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Sustaining Alberta's Water Wealth

WWF's Comments on the Water Conversation

Cover page

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Introduction

Over the past few months, the Government of Alberta has undertaken a public Water Conversation (WC) intended to engage Albertans on water issues it has identified as priorities. The WC process included public and watershed stakeholder consultation sessions across the province. Albertans were also invited to provide written input. In addition to participating in one of the Watershed Stakeholder Discussions, this submission provides WWF's perspectives on the WC process and water priorities in Alberta more broadly.

While the WC represents a positive expression of the Government of Alberta's commitment to engage Albertans in water management, fundamental questions regarding how information gathered during the WC process will be used, and how the WC is related to or different from other water initiatives in Alberta, remain unanswered. The rationale for the selection of four areas as priorities to be explored in the WC is also unclear as is the timeline for discussions on other areas that have previously been identified as priorities and those areas that were identified as priorities during the WC process. Based on WWF's experience in contributing to water management initiatives in Alberta, Canada, and abroad, we feel that a pressing water priority in Alberta is the acceleration of environmental flows implementation in water management practice. To this end, WWF recommends that the Government of Alberta (1) apply existing policy tools to support the implementation of environmental flows across Alberta, and (2) enhance and complement existing policy tools with the development of new tools to enable the implementation of environmental flows. We also provide recommendations on the 'hydraulic fracturing and water' priority identified in the WC. Clearly, the ultimate test of whether policy is achieving its objectives is the condition of our freshwater resources and ecosystems as determined by transparent and science-based assessments and indicators.

Water Conversation Process

It is laudable that the Government of Alberta continues to engage Albertans in discussions intended to improve the way it manages water on their behalf. While Albertans expect the government to ensure the province's water resources are used efficiently, equitably and sustainably, the government relies on the stewardship of all actors including advisory, industry, and non-government organizations, First Nations and Métis groups, and members of the public.

One of the key weaknesses of the WC process to date is the lack of clarity about the purpose, process and ultimate goals of the water management initiatives stakeholders have been consulted upon. From a stakeholder perspective, effectiveness of consultation is premised on having a clear

sense that when decisions are ultimately made by government, they reflect the interests, recommendations, and priorities expressed during these processes.

It is clear that through the WC process, stakeholders provided the government with perspectives and insight into water priorities across the province. However, it is unclear to many stakeholders including WWF how this information will be used by the government in future water management initiatives. It was also unclear how the findings of the WC will be conveyed back to participants. Clearly defined next steps and timelines would have resulted in more effective engagement during the WC process. It would be of value to future consultation processes for these to be clearly outlined.

The WC was framed as the 'beginning of a renewed conversation with Albertans about future government direction for water management,'[1] while it was also acknowledged that water management in Alberta is guided by the commitments in *Water for Life: Alberta's Strategy for Sustainability*. It is unclear how the WC complements or is different from the *Water for Life* strategy and its associated key directions, actions and outcomes. By extension, it is also unclear how future government direction guided by the *Water for Life* strategy and the WC process, if and where different, will be prioritized.

Water Conversation Priority Areas

The Government of Alberta identified four water issues as priorities to be explored in the WC process: (1) healthy lakes; (2) hydraulic fracturing and water; (3) drinking water and wastewater systems; and (4) water management. The government also acknowledged that Albertans may have other priorities, and suggested that these could become part of future discussions on government direction for water management.[2] Yet, it is unclear how these four issues were selected by the Government of Alberta for consideration in the WC process and how they emerged as priorities from a broader list of water issues the province faces.

Until the announcement of the WC process, WWF, like many stakeholders, was expecting the next provincial scale water management consultation to focus on the long awaited next steps of the Water Allocation Management System Review.[3] The water allocation management system is a fundamental determinant of the ability of the Government of Alberta to manage and safeguard freshwater resources and ecosystems, and similar to the 'water management' priority, it influences the other three WC priorities. However, a key distinction is that a Water Allocation Management System Review would be expected to address a broader scope of policy directions than those outlined under the WC 'water management' priority and the WC more broadly, such as the consideration of new allocation principles, policies, and tools.[4]

The need for a Water Allocation Management System Review has been clearly and consistently identified in the past by the Government of Alberta and stakeholders, and it is unclear why it is not being presented as a priority in the WC process. For example, it was first announced in 2008 by the Minister of Environment[5] and was identified as a key action in the *Water for Life* Action Plan[6] and the *Water for Life* Progress Report.[7] Initial input was provided by advisory groups in 2009[8] with the understanding that stakeholder and public engagement would follow, yet the next steps and timeline remain unclear as the review process was initially targeted for completion by 2012.[9] The Water Allocation Management System Review remains a priority for many stakeholder groups including WWF. We would welcome confirmation that it remains a priority for the Government of Alberta. Better still would be clarity about when the long-awaited review of the water allocation management system can be expected.

