

preserving our lifeline

to nurture, share, and protect the
waters of the Bow River Basin.



Glenbow Ranch Provincial Park

welcome to our newsletter

a quarterly look at stories and updates
from around the watershed

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Drought: A Southern Alberta Perspective

WORDS BY **Claudette Lacombe**

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Drought is a regular occurrence in semi-arid southern Alberta. People that live in the Palliser Triangle expect droughts, recognize they can happen in any year, and research/study ways to survive them.

"Farming Smarter is always looking at ways we can farm better with a large focus on moisture conservation," says Ryan Mercer, owner of Mercer Seeds Ltd. in Lethbridge County.

Even before people moved to the prairies, John Palliser foretold of the drought hardships people living here would experience. A more optimistic John Macoun convinced governments the land would produce and pioneers followed the railroad out across the prairie.

If you talk to a fourth-generation farmer south of Hwy 1 in Alberta, they will tell you drought is a guiding factor in cropping systems every year. There is still far more dryland farming

in southern Alberta than there is irrigated land. In fact, most farms that have irrigation also dryland farm.

"We're 90% dryland and grow peas and lentils for pulses. For cereals, we've got durum, spring wheat, winter wheat, barley, and oats. For oil seeds, we've got mustard, flax and camelina," says Mercer, who farms 7,500 acres.

"We've learned a lot and we've had a lot of dry years in the 80s and 2000s but we're farming differently than we did back then. And we learn as we go."

In 2017, to celebrate Canada's 150th birthday, Farming Smarter Association dedicated its Field School to historic farming practices and change in southern Alberta. The past tillage practices demonstration from the days before conservation tillage elicited real horror on the faces of onlookers as the Prairie Tractor & Engine Museum Society volunteers aggressively tilled a sacrificial slice of a Farming Smarter field.

"Most of the dryland now is no-till. We leave taller stubble and disturb less during seeding. Thanks to Brian Beres' work with ultra early seeding, we're seeding earlier and earlier," explains Mercer. Seeding earlier allows crops to take advantage of



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winter moisture and early spring precipitation. Dr. Brian Beres is a Senior Research Scientist – Agronomy with Agriculture and Agri-Food Canada in Lethbridge.

Mercer says, “As farmers, we have to stay optimistic, hope for the best and plan for the worst.” In his opinion, planning for the worst means having a long-term crop rotation and taking care of the soil. He firmly believes that reacting to the vagaries of weather or markets is a losing proposition.

“If you get more rain than is forecast then your crop will do well and you will have a bumper crop year,” he says. Mercer tests his nitrogen levels in the spring to check for carry over and tops up the soil nitrogen.

“Fertilizer rates are based off your soil tests, so you can fertilize accordingly. That is difficult but we generally target higher yields,” he says. The dry climate means less nutrient leaching and more carry over in southern Alberta.

“The crops that we grow will still produce okay in a dry situation. We had two inches of rain last year in crop and we still averaged 35 bushels of peas, durum and spring wheat. We generally stick to that same crop rotation even in a drought situation.”

Further east at Bow Island, Will Van Roessel, owner of Specialty Seeds Ltd., farms about 14 quarters of land where he grows hybrid canola for seed, spring wheat, durum, yellow peas, winter wheat and hybrid fall rye.

While neither Mercer nor Van Roessel are worried about next growing season yet, Van Roessel also has his contingency plan if the precipitation doesn't come. Some crops survive better even with less moisture. What people plant this year may be different than other years according to Van Roessel. Every crop has its water needs to produce a profitable yield. However, pulse crops require less water than corn or potatoes for example.

“Some people might be thinking of planting some peas or even lentils. Lentils can probably get by with even less water than peas.”

Also, as the season progresses, he will monitor the commodity prices and put his water where the money is, so to speak.

