

Keys to Successful Grazing

- Check your animals frequently to limit the amount of plant material being grazed.
- Avoid continuous season-long grazing; instead, develop flexible grazing strategies that allow plants to recover after grazing.
- Grazing plans must be flexible; consider differences in growing conditions across years as a result of wet or drought cycles, grazing by wildlife or insects, and other changing environmental conditions.
- Continue year-round rotation to distribute manure, food wastes, and trampling across pastures, or hold animals in a corral.
- Have a water source available for each pasture.
- Horses and other livestock do not necessarily need 24-hour access to feed or forage. Corral animals and feed if needed to prevent over-grazing of pastures.
- On a limited acreage, you may have only enough pasture to exercise your animals and will need to feed throughout the year.
- Grazing capacity varies from area to area. Make sure you are stocking pastures according to the amount of forage they can provide.
- Base your decision to move animals on how much grasses are used and the amount of green leaf material remaining, not on a calendar date.

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WATER, not

Introduction

Because water is in scarce supply in Wyoming and highly regulated, knowing the basics of the legal, social, geological, and other practical issues related to its use may contribute directly to your happiness as a landowner.

In Wyoming, water links our lives to those of our family, neighbors, communities, and region. We cannot emphasize enough the importance of understanding the laws and customs pertaining to water and of communication with neighbors and regulators to ensure that there is enough of this precious resource to go around and to avoid getting into hot water.

Water rights & law, water quality, irrigation a dry subject in Wyoming

A Little Bit of Law (or How It All Works) – Wyoming Water Law and Administration

The Wyoming Constitution states that water from all natural streams, springs, lakes, and other collections (such as aquifers) is the property of the state. People may only use that water if they put it to “beneficial use” and receive permission from the state. Beneficial uses include, for the purpose of this section: domestic household use, irrigation, stock water, and instream flow (water flowing in a creek, stream, or river, etc.).

The Wyoming State Engineer’s Office is the chief administrator of Wyoming waters in streams, wells, irrigation ditches, ponds, and reservoirs. To manage these waters, the state is divided into four water divisions.

A superintendent administers the waters of each division with assistance from water and hydrographer commissioners. The four superintendents and the state engineer constitute the state Board of Control, which is often synonymous with the State Engineer’s Office when discussing water administration. The State Engineer’s Office may be contacted

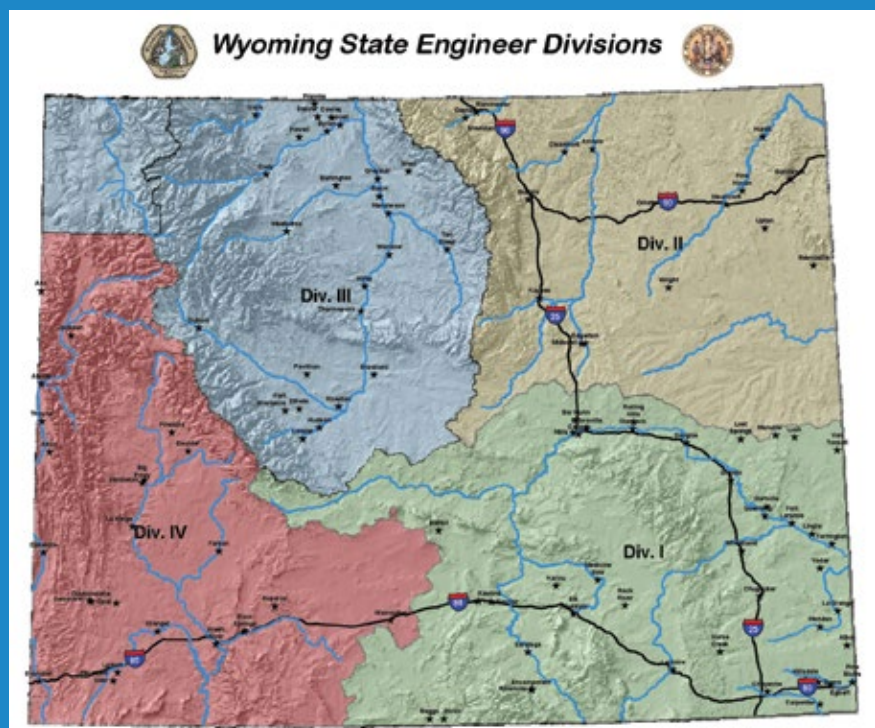
for necessary forms and information through written correspondence or the Internet.

