



HOW TO GET LIVESTOCK ACROSS A CREEK-WATERCOURSE CROSSING

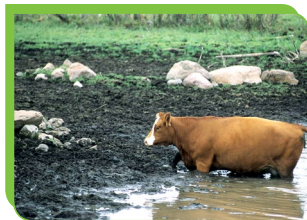
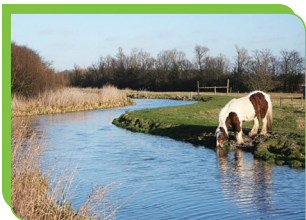
Why did the cow cross the creek? To get to the other side of course! Is this a problem?

Sometimes crossing streams does cause problems. Problems can originate from unrestricted or improperly constructed crossings including:

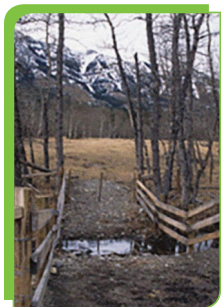
- » loss of riparian vegetation, increased erosion and sediment deposition in streams,
- » water contamination from manure or urine,
- » reduced water quality leading to reduced water intake and potential for reduced weight gain in livestock,
- » increased risk of livestock injury or death,
- » negative impacts on fish and other aquatic creatures and,
- » enforcement actions leading to fines and costly corrective actions.



Although impacts are often localized, they can severely impact downstream areas and persist for extended periods. A variety of options exist to modify or improve livestock watercourse crossing sites, limit the impacts and steward shared resources.



Considerations for watercourse crossings:



To cross or not to cross? This is the question.

The development of a crossing has a planning aspect as well as financial considerations, both in terms of construction and maintenance costs. There are also environmental and regulatory considerations, like increased erosion and impacts on downstream neighbors

and fish populations. It's good to first ask: Do I need a crossing? Is there a way to avoid building or using one?

If the answer is, "yes, I need to develop a crossing" then it is imperative to consider the various regulations governing watercourse crossing by both provincial and federal agencies. Provincial agencies regulate activities around permanent waterbodies including the bed and shorelines while federal agencies regulate fisheries, fish habitat and navigation. Depending on the situation, authorizations may be required under some or all of the regulations. Information and links to related Acts and Regulations are highlighted at the end of this factsheet.

Riparian areas are productive and can be reliable producers of forage, shelter, fish, wildlife and water. These areas are a buffer, an insurance policy especially useful to have when drought or flood occurs. They are part of a healthy, functioning landscape and form part of an extensive drainage basin within every watershed.

Although riparian areas make up only a small fraction of our landscape, they are disproportionately important to fish and wildlife, recreation, agriculture, and society in general.

Goals for a good crossing: The goal should be to get livestock across a watercourse as quickly and safely as possible while avoiding riparian and aquatic impacts, and meeting regulatory requirements. The purpose of a constructed crossing is to maintain or improve water quality, maintain bank stability and reduce the amount of time cattle spend in the waterbody. Pasture management changes like using an off-site watering system or changing season of use to when ground and water are frozen would help greatly reduce the impacts. If an open water crossing cannot be avoided, then other questions need to be considered.



What is the intensity and frequency of livestock crossings?

How many livestock and how frequently they cross a watercourse will determine how much impact a crossing will have.



Daily use by large numbers will have a greater impact than periodic use by a few cows. The season of use will also determine how much of an impact livestock have on the riparian area and its ability to filter out sediment from entering the watercourse.

Goals for a good crossing: If livestock numbers are large and they are crossing frequently, then a raised crossing such as a bridge or culvert should be used. This will prevent constant trampling of streambank vegetation and provide better,



safer access in all weather situations, while minimizing impacts. Low level crossings such as hardened fords should be reserved for situations where crossings are infrequent or by a few livestock. Culverts placed incorrectly or which are

undersized for high flows can have extensive erosion on the downstream end, leaving a large vertical gap between the culvert and stream bed, known as a hanging culvert and can prevent fish passage.

What do I need to know about my watercourse to design a good crossing?

It's important to know what the range is between flood flows and low flows (data available from <https://wateroffice.ec.gc.ca/>). The extent to which your watercourse has flooded, or could flood, provides an indication of the design capacity for a bridge or culvert to pass flood flows. If there is any uncertainty about the magnitude of flood flows, a clear span bridge, or culvert with an open bottom and large flow capacity should be considered, to avoid loss of the structure, possible channel shifts because of the structure, expensive repairs and the possibility of increased erosion downstream. Altered flow patterns resulting from an improperly designed crossing can impact riparian health and downstream neighbors.