“I'm least likely to take water away from my seed development crops because that's a high returning crop. If I'm going to take



A Prairie Tractor Museum volunteer tills the soil like it's 1950 as an astonished young farmer looks on. Photo: Farming Smarter.

water from my cereal crop, I'm more likely to take water from wheat than durum,” says Van Roessel.

Every farmer in the region will watch the moisture situation updates coming from Alberta Agriculture and irrigators will check notices from the district that serves them. They have until April or May to make planting decisions.

“I haven't had any irrigator come to me and say, ‘so we're getting a full allocation.’ They all they want to know how bad it might be,” says David Westwood, St. Mary River Irrigation District (SMRID) General Manager.

“The further south you go, it's just historically drier. This is not unprecedented. We don't go decades without having water issues,” Westwood says.

That said, he admits that, as of late January, this is a year for the records. The last time it was this dry was in the early 2000s, but it's not the same. He thinks the reservoirs had less water but the snow pillows were better.

“It's too early to get too concerned because historically we don't receive the majority of our snowpack until March, April, and into May.”

This is not to make light of the situation. Westwood and Joel Sanchez, Lethbridge Director of Infrastructure Services, both have many people and businesses that rely on them for water

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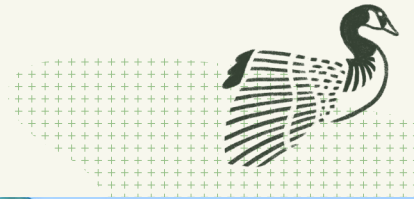
supply. SMRID delivers water to small municipalities, such as Winnifred, and food processors such as Lantic Sugar in Taber and Lamb Weston in Purple Springs. Sanchez has Hostess–Fri–to Lay, Cavendish and McCain on his supply lines and surrounding small municipalities.

“We are concerned about the circumstances, but that’s why we have different plans, activities and ideas in the works,” Sanchez says. “It’s that work with different stakeholders to make sure everybody’s on the same page and to share the same communications.” He has internal and external groups in discussions on this event.

Lethbridge has a Water Rationing Plan passed in 2016, but growth in the city means it’s time to revisit it. In 2016, the

plan focused on residential use, but Sanchez says it’s time to consider what industrial users can do too. City Council will consider economic incentives for both residential and industrial users.

“Whatever we do, we need to separate this from the drought conditions. We know we may get a really good spring and a lot of rain, but next year we might be back at the same place we’re at right now. We need to start planning for this and getting all the tools on the table so we’re ready for what we need to do.”



Mike Gretzinger, Farming Smarter Research Manager, planting wheat February 13, 2023, as part of Dr. Brian Beres ultra early seeding research. The research shows that using soil temperature rather than dates to time seeding can offer crops that yield well, resist pests and mature in time for an early harvest. Most agriculture research in southern Alberta takes drought into consideration through research in soil moisture retention, integrated pest management, and crop varieties and rotations. Photo: Farming Smarter.



Gary Vucurevich shares the results of his experiment planting sugar beets directly into the stubble of last year’s barley crop. No-till can be tricky with beets as they like soft soil. His presentation was part of the Farming Smarter 2023 Rolling Innovation Tour that took a bus load of farmers to visit on-farm innovations. Photo: Farming Smarter.

Municipal Water Conservation and Efficiency: Tools and Practices

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According to the Government of Alberta, more than 80 per cent of Alberta’s water supply is found in the northern part of the province, while 80 per cent of water demand is in the south. As climate change intensifies, so too will the tensions between water supply and demand. Summer 2023 brought these tensions to the forefront, with several municipalities issuing water restrictions (including Alberta’s largest city, Calgary). By November of that year, Environment Minister Rebecca Schulz [wrote to municipalities](#) asking them to take specific actions to prepare for the risk of severe drought in 2024, advising that “Alberta is considering a wide range of tools and approaches to respond to an emergency situation, including both regulatory and non-regulatory tools.” The following presents a snapshot of some of the tools and practices available to municipalities in their water conservation and efficiency efforts.

