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Preserving Our Lifeline

working together to nurture, renew and protect
the waters of the bow river basin

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The BRBC Team Welcomes Joe Fowler!

Joe Fowler is very excited to join the BRBC as its Watershed Stewardship Strategic Support Coordinator. This is a new position within the BRBC and will support watershed stewardship through outreach activities and education. This includes on-the-ground work such as assisting the Elbow River Watershed Partnership with its *Freshwater Field Study of the Elbow and Bow River*.

Joe is very keen to support the various forms of environmental stewardship within the Bow River Watershed. He has always been passionate about the outdoors and is grateful to be able to explore the beautiful landscapes within the traditional territory of Treaty 7. As well, science communication is something that Joe finds incredibly rewarding. Joe's field experience includes connecting with countless students and members of the public through guided hikes, school programs, science demonstrations, and educational theatre (check out [Interpretation Canada 2020 Award Winners](#) to watch Joe perform *Pirates of the Kananaskis Lakes: The Curse of the Black Whirl*). With a background in Performing Arts from Mount Royal University, Joe



Joe taking part in Elbow River Watershed Partnership training, McClean Creek.
Photo: Elbow River Watershed Partnership

is always looking for opportunities to use art as a tool to inspire environmental stewardship.

This new position is meant to support and promote all forms of stewardship within the Bow Basin, so please reach out to Joe if you have suggestions, ideas, or projects that relate to watershed stewardship! You can contact him at joe.fowler@brbc.ab.ca.

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Adapting to Multi-Year Drought

Highlights of the 2023 Legislation and Policy Workshop

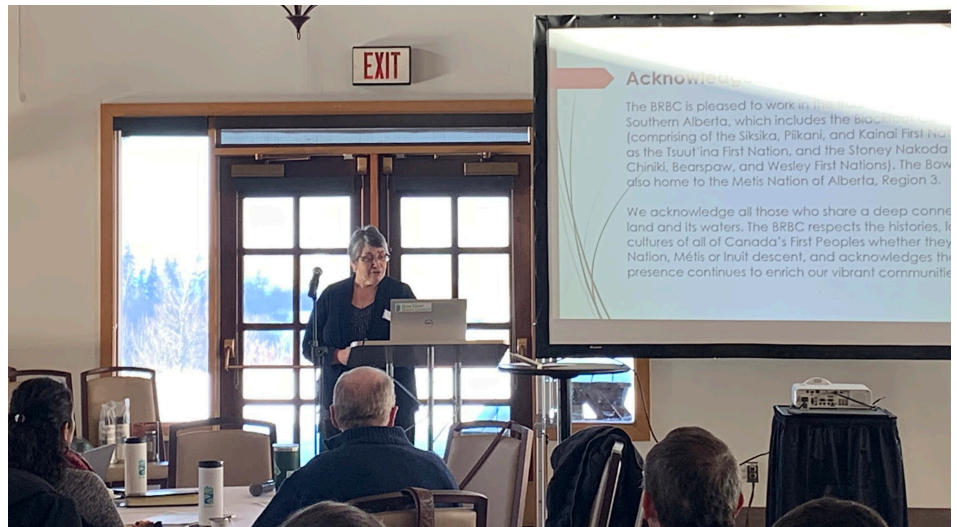
Dr. Judy Stewart, Chair
Legislation and Policy Committee
Bow River Basin Council
stewart.jmm@gmail.com

On February 24, 2023, the Legislation and Policy Committee hosted its first in-person spring workshop since 2019. The speakers were interesting and informative, and provided perspectives on how various sectors are preparing for and adapting to unpredictable multi-year drought conditions in the watershed. All presenters generously agreed to share their presentation materials with participants following the workshop. As well, presenters provided written responses to questions raised by participants but, due to time constraints, could not be addressed at the workshop. A forthcoming *What We Learned* report will capture this additional input. The present article highlights some of the key workshop take aways from the author's perspective.

Hydrology and Extremes of the Upper Bow River Basin and Sensitivity to Climate and Land Use Variation

Dr. John Pomeroy
Global Water Futures

Dr. John Pomeroy delivered a data-rich presentation that included observations from an ongoing study of seven major Canadian river basins, conducted under [Global Water Futures](#) (a



Dr. Judy Stewart welcomes workshop participants. Photo: Brooke Kapeller.

program that includes a solutions-oriented network of world class monitoring and data collection). One such observation, concerning Peyto Glacier in the Upper Bow Basin, saw that several predictions made between 2010 and 2016 mirrored what actually happened over that same time period. A highlight for the author was that ice surface depletion between 2016 and 2020 was more than had occurred between 1960 and 2020, raising the question for this author: "is the glacier now melting faster due to changing climate and land use patterns?"

