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## **PRAIRIE HABITAT JOINT VENTURE SCIENCE AND POLICY FORUM 2008**

### **Proceedings and Recommendations**

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## EXECUTIVE SUMMARY

Despite there being 1.2 million square kilometres of wetlands in Canada, or about 25% of the world's wetland area, this critical continental resource is literally draining and evaporating. This loss, along with broader water conservation concerns, are rapidly becoming important public policy issues.

About 100 science, policy, and program managers/experts in water stewardship, agriculture, environment, and rural economy met on April 8 and 9, 2008 in Saskatoon, Saskatchewan at the Prairie Habitat Joint Venture (PHJV) 2008 Science and Policy Forum. This meeting considered a range of issues around “integrating land and water conservation to better retain and restore Canada’s wetlands, particularly in the agricultural landscapes of prairie Canada.”

**The Prairie Habitat Joint Venture partnership was established to deliver the North American Waterfowl Management Plan on the Canadian prairies. The vision of the Prairie Habitat Joint Venture is of healthy prairie, parkland, and boreal landscapes that support sustainable bird populations and provide ecological and economic benefits for society.**

**The partnership includes public and private agencies and organizations representing a broad range of landscape conservation interests in prairie, parkland, and associated boreal forest landscapes in western Canada.**

These experts concluded that while considerable progress has been made by government and organizations such as the PHJV to conserve wetlands, much remains to be done to reverse current trends. Indeed, the threats of climate change and the rapid expansion of agriculture driven by rising commodity prices and government-sponsored biofuel demand are undermining past accomplishments with serious consequences for quality of life and public health.

The conference heard that wetlands are disappearing at an astonishing rate and that they are critical to the supply of fresh water. Traditionally, the PHJV has focused on wetland conservation as the means to support waterfowl populations and increased diversity. At this conference, a key message was the importance of wetlands in water quality and water regulation. Wetlands also support carbon sequestration and recreation, and have aesthetic and other important economic and ecological benefits.

The conference considered a range of policy prescriptions ranging from regulation to market-based incentives for ecological goods and services. This paper presents a high-level overview of the proceedings and recommended actions emerging from the two days.

The PHJV engaged PRA Inc to complete a pre-forum survey of participants, summarize the results of this meeting, and prepare a report.

### Key findings

- ▶ Despite a growing policy and legislative framework on wetlands, much work remains. Wetlands continue to be degraded and lost along with their inherent economically important functions that protect our water supply, regulate our climate, and provide biodiversity benefits. Even the basic definition of a “wetland” remains ambiguous and inconsistent across jurisdictions. The definition is the starting point for all policies and legislation.

- ▶ Wetlands face a number of significant pressures including technological advances in agriculture and increasing commodity prices that encourage farmers to convert wetlands to crop production. Suburban expansion and infrastructure development (transportation) contribute to wetland loss and degradation while the threat of climate change is also undermining past accomplishments on these critical wetland habitats.
- ▶ Wetlands are cornerstones of healthy ecosystems. Their loss is diminishing hydrological functions that are integral to Canada's water supply and will exacerbate climate change effects unless addressed.
- ▶ Wetland conservation efforts are frustrated by a weak legal and policy framework, the lack of adequate measures to identify and measure wetland loss in monetary value, and the lack of national policy coordination.
- ▶ Three policy tools for wetland conservation are regulation, incentives (financial and technical) to implement beneficial management practices, and market-based approaches to reward wetland stewards. An essential component of these activities is to garner the public's support through increased communication and education efforts.
- ▶ Many see market-based approaches (incentives and programs) as promising means to reward land owners who retain wetlands.

### **Recommendations**

- ▶ The Government of Canada must assume a much stronger leadership role in developing a wetland conservation policy framework that establishes no net loss as a minimum national standard, with a vision to further restore and enhance wetland area and function in the future.
- ▶ Provincial and municipal governments play critical roles in leadership. Wetland policy and regulation is primarily a provincial responsibility, secondarily impacted by municipal land use frameworks; therefore, they must develop and coordinate their policies to encourage wetland conservation on private lands ensure that treatments and programming are consistent, and ensure that there is a clear legal framework for wetlands.
- ▶ Increased science to quantify the link between wetlands and water quality and regulation is critical.
- ▶ The critical issue is that the public benefits are large but diffuse. Private landowners have little incentive to incur the costs often associated with wetland conservation. This market failure can only be solved through a cohesive combination of policy, legislation, education, and programming to create functioning markets and incentives for conservation.