In fish bearing waters, any projects that change water flow, impact fish passage, or permanently alter or destroy fish habitat are subject to the *Federal Fisheries Act* and may require approval. Fisheries and Oceans Canada (DFO) has developed a tool that proponents can use to assist in determining whether a culvert can provide fish passage (<http://www.fishprotection-tools.ca/index.html>). It is important to consult with a qualified professional to ensure the proposed crossing meets your objectives as well as any regulatory requirements.

Tips & Tricks for Construction:

- » place crossings where livestock already use a site, if it is suitable,
- » reduce the number of crossings to the bare minimum required for access,
- » locate crossings on straight sections of a watercourse, and
- » if using culverts, ensure they cause no downstream erosion, are of sufficient capacity for flood flows, and will not impede fish passage.

Stream bottom type also plays an important role in watercourse crossings. Watercourses with harder substrates such as large gravels or cobbles may provide good footing to cattle and not require much alteration or improvement. These substrates may also reduce the risk of injury for livestock.

Geotextile foundations allow for natural substrate while creating a hardened crossing. Once installed, the combined strength of the geocell plus aggregate gravel provides a stable hardened surface for low-level fords. This crossing type is ideal for a "low energy" environment with low channel velocities and minimal scour potential. Geotextile fords are primarily used in situations that have low frequency of use by cattle or vehicles.

In comparison, crossing watercourses with muddy, fine substrates can cause increased siltation downstream as the particles are easily disturbed and transported. This can affect fish by reducing egg survival, available habitat and impact downstream water quality. In these situations, a combination of a geotextile foundation with the addition of a gravel/cobble overlay is necessary.

Goals for a good crossing: Crossings should not impede or alter the natural flow regime in any way, or cause additional erosion downstream. Consideration should be given to how flows may change in conditions of heavy rainfall and fast runoff. Crossings that occur on waterbodies with fine sediments should be constructed so that they do not increase sediment transport downstream. Each site should be considered on an individual basis and a qualified professional should be consulted to ensure that the most appropriate approach is applied.



Photo courtesy of Trout Unlimited Canada



What is the slope of the bank at the crossing location?

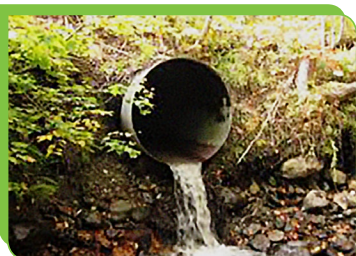
Crossing sites with steep slopes are at greater risk of erosion, loss of riparian vegetation and livestock may have problems using the site.

Goals for a good crossing: Where banks are higher than 2 m (top of bank to water level) and water depth exceeds 0.6 m, a culvert crossing or bridge should be developed, but before establishing a steep crossing, look for other locations with less slope (http://www.transportation.alberta.ca/Content/doc_Type245/Production/Complete_Fish_Habitat_Manual.pdf). In general, crossings should not be placed along bends as this can also increase the risk of erosion and loss of the crossing during floods. Soil characteristics at the site are also important in considering crossing options. Soil type, steepness of slope and depth to a rock substrate will affect bank erosion, longevity of the crossing and future maintenance of the crossing.

Are there fish present in the waterbody?

Fish may be present and need to be considered in the planning and construction of any watercourse crossing. It is important to note what kinds of fish are present as there are different restrictions for sportfish, non-sportfish and fish that are at risk. There are restricted instream construction periods based on the fish species present. These restricted activity periods focus construction or maintenance to certain times of the year to prevent disturbance to fish during critical reproductive periods. Fish use a variety of habitats, including as refuges during floods, for spawning or for feeding; altering the flow could reduce the amount of habitat available. The ability of fish to successfully travel upstream is also a consideration in designs. Sportfish and fish species at risk have specific requirements for water quality in order to survive, and these can be different from non-sportfish. Unplanned, poorly constructed crossings can lead to reduced amounts of riparian vegetation, increased erosion and higher water temperatures. All of these parameters affect the quality of fish habitat and influence which species are able to live in an area.

Goals for a good crossing: If the crossing is on a waterbody that contains fish, or if you are unsure about fish presence it is wise to consult with regulatory bodies or other qualified individuals before making any changes. It may be that fish passage upstream is important.