Environmental Flows

Based on WWF's experience in Alberta, Canada, and abroad, a pressing water management priority is moving on the implementation of environmental flows across the province to protect the social, economic, and environmental benefits healthy water bodies provide Albertans. To achieve this objective, WWF provides the following advice:

- **Apply existing policy tools to support the implementation of environmental flows across Alberta.**

- **Enhance and complement existing policy tools with the development of new tools to enable the implementation of environmental flows.**

Environmental flows (also known as instream flow needs and protected water) are commonly defined as 'the quantity, timing and quality of water flows required to sustain freshwater ecosystems and the human livelihoods and well-being that depend upon these ecosystems,'[10] and are globally recognized as central to sustainable water management.[11] The urgent need to accelerate the implementation of environmental flows in Alberta was prominent in the initial input provided by the Alberta Water Council (2009), the Alberta Water Research Institute (2009) and the Minister's Advisory Group (2009) to the Government of Alberta as part of the Water Allocation Management System Review. For example, the Minister's Advisor Group (2009, i) recommended that:

> *There is an urgent need to establish levels of Protected Water for the purpose of protecting the environment and aquatic ecosystems in all major river basins in the Province. The government should not allocate water for consumptive uses where allocations would reduce Protected Water below the stipulated levels. Where existing*

> *licences prevent the stipulated levels of Protected Water from being met, the government should establish and implement a plan to achieve legal protection for the stipulated levels within a reasonable period.*

Implementation of environmental flows (termed establishing protected water) was included for consideration as a potential enhanced water management strategy under the 'water management' priority of the WC.[12] However, instead of being viewed as an enhanced water management strategy, the implementation of environmental flows should be central to the goals and direction of water policies and management practices, as they are increasingly around the world and in Canada, including those of both of Alberta's provincial neighbours.[13] The benefits of protecting and restoring environmental flows in Alberta are becoming clear in terms of sustaining and recovering species at risk and aquatic environments more broadly,[14] but also in terms of providing increased certainty to existing and future water users.[15]

What is odd about the limited attention to this issue in the WC is that Alberta has long been recognized as a leader in environmental flows assessment in Canada. Considerable expertise has been gained in the province as illustrated by an established environmental flows program,[16] holistic environmental flows evaluations,[17] applied research,[18] transparent and inclusive planning processes,[19] and the development of a science-based management tool.[20] The experience gained in Alberta has been sought after by other jurisdictions to inform the development of their approaches to environmental flows assessment.[21]

Although the assessment of environmental flows is progressing across Alberta, implementation in water management practice remains a challenge. For a few of the province's rivers, water management plans aimed in part at protecting environmental flows are under various stages of development,[22] but for the majority of water bodies, environmental flows have yet to be secured. To move toward implementation of environmental flows across Alberta WWF recommends a two component approach described below.

Apply existing policy tools to support the implementation of environmental flows across Alberta. This proposal is consistent with those of the Minister's Advisory Group (2009), the Alberta Water Council (2009) and the Alberta Water Research Institute (2009) who all promoted the establishment of environmental flows and implementation through Water Conservation Objectives (WCOs). Since these advisory groups provided their recommendations, *A Desk-top Method for Establishing Environmental Flows in Alberta Rivers and Streams* (the Alberta Desk-top Method) has been completed and provides a technique to establish environmental flows in the absence of site-specific studies. It is therefore now possible to establish science-based WCOs

across the province. In addition, the Alberta Desk-top Method can be used to incorporate environmental flow conditions in new water licences,[23]and environmental flow conditions may also be added to licences that are reviewed. Therefore, the establishment of WCOs across the province and the inclusion of environmental flow conditions in water licences, both based on the Alberta Desk-top Method, can be applied as the first component of environmental flows implementation in Alberta.

WWF recognizes that the assessment of environmental flows involves an inseparable scientific and social process, where social decisions on the desired state of the aquatic ecosystem are at the core of developing management actions.[24] The Alberta Desk-top Method establishes the environmental flows required to meet the objective of full protection of the riverine environment, which carries certain social, economic, and environmental trade-offs that will vary depending on the water management context. Where these tradeoffs do not represent socially desired outcomes, water management planning processes supported by site-specific environmental flow studies must be initiated to inform and make decisions on alternative social, economic, and environmental objectives. This tiered approach to environmental flows assessment is promoted and being applied in many jurisdictions,[25] and is underway in Alberta's Wapiti River Basin.[26] WWF supports the application of a tiered approach in Alberta with the Alberta Desk-top Method as the first level, as it inspires transparent and collaborative planning and decision making, and an improved understanding of freshwater resources and ecosystems. Environmental flows established in this manner may also be implemented in part through a WCO.