State Engineer’s Office
4th Floor East
Herschler Building
Cheyenne, WY 82002-0370
telephone: 307-777-5063
email: seoleg@state.wy.us
www.seo.state.wy

Other web resources on Wyoming water law:

“Wyoming water rights fact sheet” – <http://www.blm.gov/nstc/WaterLaws/wyoming.html>

Wyoming water law: A summary
http://www.wyomingextension.org/publications/Search_Start.asp. Type B-849 in the “Publication Number” box.



Surface Water

Under Wyoming water law, the state retains ownership and control of water in streams through the state Board of Control. Water is appropriated and distributed under the “doctrine of prior appropriations,” based on the date the water was first put to “beneficial use” on a particular parcel of land. Water rights are tied to the land they are used on. Lands on which water was first used have “senior rights” and receive their appropriations (so many cubic feet of water/second flowing onto the irrigated hay

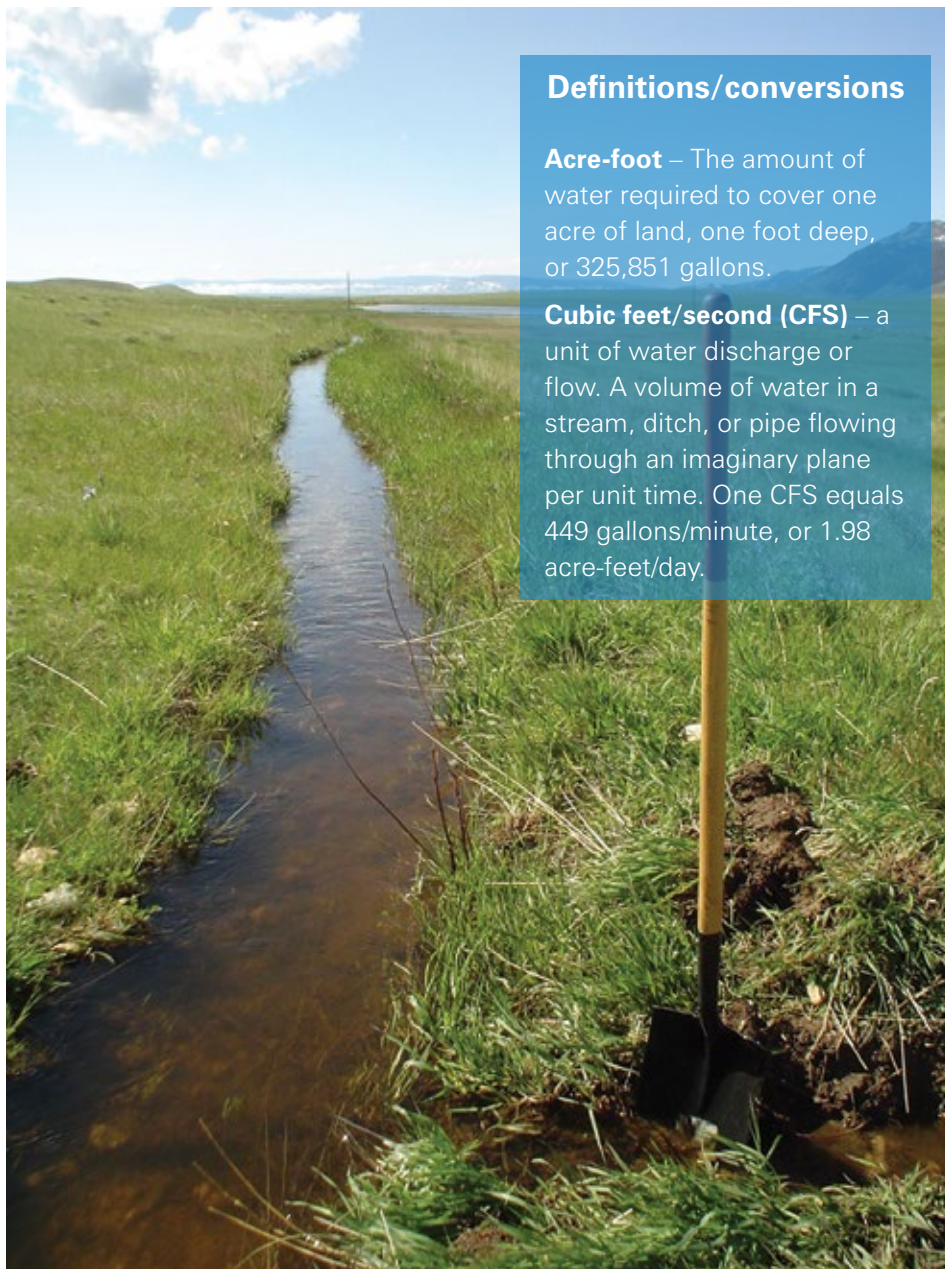
meadow for example) first. Younger (dated later) “junior rights” are appropriated in chronological order as each preceding permittee receives his or her appropriation. Early water rights in Wyoming date back to the late 1860s – before statehood. Early water rights are more likely to receive water in dry years; whereas more junior rights may not receive water at all in some dry years, particularly in watersheds that are over-appropriated like the North Platte Basin.