The research program also considered the impacts of deforestation (especially clearcuts) on mountain streamflow in Marmot Creek, where John illustrated an observed decrease in snowpack over time. As well, where clearcutting had occurred,

there has been an 18 per cent increase in snowmelt discharge into Marmot Creek. The extensive data suggests that glacier flows have diminished; deforestation and land-use changes have increased mountain runoff; and that, following spring snowmelt, there is reduced runoff in the foothills and prairie regions.

Regarding the data and what it suggests, John then raised the question of uncertainty. The future will not necessarily resemble the past; it will depend on snowpack, rainfall, temperatures and the type and amount of land-use change. He concluded with a startling observation that while watershed flows are predicted to increase in the mountain parks, there is a great deal of uncertainty about

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whether spring peak flows will actually increase or decrease in the foothills and prairies (regions where drought conditions can occur during the summer months). Uncertainty therefore needs to be taken into account in all water variability modelling exercises.

Calgary's Drought Resilience Plan
Pam Duncan, The City of Calgary

Pam Duncan is Team Lead, Resource Strategy, in The City's new Climate and Environment Business Unit. Recognizing that Calgary is part of Alberta's drought-prone southern region, The City has studied several trends: shorter winters, dryer summers, rapid population and economic growth, and an ever increasing development footprint. While Calgary grows and its citizens are trying to adapt to changing ecological and social patterns, The City can no longer apply for a licence for additional water allocation as it is in a closed basin.

Pam presented a timeline of what The City has done since 2011 to adapt to drought conditions, including studies on watershed assessment (based on tree ring analysis), predicted flow triggers, and climate change patterns. In 2016, The City increased watershed monitoring and engaged in corporate drought preparedness and operational response training in the event of a multi-year drought. In 2020, a Water Security Framework was prepared, followed by a Drought Risk Management Plan in 2021. In 2022, The City began comprehensive customer



Dr. Judy Stewart and Dr. John Pomeroy. Photo: Brooke Kapeller.

research and engagement regarding the [Drought Resilience Plan](#). The Plan includes water conservation programs, among other strategic actions.

Calgary's Drought Resilience Plan reflects many years of collaboration, monitoring, data collection, analysis and planning. To this author, the highlight of the plan is that key interested parties are being engaged in a meaningful way and empowered to take individual action to adapt to potential drought conditions.

Using an interactive, online survey, Pam asked workshop attendees to share what they are currently doing to adapt to drought. Participant feedback was instantaneously provided on the screen and illustrated that all sectors represented in the room are currently engaged in several drought adaptation activities.

Irrigation Districts and Drought
Richard Phillips
Bow River Irrigation District

Richard explained that there are 12 irrigation districts in Alberta that irrigate 1.5 million acres (over 600,000 ha) of land, and provided several different definitions of drought, including 'irrigation drought.' Referencing the 2021 severe agricultural drought in Vauxhall, Alberta, Richard explained that the irrigation district was able to manage water supply so that the irrigated crops did not suffer during that period.

An irrigation drought occurs when there is low rainfall, low or rapid melting snowpack, and insufficient storage to ensure that irrigated croplands will produce. Richard assured participants, however, that technological advances have

When employing new technology, the intentional consequences of becoming more water efficient also have unintentional consequences.

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helped the irrigation districts avoid irrigation drought. Management options include water use limits, using pipelines instead of canals to avoid evaporation losses, and careful management of critical storage in irrigation infrastructure. The use of pivots and pipelines has also increased irrigation efficiency over time.

Richard explained that when employing new technology, the intentional consequences of becoming more water efficient also have unintentional consequences. Replacing canals with pipelines, for example, can have unintentional consequences as canal systems also serve as critical habitat for birds and wildlife.

Regarding drought preparedness and adaptation policy, Richard stated that there are several approaches in play: a maximum water use limit; water ordering rules; water sharing adjustments at the start and finish of the irrigation season; and water

sharing with non-irrigators, such as municipalities. The irrigation districts have a [Human Use Declaration](#) whereby people will receive water first during a multi-year drought. Richard further explained that there is high demand for expansion within the irrigation districts and they are also affected by the closure of the river basin.

