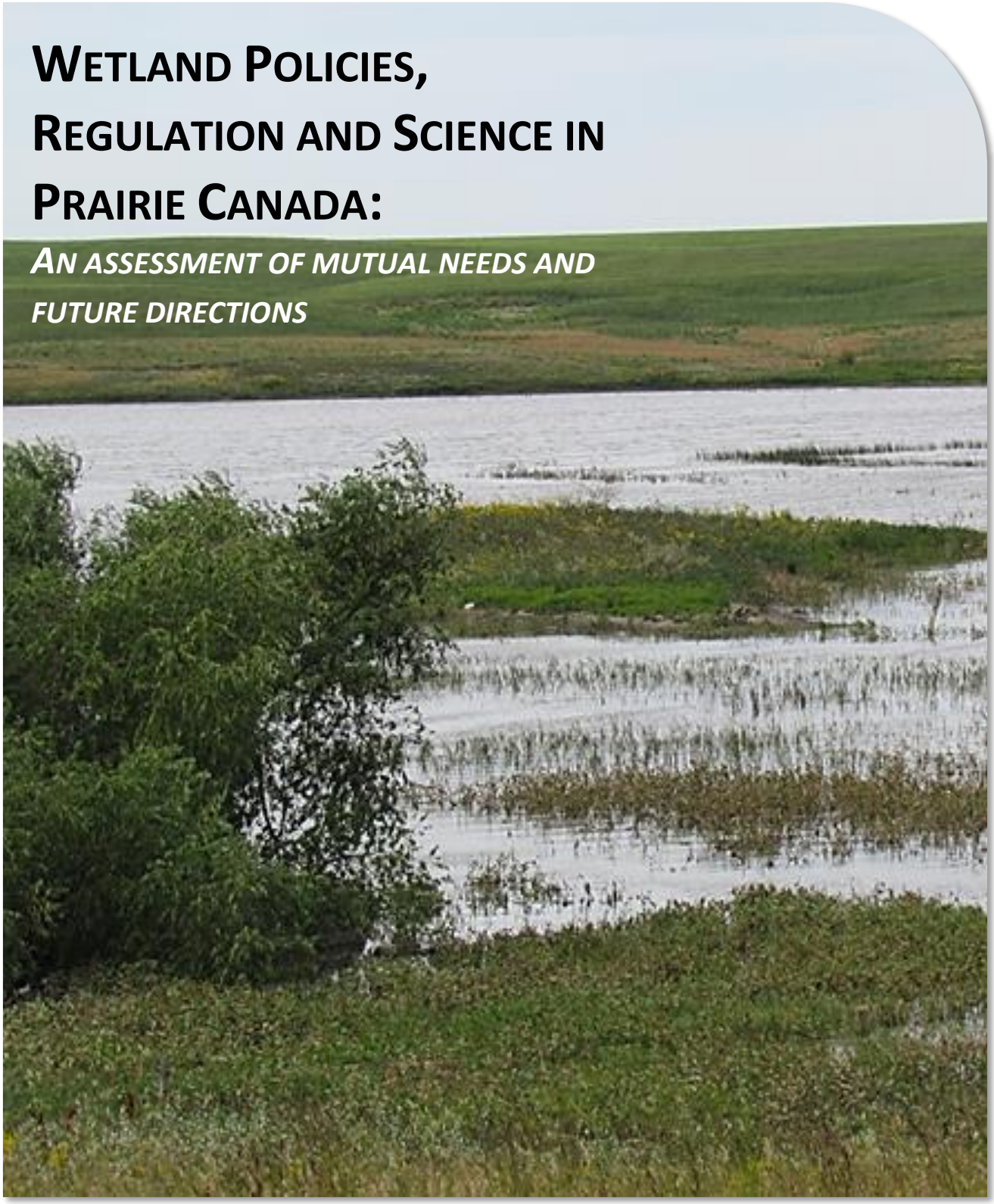
WETLAND POLICIES, REGULATION AND SCIENCE IN PRAIRIE CANADA:

AN ASSESSMENT OF MUTUAL NEEDS AND FUTURE DIRECTIONS



A Report of the Prairie Habitat Joint Venture Policy Committee Workshop

May 3-4, 2016 Regina, SK

prairie habitat joint venture

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Executive Summary

Enhanced collaboration and understanding of wetland-related legislation, regulations, and policies in the prairie-parkland portion of the Prairie Habitat Joint Venture (PHJV) was the impetus for a workshop hosted by the PHJV Policy Committee, May 3-4, 2016. Building on the policy base, the workshop broadened into a consideration of the intersection of policy and science for wetland conservation and management, creating an environment for wide-ranging discussion and debate about the needs, gaps, barriers, and opportunities. Consensus emerged about the importance of completion of a wetland inventory and classification system; the value of partnerships in any actions related to wetland conservation; development of a common language and compelling narrative about the value of wetlands to inform and engage stakeholders and citizens; improved science and research for wetland monitoring, and understanding drainage impacts on biodiversity, hydrology and water quality; and the challenge of making wetland science a key, and understandable, component of wetland management and regulation. Results of the workshop will guide future actions of the PHJV Policy Committee, and provide a focus for some of the priorities of the PHJV Science Committee.

Introduction, Context and Format

In 2015, work planning by the Prairie Habitat Joint Venture (PHJV) Policy Committee confirmed the value of a renewal and strengthening of the policy network within the PHJV partners through a workshop on a topic of current interest. Consideration of possible topics identified the priority partners placed on the value of a review of the status of wetland policy in the three prairie provinces, aiming to enable all policy practitioners to understand policy activity in other jurisdictions and share insights and future plans. As good policy is predicated on a strong science or evidence base, the developing workshop topic evolved to an opportunity to share the current state of both wetland policies and wetland-related science, with an anticipated outcome of policy needs informing broad science activities that could be contemplated for work over the next several years.

