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Comments on Draft Agricultural Water Management Mitigation Policy

This letter summarizes my analysis of the preliminary Agricultural Water Management Mitigation Policy (AWMMP), as per our email communications of 17 October 2022. My comments are based on Water Security Agency (WSA) documents from July 2022; *Engagement for a Made-in-Saskatchewan Agricultural Water Management Mitigation Policy*, and, *Proposed Framework for a Made-in-Saskatchewan Agricultural Water Management Mitigation Policy*.

My opinions are based on 30 years of freshwater research experience in southern Saskatchewan, Alberta and Manitoba, including over 200 aquatic ecosystems in the Saskatchewan Prairie region. My CV is available at https://www.uregina.ca/science/biology/people/faculty-research/leavitt-peter/index.html. Briefly, I am three-term Tier I Canada Research Chair in Environmental Change and Society, former President of the Society of Canadian Limnologists, past Director of the Canadian Institute of Ecology and Evolution, and Fellow of the Royal Society of Canada, our nation's National Academy. My specialty is Limnology, the study of inland waters.

First, I want to congratulate WSA for initiating the development of a comprehensive water management strategy, particularly as regards agricultural lands and wetlands. This policy should partly fill a large legislative and management gap in the Government's environmental portfolio, and has clear implications for sustainability of both agricultural production and environmental health.

Having said this, the majority of this letter will focus on what I perceive as shortcomings in the policy as outlined in the two documents. Thus, while the draft policy has significant potential to assist the farming community and protect the environment, it has multiple conceptual and structural problems which I suggest need to be addressed before the final policy is developed. Most of these comments will necessarily take a 30,000-ft view of the policy, as there are many key details missing from the draft document which prevent a more refined analysis.

Principle concerns about AWMMP

1. Embedding wetlands policy within an agricultural framework.

I am concerned that placing wetlands within a framework that explicitly supports agricultural interests creates a hierarchy in which concerns of the agricultural community will be paramount in

considerations of wetland management. This might be appropriate for infrastructure that the farmer has produced (barns, silos, house, etc.) but is inappropriate when considering wetlands that are critical components of the hydrological (water) cycle, and which provide ecosystems services far beyond the immediate farmland. Wetlands are part of regional, national, and global water cycle, so it is inappropriate to heavily prioritize agricultural perspectives.

SK wetlands are themselves diverse water bodies that, in aggregate, exhibit multiple ecosystem functions including, but not limited to: sequestration of pollutants by plant and sediment uptake (nutrients, pesticides, etc.); habitat for predators of crop pests (birds, dragonflies, etc.); staging and breeding areas for migratory water fowl including species at risk; sites of intense greenhouse gas exchange (CO_2, CH_4, N_2O); habitats for vertebrates including fish and amphibians; groundwater recharge and discharge sites; hotspots of biological diversity, and; locations of immense aesthetic value.

No one type of wetlands performs all functions (Mitsch 2015), so it is essential to maintain a diversity of wetlands on the prairie landscape and avoid arbitrary consolidation based on size rather than function. Several small wetlands will not serve the same purpose as one larger wetland. Most farms will not have the entire suite of regional wetlands, so are unlikely to be managed from an integrated landscape perspective by individual agricultural producers. Further, many wetlands are joined by surface and subsurface flow, as well as atmospheric water exchange, so cannot be managed effectively using site-specific strategies. This approach can lead to 'death by 1000 cuts' through cumulative impacts of multiple land use activities. As noted in the 2021 British Columbia Supreme Court Decision (*Yahey v British Columbia*), such a case-by-case approach violates inherent and treaty rights of regional First Nations.

2. Lack of explicit conservation and re-establishment measures

Saskatchewan has lost more than half of its native wetlands since 1925, almost entirely due to unregulated and permitted farm drainage (National Wetlands Working Group 1988). Further, nearly half of the permanent surface waters in southern Saskatchewan have levels of algal toxins above World Health Organization thresholds, due to a combination of nutrient pollution and atmospheric warming (Hayes et al. 2020). As shown my fossil analyses (Leavitt et al. 2006, Pham et al. 2008, Maheaux et al. 2016, Bunting et al. 2016), these damages are greatest in areas with intense agriculture, resulting in toxic algal blooms in which modern values far exceed those seen prior to the advent of farming. As you know, loss of wetlands contributes to loss of soil fertilizers and facilitates their transfer to running and standing waters thereby reducing water quality (Cooper and Moore 2003, Bartzen et al. 2010).