Water Audits

Alberta Municipalities (AM) is an organization led by an elected Board comprised of representatives from Alberta’s cities, towns, villages, summer villages, and specialized municipalities. AM’s [water management hub](#) provides information on Watershed Management, Water Conservation, Water and Wastewater, Planning and Funding, Alberta Municipalities Policies and Resolutions, and more. While recognizing significant concerns around climate change, water supply, and operational costs, AM puts the issue in simple terms: “No water = no municipalities. Water is a finite resource essential to all dimensions of municipal sustainability.”

AM points to water audits, which help identify the quantity and the location of water losses, as a vital first step towards understanding the state of a current water system. Unaccounted water losses can vary from less than 10 per cent

in new systems to more than 50 per cent in aging systems. Having a well-managed system versus a poorly maintained system has a tremendous impact on water system performance and unaccounted water losses. Additionally, annual leak surveys and replacement of aging water infrastructure can further reduce water losses.

Conservation, Efficiency and Productivity (CEP) Plans

Conservation, Efficiency and Productivity (CEP) Plans are supported by Alberta’s Water for Life Strategy and have gained traction across all sectors. The Alberta Water Council’s [Water Conservation, Efficiency, and Productivity](#) is an excellent resource for learning more about the history of CEP Plans, including progress reports.

Calgary’s CEP Plan is known as the 30-in-30 Water Efficiency Plan, which was approved by City Council in 2005. The City updated this plan with a [2016 Water Efficiency Plan Update](#) that “reaffirms The City’s commitment to protecting our water supply and identifies actions all water users can take to ensure we’re always choosing solutions that use and waste less water.”

Bylaws

Water Conservation bylaws are legal tools widely used by municipalities. The City of Calgary, for example, provides a listing of [bylaws related to water](#), along with related bylaws and topics (e.g., stormwater and wastewater). Notably, Water Utility Bylaw 40M2006 has led to nearly all homes in Calgary having water meters. Other measures within this bylaw include low water use fixtures, water wastage, and outdoor water use restrictions.

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Rebates and Conservation Pricing

In Alberta, municipalities can use rebates/reimbursements to incentivize citizens to purchase and use water conservation and efficiency products such as low-flow toilets, rain collection barrels, and mulch ground cover. The City of Brooks and the Town of Cochrane have both led projects that illustrate how rebates could work. Brooks, for example, offered rebates that target both indoor fixtures and outdoor tools and implements, including a \$50 rebate on a toilet replacement, \$25 rebate on rain barrels, and \$25 rebate on backyard composters. Cochrane offered a rebate of up to \$75 on wood mulch and up to a maximum of \$60 for fescue grasses, in addition to rebates on indoor fixtures.

Many municipalities also offer conservation pricing/tiered water rates that link costs to consumption. When designed properly, this type of rate structure can be effective in providing a strong price signal to encourage water conservation.

Education and Outreach Initiatives

Water education and outreach initiatives heighten public awareness of the need to conserve water and provide interactive ways to engage the general public on water conservation concepts. The City of Brooks is very active in its outreach initiatives, including its Water Wise Plant Tag Program and Water Use Scorecard. As well, the [Mayor's Environment Expo](#) in Calgary is an annual event that focuses on engaging youth in environmental action (the BRBC often participates in this expo!). And recently, The City of Lethbridge launched a water conservation survey, asking its citizens for feedback on their current water conservation practices and initiatives The City may consider implementing.

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BRBC Executive Director, Mike Murray, at the Calgary Mayor's Expo BRBC booth. Photo: Bow River Basin Council.

Water Reuse and Stormwater Use

As stated in the Government of Alberta's [2020 Public Health Guidelines for Water Reuse and Stormwater Use](#), "There is growing interest in re-using wastewater or using stormwater for non-potable end uses, largely due to the economic and environmental benefits. Alberta is adopting a fit-for-purpose approach to the use of alternative water sources, whereby the water sources are treated to a quality acceptable for the intended end use, posing acceptable levels of risk to the user, the public, and the environment."