The workshop steering committee prepared a Context and Purposes statement (Appendix I), identified and invited participants with a broad range of expertise in environmental/conservation or agricultural policy, economics, and wetland-related science disciplines to attend a 2-day workshop in Regina SK, May 3-4, 2016. The agenda (Appendix II) was structured with an overview of the PHJV to set the workshop context, followed by presentations from Alberta, Manitoba and Saskatchewan about the current status of wetland regulations and policy in each province, insights about the legal framework for wetlands in the prairies, and learnings from U.S. wetland managers making up the initial session focused on wetland policy. A second session connected policy needs to science and knowledge in the four areas of biodiversity/habitat, monitoring, hydrology, and water quality with the discussion leaders tasked with describing the current state of understanding in each discipline, at an overview level. Consideration of available and needed policy tools bridged into the third session focusing on priority actions and opportunities for collaboration. Active participation by the invitees (approximately 45, Appendix III) was enabled through a facilitated discussion approach.

Setting the Stage

Federal Wetland Programs, Policy and the PHJV

Bob Clark, Environment and Climate Change Canada

The workshop's initial presentation, given by Bob Clark, Environment and Climate Change Canada, set the stage for the workshop by describing current efforts by the multi-partner Canadian Wetlands Roundtable to advance national wetland policy and giving an overview of the history of the North American Waterfowl Management Plan (NAWMP), the Joint Venture (JV) delivery model, and the importance of the PHJV within NAWMP. Celebrating its 30th anniversary in 2016, the NAWMP has been a highly successful international conservation program, impacting millions of hectares of habitat in the PHJV, the largest of the NAWMP JVs. Although habitat loss continues,

the policy environment around wetlands and habitat is advancing, and for the most part the duck population trajectories point in the right direction, driven in large part by unprecedented amounts of precipitation in the past 5 years. PHJV programs are moving to encompass all-bird conservation, and are making efforts to broaden the coalition of supporters (hunters, conservationists, citizens) working to sustain wetlands and related habitats for wildlife and ecological benefits to society. The challenge of linking conservation actions to outcomes of greater relevance to more people will be tackled through development of effective habitat conservation policies, ecological inventories, understanding impacts of climate change and land use, and gaining a better appreciation of stakeholder and public interests and needs.

Provincial Regulations and Policy: Current Status

Alberta Wetland Policy: From Development Through Implementation

Thorsten Hebben, Alberta Environment and Parks

Thorsten Hebben of Alberta Environment and Parks led off the presentations about the current status of wetland policies in the three provinces of the PHJV, introducing the Alberta Wetland Policy, the most advanced of the provincial wetland policies. The goal of this policy, released in 2013 under the umbrella of the Alberta Water Act, is "to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society and the economy". The policy recognizes the diversity of wetlands, establishing functional criteria and relative value categories, and a wetland mitigation hierarchy stepping down from the preferred response of avoidance of impacts by developments, to minimization, and as a last resort, to replacement with replacement area being determined by the class of wetland impacted. A robust set of tools includes a wetland inventory (accessed at *GeoDiscover Alberta* (https://geodiscover.alberta.ca/geoportal/catalog/main/home.page)), classification system, relative wetland value estimator, rapid assessment tool, and a library of guidance directives and documents. The first implementation phase focused on the settled areas of Alberta and attention is now directed at boreal and foothills wetlands on Crown-owned lands, being impacted most often by large scale, multi-year projects. New items and tools under development include wetland restoration protocols and an offset system, practitioner competencies and practice standards, a wetland replacement fund, a certification process for wetland replacement agents, and a provincial wetland science agenda.

Key learnings confirm the still routinely held public view of wetlands as wastelands, the impact on wetland conservation of "straight-line agriculture", ditching and tile drainage by private landowners, and the need for growth in the understanding of regulatory accountabilities. Hebben underscored the importance of communication, partnerships, land use plans, and land managers as fundamentally important to policy success, particularly in the regional context within which risk management aspects of wetland conservation/function can be considered in planning efforts.

Critical areas for near-term action identified by Hebben included establishment of wetland inventory standards, development of systems and tools that make regulatory processes more accessible and intuitive for private landowners and agricultural producers, and development and implementation of an integrated, broadly held wetland education and outreach agenda and program.

Manitoba: Provincial Policy and Regulation Overview

Rhonda McDougal, Manitoba Sustainable Development

Finding the appropriate balance between environmental protection and economic development – this challenge is interwoven in the history and current status of the Manitoba efforts to develop new legislation for surface water management, including wetland conservation, according to Rhonda McDougal of Manitoba Sustainable Development. Key drivers for new surface water legislation include severe flooding and downstream impacts experienced in the province, lack of clarity and certainty in the many acts that influence wetlands, land use pressures, Lake Winnipeg water quality issues, growing recognition of wetland ecosystem services and watershed planning, and climate change commitments. Significant energy invested in communication, consultation, relationship building and planning has positioned Manitoba for potentially moving towards new legislation, with an anticipated no net loss of wetland benefits component and a mitigation hierarchy, similar to that of Alberta. Goals for the proposed regulatory approach for drainage are improved efficiency and regulatory certainty, no net wetland loss, and a watershed-based approach for regulatory planning. McDougal described the strong science basis for wetland conservation policy, encompassing aspects such as carbon sequestration, water quality, wetland connectedness, inventory, and wetland function.

Successes to date include a solid set of planning documents and strategies, growth in integrated watershed planning, and strong and diverse partnerships. Challenges and barriers remain such as continued pressures to bring more land into agricultural production, wetland policy seen as a barrier to rural economic development, existing developments that are counter to good surface water management, lack of a complete wetland inventory, and limited understanding of wetland benefits in relation to ecosystem health. The environment for successful policy development and implementation will require inclusion and participation of all stakeholders, communication, sharing local knowledge and scientific information, collaborative research, and building and maintaining partnerships.

Areas for immediate attention, from McDougal's perspective, are to provide drainage licensing and enforcement officers with better tools to consistently assess and identify wetlands and their suite of ecological goods and services, to ensure that wetland conservation and restoration beneficial management practices (BMPs) are included in any new Alternative Land-Use Services (ALUS) type program, and to continue to work with stakeholders and all levels of government towards greater regulatory clarity and consistency.