Enhance and complement existing policy tools with the development of new tools to enable the implementation of environmental flows. While the use of WCOs and conditions on water licences will contribute to the implementation of environmental flows, their application has thus far been restricted to new water licences and those that are periodically reviewed. WCO licences generally hold a junior priority while senior licences are not made subject to the same environmental flow conditions as junior licences. Together these factors constrain the ability to achieve and maintain an established WCO, or implement an environmental flows regime, in water management practice. Therefore, as noted by the Minister's Advisory Group (2009), there is an urgent need to develop an approach to implement environmental flows where existing licences would otherwise present a barrier.

While implementation issues associated with the junior priority of WCOs and senior water licences may be most pronounced and have been widely recognized in the South Saskatchewan River Basin,[27] they may be encountered wherever water licenses were issued without environmental flow considerations or are not subject to periodic review. For example, challenges associated with implementing an ecosystem base flow, a fundamental component of environmental flow protection,[28] were encountered in water management planning for the Lower

Athabasca River,[29] one of Alberta's lesser utilized basins.[30] It should be noted that the application of provisions in existing licences may permit the implementation of environmental flows in some river basins.[31] However, on a provincial scale, the enhancement of existing policy tools or the development of new ones is required to address existing licences in the implementation of environmental flows in a consistent manner. These policy improvements represent the second component of an environmental flows implementation in Alberta.

There are without question many challenges associated with the implementation of environmental flows and addressing existing water licences is generally the most difficult.[32] Some leading jurisdictions are demonstrating how these difficulties can be overcome by developing approaches that suit their water management context. Brief descriptions of the approaches and experiences in New Zealand, Florida, and British Columbia are provided below. Although stakeholders may provide valuable contributions to and must be involved in the implementation of environmental flows in Alberta, ultimately government leadership is required.

New Zealand

Under New Zealand's *Resource Management Act of 1991*, a 30-year 'sunset clause' was placed on all legacy water licences issued under past legislation as part of a sustainable approach to water management.[33] These legacy water licences (termed 'deemed permits' and previously 'mining privileges') were granted under a prior allocation system in perpetuity and did not include any assessment of the volume of water resources available or conditions for the protection of aquatic ecosystems.[34] As a result, some water resources in the Otago region of New Zealand are over-allocated and the use of water licences takes precedence over maintaining sufficient flows for the aquatic ecosystem, even permitting the de-watering of parts of some rivers.[35] Clearly, the implementation of environmental flows, a key national objective and component of regional water management plans, was constrained by these legacy licences. The introduction of a sunset-clause has enabled the conversion to modern water licences (termed resource consents) that are subject to meeting environmental flow conditions and other modern water management expectations such as water use efficiency.[36] Licencees have 30 years to adapt to this shift in the approach to water management, and may arrange for the conversion of their legacy licences at any point within that period.[37] By 2021, all water licences in New Zealand will be subject to the environmental flows conditions established in water management plans.[38]

Florida

Under Florida law, environmental flows (termed minimum flows and levels) are required to be established for rivers, streams, estuaries, springs, lakes, wetlands, and aquifers.[39] When water

bodies are below their stipulated environmental flows or are projected to fall below them within 20 years, the development of a recovery or prevention strategy is required to ensure environmental flows are maintained over the long-term.[40] These strategies may require a reduction of permitted water withdrawals but in conjunction must also include water conservation measures and the development of additional water supplies to support existing and projected uses.[41] Thus, the requirement for environmental protection and restoration is combined with water resources development to achieve environmental objectives without inequitably affecting water users and limiting economic growth.[42] Florida is another example where it was recognized that the implementation of environmental flows sometimes requires the alteration of existing licences, and an approach was developed to pursue this in an equitable manner to water users.

British Columbia

While British Columbia's proposed Water Sustainability Act is still under development,[43] a number of commitments regarding the implementation of environmental flows have been made. These commitments include legislative requirements for environmental flow protection across the province, formula-based environmental flow assessments for all new surface water and groundwater allocation decisions, and restoring environmental flows through the application of conditions on existing and new licences (such as licence expiry dates and cutbacks on water allocations) in areas of the province where there are significant water supply issues and risks to water quality, quantity, and ecosystems.[44] Although these actions are still proposals, they do signal that British Columbia is moving towards an environmental flows implementation approach that will apply to all waters and all water users.