Building Resiliency to Multi-Year Drought

Andre Asselin

Alberta Water Council

Ahead of the lunch break, Andre Asselin, Executive Director of the Alberta Water Council (AWC), presented materials put together by an AWC project team before the 2020 pandemic, including a set of tools for use by Watershed Planning and Advisory Councils (WPACs) such as the BRBC. This portfolio of tools and workshop materials are publicly available and accessible to all WPACs to help them work with their

municipal members to prepare for multi-year drought. Tools and materials include background information, topical data sets and resources, and specialized teaching resources. Explore the link, [Building Resiliency to Multi-Year Drought Project](#), to access all of the information.

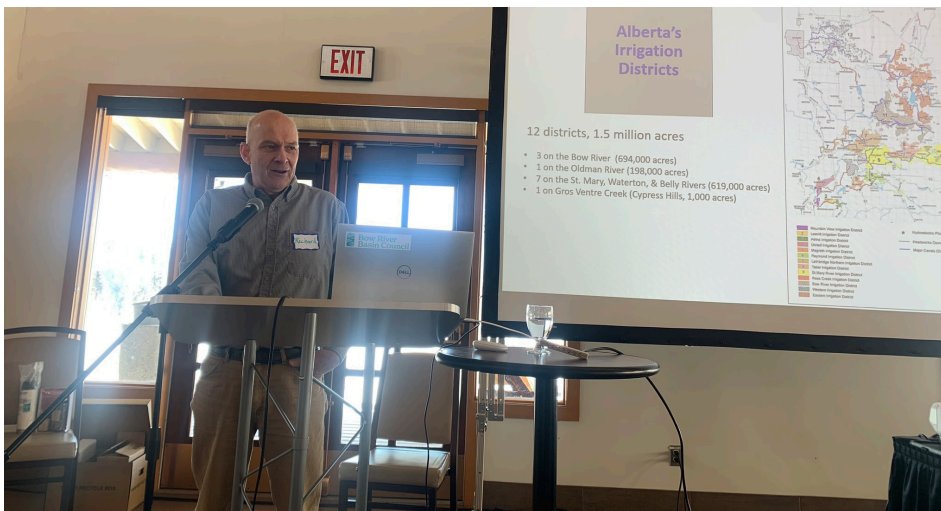
Andre went on to describe other AWC projects related to multi-year drought adaptation, including: the recently completed review of *Water for Life* and its action plan; and the water conservation, efficiency, and productivity planning that is on-going by all major water-user sectors in Alberta. The AWC is also working with WaterSMART on a project, 'Improving Drought Resilience Through a Simulation,' which was presented by WaterSMART later in the workshop. Andre gave us plenty to think about, and perhaps the BRBC will embrace the Building Resiliency to Multi-Year Drought Project and help municipal members in our watershed prepare for drought as well.

Climate Change and Multi-Year Drought

Dr. Mary-Ellen Tyler

University of Calgary

Following the lunch and networking break, Dr. Mary-Ellen Tyler discussed the implications for the Bow River should multi-year drought conditions prevail. Setting the stage for discussion, Mary-Ellen described the regional semi-arid hydrological system



Richard Phillips, Bow River Irrigation District. Photo: Mike Murray.

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Dr. Mary-Ellen Tyler, University of Calgary. Photo: Mike Murray.

and how only 30 per cent of the water supply in the Bow Basin is 'blue flow' (i.e., liquid surface water flowing in rivers, creeks and streams). However, 70 per cent of our water supply is 'green flow' held in vegetation and soils. This results from precipitation and snowmelt that is absorbed into the soils in the spring and is slowly released during the summer months. As such, it is important to actively manage the landscape for water and not just manage stream flow, as the hydrologic cycle is far more than stream flow alone.

When we intensify land use, impact landscapes, or intensify water use at local and regional scales, we affect the ecosystem's ability to provide critical green flows, especially during drought conditions. The Canadian Climate Atlas projections for the Calgary region show average annual precipitation as relatively constant over the next 30 to 50 years. However, significant increases in days over 30 degrees Celsius are projected which, when coupled

with the very high regional evapotranspiration rates, will significantly reduce our moisture availability. The projected shift in precipitation from snow to rain and from growing season to winter months will also reduce access to moisture. In this context, drought and the potential for multi-year drought may be more about timing, heat and evapotranspiration, and less about the amount of annual precipitation.

Mary-Ellen went on to state that current predictions about future water availability in the Bow Basin are based on data from the last 200 years. However, tree-ring analysis providing moisture history for the last 1,000 years in the region clearly shows previous periods of multi-year drought, with the last 200 years being relatively wet.