Saskatchewan's New Approach to Agricultural Water Management

Doug Johnson, Saskatchewan Water Security Agency

Saskatchewan's wetland conservation history has been one of active promotion of drainage for agricultural development, enabled by a suite of legislation and government programming, with limited attention to regulatory compliance. Doug Johnson, Saskatchewan Water Security Agency, described how stakeholder discomfort with the historical approach, exacerbated by a recent series of wet years and flooding problems, resulted in the development of new drainage regulations in 2015 to address and mitigate drainage downstream impacts (hydrology, water quality) and wetland loss by ensuring efficiency and fairness in project consideration/approval, based on the best available science and knowledge. The regulations require the Water Security Agency to consider any proposal's impact on others' property, hydrology, water quality, and fish and wildlife habitat, and mitigation of downstream impacts. A suite of mitigation tools is under development as the new regulation moves into its implementation phase.

Two pilot projects encompassing 225 quarter sections in eastern Saskatchewan have confirmed the willngness of more than 80% of operators to work toward developing mitigation conditions that are acceptable, practical and incrementally address downstream impacts. The pilots have identified the need to consider projects within a larger network context for successful mitigation approaches. Other observations of note include the need for complete and current wetland and drainage inventories, clarification of the competencies of qualified persons to develop mitigation options, the value of manuals and fact sheets, and the landowner/operator role in developing project conditions to facilitate compliance.

Challenges to be faced in implementation of the regulations are varied: the large number of existing/old unlicenced works, regulator internal capacity for handling the backlog of approvals, landowner acceptance, and significant knowledge gaps about the impacts of drainage. More comprehensive scientific information is needed to understand the magnitude of drainage impacts on hydrology (i.e., flooding), water quality and habitat to allow the establishment of thresholds and targets for mitigation and development of effective mitigation approaches.

Wetland Law (Alberta) and Experience and Lessons from the U.S.

Achieving Wetland Conservation in the Canadian Prairies: Policy Linkages and Insights from *Alberta Wetlands: A Law and Policy Guide, Second Edition (2016)*

Arlene Kwasniak, Canadian Institute of Resources Law, University of Calgary

Having just completed the revision of her comprehensive law and policy guide for Alberta wetlands law, (available from the CIRL https://cirl.ca/), Arlene Kwasniak was uniquely positioned to offer insights into the legal framework and policies affecting wetland conservation in Alberta, and by extension to the other PHJV provinces. Describing provincial wetland policies as essential for wetland conservation, she noted the primary focus of the policies is to enable applications that will impact wetlands (e.g., draining, filling, dredging) and result in a mitigation hierarchy coming into play (the primary focus of a wetland *conservation* policy). Taking the view that wetland policies are limited in scope (apply only to planned projects needing water-related government approvals, reactive rather than proactive), Kwasniak observed that wetland policies should be "comprehensively linked to and integrated with other policy frameworks relevant to wetland protection and conservation…". Municipal involvement is critical for policy success because of municipalities' detailed local knowledge of wetlands and their variety of functions, municipal plans and bylaws related to developments, their role in stormwater management, and in citizen information and education. Building on her point of integration with other policies, Kwasniak suggests valuable connections for wetland conservation can be accomplished by explicitly recognizing wetlands in regulatory frameworks for activities such as oil and gas development, grazing, forest harvesting and road construction. Deregulation of any approvals process for low risk actions gains stakeholder support and implementation efficiency, but to be effective, wetland impact avoidance and conservation should be embedded in the larger suite of government regulations and policies that govern these deregulated activities. Most important in this integrated approach is to avoid wetland impacts and loss during the planning stages.

Achieving Administrative and Ecological Success in Wetland Mitigation Policy: Lessons Learned from U.S. Experience 1986-2016

Jeanne Christie, Association of State Wetland Managers

Jeanne Christie, Association of State Wetland Managers (ASWM, http://www.aswm.org/), took the workshop participants on a fact-filled and resource/reference-rich tour of her experiences with wetland conservation in the U.S. which began with sound science forming the foundation of wetland programs and policies in the 1980s and 1990s through today. In her view, U.S. federal laws are stronger than their counterparts in Canada, and these federal statutes form the foundation for even stronger and/or

complimenting laws in many states. Referring to a 2015 ASWM report on the status and trends of state wetland programs, Christie described a hierarchy of actions and effectiveness for wetland conservation, starting with protection, moving to voluntary restoration, and lastly to mitigation. Many challenges exist for voluntary restoration and mitigation efforts, including, but not limited to, inconsistent evaluation of outcomes, vague perfomance criteria, lack of recognition in regulations about environmental variability, underestimated costs, climate change, changing land use, and regulatory agency silos. Recommended next steps are development of concrete actions, confirmation of which organization is best equipped to lead the actions, outlining how to implement the actions, partner engagement, and development of a national strategy for improving wetland restoration outcomes for both voluntary and regulatory programs.

Christie observed that climate change will present a significant challenge to wetland protection and restoration in the prairie pothole region and offered recommendations regarding the challenges of invasive species, overestimating ecosystem resilience, conflicting project goals, inadequate project after-care, and lack of adaptive management. Outreach is critical because the public must both support and be actively engaged to achieve the no-net-wetland-loss objective of wetland conservation. Christie identified a number of programs and reports about to be concluded and published that can help wetland managers, scientists and policy practitioners form the basis for stronger engagement.

Needs, Gaps, Barriers and Opportunities

The question and answer components of these presentations and the facilitated discussion at the conclusion of this component of the workshop resulted in a list of needs, gaps, barriers, observations and future opportunities that lent themselves to being grouped into the themes of comprehensive information, awareness/communications, improving the legal and policy framework, and coordination and partnerships. Examples of items identified under each of the themes follow.