- ▶ The federal and provincial governments should create and fund a national secretariat to coordinate and advance a “wetlands science and policy agenda.” Such a secretariat would:
  - Facilitate the development of national wetland conservation policy standards for application at the federal, provincial, and municipal levels
  - Accelerate the development and evaluation of market-based instruments, increase the understanding of the economic and ecological benefits arising from wetland conservation, and catalyze cross-jurisdictional development of wetland policy
  - Establish a national wetland inventory and monitoring program to quantify numeric conservation goals, create a common wetland definition and delineation, and also support the evaluation of conservation policy
  - Communicate the benefits of wetlands to the public, support the basic scientific research in wetland conservation, and host symposia of experts to facilitate communication among members of the research and education community.

## 1.0 Introduction

About 100 science, policy, and program managers/experts in water stewardship, agriculture, environment, and rural economy met on April 8 and 9, 2008 in Saskatoon, Saskatchewan at PHJV's 2008 Science and Policy Forum.

**The Prairie Habitat Joint Venture partnership was established to deliver the North American Waterfowl Management Plan on the Canadian prairies. The vision of the Prairie Habitat Joint Venture is of healthy prairie, parkland, and boreal landscapes that support sustainable bird populations and provide ecological and economic benefits for society.**

**The partnership includes public and private agencies and organizations representing a broad range of landscape conservation interests in prairie, parkland, and associated boreal forest landscapes in western Canada.**

This meeting considered a range of issues around “integrating land and water conservation to better retain and restore Canada’s wetlands, particularly in the agricultural landscapes of prairie Canada.” The 25 science and policy presentations assessed drivers of land use change from agriculture to climate change as well as new emerging tools, programs, and policies affecting wetland conservation.

The PHJV engaged PRA Inc. to complete a pre-forum survey of participants, summarize the results of this meeting, and prepare a report.

## 2.0 Antecedents and precedents to the meeting

Canada has 1.2 million square kilometres of wetlands, or about 14% of the land area of the country, which represents about 25% of the world’s wetland area. This globally significant water resource is depleting at a rapid rate, and a significant ecological and health asset – clean water – is being compromised.

The need for wetland conservation is not new. In 1990, a forum on sustaining wetlands resulted in the Federal Policy on Wetlands (1991), a first in the world that identifies Canada’s commitments and strategies to implement wetland protection. According to the Final Report of the 2003 Conference on Canadian Wetlands Stewardship, by 2003, some 8 million hectares of wetland had been preserved. About one-third of all Canadian wetlands are managed federal and provincial lands, with many of the preserved wetlands lying in national parks, protected areas under provincial and territorial governments, and in migratory bird/wildlife areas created by Environment Canada. However the majority of wetlands in Canada, including those within the Canadian Prairie Pothole Region, occur on private land and are under assault from a range of threats. Government regulations and policy have not successfully extended to these wetlands that lie in the path of farm expansion, suburban and exurban development, and infrastructure development (oil, transportation, etc.)

Wetland conservation provides wildlife habitat, helps protect source water supplies, regulates climate through carbon sequestration, supports flood control, and offers many other aesthetic, recreational, and ecological benefits to Canadians. It relies on international cooperation since wetlands straddle borders and because migratory bird and waterfowl populations depend on wetlands stretching from Northern Canada to Mexico.

Lacking comprehensive wetland monitoring information, the Federal Commissioner of the Environment and Sustainable Development stated in 2003 that “there is not enough information on the current status of wetlands to say whether it is improving or getting worse.” The Commissioner also noted that “no single federal department or lead agency is formally responsible for wetlands.”

Provincial governments, and municipal governments acting as their proxies, retain direct control over land uses affecting wetlands. Constitutionally they have the power to regulate land through zoning and can exercise ultimate control through the powers of eminent domain. Federal responsibility is derived from the shared federal-provincial-territorial authority in environment and agriculture. Federal government programming for wetland conservation falls to Environment Canada through the Habitat Stewardship for Species at Risk, and Agriculture and Agri-Food Canada through components of the Environmental Chapter of the Agricultural Policy Framework. However, wetlands comprise a small element of these initiatives.