If you are buying land or own land with live surface water flowing across

it or a small stock reservoir, and you are unsure of your water right status, contact the State Engineer’s Office (SEO) to find out details. New permits for junior water rights may be obtained by working with a professional engineer or surveyor to produce the appropriate maps and plans required for the SEO permitting process. A priority date is established based on date of acceptance of the application in the SEO. Once the project is in place and the water has been put to beneficial use (or a reservoir constructed), and more paperwork is submitted to the SEO, the water right is adjudicated or legally assigned. After adjudication, water may be delivered to that right after all earlier rights on the stream or the irrigation system are fulfilled. Water rights for irrigation are adjudicated on the basis of 1 cubic foot/second (cfs) of flow per 70 irrigated acres. A second cfs of flow is available for irrigation rights with a priority date earlier than March 1, 1945, to be fulfilled after everyone in the given stream or ditch system receives their first appropriation. If everyone in a system has received their full appropriation, the system or stream is said to be “not in regulation,” and individuals may divert more than their legal appropriation.

Bottom line: even if you have an irrigation ditch or stream flowing across your property, the water may not be yours to use – call the SEO to find out the situation before pumping or diverting.

Stock ponds or small private reservoirs are also regulated as surface water, and they are governed similarly to streams as far as permitting and priority dates. Building a pond or small reservoir for livestock or recreation is also governed by the SEO with an elaborate permitting process that must be followed with the assistance of a professional engineer



Definitions/conversions

Acre-foot – The amount of water required to cover one acre of land, one foot deep, or 325,851 gallons.

Cubic feet/second (CFS) – a unit of water discharge or flow. A volume of water in a stream, ditch, or pipe flowing through an imaginary plane per unit time. One CFS equals 449 gallons/minute, or 1.98 acre-feet/day.

licensed in Wyoming. There are two general types of ponds. One is created by damming a stream or building an impoundment (reservoir) below a natural spring. The other is created by excavating into a shallow water table like those found in flood plains near streams. Talk to a professional engineer or geologist to find out if your property is suitable for pond or reservoir construction before digging or applying for the appropriate permits.

The most recently defined beneficial use of surface water in Wyoming is called "instream flow." This concept recognizes that keeping water in stream channels can benefit people by maintaining or improving fisheries. Unlike other uses, only the Wyoming Game and Fish Department can hold instream flow water rights, which are non-consumptive (no water is removed from the stream).

For more information read or visit:

"Wyoming water 101: How our state regulates our most important natural resource" – *Barnyards & Backyards* magazine article, Summer 2007. You can find it at barnyardsandbackyards.com.

"To build a pond in Wyoming" – *Barnyards & Backyards* article, Spring 2008. Find it at barnyardsandbackyards.com.

"Wyoming fish ponds: How to build and stock them" – *Barnyards & Backyards* article, Fall 2011.

To obtain a back-issue or other issues of *Barnyards & Backyards*, email cespubs@uwyo.edu, or call 307-766-2115.