Hydraulic Fracturing and Water

Hydraulic fracturing (fracking) combined with improved horizontal drilling could open up extensive unconventional gas sources to offset the decline of conventional gas in much of the Western Canada Sedimentary Basin. Yet, uncertainties about the environmental consequences of developing unconventional gas resources, including but not limited to impacts on water resources, have prompted jurisdictions such as New York and Quebec to adopt a precautionary approach.

The water resource impacts of unconventional gas production and fracking in particular are important, yet subsidiary to the more fundamental question: Can this form of energy development be countenanced at a time when the International Energy Agency has calculated that 2/3rds of known fossil fuel resources must be left in the ground in order to avoid dangerous climate change?[45] The question is particularly pertinent in Alberta, which is increasingly exposed to the risk of disruption of its energy trade because it has failed to develop a workable provincial climate mitigation plan.

Shale gas wells use water both to drill and frack. More than half of the water injected into a well as fracking fluid remains permanently belowground. What is known as flowback water, consisting of recovered fracturing fluid and produced water from the formation must be stored in lined ponds before it can be treated, reused or disposed, creating a risk of groundwater contamination.

Water Quantity

The amount of water used in fracking appears to be quite variable, with estimates of 17 and 49 million litres (i.e. 4.5 and 13 million gallons) per well in the Marcellus and Eagle Ford formations respectively.[46] The just-tabled Environmental Commissioner's 2012 Report uses a lower estimate of 11 million litres.[47] Some wells are fracked repeatedly during their productive lives. With such enormous variability, the potential impacts of shale gas development on regional freshwater resources can only be understood with specific knowledge of site characteristics and operational plans, including the pace and scale of development, the source of water and specific plans to contain, treat and dispose of the contaminated water pumped from the wells following fracking.[48]

The impacts of individual water withdrawals must be assessed first in relation to the size of the streams tapped and then cumulatively basin-by-basin in order to understand the impact of withdrawals on environmental flows. Alberta specifies maximum diversion rates for each source and we presume these rates are based on some assessment of the capacities of those water bodies. Recording not just the section address, but the creek or river into which the many unnamed streams and lakes[49] flow would facilitate the assessment of cumulative withdrawals by basins and sub-basins.

Twenty to fifty percent of fracking fluid water is lost underground,[50] removing it permanently from the hydrological cycle. Does it make sense to allow the freshwater resources to be used in this manner?

Water Quality

EnCana and Apache Corp. are pumping and treating sour saline groundwater[51] for use in fracking fluid in their Horn River operations in B.C. Saline groundwater is clearly preferable to fresh surface water from an environmental perspective, so long as the handling and treatment of the saline groundwater and disposal of the flowback water are done properly. It remains to be seen whether a significant fraction of the company's water requirements can be met in this way and whether this kind of innovation can be applied more broadly.

We have learned that the Energy Resources Conservation Board requires disclosure of the chemical constituents of fracturing fluids. Mandatory disclosure of the kinds and amounts of chemicals used in wells, not only in fracturing, but in all stages of drilling, could enable the industry-wide use of the least harmful chemicals capable of fulfilling drilling requirements.

The development of unconventional gas is feasible with improved horizontal drilling and fracking, but is it advisable? Among the environmental and economic drawbacks of unconventional gas sources are rapid field decline rates, low recovery efficiencies, extensive and intensive habitat disturbance, fugitive emissions of methane and carbon dioxide and finally impacts on water resources.

A careful evaluation of the potential impacts of fracking on water resources is an important facet of the province's due diligence when it comes to the development of extensive low-grade shale gas resources. WWF recommends:

- The Government of Alberta acknowledge that water resources impacts are but one of a number of serious concerns with the environmental sustainability and economic viability of unconventional gas development. A corollary is that the application of best practices with respect to water management is not sufficient on its own to justify the widespread development of unconventional gas resources.
- Freshwater resources should not be used for fracking water where alternative sources are possible. Using saline groundwater would make a resource of high TDS water that is otherwise not generally useful, while avoiding the contamination of fresh surface or groundwater, not to mention the loss of freshwater from the hydrological cycle.
- Notwithstanding the recommendation that freshwater resources not be used where alternative resources are possible for this purpose, and until such a

prohibition can be effected, Alberta needs to manage cumulative water withdrawals not just for unconventional gas development, but for all uses. We recommend that small unnamed streams be labeled not just by their map coordinates, but as tributaries of named creeks or rivers to facilitate the aggregation of withdrawals for cumulative assessment purposes.