In 2003 a Conference on Canadian Wetlands Stewardship was organized by the North American Wetlands Conservation Council. This conference identified several strategies and actions that governments, non-governmental organizations and agencies, and Canadians in general should complete by 2013. The general vision articulated for 2013 is “an increase in the quantity and quality of Canada’s wetlands where the ecological and hydrological functions are maintained or enhanced for the sustainable use of Canadians and Nature.” The strategies and actions to be completed include:

- ▶ Changing the policy framework to increase analysis, developing a “wetland industry” and attaching social and economic values to wetlands, creating incentives to preserve wetlands, increasing accountability for the conservation of wetlands, and developing national standards
- ▶ Developing an integrated landscape and watershed management approach
- ▶ Developing a national wetland inventory through the establishment of a national wetland industry association
- ▶ Implementing governance and support systems to increase the conservation of wetlands
- ▶ Increasing the infrastructure, support systems, and funding to promote wetland conservation
- ▶ Promoting wetland education and communication with the public.

**Key messages:**

**Halfway into the ten-year planning horizon established for the 2003 Canadian Wetlands Stewardship Strategy, little if any progress has been made toward key strategic policy objectives.**

**Despite the current efforts of PHJV partners, at this point, the goals set in 2003 will not be reached by 2013 with adverse consequences for wetlands, which through the preservation of water control, water quality, and waterfowl biodiversity are cornerstones of healthy ecosystems. We depend on ecosystem services for basic amenities like food, water, and a stable climate; wetland loss threatens the economic future and welfare of Canada and the North American continent.**

### 3.0 The 2008 PHJV Science and Policy Forum – Findings

The 2008 PHJV Science and Policy Forum attracted leading Canadian and United States scientists and policy analysts to review progress and challenges around integrating land and water conservation to retain and restore wetlands, with a focus on the agricultural areas of Canada.<sup>1</sup> The two day sessions addressed six themes:

- ▶ Conservation by science and policy
- ▶ Our changing landscape – cause for concern
- ▶ Our changing landscape – agricultural role
- ▶ Valuing wetlands
- ▶ Applying innovative approaches
- ▶ Building wetland policy.

A concluding plenary session developed priority actions by government and organizations involved in wetland management.

The Forum was preceded by a survey of potential participants to collect observations on wetland status and priorities. After the Forum, a follow-up teleconference with experts was held to review the main issues, and the PHJV Board, which structured and guided the two-day session and the production of this report, completed a final review including a focusing exercise. The issues and recommendations described below emerged from all of these presentations, discussions, expert analysis, and observations.

#### 3.1 Conservation by science and policy

The first four presentations set the tone for the Forum. In his welcoming remarks, Bill Gummer (Environment Canada) noted that the Prairie Habitat Joint Venture has had a vital role in supporting the North America Waterfowl Management Plan (NAWMP). The partnership inherent in NAWMP represents a significant initiative that has involved government, industry, non-governmental organizations, and the public in science-based policy formulation and delivery. Important concepts underlying the approach by PHJV must be the need to increase the science base for wetland management, the necessity for a joint and coordinated action among all stakeholders, and the need to communicate the value of wetlands to a wide audience.

Pat Kehoe (Ducks Unlimited Canada) reviewed the 2006 vision developed by the PHJV and the many program initiatives introduced at that time. Most important is the recent development of the Waterfowl Productivity Model that supports the evaluation of various PHJV initiatives on waterfowl populations. This model suggests that the various PHJV initiatives have reached 25% of the main NAWMP goal, namely to restore habitat to support waterfowl populations to their 1970 levels. This is an impressive accomplishment; however, pressures on the land are intensifying, and wetlands continue to be lost. A coordinated and integrated set of policies are essential to the promotion of the habitats that are essential to waterfowl populations.

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<sup>1</sup> Appendix A presents the Forum agenda, presentation abstracts, speaker biographies, and participant list.

Clayton Rubec (Environment Canada) reviewed the status of mitigation policies to conserve wetlands across Canada, with particular focus on the period since the adoption of the federal Policy on Wetland Conservation. While some successes have occurred, he notes that principles of avoidance, mitigation and compensation are inconsistently applied, with no national framework and little assessment of impacts or value.

Finally, Dan Wicklum (Environment Canada) explored the challenges and opportunities emerging from the recent transformations within Environment Canada that have changed organizational structures and priority setting processes. A central message of this presentation was that while the PHJV is well positioned to offer leadership in wetlands and waterfowl management, increased investment is urgently needed in developing “coordinated broad-scale, cost-effective landscape monitoring” to inform conservation policy.