Water management and instream flow – Wyoming Game & Fish Department, <http://gf.state.wy.us>

Water Resources Data Systems – University of Wyoming, www.wrds.uwyo.edu (this is a great database of water resources in Wyoming).



Extensive, thick limestone and sandstone layers exposed near the edges of Wyoming's great basins are often the best producing sources of high quality drinking water.

Well Water and Well Water Law

Wyoming ground water laws were enacted long after surface water laws, and ground water is similarly treated as property of the state. Use must be permitted through the SEO. Domestic wells are defined as non-commercial household use, which includes lawn and garden watering not to exceed one acre and not to exceed 25 gallons per minute (gpm) production. Livestock watering wells are also limited to 25 gpm. Before drilling a new domestic well, or any water well, an application must be filed with the SEO. Permission will generally be granted if it is believed the aquifer (underground geologic water source) can supply the water without being depleted or otherwise damaged. Once the permit is issued and the well is drilled, a notice is filed with the SEO stating that the well complies with Wyoming regulations, along with a plat showing the location of the well and the point(s) of use. All of this must be certified by a professional engineer or surveyor licensed in Wyoming. Finally, a certificate of

appropriation is issued by the Board of Control and recorded in both the local county clerk's office and at the SEO.

Water Quality

Having well or surface water rights is one thing; having high quality water is something different altogether. What is water quality? Users should consider a variety of factors that affect the water quality since well or stream waters are never pure H₂O. The major issue confronting rural Wyoming residents is high total dissolved solids or TDS. The purest natural waters come to us in the form of rain or snow that pick up dissolved minerals as they interact with geologic materials in sediment and bedrock. Thus, your water quality will be governed to a great extent by local geology. All rocks dissolve in water, releasing salts, hardness, and alkalinity. Of the common rock-forming minerals, quartz and feldspar (the major minerals making up granites in Wyoming's major mountain ranges) are extremely resistant to weathering; whereas, salts like gypsum and

halite (rock salt) are the easiest to dissolve and add total dissolved solids (TDS) to the water solution, reducing water quality. Shales or clays are usually loaded with salts, and due to their properties these formations rarely contain significant amounts of useable water. What water they do contain is usually of very low quality. Intermediate to these extremes are limestones and sandstones, which usually lie exposed at the margins of Wyoming's great basins or valleys. If these are fractured (creating permeable underground reservoirs) and have fresh rain or snowmelt flowing into them, they can be the best producers of high quality water for domestic wells. Water quality can vary significantly in a small area – just because your neighbor has good water doesn't mean that you will also have such good luck.

The term total dissolved solids, or TDS, is a general term for all of the constituents including dissolved salts, calcium, sodium, magnesium, potassium, sulphate, and bicarbonate. These are not harmful chemicals in themselves, but in high enough concentrations they can render water undrinkable for people or livestock and can even kill plants. Dissolved salts cannot be filtered like suspended particles. They can only be removed with distillation or reverse osmosis (RO), both of which are expensive and energy intensive. Your local conservation district can probably give you a general indication of your water's saltiness by measuring electrical conductivity (EC). Before you drink, water your livestock, or irrigate from a new source of water, have it tested at a reputable lab. Guidelines for levels of TDS acceptable for irrigating and stock watering can be found in the *Barnyards & Backyards* magazine articles referenced below. Guidelines for human consumption levels, as recommended by the U.S.

Bureau of Reclamation Reservoirs Provide Much of the Irrigation and Municipal Water in Wyoming

The U.S. Department of the Interior's Bureau of Reclamation (BuRec) has a large presence in Wyoming: 18 projects that include 13 power plants and 28 dams. BuRec makes it possible to irrigate pasture and crop land with surface water. Water held in BuRec reservoirs is allocated to specific uses in specific amounts. For example, in Buffalo Bill Reservoir near Cody, water is allocated to irrigation districts, municipalities, instream flow, and the State of Wyoming. Water in Buffalo Bill Reservoir is used mainly for irrigating agricultural crops.

Environmental Protection Agency (EPA), are lower than stock and irrigation concentrations and are based on palatability (tasting reasonably good) rather than toxicity (reference below).