Comprehensive Information

- A complete and robust wetland and drainage inventory
- Studies for understanding relationships between cumulative impacts and outputs of importance to society, that are broader than wildlife/habitat conservation and include other societal impacts
- Changing agricultural practices and impacts on wetlands, and the downstream influence of the drained landscape (e.g., influences and impacts of prophylactic seed treatments, straight-line agriculture, introduction of crop cultivars for landscape components not currently being used for agriculture)
- Application of agriculture farm machinery technology to protect and conserve wetlands
- Human dimensions of wetland conservation, with reference to a specific PHJV-hosted social science workshop in future to consider social and economic issues and barriers to wetland policy and potential solutions to increase acceptance of new practice standards and expectations, particularly of agriculture producers

Awareness/Communication

- Understanding stakeholder motivations and attitudes, which ties to the human dimensions of the information theme
- Communication strategies tailored to the audience and specific issue – getting the narrative right
- Science, and the ability to communicate this science to stakeholders
- Identification of benefits of wetlands, including who receives the benefits and who bears costs in terms of compensation and reclamation
- Knowledge synthesis; putting the narrative together into one far-reaching story, all linked together
- Development of a business case for wetland conservation and management aimed at the insurance industry, agriculture, and the public
- Communication to link stakeholders and the public to wetland conservation and management programs
- Articulation of the processes necessary to make progress

Improving the Legal and Policy Framework

- Policy, plans and evaluations with appropriate time horizons, spanning electoral cycles
- Strengthened application of land use and planning acts
- Policy congruency among agencies with an interest in, and/or impact on, wetlands
- Economics, and perceptions of economics, surrounding wetland conservation
- Policies for boreal peatlands
- Structuring policies to open doors, enable the conversation with all affected parties, and result in integration in a variety of fields/avenues
- Policies and programs that achieve the desired outcomes, by presenting the opportunity for success to program recipients and to those responsible for implementation and delivery
- Maintaining the ability to say “no”

Coordination and Partnerships

- Recognition of the need for application of a partnership model
- Centralized repository and knowledge broker for information related to wetland conservation, management and science and opportunities for provincial agencies, ENGOs, academics, researchers, consultants to input to and access this repository
- Empower municipalities through regional plans, providing appropriate resources to enable municipalities to meet delivery expectations
- Clarification and confirmation of the definition of the engagement role for municipalities to allow application of their existing tools
- Understanding that projects can have different investment returns, especially when considering the influence of time frames (e.g., projects with a climate change focus may take longer to deliver full benefits, whereas flood control projects may bring more immediate returns to citizens and insurers)

Connecting Policy Needs to Science-based Solutions

Linking Policy Needs to Habitat and Biodiversity Science Knowledge and Expertise

Jim Devries, Ducks Unlimited Canada, and Chair, PHJV Science Committee

As Chair of the PHJV Science Committee, Jim Devries of Ducks Unlimited Canada had the dual task of introducing the workshop component linking science to policy, and providing introductory remarks for the biodiversity and habitat science knowledge and expertise section. The PHJV Science Committee aims "to gather and incorporate the best scientific information supporting the goals, objectives and implementation of the PHJV" and "understanding the linkages between wetland and upland habitat amount and distribution and biological responses in terms of waterfowl and other bird diversity, abundance and reproductive success". Devries noted that with agriculture the most influential land use in the prairie-parkland biome, it is important to understand its impact on the biodiversity and habitat associated with wetlands, something that is much larger than the PHJV's focus on impacts on waterfowl and wetland-associated birds – more information is required. The diverse information needs were framed as challenges by Devries and started with a wetland inventory, a recurring observation throughout the workshop, but included aspects like a wetland biodiversity assessment that can operate at both a detailed local scale and also can be applied at a larger scale to wetland types identified by the inventory, wetland-associated species at risk, how biodiversity and the no-net-loss of wetland function goal is impacted by actions such as conversion of a complex of small wetlands to stormwater retention ponds linked by drainage canals, biodiversity links to farm economics, the impacts of changing agricultural practices on biodiversity and human health, and clarification of the level/amount of information that is required to make choices about biodiversity and habitat conservation.

At the completion of Devries' overview, a facilitated discussion expanded on his observations, offering a variety of observations and identifying additional information requirements such as:

- the value of a tiered approach to wetland biodiversity assessment (high level inventory, "windshield" level, and detailed local),
- the need for a rapid (and credible) assessment protocol to bridge with the lengthy detailed monitoring programs,
- automated tools to assess values and functions for different wetlands and wetland complexes in different landscapes, to enable enhanced integration of policy options with licensing/permitting decisions, a recommendation repeated in various forms in subsequent sessions as well,
- information on use of wetlands by a wider range of species, and particularly key species,
- frogs and salamanders have taken on a role as "charismatic microfauna",
- clear identification of the goals for biodiversity,
- citizen monitoring to strengthen public understanding of biodiversity and to bring the definition of biodiversity to a personal level,
- knowledge of thresholds for impacts on biodiversity, and
- translating the information on biodiversity to ensure it is relevant to decision-makers.

Linking Policy Needs to Inventory, Monitoring and Technology Solutions

Michael Watmough, Environment and Climate Change Canada

As lead for the inventory and monitoring section, Michael Watmough, Environment and Climate Change Canada, started the session with a first-hand view of wetland loss (draining, filling, channelization, burning/discing/tilling), impacts like irrigation and dugouts, and drainage methods, and then described the current status of wetland monitoring and wetland loss (mean gross loss of 2.6% of PHJV wetland area between 2001 and 2011) and the ditching inventory in the three provinces. Wetland inventories are costly and manpower-intensive, requiring clear definition of their intended purpose. The level of information is dependent on their ultimate purpose, whether for baseline information, change detection, or regulatory compliance. Collection of the inventory data must be done in a consistent manner, to established data standards to ensure their usability to many partners and to enable the integration of a variety of attributes. Monitoring of wetland status and trends through time is separate from inventory, and the current monitoring in the PHJV is done through a sampling strategy in order to provide timely information on status and trends. The composite of monitoring data and ditching inventory maps has provided an effective combination to aid in conservation implementation planning in the PHJV.

Other observations from Watmough's presentation and the facilitated discussion that followed included:

- wetland loss has different definitions depending on the species, policy perspective, objectives, and levels of protection intended,
- extensive road networks allow ditch connection and increased storage or movement capacity,
- determine what the inventories/maps are or aren't with regard to compliance, and how these will help track non-compliance,
- need to be able to differentiate between anthropogenic activities and the influence of climate change,
- need two-way discussion with policy people to ensure the inventories and monitoring efforts match policy needs or can be adjusted to meet these needs. Clear identification of the level of accuracy, time frame and application of the data is needed for definition of the policy challenge to be actioned,
- inventory or monitoring approach needs to be realistic and affordable,
- the PHJV Habitat Monitoring Program is the Canadian equivalent of the U.S. status and trends report, although only Prairie Canada (PHJV delivery area) is included,
- new techniques such as 3-D basin identification, rapid satellite verification and LIDAR can be applied as needed; however, costs can be prohibitive at the inventory scale but less so at a monitoring sample base,
- concentrate surveillance activities to areas of significant and rapid change and/or expected change,
- utilize PHJV Wetland Status and Trends monitoring data in models intended to direct conservation, restoration, and mitigation efforts,
- as moving to a regulatory system changes the monitoring needs and strategy, the role of the regulator must be clarified to confirm the collaborative opportunities

(wetland monitoring vs. drainage monitoring) and to ensure consistent data collection as part of approvals,
- because regulatory maps are challenging and expensive to create, confirmation of the level of data required is necessary as is confirmation of the responsible agency for map production, and
- future mitigation offset policies will need appropriate data bases and confirmed QA/QC processes.