Culvert placement needs to match the base of the streambed and slope of existing channel bed, to prevent hanging culverts, like this one, which blocks fish passage.

If so, clear-span bridges or arch rib culverts (with an open bottom) are the choices to make. Care should be taken to maintain healthy riparian vegetation along the bank and reduce activities that will cause increased erosion. Efforts to improve crossing conditions should take into account the specific requirements of the fish species present at the site as well as those downstream.

LAWS AND REGULATIONS

There are several laws and regulations related to working in and around water.

Legislation to be aware of when contemplating a livestock crossing:

FEDERAL

Fisheries Act

Any waterbody that contains fish at any time during any given year or is connected to a waterbody that contains fish at any time during any given year is subject to the *Fisheries Act*. Under section 35(1) of the *Fisheries Act*, "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal fishery, or to fish that support such a fishery." DFO interprets serious harm to fish as the death of fish, permanent alteration to fish habitat, and destruction of fish habitat. Projects that have the potential to obstruct fish passage, modify flow, or result in the entrainment of fish may also cause serious harm to fish. Seek advice from a qualified environmental professional if you are unsure about whether your project requires a review by DFO. For more information check out DFO's "Projects near water" webpage <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>.

Navigation Protection Act

The *Navigation Protection Act* is administered and enforced by Transport Canada and is designed to protect the public right of navigation. The *Navigation Protection Act* requires approval for any works that may affect navigation on Canada's busier navigable waters that are listed in a schedule to the Act. For more information on Transport Canada's Navigation Protection Program, please visit <https://www.tc.gc.ca/eng/programs-621.html>. More information on the proposed *Canadian Navigable Waters Act* can be found at <https://www.canada.ca/en/services/environment/conservation/assessments/environmental-reviews/navigation-protection.html>.



Species at Risk Act

The federal *Species at Risk Act* protects endangered and threatened species and their habitats across Canada. This act and regulations may also apply if your property is home to at risk species and/or their habitat. For more information: <https://www.ec.gc.ca/alef-ewe/default.asp?lang=en&n=ED2FFC37-1>.

PROVINCIAL

Water Act

The *Water Act*, administered by the Alberta Ministry of Environment and Parks (AEP), regulates any activity that:

- » changes the flow or level of water,
- » changes the location of water or the direction of flow of water,
- » causes or may cause the siltation of water or the erosion of any bed or shore of a water body, or
- » causes or may cause an effect on the aquatic environment.

Under the *Water Act* a waterbody “means, for the purpose of this Code of Practice, a water body with defined bed and banks, whether or not water is continuously present, but does not include fish bearing lakes.” Projects including the placement, construction, maintenance, replacement or removal of a watercourse crossing must ensure that they follow the *Water Act’s* Codes of Practice. Regulations vary depending on the type of watercourse and crossing. Watercourses in Alberta are classified according to size and fish habitat. Schedule 2 of the

Code of Practice includes standards for carrying out watercourse crossing work to ensure the risk of adverse impacts is minimized.

Maps are available from AEP (<http://aep.alberta.ca/water/legislation-guidelines/water-codes-of-practice.aspx>) to determine your watercourse’s classification and any restricted activity periods. A qualified person, as described in the code of practice, who can assess the proposed crossing and any impacts to the fish and watercourse habitat is recommended to help you complete the application. Higher risk projects include projects that change the substrate, or alter the flow, which has potential to alter fish habitat and downstream hydrology.

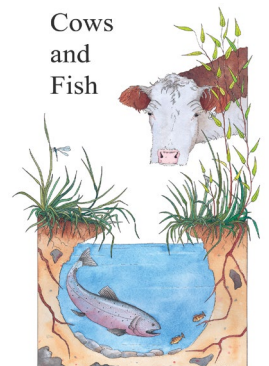
Other provincial, federal and/or municipal regulations may apply in some situations, always be sure to check with local authorities before completing any work.

Overall, you should aim to maintain or restore riparian functions to ensure long-term riparian health. For more information on grazing in riparian areas please see “Caring for the Green Zone: Riparian Areas and Grazing Management” or contact Cows and Fish for more information on riparian grazing or riparian health (www.cowsandfish.org; riparian@cowsandfish.org; 403-381-5538).

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Illustrations and photos provided by Cows and Fish.

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