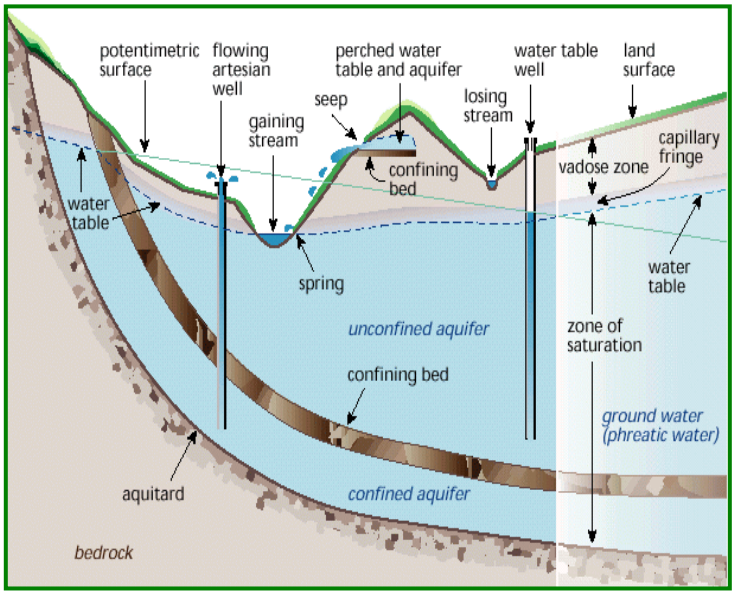
Water Sources for Range Livestock



Planning your water system

Planning for a water system consists of two basic steps: determining water requirements and compiling an inventory of water sources. For information on livestock water requirements, refer to the fact sheet “Water Requirements for Pastured Livestock” in this series. Sources of water for range livestock can consist of a single source or a number of sources in combination. The sources can be direct from naturally-occurring surface or groundwater supplies, or can be indirect through some sort of man-made delivery system (pipelines, tank loaders, canals, dugouts). Whatever the source or sources, they should be sufficient to meet the water requirements of the livestock to be watered, both in quantity and quality. A well-planned water system should also have a backup or secondary water source in case one source fails. Water sources should also be protected from physical damage and contamination.



Groundwater - description and terminology Source: Stream Corridor Restoration: Principles, Processes and Practices, USDA-NRCS, 1998.