Linking Policy Needs and Hydrological Science Knowledge and Expertise

Chris Spence, Environment and Climate Change Canada

Chris Spence, Environment and Climate Change Canada, was charged with overviewing the current understanding of hydrological science in the prairies to set the foundation for the larger discussion. He offered a summary of recent research into surface and subsurface hydrological connectivity of wetlands, the role small upslope ponds play in maintaining water levels in larger downslope ponds, and the importance of the watershed for wetland hydrology and wetland function, drawing the conclusion that wetlands and wetland complexes are dynamic systems which are challenging for policy development. Part of the foundation of sound wetland policy is a GIS wetland inventory to enable classification of wetlands, and to faciliate confirmation of a wetland's function and value in the wetland complex.

Individual wetlands exist and function hydrologically within a larger scale context, and Spence believes hydrologists (and by extension, policy and decision-makers) must progress from thinking about wetlands as isolated units to thinking about the entire wetland complex as the basis for policy and decisions related to drainage, floodplains, flooding, and conservation.

Spence identified common solutions including a GIS database, research into wetland and watershed budgets across a diversity of wetland complexes, including, if possible, those before and after significant watershed alteration, further model development to inform extrapolation of thresholds and tipping points, evaluation of wetland classifications to ensure no-net-loss policies are succeeding, an app for rapid on-site wetland classification, all within a collaborative approach inside the water resource community.

Comments from the facilitated discussion added to Spence's observations:
- support is strong for development of wetland inventory for the prairies coupled with a GIS tool for predicting hydrological function, linking to floodplain regulations and policy,
- hydraulic throttles are believed to be an important tool for managing surface water flow through a wetland complex,
- policy requirements define the science needs (approvals requirement speaks to individual wetlands, but conservation policy will need watershed science),
- benefits to individual landowners of preserving wetlands need to be confirmed and quantified,
- the problem(s) to be solved through hydrological science must be clearly articulated, along with a common language for new concepts,
- consideration of the impact of wetland consolidation within the policy environment is needed,
- understanding the hydrological effect of riparian vegetation,

- translation of academic research science into operational tools, along with an approach/entity to lead this development and to ensure maintenance of the tools, and
- science to inform the approvals process, in a fashion and format that can be understood by a landowner/applicant.

Linking Policy Needs and Water Quality Science Knowledge and Expertise

Pascal Badiou, Ducks Unlimited Canada

The final presentation in the science session, given by Pascal Badiou, Ducks Unlimited Canada, described the state of knowledge and science related to water quality, using information from work done for the most part in Manitoba and Saskatchewan. Nonpoint sources, particularly agricultural runoff, are the most important contributors of pollutants and nutrients to lakes, rivers, streams and wetlands in the PHJV, and it is generally accepted that wetlands are important mitigators of nonpoint nutrient pollution. Badiou cited increasing evidence linking wetland drainage with flooding and high flow events with nutrient export, describing research that shows wetland drainage increased the contributing area of the watershed, resulting in higher nutrient (phosphorus) discharge, negatively impacting downstream water quality in the watershed. He also described how wetlands in intact landscapes (within grasslands) have lower nutrient concentrations than those in agricultural croplands, demonstrating how wetland drainage converts areas that were acting as phosphorus sinks to source areas for nutrient export.

Badiou summarized the challenges related to understanding water quality in prairie wetlands as three-fold: no consistent long-term monitoring is underway, little information exists regarding the impact of wetland drainage on water quality, and there is little information about land use impacts and wetland management practices on wetland water quality.

Workshop participants offered additional comments concerning water quality in wetlands:

- more information is needed, including for boreal wetlands and peatlands,
- debate continues about whether there is sufficient information for application of the precautionary principle in wetland water quality management, although most agree sufficient information exists to begin the conversation with stakeholders and decision-makers,
- one's perspective about the importance of water quality considerations is influenced by your interests (e.g., cottage owners as compared to agricultural producers),
- different run-off events (spring snow melt vs. rainfall events) can have different impacts, and different flow events can have different top-water nutrient movement patterns,
- long-term monitoring of water quality in prairie wetlands will be important in understanding wetlands in relation to the overall nutrient budget and to be proactive related to climate change policy development,
- permit approvals processes and licence conditions should be structured to produce water quality data,
- clarity should be sought on the impact of water quality in wetlands to surrounding landowners,
- types and locations of wetlands to produce the most benefits related to water quality should be identified, as

should the impact of land use and wetland management practices on water quality in wetlands, and the incremental impact of drainage on water quality, with emphasis on nonpoint sources and thresholds,

- models should be developed to aid in these understandings, and
- BMPs and a common narrative about water quality management would be valuable.

Practical Tools and Approaches for Effective Wetland Policy

Stephen Carlyle, Manitoba Habitat Heritage Corporation

A presentation by Stephen Carlyle, Manitoba Habitat Heritage Corporation and member of the PHJV Policy Committee, bridged from the science/policy session to the third and final session. Challenges identified throughout the workshop were summarized by Carlyle as legislation complexity, the need for policy congruence and collaboration, recognition of wetland benefits, clarification of the roles and processes of the delivery agencies, land prices and agricultural expansion, application of planning and zoning as a tool for wetland conservation and drainage regulation, cumulative impacts, human behaviour, historic drainage and new drainage management, peatlands, and resource constraints. Potential tools and projects that, in Carlyle's view, could address some of the challenges are: a systematic review and synthesis of regional policies, a wetland assessment and valuation system, wetland network/complex information, and strengthened collaboration, including possible development of a wetland policy network or association.