Conclusion

WWF looks forward to continuing to contribute to water management initiatives in Alberta and seeing formal outputs of the WC process. We also request clarity on next steps so that we can engage more effectively as this process moves from conversation to policy reform to implementation.

Endnotes

[1] Government of Alberta (2013, 4).

[2] Government of Alberta (2013)

[3] Alberta Environment and Sustainable Resource Development (2012).

[4] Government of Alberta (2009, 9) 'The current water allocation system has been in place for more than 100 years; however, limitations to this system have arisen out of the complexity of current and emerging allocation issues. New water allocation policies, principles, and tools must be developed to address growth pressures, promote conservation, ensure fair access and wise water use, and protect aquatic environments.'

[5] Cryderman (2008) ' "The water allocation system that we have in place needs to be reviewed" said Rob Renner, who added that the public review will come within 18 months.'

[6] Government of Alberta (2009).

[7] Government of Alberta (2012, 38) 'Develop and implement a viable governance system that supports sustainable management of water' was identified as a short term action by 2012 and included the deliverable of 'Review and renew Alberta's current water allocation system to meet future needs including the environment and other protected uses.'

[8] Alberta Environment and Sustainable Resource Development (2012)

[9] Alberta Environment and Sustainable Resource Development (2012); Government of Alberta (2012; 2009)

[10] Alberta Environment and Sustainable Resource Development (2011); Brisbane Declaration (2007)

[11] Arthington et al. (2010); Dyson et al. (2003); Hirji and Davis (2009); O'Keeffe (2012)

[12] Government of Alberta (2013, 8)

[13] Government of British Columbia (2010); Saskatchewan Water Security Agency (2012)

[14] Alberta Environment (2003); DFO (2010)

[15] Alberta Utilities Commission (2011)

[16] Alberta Environment and Sustainable Resource Development (2011)

[17] Clipperton et al. (2003)

[18] For example Paul (2013); Golder Associates Ltd. (2004)

[19] Ohlson et al. (2010)

[20] Locke and Paul (2011)

[21] Hatfield (2012); Locke (2011)

[22] For example Alberta Environment/Fisheries and Oceans Canada (2007); Aquatera (2013); Ohlson et al. (2010)

[23] Locke (2011). As of November 2011, 'Approximately a dozen licences (mostly in Northern Region with one in the Central Region) have been issued based on the Desktop Method recommendation.'

[24] Annear et al. (2004); Dyson et al. (2003); Hamilton and Seelbach (201); Kendy et al. (2012); O'Keeffe and Le Quesne (2009); Poff et al. (2010)

[25] Bradford (2008); Hatfield et al. (2003); Peters et al. (2012)

[26] Aquatera. 2013

[27] Alberta Water Council (2009) Alberta Water Research Institute (2009); Minister's Advisory Group (2009)

[28] Acreman (2005); Locke and Paul (2011); Richter et al. (2011)

[29] Ohlson et al. (2010)

[30] Alberta Environment and Sustainable Resource Development (2013)

[31] Kwasniak (2010)

[32] Acreman and Ferguson (2009); Le Quesne et al. (2010)

[33] New Zealand Government (2009); Otago Regional Council (2012)

[34] Otago Regional Council (2012; 2011)

[35] Otago Regional Council (2012; 2011; 2009)

[36] Otago Regional Council (2012; 2011)

[37] Otago Regional Council (2012)

[38] Otago Regional Council (2012)

[39] Munson et al. (2005); Neubauer et al. (2008)

[40] Florida Department of Environmental Protection (2010)

[41] Florida Department of Environmental Protection (2010); Matthews and Nieto (1998); Munson et al. (2005);

[42] Munson et al. (2005); Matthews and Nieto (1998)

[43] Government of British Columbia (2013)

[44] Government of British Columbia (2010)

[45] International Energy Agency (2012)

[46] Beauduy (2011); Nicot et al. (2011), as cited in Cooley and Donnelly (2012)

[47] Commissioner of the Environment and Sustainable Development (2012), Chapter 5 Environmental Petitions, Paragraph 5.74.

[48] The industry uses a wide range of chemicals in the fracking process including acids, biocides, lubricants and 'propants'. The water pumped from a well can also include salts, metals and radioactive elements found naturally in the formation.

[49] Alberta Environment Authorization / Approval Viewer (http://environment.alberta.ca/01519.html), Accessed 10-April-2013.

[50] Commissioner of the Environment and Sustainable Development (2012), Chapter 5 Environmental Petitions, Paragraph 5.74. Other estimates fall in a narrower range of 30-40%.

[51] Hunter (2012)

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