As presented in the draft documents, there are no plans to re-establish any of these wetlands, even in circumstances where there is no net agricultural value to the modified wetland (i.e., input costs are greater than production value). Further there are no explicit strategies to rehabilitate existing wetlands subject to on-going damages. Rather than simply stating that these issues will be addressed in an operational framework, I believe it is essential that WSA explicitly incorporates a specific plan to recover and rehabilitate wetlands damaged by inappropriate land use.

As noted in my comments to the acting President of WSA in the PARCS wetland seminar series (14 Oct 2022), I am particularly concerned that this policy has no meaningful plan to improve surface

water quality in wetlands or associated water bodies. Instead, it appears to focus on not making water quality worse than at present, much like the *25 year Water Plan*.

3. Lack of meaningful enforcement

The current policy does not address the 10's of 1000s of kilometers of illegal drainage which has contributed to substantial damages to agricultural producers, for example, in the case of the Quill Lakes flood. In fact, the documents explicitly proposes to "retain current drainage works", apparently irrespective of their legality. While climatic variability affects the quantity of precipitation, and therefore runoff, the loss of wetlands and the increased channelization of surface drainage combine to increase the volume, rate, and energy of runoff which in turn erodes fine topsoils and causes gully erosion and loss of soil fertility (Pimentel et al. 1987).

As presented, the documents mainly outline how new management strategies will facilitate future drainage permits and, as a result, neither considers the damages already done by ongoing projects, nor holds producers responsible for inappropriate and even illegal activities. Further, it does not explicitly consider damages done to non-agricultural communities, such as First Nations. This policy appears to be developed as part of a larger strategy to facilitate drainage by simply requiring the permission of downstream landowners, and the provision of an undefined "adequate" water body. Basically, this assures drainage into lakes, where water quality is already diminished by up to 4-5 fold over historical levels (Pham et al. 2008, Leavitt et al. 2006, Maheaux et al. 2016, Bunting et al. 2016)

4. Doesn't adequately separate runoff (drainage) from wetlands function

At least part of the problem is that the policy does not yet make a clear distinction between effective drainage of precipitation ('control of runoff') and the role of wetlands in the hydrological landscape (see functions above). Further, there is no strategy to store water among years in the case of drought. While it's desirable to mitigate (i.e., redress) damages associated with flooding by sudden inputs of water (snowmelt, rain storms), the policy as written also appears designed to 'mitigate wetlands' when in fact most wetland's functions are immediately beneficial to farmers. Certainly, permanent wetlands prevent agricultural production in their immediate vicinity, but at the same time they also protect local and downstream ecosystems (Pimentel et al. 1987, Mitsch 2015). The historical loss of wetlands has demonstrably degraded surface water quality in the Prairies (Bartzen et al. 2010), and there is virtually no further high quality land available for 'new farming' enterprises. This leaves the question; why is further wetlands drainage needed?

To address this issue, the WSA should focus mitigation efforts on control of runoff from sudden increases in overland water flow. Enforceable best management practices are needed to allow lands to be efficiently brought into production each spring, without increasing water velocity and consequent erosional damages to farm and downhill systems. In this regard, re-establishment of former wetlands should be investigated as a management strategy, while compliance and reporting requirements need to be enacted to insure that drainage does not further increase nutrient and other chemical runoff.

Secondly, I recommend that WSA or other expert organization (e.g., universities) conduct a comprehensive assessment to quantify the magnitude and variability in wetlands inventory, as well as establish the risks and thresholds for permitted drainage and wetlands loss (e.g., maximum

permissible losses). The will be essential to defining what is 'sufficient' wetlands protection. Given that the grasslands will warm by 3-5^{o}C in the next 50 years (Sauchyn et al. 2020) and increase evaporative water loss, it is likely that re-establishment of wetlands and their aquifer recharge capabilities will become a critical facet of sustainable agriculture in the coming decades. Further, my research with SK Crop Insurance Corp has shown that the probability of a catastrophic drought worse than the 1930s in southern Saskatchewan is nearly 1 in 2 within the next 50 years. Together, these risks of future water shortage suggest that the optimal water management strategy may be to reestablish rather than deplete wetlands.