Respondents to the pre-forum survey of invitees strongly endorsed the value of predictive models for understanding the role of wetland loss drivers including biofuels (82% of respondents), climate change (81%), grain markets (80%), livestock markets (75%) and urban sprawl (62%). Strong support exists for the PHJV partners, especially federal and provincial government, to continue the investment in predictive models.

**Key messages:**

**There was a theme throughout these presentations, which also ran over the entire two-day session, that stronger wetland conservation policy (and policy that supports restoration) is overdue and critical for achieving PHJV and NAWMP goals continentally, and for providing significant ecological and health benefits to Canadians.**

**Despite important successes, the science underlying waterfowl and wetland management urgently needs more administrative and financial support, especially to evaluate past programs and extract key scientific conclusions upon which to formulate future policy.**

**With a few exceptions, wetland mitigation principles to avoid, mitigate, and compensate for wetland losses have not been effectively integrated into Canadian policy, which has hampered wetland conservation efforts.**

**The science base for wetland management must be strengthened to support improved and continuous implementation of a more coordinated policy.**

**Policies to mitigate and compensate for wetland losses remain fragmentary and unproven.**

**Predictive models that support the analysis of current trends and policies on wetlands are especially important.**

### 3.2 Our changing landscape – cause for concern

The second set of papers reviewed the recent trends in wetlands and the main drivers of change. Presenters at the conference and experts consulted afterwards all believe that maintaining wetlands is, to use the expression of one participant, “daunting.” They indicated that maintaining wetland functions and the productive capacity of the Canadian Prairie Pothole Region for waterfowl is difficult, “even without the added challenges of climate change.” Experts and conference participants believe that in the short run, commodity price increases driven by accelerating demand for food and biofuels will be a dominant driver of wetland decline, and that in the longer term, climate change poses the most significant issue.

Wetland loss is best described as proceeding at a *slow but continuing rate, emphasized by some dramatic wetland losses in localized areas* of prairie Canada. The change over the last century is striking; as Rhonda McDougall (MB Watershed Stewardship) explained, in 1885, some 12% of the southern Manitoba land area could be classified as wetlands; in 1992, this had dwindled to less than .1%. More recently, from 1985 to 2001, PHJV habitat monitoring transects recorded (after estimates of up to 70% historical loss of wetlands in the settled areas of prairie Canada) an average of -5.25% gross wetland area losses. Loss of wetland habitat is mainly a result of increased agricultural activity and practices such as cultivation, burning, and wetland drainage. The increasing size of farms and the drive for efficiency necessitates both larger equipment and the elimination of “nuisances” such as native grass, small ponds, and marshes.

Mike Watmough (Environment Canada) explained that Environment Canada has been monitoring wetlands since 1985 and confirms that losses continue. The lack of a generally accepted wetland definition makes consistent measurement and monitoring difficult. However, it is generally recognized that “what gets measured, gets managed” and consistent monitoring remains a high priority for the PHJV partners and government as a foundation for effective decision making and practical policy implementations. Respondents to the pre-Forum survey strongly endorsed wetland monitoring (96% of respondents), and most believe it is the role of the government both to execute and fund this activity. Further, most (60%) stated that the responsibility falls to the federal government.

Mike Anderson (Institute for Wetland and Waterfowl Research) focused on how climate change is expected to influence wetlands. He notes that, the scientific community has accepted the reality of climate change, and this will add to the challenges of maintaining wetlands. Specifically, increases in temperature and greater variation in rainfall will have adverse effects on shallow wetlands. Anderson characterized this shift as a watershed change in the productive capability of prairie landscapes comparable to the settlement of the prairies in the early 20<sup>th</sup> century.

Finally, Jeff Nelson (Ducks Unlimited Canada) reviewed increased demand for biofuels as a factor in wetland losses and degradation (in the United States and Canada). In general, United States government policy to promote biofuels, especially corn-based ethanol, has contributed to increases in farm commodity prices, further encouraging the expansion of agriculture, with consequent increased threats to wetlands. However, certain crops, such as winter wheat and switchgrass may offer important potential benefits to waterfowl by providing cover during

nesting periods. The recent run up in food prices has encouraged some farmers in the United States to exit the Conservation Reserve Program, and this withdrawal of acreage has resulted in a significant decrease in perennial cover and wetlands on the Northern Plains. In Canada, as in the United States, by increasing the global price of corn and substitute grains, biofuels policy may increase economic pressure to convert grassland and wetlands to annual crop production. At the same time, using certain crops for biofuels, such as switchgrass and winter wheat, may benefit habitat and waterfowl if they displace spring-seeded crops. He stressed the need for incentives to encourage the biofuels industry to use crops such as switchgrass that offer multifunctional benefits (i.e., provides cellulose for biofuel feedstock while preserving wildlife habitat).