Other water issues associated with streams, irrigation water, or water from shallow wells near corrals or septic systems are bacteria and other pathogens that may have entered the water and high nutrient levels (nitrate and nitrite), which can cause health problems when present in certain amounts. Unlike high TDS, these may not be detectable by taste. When in doubt, test your water. When siting a new well or a new corral, keep in mind the distance between the well and corral – see the article "Proper well maintenance helps ensure a good water supply" in Winter 2007 issue of *Barnyards & Backyards* magazine for more info.

If your drinking water is found to have E. coli bacteria and/or other pathogens, it can be boiled or can be filtered with activated charcoal or very

fine mechanical filters. On the other hand, nitrate is a dissolved salt and can only be removed by RO or distillation. Water quality in shallow wells affected by shallow aquifers may change with the seasons. High flows in the aquifer will dilute some pollutants like salts during the spring while low flows during fall and winter will concentrate them. The best plan is to regularly test drinking water at different times of the year and keep a log book to look for trends over time.

For more information read or visit:

"Water quality determines plant health" – *Barnyards & Backyards* article, Winter 2007. Find it at barnyardsandbackyards.com.

"How geology affects your well water quality" – *Barnyards & Backyards* article, Fall 2008. Find it at barnyardsandbackyards.com.

"The right stuff: Water quality plays big part in livestock performance" – *Barnyards & Backyards* article, Spring 2009. Find it at barnyardsandbackyards.com.

Water: Drinking Water Contaminants – <http://water.epa.gov/drink/contaminants/index.cfm>. This EPA website is an in-depth source covering federal drinking water standards, private wells, pollution prevention, and many other topics relating to water.

Irrigation Districts and Water Associations

Water is such an important commodity in Wyoming that state statutes allow for the creation of legal political subdivisions called irrigation districts to manage and fund local irrigation projects and systems. Irrigation districts fall under Wyoming Special District Law, which sets guidelines for taxation, governance, and accountability to the state for handling of funds. These districts are organized by landowners with water

rights around a water supply system, like a main ditch or a natural stream. These landowners share the common goal of keeping the system in good working order and level assessment fees on themselves for repairs and to pay staff to keep the system in good operating condition. Membership in these associations is usually limited to people with properties within the district boundaries who have water rights.

Subdivisions and Water Masters

New landowners take on important responsibilities when they purchase a home or lot in a subdivision served by an irrigation district. Landowners must talk to and cooperate with their neighbors, the water master, and the irrigation district to ensure efficient water delivery. There is no free water in Wyoming. A landowner pumps it, maintains ditches to deliver it, or pays a municipality or irrigation district to deliver it. Failure to pay irrigation district fees may result in a lien on the property.

Subdividing and building homes on a ditch-irrigated pasture or crop field results in a water delivery

system that is different than a farm/ranch system. The irrigation district ditch rider (an employee who opens and closes ditch gates) still opens the top gate that feeds what used to be one field. He or she does that at the request of the subdivision water master, a legally appointed/elected officer of the subdivision who manages the irrigation system. Once the water is flowing through the gate, it is the responsibility of the water master and subdivision homeowners to agree on how, when, and where the water will flow through the subdivision and into the wastewater system at the bottom of the property.

Lot owners have a responsibility to pay subdivision annual dues (even if they are not using the water) and water fees, to clean and repair irrigation ditches that cross their property (even if they are not using the water), to avoid damaging neighboring land by flooding, and to use water appropriately for Wyoming's arid climate.

There are likely more arguments about water than any other topic in the West. As Mark Twain reportedly said: "Whiskey is for drinking; water is for fighting over." **Time invested**

in understanding and carrying out these responsibilities makes for good neighbors and happy communities.

Irrigation and irrigation practices

Landowners wanting to change the method of irrigation (say from flood to sprinkler) on their property must work through several regulations because Wyoming waters are legally tied to the land they flow through or irrigate. Pivot sprinklers typically are served by wells. The SEO will be involved in permitting the well. Irrigation districts are interested in and have procedures for changing the use of flood irrigation waters.