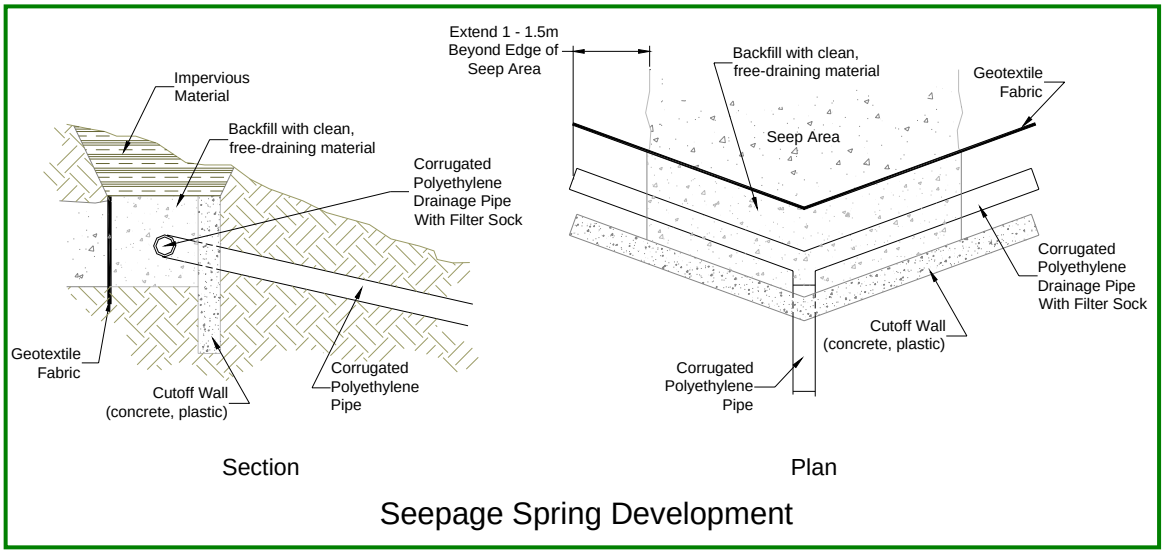
Groundwater

Water supplies from groundwater can be accessed through either wells or springs. There are two main types of wells, each distinguished by the depth and the size of the bore hole. Bored wells are generally constructed where the groundwater source is relatively close to the surface (<30 metres (m) or 100 feet (ft)), and are usually large-diameter installations (45-90 centimetres (cm) or 18-36 inches (in)). Drilled wells are smaller in diameter (10-20 cm or 4-8 in) and are completed to much greater depths (up to several hundred metres). Because they are shallow, bored wells are affected more by variations in precipitation than drilled wells, but their large diameter effectively means that the well itself provides some storage. Unless the well is a flowing artesian well, a pump will be required to extract and distribute the water. Groundwater exploration and well development are regulated by the province, and are complex topics that are considered to be beyond the scope of this fact sheet and one is advised to seek advice on the regulatory requirements.

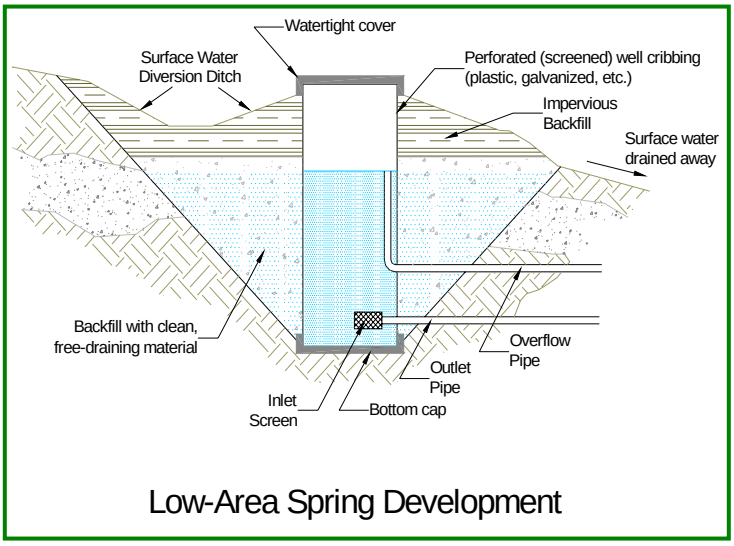
A spring or seep is an area where groundwater emerges naturally on the earth’s surface. Because the water flow from springs can vary significantly throughout any given year, and from year to year, an attempt should be made to determine the flow that is likely to be available from a spring during the period of intended use.

This can be done using a temporary dam and pipe to collect flow in a container of known volume and recording the time required to fill the container. If the flow rate from the spring can meet the peak demand from the livestock, then development will be straightforward. However, if the flow rate is less than the peak demand, but can meet the daily demand over a 24 hour period, storage

will be required. To determine peak demands and storage requirements, consult the Fact Sheet "Troughs for Watering Range Livestock" in this series.