Presenters and experts identified a continued need to monitor habitat change in the PHJV region. The pre-Forum survey shows that most of the 93 respondents (89%) believe that PHJV should continue to invest in predictive models of habitat change. Some (42%) also reported that they believe there is a lack of capacity to research the basic functions of wetlands.

Loss and degradation of prairie wetlands continues at a time when National and Provincial Water Strategies are developing and being implemented to address issues of providing safe and reliable water supplies and healthy aquatic ecosystems as well as responding to regional droughts and flooding. Conservation programs, particularly the NAWMP, are part of a solution for implementing prairie water strategies.

Many respondents to the pre-forum survey believe that the “average Canadian” is not very knowledgeable about wetlands; more are seen as understanding issues related to biodiversity (35% of respondents believe this is the case) rather than concepts such as the role of wetlands in carbon sequestration (no respondents believe that any Canadian has knowledge of this role) and water control/quality.

**Key messages:**

**Wetland losses continue, despite the efforts of government and NGOs to reverse this trend. A “no net loss” policy must be adopted without delay.**

**Current policies remain insufficient, especially in the face of key drivers in wetland loss coming from agricultural prices, infrastructure development, biofuel subsidization, and urban expansion.**

**The costs of wetland loss are not recognized among the public and policy makers, which diminishes the priority placed on the development of conservation policy.**

**Monitoring wetland and habitat degradation remains a high priority and is a prerequisite for more effective decision making and policy; the federal and provincial governments need to fund and coordinate an expanded monitoring program as part of their natural resource management mandate.**

**Resource policies need to be more targeted and better coordinated to avoid collateral environmental damage and capitalize on potential synergies (e.g., encouraging production of biofuels from feedstocks that result in joint wildlife and environment benefits).**

### 3.3 Our changing landscape – agricultural role

The effect of agriculture on wetlands was a recurring theme throughout the Forum. Governments and NGOs have attempted to implement farm level policies to encourage the retention and restoration of wetlands. The pre-Forum survey revealed that almost all respondents believe that land managers have a responsibility to conserve wetlands as part of their function as land stewards; however, half recognized that this expectation was realistic only if the costs were negligible. Other studies such as the Environment Chapter evaluation recently conducted for Agriculture and Agri-Food Canada revealed that farmers' decisions to adopt environmental practices are largely based on costs and whether the practice has an economic benefit in addition to an environmental benefit. While the loss and degradation of wetlands in prairie Canada is primarily attributed to agricultural practices, the opportunity to retain and restore wetlands is expected to be greatest through collaboration with individual producers.

Dean Smith (Agriculture and Agri-Food Canada) reviewed APF Environment Chapter programs that support “environmentally responsible agricultural production.” The three programs showcased include the National Environmental Farm Planning Initiative, the National Farm Stewardship Program (NFSP), and Greencover Canada, which offer technical and financial assistance to farmers to implement beneficial management practices (BMPs) that support responsible agri-environmental farm practices. An environmental farm plan (EFP) is a prerequisite for BMP cost-share assistance under the NFSP and involves a confidential assessment of on-farm environmental risks. EFPs have had a high acceptance in Canada, especially Ontario. Some 30% of farm acreage is now covered by an EFP, and adoption of BMPs to address identified agri-environmental risks is ongoing. The net impact of EFPs and BMPs on wetlands and waterfowl remains very difficult to assess. In part this is because EFPs are confidential, which limits baseline assessment and tracking.

The Conservation Reserve Program (CRP) in the United States involves a significant financial commitment by the United States government to retain wetlands and wildlife habitat. Jim Jost (United States Department of Agriculture) reported that North Dakota alone has lost 400,000 acres of CRP as agricultural price increases have outpaced the payments made under the CRP. This represents 11 percent of the total enrollment. South Dakota has lost 270,000 acres. This represents 17 percent of the CRP acreage in the State. He notes, however, that substantial acreage remains in CRP. At the same time, banks and agribusiness groups are supporting farmers' early withdrawal from the CRP and arguing that the penalties for such withdrawal be waived.