The Guidelines go on to describe five alternative source waters (e.g., rooftop collected rainwater) and nine potential end uses (e.g., non agri-food irrigation). While beer is not identified as a potential end use in this document, it should be noted that the University of Calgary's Advancing Canadian Water Assets partnered with Village Brewery and Xylem Inc. to produce [Alberta's first beer made with reused water](#), demonstrating how treated wastewater can help address water scarcity, and how the Government of Alberta can provide guidance to ensure public health and safety.

In Alberta, reclaimed wastewater could be used to flush toilets, as long as the approved reclaimed wastewater system adheres to plumbing code (the Government of Alberta provides [guidelines for both rainwater harvesting and reclaimed wastewater](#)). However, as noted by the government, "reclaimed wastewater may contain substances and micro-organisms that pose a risk to public health and the environment." Research is underway, with the University of Alberta recently receiving [\\$1.4 million in funding](#) to research wastewater recycling.

There are many online water reuse resources, including:

- The University of Alberta's [Water Reuse and Recovery Lab](#) closed in 2020 but still has useful information, including links to [water reuse projects](#) in Alberta and across Canada.
- Alberta WaterSMART's [Water Reuse in Alberta: Case Studies and Policy Development to Support Economic Development](#) (2015)



Xylem's ozone oxidation equipment, used to produce Alberta's first beer made with reused water, created an effective barrier for removing viruses and bacteria from the water stream to disinfect it. Photo: Xylem Inc. (from [Water Canada](#)).

Conclusion

While Alberta's legislation and policy provide a framework of rules and guidelines surrounding water conservation and efficiency, it's the municipalities themselves that actively implement the tools and initiatives to achieve conservation and efficiency. Other sectors, including agriculture and industry, are also doing their part and have done much that is commendable. Moving forward, the challenges of balancing water supply with demand will require continued collaboration (e.g., through organizations like the Bow River Basin Council) and innovation (e.g., the [Alberta Water Nexus Project](#)). It is the collective efforts of all water users that will meet these challenges both today and into the future.



Public Safety and the Environment: Solving the Road Salt Dilemma

WORDS BY Bill Berzins Bill Berzins, M.A.Sc. P.Eng.

Aquen Canada Inc., BRBC Chair: 2000 – 2009

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When the Bow River Basin Council (BRBC) was established as a Watershed Planning and Advisory Council under Alberta's Water for Life Strategy shortly after 2000, it brought together the people and processes necessary to help make the difficult tradeoffs between social, economic and environmental interests. Today, the BRBC's municipal members are faced with very difficult tradeoffs: Do we increase the use of road salt to further reduce accident frequency? Do we reduce the amount of salt used to protect the aquatic environment? Does road salt in runoff limit the reuse of stormwater as we enter extended periods of drought with less water available for a healthy economy?

Stormwater reuse has been a key issue for the Calgary Metropolitan Region Board (CMRB) since its initial studies supporting a Regional Servicing Plan began in 2019. At that time, the CMRB published a [Stormwater Reuse Background](#) that identified water reuse case studies around the world. The CMRB correctly identified stormwater reuse as a potential solution for reduced water availability under climate change scenarios (and, in fact, stormwater runoff was already contributing to the Bearspaw and Glenmore reservoirs).

More than 5 million tonnes of salt are applied to roads across Canada resulting in elevated levels of sodium and chloride in soils, vegetation and the aquatic environment. The reduction of salt in runoff is a priority for the Federation of Canadian Municipalities, which has a Green Municipal Fund Program supporting studies to reduce salt impacts.

Undoubtedly, salt application benefits commuters during icy conditions. Studies across the US have shown that the application of salt can reduce accident frequency by 85%. A 10% improvement in the surface friction of a road can yield a 20% reduction in crashes. And on four-lane roads, before-and-after analysis has shown a 93% reduction in crashes after de-icing. Calgarians benefit immensely from [The City's Snow and Ice Control \(SNIC\) Policy](#).