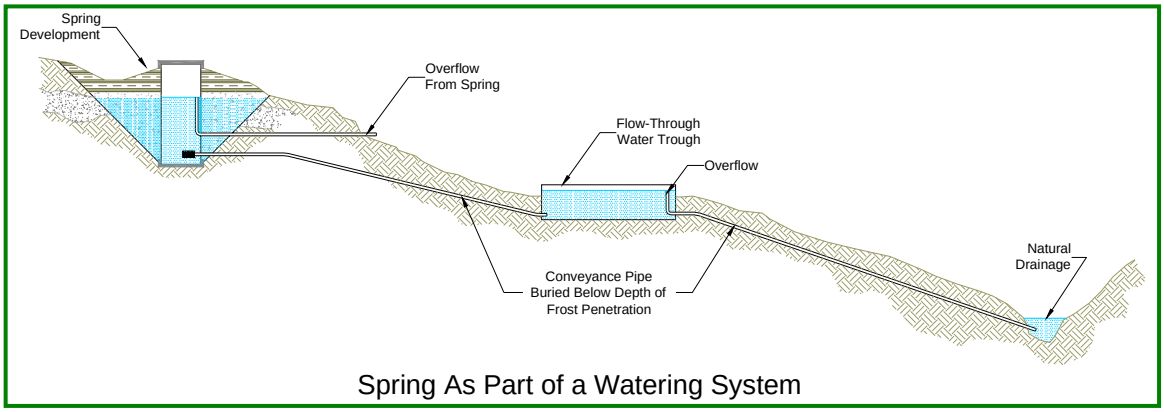


Seepage Spring Development



Low-Area Spring Development

The actual surfacing point of a spring may only be a very small part of the total water-bearing area. Excavation parallel to the contour of the land at or slightly below the level of the discharge point may substantially increase the flow of the spring. Similarly, installing physical improvements such as drainage pipe and cribbing can also increase the flow available from a spring and contribute to its protection. The accompanying sketches show some ways in which springs can be developed to improve their yield and to protect the source.



Spring As Part of a Watering System

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In developing a spring, care should be taken to ensure that it remains free-flowing. In that regard then, building a dam or embankment around the spring to store water may cause the spring to stop flowing due to the rise in water level where the spring discharges. For the same reason, overflow pipes should be included as part of any spring development. Care should also be taken to ensure that the spring is not contaminated from surface runoff. To do this, cover any excavation made in developing the spring with impervious material, divert surface runoff around the site, pipe water from the spring to a remote site for watering livestock, and fence the site off to protect it from trampling and contamination by livestock.