When determining how much irrigation water you'll need to raise a crop, consider that pasture grasses and crops need varying amounts of water at different growth stages. Growth slows when too much or too little water is applied. It is possible to calculate exactly how much water a pasture or crop needs per week. Contact your local UW Extension educator for assistance. Crop health will improve with appropriate watering, and landowners will save money when they apply only what plants can use.

Flood Irrigation

Many Wyoming irrigation districts are able to deliver water using inexpensive gravity feed (once the infrastructure is in place) because of our high-elevation snowpack and low-elevation pasture/crop lands. A series of canals, pipes, and/or ditches deliver water to individual fields or subdivisions.

Fields are flooded when siphon tubes are used to transport water from the ditch to the crop row or when gated pipe gates are opened. With flood irrigation, water rushes down furrows in fields with row



This wetland in the western Laramie Valley is a result of an 1883 water right. In addition to supporting cattle grazing, this irrigated meadow is home to the endangered Wyoming toad, numerous waterfowl species, and other wildlife. The shallow ground water from irrigation also supplies a drinking water well for a children's educational camp.



crops or spreads out across the field without the use of furrows, such as in pastures.

Soil has many living organisms that require oxygen. These organisms can be killed when a row crop field is flood irrigated too long, excluding oxygen from the soil. Also, water from pastures irrigated too long usually moves downhill to a neighbor's property where it may not be wanted. Therefore careful monitoring of irrigation water is necessary. Experienced irrigators know just how long to irrigate their fields.

There are some benefits of flood irrigation that are not always obvious to someone first viewing it. In some areas of the state, flood irrigation recharges aquifers that supply wells and keeps salts from accumulating in the soil. In other parts, ephemeral wetlands are created that support a wide array of wildlife species during the irrigation "season".

Sprinkler Irrigation

Land without surface water or an irrigation ditch is often irrigated with pivot sprinklers that draw water from a deep well. Producers may choose to use pivot sprinklers to better control the irrigation amount and timing. Landowners must go through all the Wyoming permitting procedures described above for a well in order to change to pivot sprinklers. Always test well water to determine if it is appropriate for plants before using it for irrigation.

Sprinklers are capable of delivering the exact amount of water a crop needs when the crop needs it.

Fertilizer and pesticides can also be delivered through a pivot irrigation system. With some water sources and soils, salt accumulation in the soil should be monitored when using sprinkler irrigation.

Some producers put irrigation ditch water through pivot sprinklers. A series of filters and screens are needed to clean ditch water before it is used or it can clog pumps and nozzles.

Small rural lawns are often watered by sprinklers on garden hoses connected to a domestic well. These require no special permitting. Watering lawns can be labor intensive and use a lot of water. If you have the luxury of starting a small lawn from scratch, keep the size to a minimum and use low-water, drought-resistant grass species – native turf grasses can require one-half to one-third the amount of water as traditional varieties of Kentucky bluegrass, which need up to 35 inches per year. Also, limit your watering to early mornings to avoid water losses due to evaporation. Water-wise landscaping can be attractive and reduce your work. Many resources are available to help you.

Talk to your local UW Extension office or conservation district about landscape and lawn species selection for your area and watering requirements for these plants.

Drip Irrigation

Residents of the arid West often use drip irrigation in landscape areas around their homes for trees, shrubs, and vegetable gardens. Commercial

row crop growers in California have used it for years in high-value crops. A few Wyoming producers are using sub-surface drip irrigation for crop production, and many landowners utilize such systems to establish windbreaks.

Drip irrigation has benefits such as efficient water use and reduction of plant disease, but drawbacks can include high initial costs, clogged emitters, and rodents chewing on tubing.

Municipal water would be clean enough to run through a simple filter before using. Well water or ditch water may require more filtering before putting it through a drip system.

Typical equipment used in a drip system includes: backflow preventer, automatic timer, Y-filter, pressure regulator, drip tubing, micro tubing, emitters, sprayers and stakes, end cap or a figure-eight fitting, and some method of supporting the head assembly. See the "Windbreaks" section for detailed information on creating a drip system for windbreaks.

Wyoming winters freeze everything! Drain tubing, pipes, and pumps before they freeze, or they may get damaged.

For more information:

Many articles, videos, and other resources can be found on water-related subjects including water law, irrigation, and low-water-use lawns and garden plants by visiting barnyardsandbackyards.com

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