On the flip side, road salt increases chloride concentrations in runoff. Chloride is a highly soluble and mobile ion that spreads rapidly throughout a water body. It is also toxic to wildlife and can be incredibly persistent because nothing naturally breaks down chloride in the environment. High chloride levels can

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Before and after photo of de-iced roadways. The City of Calgary only uses sodium chloride and calcium chloride. Road salts used for snow and ice control may be solid or liquid brines. Photo: The City of Calgary.

also inhibit the growth/reproduction of aquatic species, impact food sources, and disrupt amphibian [osmoregulation](#). In addition, high chloride levels can lead to oxygen depletion by creating an oxygen-deficient layer that is harmful to aquatic life. A [comprehensive 5-year scientific assessment](#) published by Environment and Climate Change Canada determined that, in sufficient concentrations, road salts pose a risk to plants, animals and the aquatic environment.

Excess salt in the environment also impacts riparian landscapes. Salinity affects almost all aspects of plant development including germination, growth and reproduction. High salinity can cause ion toxicity, osmotic stress, nutrient deficiency and oxidative stress on plants, thereby limiting water uptake. There are also impacts on agrarian landscapes. In Eastern Canada, downstream landowners have successfully been awarded compensation for crop losses, the cost of soil/plant analysis, and for the diminution of property value resulting from road salt contamination.

Closer to home, Alberta’s Ministry of Environment and Protected Areas has monitored water quality in Fish Creek

at its mouth to the Bow River for 20 years through its [Tributary Monitoring Network](#). Although sample frequency is too limited to yield a conclusive trend, 10% of samples analyzed from December through to February showed chloride levels exceeding [Alberta Water Quality Guidelines](#) for acute toxicity (see Table 1). Perhaps equally problematic is the fact that chloride measurements often exceed levels considered acceptable for long-term chronic exposure. Acute guidelines are never to be exceeded; chronically high chloride levels can cause permanent damage to the ecosystem.

So the question arises “Could the elevated chlorides in Fish Creek be naturally occurring?”

The Fish Creek Watershed Association recently published its [State of The Watershed Report](#), confirming that water quality exiting the upper reaches of the watershed met aquatic and irrigation water quality guidelines. It appears that outside Calgary city limits, Fish Creek water quality meets guidelines.

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Table 1. Chloride levels at the mouth of Fish Creek into the Bow River.

Station Location	Sample Comment	Sample Date & Time	17206 CHLORIDE DISSOLVED mg/L	2003 CHLORIDE DISSOLVED mg/L	Alberta Guideline Acute	Alberta Guideline Chronic
AB05BK0070 FISH CREEK, #8 NEAR THE MOUTH	Chinook weather conditions causing street runoff.	3/26/2002 15:15	687		640	120
	sampled from chiseled hole; sunny; calm; over ice flow	3/14/2018 13:30		690		
	picked a hole. pH probe is suspect.	3/3/2021 14:30		610		
	overcast; sampled from open lead	12/4/2018 12:05		410		
	Sunny, calm, augered hole	3/9/2022 12:45		390		

Further downstream, Fish Creek absorbs runoff from surrounding neighbourhoods and Calgary's expanding road network. In 2020, seeking to understand the impact of increased salt content in stormwater runoff from these sources, researchers from The University of Calgary analyzed the quality of the runoff from Anderson Road and the communities of Cedarbrae and Braeside. They discovered that levels of Total Dissolved Solids (primarily chloride and sodium) were many times higher than Alberta's acute toxicity limits.

As with any environmental issue, the first step towards solving the problem relies on a basic understanding of the sources of elevated chlorides, in this case likely related to the application of snow and ice control formulations on the streets upstream. Over the years, The City has used a number of formulations to improve road safety. Depending upon road conditions, these formulations have included pickled gravel, granular road salt, calcium chloride, salt brine and beet brine.