Current trends show that changing weather patterns are leading to hotter and drier summer conditions and increasingly complex ecosystem dynamics.

Mary-Ellen explained that while climate mitigation activities to date have been largely concerned with managing carbon and other GHG emissions, most of our current climate risk vulnerabilities and adaptation efforts in the region are about water. Activities to address the impacts of severe weather events also need to be concerned with how we use and conserve water. There is a direct link between climate change projections and water quantity/quality in our watershed.

Mary-Ellen's concluding remarks stressed that "the onset, duration and severity [of drought] are effectively unpredictable" given our current forecasting capabilities. This caught the author by surprise, for if an ecosystem is unpredictable, is it also unmanageable through well-meaning human interventions? As Mary-Ellen succinctly summarized in her last slide: at the end of the day, when we are preparing for and adapting to multi-year drought conditions, maybe the best we can do is 'pray for rain.'

Collaborative Watershed Management Supported by the SSROM Model

Robert Hough and Mike Kelly WaterSMART

This final presentation of the day provided insights into a project that was mentioned earlier by Andre Asselin. Starting off the conversation, Mike Kelly

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explained that 42 per cent of the flow that eventually makes its way to Saskatchewan derives from the Bow River watershed. In contrast, 38 per cent comes from the Oldman River, 18 per cent from the Red Deer River, and only 1 per cent from the lower South Saskatchewan River. Looking at the whole of the South Saskatchewan River system, water supplies in the Bow are critical for ecosystem sustainability and watershed health. Mike stressed that "all models are wrong, but some are useful" (quoting George Box). WaterSMART is currently using models to inform basin-wide land use and water use decision making. The work involves putting together long-term watershed management plans and providing insights into how changing climate patterns may affect the basin as a whole. The goals of the program are to bring people together who know the basin;

provide a strong data base and monitoring and analysis tools; and work collaboratively to determine the strengths, weaknesses, opportunities and barriers to multi-year drought adaptation.

Robert explained that WaterSMART is using the OASIS platform to study climate variability through systems for monitoring, data collection, analysis, and forecasting. In 2015, WaterSMART began the process of building adaptation road maps for the South Saskatchewan River Basin. Outcomes for the program include local-scale watershed management plans, sub-watershed modelling and forecasting, communication platforms, and operational flexibility to address the impacts of severe weather events on water variability. While stressing the importance of modelling, we were reminded that there is a great deal of uncertainty

and unpredictability associated with forecasting drought conditions in the basin.

A highlight for the author was Robert's comment that a major land use adaptation might be to restrict development in the floodplain. This seems to be a common thread that wove its way through each presentation at the workshop. Perhaps this is a major provincial policy direction that is a long time in coming and critical to adapting to multi-year drought.

The breadth and scope of the day's presentations gave each attendee much to think about, both in terms of one's own work and how collaboration underpins this work. The BRBC Legislation and Policy Committee extends its thanks to the presenters and attendees for making the day a great success!



Presenters during the Q & A portion of the workshop. Photo: Mike Murray.

"I attribute my achievements to the encouragement I received from the great people surrounding me."

Congratulations Mark Bennett! Recipient of the QE II Platinum Jubilee Medal

On February 8, 2023, Mark Bennett was awarded the Queen Elizabeth II Platinum Jubilee Medal in recognition of his more than 20 years as Executive Director of the BRBC. The medal was created to mark the 70th anniversary of Her Majesty Queen Elizabeth's accession to the Throne as Queen of Canada.

For 70 years, Her Majesty Queen Elizabeth exemplified the meaning of public service. The medal honours those who have reflected that same dedication to the service of family, community and

country. The award was presented by the Honourable Sonya Savage, Minister of Environment and Protected Areas, on behalf of the Honourable Salma Lakhani, Lieutenant Governor of Alberta.

"I was very pleasantly surprised when I was told of this award. I had no idea that I had been nominated," said Mark. In a written communication accompanying the medal, the Lieutenant Governor thanked Mark for his dedicated service to his peers, community, Alberta and Canada.



Mark and Kim enjoying the moment.
Photo courtesy of Kim Sturgess.

"This wonderful award belongs as much to the BRBC as it does to me. I couldn't have accomplished a fraction of what I did were it not for the support I received from the BRBC Board, its members, and my colleagues. I attribute my achievements to the encouragement I received from the great people surrounding me."

