State of the Watershed Phase 2 Report, Stream Crossing Density was included as an indicator of land use pressure in the watershed. Small stream reaches crossed by one or more roads are shown in the left, while Relative Disturbance Classifications are on the right.



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Another way to look at stream connectivity is to look at the density of culverts, since culverts are often incorrectly placed or under- or over-sized with respect to fish needs. Culverts are frequently used (instead of bridges) in smaller streams. Areas in the Athabasca watershed with multiple land uses such as forestry, agriculture, and mining, show moderate to elevated **Relative Disturbance Classification** for the indicator Stream Connectivity. This indicator has no ecological thresholds and classification was derived through Jenks analysis (a data clustering method). The classification is only relative to the tertiary watersheds in the Athabasca River Basin. To learn more about this indicator, and the other indicators developed for the Athabasca Watershed, see the AWC phase 2 report at <https://awc-wpac.ca/our-watershed/state-of-the-watershed/>.



Small streams with culverts are shown in the left, while pressure ratings generated using Jenks analysis are on the right.

This version of the stream crossings info sheet was updated by AWC staff in February 2022.