Discussion of Carlyle's summary resulted in additional needs and opportunities such as:

- policy performance evaluations,
- business case for wetland conservation, including quantifying ecological goods and services from wetlands,
- stakeholder (including industry) engagement at a strategic level and early on, and communication tools to assist with this engagement, aimed at having stakeholders help to solve the identified problems and maintain momentum,
- a mechanism to effectively involve farmers and landowners, who currently fall into a loosely knit community with many organizations,
- guidance documents for impacting agencies and audiences, adapted for different audiences, and a process for sharing all relevant information (e.g., research, BMPs, fact sheets),
- development of a professional reliance model to assist the statutory decision-makers in implementation and delivery,
- a decision support tool for policy makers,
- a comprehensive and complete wetland inventory, and
- strong support for the idea of a wetland policy network or association (a suggested name was the Provincial Association of Wetland Stewards (PAWS)) similar to the Association of State Wetland Managers, or consideration of a broadening of the mandate of an existing wetland or water management forum in western Canada.

Creating Action and Partnerships: Enabling Collaboration on Prairie Wetland Policy: Priority Actions and Opportunities

Synergies and opportunities emerged as the status, gaps and needs of the provincial policy practitioners were merged with the information provided by the scientific experts. Consensus among workshop participants was evident around the themes of communication, foundational science needs, and development of modelling tools to further policy development and/or conservation activities. Although sufficient information exists for development of many of the wetland-related policies throughout the Prairie Provinces, the conversation emphasized areas requiring continued attention. The discussions of provincial policies underlined the need for studies to further the understanding of the relationships between cumulative impacts of wetland drainage and outputs of importance to society (e.g., water quality, flooding impacts) that are broader than wildlife/habitat conservation. This need was echoed by the science experts who emphasized the challenges related to understanding the dynamic relationships between prairie wetlands and biodiversity, water quality and hydrology. Dialogue about water quality issues highlighted the gap as three-fold: no consistent long-term monitoring, the paucity of information regarding the impact of wetland drainage on water quality, and limited information about land use impacts. Additionally, the hydrological discussion recommended researchers, policy specialists and decision-makers should consider the entire wetland complex as the basis for policy and decisions related to drainage, floodplain management, flooding, and conservation.

These recurring themes set the context for development of priority needs and actions, and identification of possible opportunities for partnering on them, in the final session of the workshop. Facilitator Sheldon McLeod set the challenge of developing a "top three" actions list with observations about gaps and barriers and invited the workshop participants to select one of five discussion tables for this purpose. The table discussion results were reported back in a plenary, subjected to one final review, and are summarized below. To some degree, the "table" results were similar in content to the results of the earlier presentation components, but viewed collectively, the table results were often substantively different in approach, reflecting the diverse backgrounds, interests, and expertise of the workshop participants.

Policy Development

- Agriculture community: many organizations, loosely knit, individual perspectives
  - Identify and engage leaders in the agriculture community to support policy implementation and transition to new standards of practice.
  - Explore compliance mechanisms and approaches that can achieve performance expectations and targets.
- Stakeholder engagement/framework: strategic, with clearly established and agreed-to boundaries
  - Engage people early, and in a safe environment, in regulation and policy development efforts to build understanding and ownership, accelerate stakeholder support and commitment, and solve problems limiting effective policy implementation.

- Guidance documents
  - Develop guidance and support documents targeted to specific audiences (e.g., application of a professional reliance model requires different documents than a statutory decision-maker).
  - Build a central repository to enable sharing of existing documents.
  - Create documents to effectively link research and science with BMPs.
- Benchmarking process
  - Establish a network to share and evaluate BMPs, stay abreast of ongoing developments (policy practitioners' association), and facilitate adaptive management.
- Barriers include poorly defined policy evaluation process and limited government policy capacity.

Habitat and Biodiversity

- The "language" of biodiversity
  - Develop a common language to be able to relay the importance of biodiversity and rationale for its conservation.
- Ranking biodiversity
  - Develop a system for scoring/indexing/rating biodiversity and create biodiversity hotspot maps, to enable informed decision-making.
- Biodiversity metrics
  - Develop a variety of categories and metrics for biodiversity information requirements, but be certain the need for these metrics is evident.
- Collaborators include industry, First Nations (land managers group), ENGOs, PHJV Science Committee, governments, agriculture (capitalize on the emerging roundtables that are considering social licence aspects of agriculture).

Inventory, Monitoring and Technology Solutions

- Completion of a standardized PHJV wetland and drainage inventory
- Data requirements to meet the various users' needs
  - Clearly identify the purpose of the data (e.g., regulatory baseline change detection and/or research), amount, level of accuracy, and time frame for data application by various users.
  - Ensure a consistent approach to data collection so as to enable compatibility in different systems.
  - Ensure data requirements also reflect the science needs to provide baseline data for the tools and models identified by other science groups.
- Data collection as part of approvals process or regulatory compliance process
  - As policies and programs are implemented, ensure data are consistently captured and tracked regarding works approvals and mitigation.

Hydrology

- Science needs
  - Develop further foundational hydrological science required to ensure policy development, conservation activities, and regulatory actions are defensible. Foundational science includes:
    - understanding the relationship between cumulative drainage and flooding impacts;
    - understanding the hydrology of drainage of wetland complexes;
    - evaluating the hydraulics of throttle culverts or other mitigation activities; and
    - understanding the hydrology related to gatekeeper wetlands.
  - Partners would include ENGOs (e.g., DUC), universities, institutes, provinces, federal agencies (NHRI), landowners, industry, municipalities.
- Identification and development of applied operational tools
  - Establish supporting resources, including an organizational structure, to develop applied operationally oriented tools from the research science, using existing forums to leverage collaboration, rather than attempt to develop a new organization/forum.
  - Develop a GIS tool to assess hydrological function of wetlands for a variety of purposes (e.g., design, mitigation, regulation targeting), and use this tool to assist with demonstration of economic costs and benefits.
  - Potential collaborators include ENGOs (e.g., DUC) and the provinces.
- Communication
  - Nurture the ability to communicate science findings, with a common language, directed at both the stakeholders and funding agencies.