Mark concluded by saying, "The day was all the more special because my longtime friend and colleague, Kim Sturgess (WaterSMART), was one of my co-recipients. That we have followed similar, if not nearly identical paths, tends to confirm the value of the work we have been doing."



Former Minister of Environment, Whitney Issik (right) joins Minister Sonya Savage in presenting Mark the Queen Elizabeth II Platinum Jubilee Medal (Alberta).
Photo: Government of Alberta.

Highlights of the 2023 BRBC Science Forum: State of the Watershed

Alejandro Caguao
Summer Student
Bow River Basin Council
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On April 26, a beautiful and sunny day, the BRBC held its annual Science Forum. Organized by the BRBC's Science Committee, more than 90 attendees gathered to learn about new studies and forge meaningful connections. The forum took place at the Southern Alberta Institute of Technology's (SAIT) Heritage Hall, which provided an exciting and engaging atmosphere for the presentations.

Wendell Koning, Chair of the Science Committee, kicked off the day with opening remarks. The forum featured eleven speakers who presented on the overarching theme, "State of the Watershed," across four sessions: Bow River Health Assessment; Assessing Natural and Built Components of the Aquatic Ecosystem; Assessing Groundwater and Riparian Components of the Aquatic Environment; and Management of the Aquatic Environment. Attendees also had the chance to ask questions, network, and view gallery posters.

Session One: Bow River Health Assessment

The first presenter, Dr. Patricija Marjan from the University of Calgary (UCalgary), introduced the work of the Bow River Ecosystem



Wendell Koning delivering opening remarks at the 2023 Science Forum.
Photo: Mansi Patel.

Health Assessment (BREHA) research group. This group was established to evaluate the health of the Bow River ecosystem and is a partnership between the City of Calgary, Advancing Canadian Water Assets, NSERC, Alberta Innovates, Innotech Alberta, and Riverwatch Institute of Alberta. BREHA's goal is to establish key indicators of exposure to municipal wastewater and stormwater at various levels of biological organization, from primary productivity to fish responses. This will help identify areas of environmental degradation and concern in the Bow River watershed within Calgary.

Breanna Sayles and Aphra Sutherland, also from the UCalgary, then presented their project, "Quantifying the Potential Impacts of Municipal Wastewater Effluent (MWW) on the Basal Aquatic Food Web." This project assesses the impact of MWW on the decomposition rate of organic matter, periphyton standing crop, biofilm production, benthic invertebrate community composition, and physiology. The study aims to establish a baseline of effects for an integrated monitoring program

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that can assess the responses of the basal food web in the Bow River watershed and South Saskatchewan River Basin.

UCalgary was well represented at the forum, with Rajiv Neal Tanna rounding out the forum's first session with his research on identifying areas of concern in the Bow River system using the longnose dace as an indicator species. The study confirms that the longnose dace is responsive to both stormwater and municipal wastewater inputs. The goal of the research is to identify key indicators of exposure and responses to differentiate between stormwater and sewage stressors.

Session Two:

Assessing Natural and Built Components of the Aquatic Ecosystem

The second session began with Dr. Norma J Ruecker from the City of Calgary, who discussed the presence of geosmin in our waters. She emphasized the importance of improved communications between citizens and The City, and having a plan in place to support these communications. Data from on-going water quality monitoring helps inform these public communications.

SAIT students Florencia Said, Eben Otchere and Benjamin Ochen then presented on [a tool](#) they are developing to visualize extinct and endangered species in Alberta using StoryMaps. The tool will display the distribution of extinct and endangered species in Alberta



SAIT students outlining their work on developing an educational tool to visualize extinct and endangered species in Alberta. Photo: Mike Murray.

using open data from different sources, providing a detailed overview of their status to help inform conservation efforts. This tool will be invaluable in educating the public and policymakers about the importance of preserving endangered species in Alberta.

Brandon Allen (Alberta Biodiversity Monitoring Institute) concluded the session by introducing the new [Stream Connectivity Indicator](#). This indicator uses various factors, including stream type and stream crossing surveys, to map barriers to aquatic habitats and predict the status of stream connectivity across all watersheds in Alberta. The indicator reveals that the connectivity of watersheds has declined.