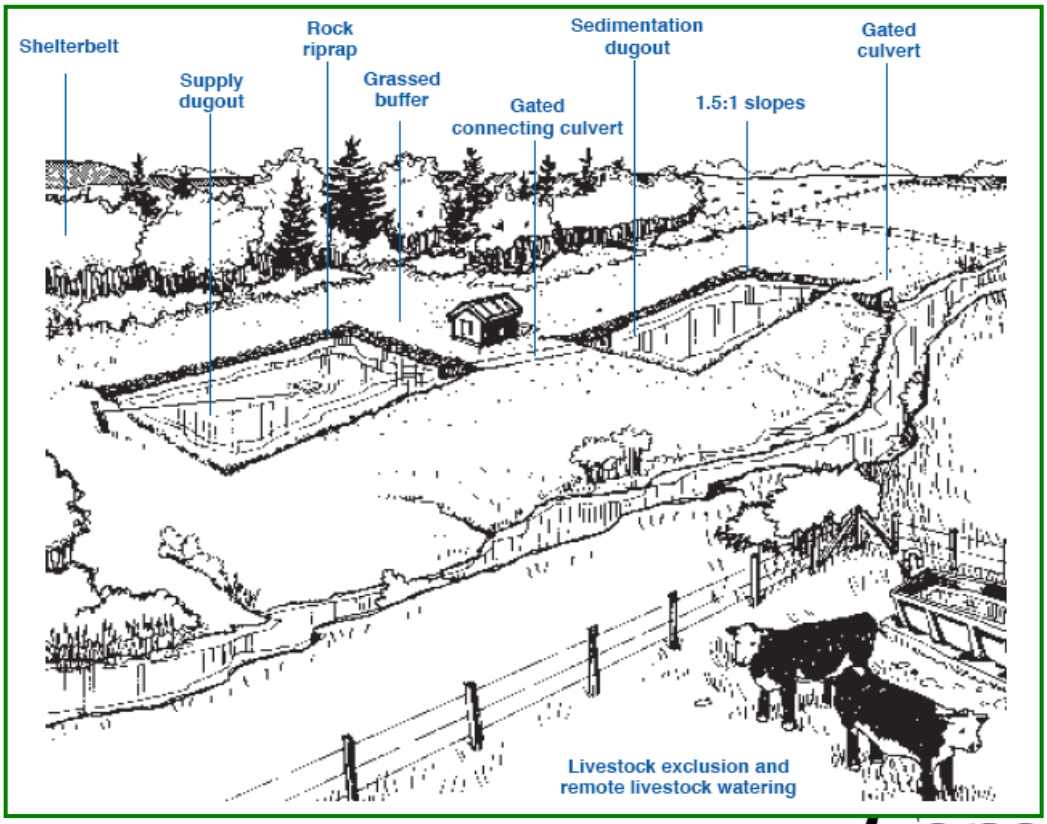
Surface Water

Dugouts

The most common type of surface water source for range livestock watering is the dugout. Depending on local conditions and stock requirements, dugouts can provide water for only seasonal spring grazing needs, or for several years. There are a number of factors to consider in siting a dugout, some of which are topography (drainage area), hydrology (the amount of precipitation the area receives), geology (permeability of the soils), and potential pollutants (organic matter like leaves and drainage from barnyards, feedlots, cultivated land, road ditches). If possible, future development plans should be considered since both the quality and quantity of runoff can be affected by changes in land use.

Some less-than-ideal sites can be improved through physical improvements (seepage control, brush clearing), and water quality can be maintained or improved through simple treatments such as aeration or chemical additives, and preventing direct access through the use of remote watering facilities such as nose pumps or solar pumps. The sketch on the following page illustrates a typical dugout installation.

Because the subjects of dugout siting, construction and maintenance are beyond the scope of this fact sheet, additional information and advice should be sought before constructing a dugout. Special approvals or permits may be required to construct a dugout, particularly if the dugout will be located in an existing watercourse, lake or wetland. Seek information on the regulations in your region (provincial and Fisheries and Oceans Canada approvals may be required).



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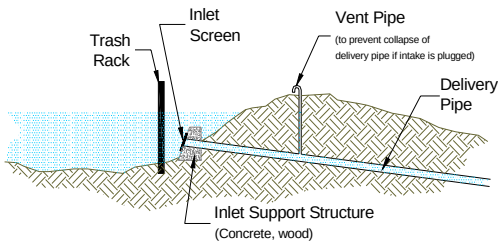
Rivers, Creeks, Canals and Lakes

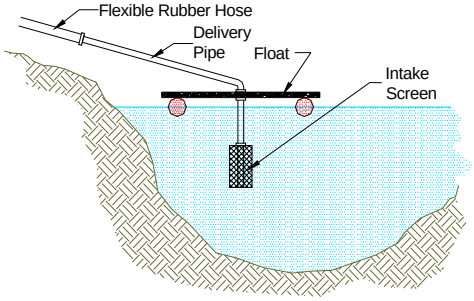
Natural surface waters such as rivers, creeks and lakes can be a good source of water for livestock, as can man-made water channels like canals. In low-intensity grazing areas, it may be acceptable to allow the livestock to access surface waters directly, but this is generally discouraged because it results in water quality degradation and damage to banks and shores, and it can also affect livestock health through foot-rot, reduced water consumption due do access difficulties, and drowning.

Approvals may be required under provincial regulations or from Fisheries and Oceans Canada through the Fisheries Act for water taking from a surface water source. If the water source is a canal, permission to use the water for livestock, and to construct any diversion for such purposes, must be obtained from the owner of the facility. No special approvals, permits or licenses may be required if the intended use of the water is for traditional agricultural use. A diversion which results in a significant alteration of water levels may require DFO review, and possibly, authorization. An example of a “significant” alteration or disturbance would be a stockwatering dam.