Water Quality

- Understanding water quality within the context of wetland loss in the Prairie Provinces
  - Develop a better understanding of water quality in the context of overall nutrient budgets and concentrations.
  - Determine the impact of different land uses on water quality (e.g., drainage, BMPs).
  - Work to confirm connections between water quality triggers (e.g., flood control, lake management), with the understanding that the perspectives of the provinces may vary from time to time.
- Modelling tools for policy development or conservation activities
  - Develop and apply modelling tools to determine the most cost-effective approaches for mitigation and restoration efforts (e.g., location on the landscape to target wetland enhancement or replacement, determine effects of climate change on water quality, agrochemical effects, what techniques provide best return on investment).
  - Rationale for these activities/actions is that having information available for current situations (e.g., nutrient budget) and modelling information on how wetlands influence water quality could inform future decisions, specifically on issues of climate

change, BMP implementation and wetland restoration.
    - Collaborators would include provincial and federal agriculture departments, research groups, and the PHJV.
- Communication
    - Create appropriate water quality messaging for stakeholders.

Creating Action and Partnerships: The Way Forward

PHJV Co-Chairs Peter Joyce (Saskatchewan Environment) and Shane Gabor (Ducks Unlimited Canada) thanked the workshop participants for their willingness to engage in substantive discussion, and noted the way forward for the PHJV Policy Committee to be to:

- summarize the workshop outputs, accomplished through this report,
- confirm those areas for which the Policy Committee is best positioned to support further action,
- collaborate with the PHJV Science Committee in these further actions, integrating the Policy Committee considerations with those of the Science Committee, and
- consider possible future networking opportunities and workshops hosted by the Policy Committee.

As wetland conservation and management involves a much broader and larger wetland policy "community", the outputs from the PHJV policy/science workshop including potential work areas/actions can be envisioned as a list of higher priority items for the broader community to consider for future collaborative study and energy. Efforts by the larger community will also help guide the actions of the PHJV Policy Committee.

APPENDIX I: WORKSHOP CONTEXT AND PURPOSE

Context: The Canadian Prairie Pothole Region (PPR) is the most important breeding area for continental waterfowl supporting more than half of the North American waterfowl breeding population and providing habitat for many other important bird species. PPR wetlands provide numerous ecosystem services including nutrient abatement and flooding attenuation. However, ongoing wetland loss (~ 3% per decade, -0.35%/year) threatens the ability of this landscape to provide these functions. The recent development and implementation of wetland-related policies and regulations in the Canadian Prairie Provinces is expected to address the impacts of wetland loss. However, for policy development to respond in a timely way, priority barriers and information needs must be identified and addressed efficiently. Recognizing its important role, the PHJV has played an active role in promoting and supporting wetland-related policy. The workshop is intended to foster inter-jurisdictional collaboration and co-operation to identify and address mutual policy development needs and to help guide the joint efforts of policy practitioners and other PHJV partners going forward.

Workshop Purpose: (1) To share information on the challenges and progress of wetland policy, regulation and science in each prairie province, (2) prioritize common needs to advance wetland policy and regulations across the prairie region; and, (3) to identify partner-supported collaboration opportunities to address these needs.

Outcome: An Action Plan which identifies needs, potential collaborative outcomes, and partner roles.

Component 1 – Identifying Policy Needs
Purpose: To provide an overview of each province's wetland policies and regulations including intent, stage of development, challenges, successes and needs.

Outcome: Provide workshop participants with an understanding of challenges and successes in developing provincial policy and regulations (refer to component 3).

Component 2 – Linking Policy Needs to Solutions
Purpose: (1) To assess the state of science, data and tools supporting development and implementation of wetland policy and regulations. (2) To identify the common needs to advance wetland policy development and implementation.

Outcome: A list of common top-of-mind needs to advance wetland policy and regulation development or implementation (refer to component 3).

Component 3 - Identifying Actions and Collaborative Opportunities
Purpose: To prioritize the common needs for wetland policy and regulation development and implementation identified in components 1 and 2.

Outcome: A list of action items to address the identified needs; including collaborative outcomes and partner roles.

Workshop Format: To achieve the outlined outcomes, the two-day workshop will bring together invited provincial policy-makers, delivery agencies and scientists to develop an action-oriented plan. The format of the meeting is a facilitated discussion in which all invited attendees are participants. Invited participants have been identified based on experience or expertise related to wetland policy and prairie wetland science in Prairie Canada. Input from science and policy experts is essential in the development of prioritized action-based solutions and identification of collaborative opportunities. After the workshop, the PHJV policy committee will compile the results of the discussions and prioritization process to develop an action-oriented plan.

APPENDIX II: AGENDA

Wetland policies, regulation and science in Prairie Canada: An assessment of mutual needs and future directions

May 3-4 2016
Conexus Arts Centre, Regina, Saskatchewan

DAY ONE (Tuesday, May 3) Session Chair: Corie White, SK NAWMP Implementation Committee Chair, Saskatchewan Water Security Agency	
8:30-8:45	**Welcome, Opening Remarks, Introductions and Workshop Format** ○ Provincial Host Welcome Remarks (Dave Phillips, Ministry of Environment and Dale Hjertaas, Saskatchewan Water Security Agency) ○ Welcoming Remarks from PHJV Policy Committee Co-Chairs Peter Joyce and Shane Gabor
	Objectives and Process for the Workshop Sheldon McLeod, facilitator
Introduction to NAWMP and PHJV Roles in Wetland Conservation Policy	
8:45-9:15	**Federal Wetland Programs, Policy and the PHJV** Bob Clark, Environment and Climate Change Canada
Section 1: Sharing Policy Information & Identifying Needs	
9:15-10:00	**Alberta: Provincial Policy & Regulation Overview** Thorsten Hebben, Alberta Environment and Parks
10:00-10:15	***Health Break***
10:15-11:00	**Manitoba: Provincial Policy & Regulation Overviews** Rhonda McDougal, Manitoba Sustainable Development
11:00-11:45	**Saskatchewan: Provincial Policy & Regulation Overview** Doug Johnson, Saskatchewan Water Security Agency
11:45-12:15	**Facilitated Discussion:** *Based on provincial policy summaries, what are the common and most important needs, gaps and/or barriers to policy development and implementation across the prairies?*
12:15-1:00	**Lunch**