Session 3:

Assessing Groundwater and Riparian Components of the Aquatic Environment

After a satisfying lunch catered by Hotel Arts, Dr. Cathy Ryan (UCalgary) presented on collaborative work with the University of British Columbia. This work, undertaken by Sarah Wensink (BSc candidate, UCalgary), focused on evaluating concentration and flux trends observed over a 10-year period to understand how groundwater flow paths and fluxes have changed in the Eastern Slopes' rivers. The study results indicate that increased groundwater recharge in

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carbonate aquifers is responsible for increased river discharge at the decadal scale.

Sophie Prevost (UCalgary) then presented her study on the hydrological characterization of springs in the Big Hill Creek Watershed, emphasizing the significance of small springs in adding water volume to the creek's flow. The study analyzed the occurrence and distribution of springs and characterized them based on discharge, spring type and water chemistry. A goal of this ongoing study is to develop a conceptual model of spring flow contributions to Big Hill Creek.

Session 3 concluded with Catherine Dowdell (Cath-earth-sis Services Inc.) presenting research on riparian health and urban forestry. Her study assessed the socio-ecological viability of urban agroforestry in a naturalized riparian area along the Bow River in Calgary. The study found that riparian health can be improved by including a diversity of woody plant species to mitigate stressors and protect against climate change.

Session 4: Management of the Aquatic Environment

Two presentations were delivered in the final session of the forum. Jonathan Slaney and Mary Quinlan from the City of Calgary presented on "The City of Calgary's Gravel Management Program and the 10th Street Bar." Attendees learned how, through reimagining

morphology, this project aims to address natural gravel formations that have formed under bridges due to climate changes. The project is based on a physical model that will not only reduce the risk of floods but also improve fish and riparian habitats, as well as increase recreational opportunities along the Bow River.

The final presentation of the day, "A Practical Framework for Stationary and Nonstationary Flood Frequency Analysis," was delivered by Dr. Cuauhtémoc T. Vidrio-Sahagun (UCalgary). Dr. Vidrio-Sahagun explained that there are various methods for conducting flood frequency analysis (FFA), which may lead to inconsistent results. He suggested a new framework that guides the analysis of FFA systematically and coherently. The new framework can account for nonstationary conditions, allows for professional input and discretion, and is implementable nationally and globally.

Poster Gallery and Networking

A diverse array of research topics related to the Bow River watershed were displayed in the forum's poster gallery. These included studies on the distribution of *Thesium ramosum* along the watershed; the impact of municipal wastewater effluent on the microbiomes of downstream macroinvertebrates and riparian spiders; sampling month influence on the interpretation of whole organism trout-perch characteristics in long-term

monitoring programs; and an overview of the bedrock geology, hydrogeology, glacial geology, and environment of Big Hill Springs Provincial Park. Additionally, Shane Dorchak (Urban Systems Ltd.) delivered a mini presentation on a scale model distribution manifold that will be installed under the CPR tracks in Cochrane.

The day's events concluded with a well-attended gathering of forum participants at Loco Lou's pub for drinks and networking!

Special thanks to the BRBC Science Committee and its Chair, Wendell Koning, for making the 2023 Science Forum a huge success. The BRBC also extend its gratitude to SAIT for hosting the event and to all presenters and attendees. See you at the 2024 Science Forum!



Shane Dorchak's mini presentation in the poster gallery.
Photo: Mansi Patel.

BRBC Quarterly Educational and Networking Forum Annual General Meeting & Member Appreciation Reception

Elbow Valley Community Centre 100 Misty Morning Drive
Calgary

June 14th, 9:00 am – 3:00 pm*
Member Appreciation Reception: 3:15 – 5:30

*Optional Tour: 8:30 - 10:00 am

Sustainable Stormwater Management – Elbow Valley Example
Led by Liliana Bozic, Urban Systems

FORUM SPEAKERS

Sharlene Fritz, Ghost Watershed Alliance Society
Brooke Kapeller, Bow River Basin Council

Piece by Piece – Online reporting of the Ghost River sub-basin within
the Bow River Basin

Jennifer Hird, Alberta Biodiversity Monitoring Institute
ABMI Wetland Atlas

Annual General Meeting and BRBC Committee Updates

- Science Committee
- Stakeholder Engagement Committee
- Watershed Stewardship Coordinating Committee
- Legislation and Policy Committee
- Youth and Young Professionals Committee

Brandi Newton, Alberta Environment and Protected Areas
Water distribution and changes, 1976–2015

Randy Pacquette and Kayla Garvey, WaterSMART
Practicing drought response in the South Saskatchewan River Basin
through a model-supported simulation exercise

City of Calgary
City of Calgary 10 years after the 2013 Flood

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

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