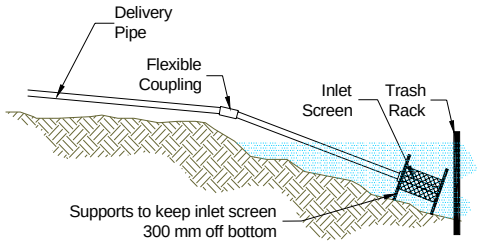
In cases where direct access by livestock is not being practised, diversion of water for consumption by livestock will require an intake in the river, creek, canal or lake. Intakes for stockwatering applications are generally very simple structures as the required water flows and volumes are not large. Designs can vary greatly depending on the required diversion volume and flow, the flow and/or volume of the source, the presence of debris or ice, and requirements for the protection of fish habitat. The following sketches illustrate some typical intakes that could be used for stockwatering applications.



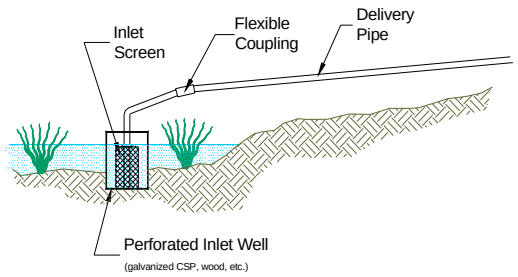
Gravity Intake



Floating Pump Intake



Supported Pump Intake



Pump Intake in shallow water with muddy bottom

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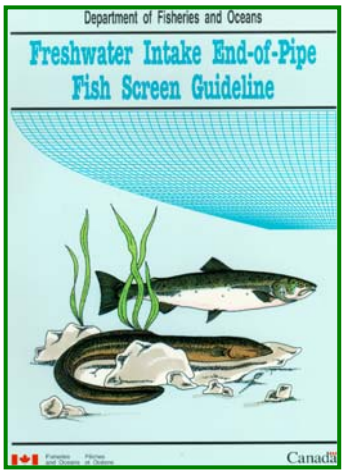

A properly-sized screen can protect the stockwatering system from clogging, but it is of primary importance with respect to protection of fish and fish habitat. For most stockwatering applications, a screen with openings smaller than 2.5 mm (0.1 in.) and with total area of openings not less than 50% of the total screen area should be sufficient. The velocity through the screen (flow in m^3/s or ft^3/s divided by opening area in m^2 or ft^2) should be less than 0.03 m/s (0.1 ft./s).

In situations where there may be some uncertainty regarding the appropriate size of screen (particularly large applications involving significant flows), the Fisheries and Oceans Canada publication "Freshwater Intake End-of-Pipe Fish Screen Guideline" and local Fisheries and Oceans Canada representatives, should be consulted.

The Bigger Picture

A water source is only one component comprising a livestock watering system that can protect water quality and wildlife habitat, allow for more effective pasture utilization, and provide enhanced livestock health and productivity. For further information on livestock water systems, contact your local AAFC-PFRA office, or call the toll-free telephone line at 1-800-667-7644.

Sources of information for this Fact Sheet included: *The Stockman's Guide to Range Livestock Watering From Surface Water Sources*, available from the Prairie Agricultural Machinery Institute, http://www.pami.ca/pami_publications.htm#stockman_guide; *Stream Corridor Restoration: Principles, Processes, and Practices*, by the Federal Inter-agency Stream Restoration Working Group (FISRWG). GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN3/PT.653. ISBN-0-934213-59-3; *B.C. Livestock Watering Manual*, B.C. Ministry of Agriculture and Fisheries, Soils and Engineering Branch; *Water Wells that Last for Generations*, joint publication of AAFC/PFRA - AEP – AAFRD; *Freshwater Intake End-of-Pipe Fish Screen Guideline*, Fisheries and Oceans Canada, Communications Directorate, Ottawa, Catalogue No. Fs-23-270/1995E.

UNIT CONVERSIONS

1 US gallon = 3.785 litres (l) 1 cubic metre (m^3) = 1,000 litres (l) 1 metre (m) = 3.28 feet (ft)
1 Imperial Gallon (Imp. Gal.) = 4.546 litres (l) 1 kilometre (km) = 1,000 m = 0.62 miles

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