DAY ONE (Tuesday May 3) (Continued) Session Chair: Michael Barr, Alberta NAWMP Partnership	
1:00-1:30	**Achieving Wetland Conservation in the Canadian Prairies: Policy Linkages and Insights from *Alberta Wetlands: A Law and Policy Guide, Second Edition (2016)*** Arlene Kwasniak, University of Calgary
1:30-2:00	**Achieving Administrative and Ecological Success in Wetland Mitigation Policy: Lessons Learned from US Experience 1989-2016** Jeanne Christie, Association of State Wetland Managers
2:00-2:30	**Facilitated Discussion**: *Key lessons from legal and US perspective*
2:30–3:00	***Health Break***
Section 2: Connecting Policy Needs to Solutions	
Science Based Solutions	
3:00-4:00	**Linking Policy Needs to Habitat & Biodiversity Science Knowledge and Expertise** Session Lead: Jim Devries, Chair, PHJV Science Committee, Ducks Unlimited Canada • *Recap of habitat or biodiversity information needs arising from provincial presentations* • *Facilitated discussion session to share knowledge, and identify potential solutions and collaboration opportunities*
Data and Technology Based Solutions	
4:00-5:00	**Linking Policy Needs to Inventory, Monitoring and Tech Solutions** Session Lead: Michael Watmough, Canadian Wildlife Service, Environment and Climate Change Canada • *Recap of data, technology and/or information management needs arising from provincial presentations* • *Facilitated discussion session to share knowledge, and identify potential solutions and collaboration opportunities*
Adjourn for the day	

DAY TWO (Wednesday, May 4) Session Chair: Shane Gabor, PHJV Policy Committee Co-chair, Ducks Unlimited Canada	
8:30-8:45	Recap Day One Outcomes and Review Goals for Day Two
Section 2: Connecting Policy Needs to Solutions (Continued)	
Science Based Solutions (Continued)	
8:45-10:15	**Linking Policy Needs and Hydrologic Science Knowledge and Expertise** Session Lead: Chris Spence, Environment and Climate Change Canada • *Recap of key hydrology questions/science needs arising from provincial presentations* • *Facilitated discussion session to share knowledge, and identify potential solutions and collaboration opportunities*
10:15-10:30	**Health Break**
10:30-12:00	**Linking Policy Needs and Water Quality Science Knowledge and Expertise** Session Lead: Pascal Badiou, Ducks Unlimited Canada • *Recap of key water quality science needs arising from provincial presentations* • *Facilitated discussion session to share knowledge, and identify potential solutions and collaboration opportunities*
12:00-1:00	**Lunch**
Policy Based Solutions ***Session Chair: Peter Joyce, PHJV Policy Committee Co-chair, SK Ministry of Environment***	
1:00-2:00	**Practical Tools and Approaches for Effective Wetland Policy** Session Lead: Stephen Carlyle, PHJV Policy Committee, Manitoba Habitat Heritage Corporation • *Recap of key challenges & needs arising from provincial presentations* • *Facilitated discussion session to share related policy experience and identify common challenges, interests and collaboration opportunities*
2:00-2:15	**Health Break**
Section 3: Creating Actions and Partnerships	
2:15-4:00	**Enabling Collaboration on Prairie Wetland Policy: Priority Actions and Opportunities** • *Facilitated group discussion to prioritize key challenges and actions* • *Identify next steps and actions associated with solutions* • *Identify potential collaborative opportunities to achieve actions, where appropriate*
Adjourn	

Appendix III: Workshop Participants

Name	Affiliation
Andrea Barnett	Ducks Unlimited Canada
Arlene Kwasniak	University of Calgary
Bart Oegema	Saskatchewan Water Security Agency
Bob Clark	Environment and Climate Change Canada
Brian Hepworth	Ducks Unlimited Canada
Chad Lawley	University of Manitoba
Chris Spence	Environment and Climate Change Canada
Chrystal Mantyka-Pringle	University of Saskatchewan
Corie White	Saskatchewan Water Security Agency
Dan Farr	Alberta Biodiversity Monitoring Institute
Diogo Costa	University of Saskatchewan
Doug Johnson	Saskatchewan Water Security Agency
Etienne Soulodre	Saskatchewan Water Security Agency
Glen M^{c}Master	Saskatchewan Water Security Agency
Heather Toews	University of Saskatchewan
Hugh Hunt	PHJV Policy Committee Coordinator
Jeanne Christie	Association of State Wetland Managers
Jennifer Kerr	Alberta Agriculture and Forestry
Jim Devries	Institute for Wetland and Waterfowl Research, DUC
Joel Ingram	Environment and Climate Change Canada
John-Mark Davies	Saskatchewan Water Security Agency
Ken Belcher	University of Saskatchewan
Kevin Shook	University of Saskatchewan
Kevin Teneycke	Nature Conservancy of Canada
Kiel Drake	Bird Studies Canada
Len Kryzanowski	Alberta Agriculture and Forestry
Lyle Boychuk	Ducks Unlimited Canada
Michael Barr	Alberta NAWMP Partners
Michael Champion	Ducks Unlimited Canada
Michael Watmough	Environment and Climate Change Canada
Nathalie Brunet	Saskatchewan Water Security Agency
Neil Fletcher	Pacific Coast Joint Venture, BC Wildlife Federation
Pascal Badiou	Ducks Unlimited Canada
Patricia Farnese	University of Saskatchewan
Per Andersen	Ducks Unlimited Canada
Peter Joyce	Saskatchewan Ministry of Environment
Rhonda McDougal	Manitoba Sustainable Development

Ron Bennett	Environment and Climate Change Canada
Ron Eley	Saskatchewan Agriculture
Ryan Fisher	Saskatchewan Ministry of Environment
Shane Gabor	Ducks Unlimited Canada
Sheldon McLeod	Facilitator, SL McLeod Consulting
Stephen Carlyle	Manitoba Habitat Heritage Corporation
Terra Simieritsch	Lilium Consulting
Thorsten Hebben	Alberta Environment and Parks

prairie habitat joint venture

For more informationabout the PHJV

www.phjv.ca