Lyndon Carlson (Farm Credit Canada) offered an optimistic view of agriculture's future in Canada. Certainly the trend towards fewer and larger farms will continue, but the new farmer will be educated, technically aware, and will have a greater understanding of environmental stewardship. This suggests that a critical “ingredient” to supporting wetlands, namely willing farmers, will be available to support BMPs on the land. It is possible that these younger farmers may have longer-term perspectives on the benefits of environmental protection.

**Key messages:**

**Wetlands are threatened by agricultural commodity price increases to the extent that previous conservation gains may be eroded as farmers push remaining marginal land and wetland into annual crop production.**

**Canadian agri-environmental programs focus broadly on increasing producer awareness and action to address agri-environmental risks; the effect of these programs on wetlands is unclear.**

### 3.4 Valuing wetlands

Sound land stewardship creates a range of market and non-market benefits such as sustainable agriculture, fresh water, flood control, biodiversity, and aesthetic/recreational benefits termed “ecological goods and services.” Most (97%) of the pre-Forum survey respondents believed that policy makers/regulators require more information on the economic value of wetlands, and 94% of respondents said that the societal value of wetlands has not been sufficiently quantified. The survey asked respondents how important it is to economically quantify four wetland functions; over 90% think it is important to quantify regulation and absorption functions and ecosystem health functions, 81% think it is important to quantify social/cultural functions, and 71% believe it is important to quantify production functions. Wetlands provide many non-market benefits to farmers and society; continued work to estimate the economic value of these benefits is needed to support and rationalize conservation policy.

Although many sustainable agricultural practices benefit producers’ bottom lines and provide public environmental benefits, farmers and ranchers may incur net opportunity and efficiency costs to retain and restore wetlands. The failure of the marketplace to reward private agricultural producers for the provision of public wetland benefits is thought to be a central reason for wetland decline and requires corrective intervention by government. Ken Belcher (University of Saskatchewan) described regulatory, economic (conservation payments, taxes, markets/tradable rights/easements), and extension/advisory instruments and the circumstances in which they may best apply.

Vic Adamowicz (University of Alberta) argued that the economic value of wetlands is one of the most studied non-market goods and services. However, the research produces highly variable estimates with few reliable values available for Canada. Location, land use alternatives/density, income of area residents, and the method of valuation all produce varying estimates. An important finding is that value estimates in one location may not be accurate in another, meaning that comprehensive valuation of wetlands in Canada requires original studies in many locations. The trade-off between private net benefits and public net benefits arising from land uses drives policy. Taxes and fines may be appropriate in one instance where the land owner profits at the expense of public benefits, by dumping toxic waste for example. However, if the land owner suffers a loss, such as withholding land from production, from which society benefits, compensation is indicated.

Shane Gabor (Ducks Unlimited Canada) defined *natural capital* as the stock of natural services, environment, and ecosystem resources, and he defined *ecological goods and services* (EG&S) as the economic and social benefits that flow from this stock. The goods that flow from wetlands include carbon sequestration, water supply, water (flood) control, recreation, biodiversity, and nutrient retention and others. He offers several examples of the value of goods that wetlands can offer, such as the \$100 million in construction costs for levees in the Charles River Basin (Massachusetts) that were avoided by a \$10 million investment in wetlands damages.

John Pomeroy (University of Saskatchewan) showed the challenges in developing reliable water flow (hydrology) estimates for even a small area. Using the Smith Creek Basin in Eastern Saskatchewan as a study site, he is developing a prairie hydrology model. This predictive model will provide forecasts of water flows with consideration of the effects of wetland drainage and restoration as well as changes in the surrounding land use. This is particularly important to estimating the downstream cumulative impacts from changes in water flows. The conclusion is that wetlands can make a significant contribution to water flow. But this is a small scale example that, while interesting, needs to be replicated in other areas, and at larger scales, to become persuasive.