Potential concerns emerge, however, when looking deeper into the composition of some of these formulations. Safety data available from suppliers indicates that the aquatic toxicity of some of the additives is unknown (e.g., anti-caking compounds including sodium hexacyanoferrate and ferric ferrocyanide). While much is known about the potential harm from ingestion of excess quantities of salt, less is known about the effect of road salt additives within the aquatic environment.

In terms of solutions, the "solution to pollution is dilution" approach to chloride and sodium exceedances has limitations. For example, dilution via the use of potable water for irrigation, especially given climate change and our unpredictable rainfall, burdens Calgary's drinking water infrastructure and is subject to water use restrictions (especially during El Niño cycles). As well, relying on high precipitation during the spring freshet to temporarily flush the problem downstream does little for water quality during a drier fall season. Neither solution reduces the problem of acute salinity in Fish Creek.

Because these traditional solutions may not be sustainable during droughts, alternative treatment methods may be required prior to reusing water exiting Calgary's storm drain system. Fortunately, alternative treatment options are emerging, including electrodialysis. In addition to producing clean water (i.e., water that may be suitable for irrigation or potable use), electrodialysis can be "tweaked" to produce a more

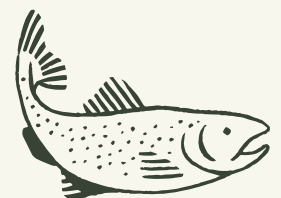


Runoff from Anderson Road, Calgary. Photo: Bill Berzins.

concentrated brine. Since Calgary already utilizes a 22% brine solution for its SNIC program, a concentrated brine from a dialysis system has the potential to be reapplied on city roads. Cleaner stormwater and reusable brine might represent a win-win for public safety and a cleaner environment.

By building on CMRB's identified solution of stormwater reuse under climate change scenarios, reviewing and improving policies (e.g., The City of Calgary's recent [Snow and Ice Control Policy Review](#)), and testing alternative treatment methods, scientists and engineers may soon find ways to lessen the impacts of road salt on urban ecosystems while providing clean stormwater for municipal water supplies.

For more information on stormwater reuse, contact Bill Berzins at billberzins@shaw.ca.



BRBC Quarterly Educational and Networking Forum

Calgary Hellenic Banquet Hall
1, Tamarac Crescent SW, Calgary
March 13th, 9:00 am – 3:00 pm
(8:30 am, sign in)

To register, [please visit this link](#).



FORUM SPEAKERS

Emily Harrison, Northshore Environmental
Regulatory Rabbit Holes Regarding Projects
in and Around Water

Colin Dumais, Radon West
Radon Hazards in and Around Groundwater

Dr. Cathy Ryan, University of Calgary
Where Does the Water in Calgary's Rivers
'Come From'?

Norma Posada, The City of Calgary

Mike Gallant, KWL
The City of Calgary Riparian Monitoring
Program

Anne Naumann, Calgary River Valleys
Calgary River Valleys Restoration Efforts

Tenaya Lynx, BRBC
Bow Basin Climate Adaptation Project
Update

Dr. Eva Enkelmann, University of Calgary
The Memories of Minerals that Form the
Rocky Mountains

**Dr. Chris Spence, Environment and
Climate Change Canada/Prairie Water**
PRAIRIE WATER Datasets, Tools and Products

Kendra Tippe, MD of Bighorn
MD of Bighorn Climate Adaptation and
Resilience Plan

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Sustainable funding fuels the work we do and allows us to support projects across the Bow Basin. The BRBC prides itself on maintaining autonomy and integrity via diverse funding sources, including donations by our membership and partners.

To learn more about our current initiatives, visit www.brbc.ab.ca

A donation can be made online at brbc.ab.ca/donate

The next BRBC newsletter will be released in June.
If you would like to submit an article, please contact
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