5. Made-in-Saskatchewan approach ignores decades of scientific evidence

I am concerned that the proposed policy seems overly reliant on a handful of recently-funded, short-term local studies, only some of which deal directly with runoff, water quality, and wetlands issues. This reliance on a 'made-in-Saskatchewan' approach ignores 100s if not 1000s of relevant research papers produced by academic, provincial and federal scientists from within the prairie region. Having worked on 100s of lakes throughout the Prairies (Orihel et al. 2012, Pham et al. 2018, Hayes et al. 2020), it is evident that Saskatchewan grassland surface waters respond to climate change and human activities in fashions consistent with the global literature on grassland regions. Rather than incorporate the vast array of high quality scientific research, as done recently by the Government of Manitoba's new *Water Management Strategy*, the proposal appears to look inward for a rationale to treat SK farms and surface waters differently from those in other prairie jurisdictions. Ignoring the large body of scientific evidence in favour of a limited provincial perspective is likely to result in further degradation of Saskatchewan's surface waters.

6. Additional details on Draft MiS AQMMP.

Below I list a few concerns I have about the specific narrative within the draft AQMMP. These are necessarily abbreviated due to missing details in the document.

- Agri-environmental priorities, p. 1. Water quality. This section seeks to "ensure quality is sufficient for Saskatchewan residents". As with the province's recent *25 Year Water Plan* this goal appears to use modern conditions as the definition of 'sufficient' and does not consider what improvements might be achieved over 30 years with a policy based on preservation, conservation, and re-establishment of wetlands and reduced pollution. In fact, there is no explicit plan to improve water quality, instead apparently relying on volunteer actions by producers. A similar criticism applies to the bullet point on Wetland Habitat (see comment above about inventory and risk assessment). Finally, the greenhouse gas management aspect is vague, and not obviously linked to current research.

- What will a mitigation policy achieve, p. 2. As above, the focus is almost entirely on supporting agricultural production with only 'sufficient' wetlands retained to support drainage and non-agricultural functions.

- Policy outcomes – to be developed. This needs to be developed in a manner separate from a simple summation of public opinion and must aggressively seek out the best available scientific evidence, as well as ensure that full and meaningful consultations are conducted with all key groups (farmers, public, scientists, First Nations, recreational uses, environmental groups, etc.).

- Guiding principles, p. 3. I suggest that concept of *agricultural development* replace the focus on economic growth. Development retains the agri-environmental system for use by future generations, whereas economic growth is just 'bigger is better', irrespective of environmental damages or long-term consequences. With an expected increase in global population of 3 billion people by ca. 2100 (United Nations 2022), there will be pressure to increase Saskatchewan farm production proportionately. Policies designed today for a static status quo will necessarily fail in the face of increased population, fertilization, tillage, drainage, chemical applications, etc. It can be argued that development of the SK agricultural industry does not require more of the same, it requires *better*.

- Risk based approach, p 4. As written, risk will only be considered in the context of the agricultural producer. These risks need to balanced against environmental protection and rehabilitation, First Nations inherent and treaty rights, and those of other water users.

- Saskatchewan's Approach/Toolbox, p. 4-5. Here the devil is in the details. Too many of the critical details are not in plan, so that a critical evaluation of the effectiveness of on-going and proposed activities is not possible.

In conclusion, it is clear that an agricultural water policy should central to WSA's environmental protection policy, and this draft proposal represented an important first step to fill a void in the province's water management strategies. However, there is a clear conflict of interest when WSA is developing water policy specifically for the agricultural industry. Having largely absorbed the environmental protection component of SK Environment as regards aquatic ecosystems, the Agency should now also be proactive as regards wetlands and water quality protection, rather than merely providing a process to retain illegal drainages and facilitate future drainage activities.

Please contact me if you require further details. I can be reached by phone (306 585 4253), Skype (PeterRLeavitt) or email (Peter.Leavitt@uregina.ca).

Sincerely,

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