**Key messages:**

**Wetlands deliver important ecological goods and services to society. Increased research will further reinforce their value and support policy instruments and incentives to encourage landowners' wetland stewardship.**

**Case studies are suggestive in portraying the benefits of wetland conservation and describing the EG&S wetlands provide.**

### 3.5 Applying innovative approaches

The Forum reviewed three methods for addressing wetland conservation — regulation, market-based solutions, and an appeal to landowners' long-term interest in sustainability. The pre-Forum survey respondents all endorsed the use of various market-based instruments as devices to encourage wetland reservation and restoration.

- ▶ **Regulatory measures** applied to prairie wetlands amount to forms of zoning that limit the landowners' use of the land, place caps on water and air emissions, etc. This is hard to impose after the fact (i.e., after the sale of land) and without compensation. Post-Forum experts believe these have a role, but not a major one. One challenge is that these matters would involve coordination with provinces and municipal/county authorities.

The extreme expression of regulation is appropriation of land under provisions of eminent domain. Designation of wetlands for public purposes, in the same way that parks and wilderness are reserved, is an option, but this would require considerably stronger scientific justification to withstand court challenges to the public taking of private land.

- ▶ **Economic instruments.** Three economic instruments were discussed: conservation payments such as the compensation under the Conservation Reserve Program in the United States<sup>2</sup>; taxes, or more accurately property tax reductions on wetlands to encourage their retention; and markets/tradable rights/easements, which were of considerable interest at the Forum, and involve setting a price for the EG&S produced by wetlands.

Many presenters (and the PHJV website) spoke of market-based approaches and program payments for EG&S, but a number of technical challenges exist. The government and some NGOs are viable buyers of EG&S; however, according to one presenter (Ian Campbell, AAFC), governments are uncertain about the public value derived from such direct payments, the potential for overpayment, the potential for them to be perceived as camouflaged income support by other sectors and trading partners, and the possibility that inequities may be created with other sectors that could also deliver EG&S. He reported on research funded by AAFC that is testing innovative approaches to EG&S, using cost-benefit analysis, which will provide important information for the setting of agri-environmental policy. The line between rewarding good land stewards for providing public benefits and paying landowners not to pollute is debatable. Many (including farmers) believe that land users have an intrinsic responsibility to be stewards and question whether they should be paid to undertake that role.

Dennis O’Grady (South Nation Conservation Authority, Ontario) reviewed the phosphorous credit trading program where wastewater dischargers buy “P credits” from farmers who use the proceeds to invest in water improvement projects to reduce phosphorous loading.

Peter Boxall (University of Alberta) discussed “reverse auctions” as a market-based mechanism that uses competition, price discovery, and trade to deliver environmental outcomes in a fair and cost-effective manner. He summarized the results of a study to develop and test various reverse auction frameworks to generate water quality improvements through the adoption of specific Beneficial Management Practices (BMPs) among producers in the South Tobacco Creek watershed, Manitoba.

- ▶ **Extension and advisory measures** attempt to encourage farmers to adopt a range of BMPs to reduce the impact of farm operations on soil, water, and air quality. This involves research and development to identify changes in practices, technical assistance to communicate how to implement changes in farm practices, and financial assistance to encourage producers to make the investments to change practice. Currently, the federal and provincial governments have identified 30 approved BMP categories, many of which affect water quality and wetlands.

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One presenter noted that the new farm bill includes provisions for funding a new round of payments to farmers.

**Key messages:**

**Market- and incentive-based approaches are being developed in Canada but significant investment is needed to quantify the link between stewardship practices and environmental outcomes and develop broadly applicable strategies.**

**Increased communication and education of the public is essential to increase the awareness of the non-market benefits of wetland conservation.**

**New market-based approaches show promise, but require more focused research and funding to develop.**

### 3.6 Building wetland policy

Pre-Forum survey respondents viewed Alberta, New Brunswick, Nova Scotia, and Prince Edward Island as having the most effective wetland policies. Other provinces were viewed as lagging behind. The respondents also believe that regulation is needed as a backstop for incentive-based programs.

The final set of papers reviewed the development of wetland policy in Manitoba, Saskatchewan, Alberta, and Nova Scotia. Petra Rowell (Alberta Environment) reviewed the “holistic” approach in Alberta, which is a multi-stakeholder approach from across the Government of Alberta. She offered an optimistic assessment of the success at creating a new strategy for a new wetland policy in light of the contribution from across government. The policy rests on the Alberta Water Council, which develops overall policy, and 11 watershed councils that complete local planning and performance measurement. A new wetland policy will address avoidance of wetland loss and restoration of wetlands previously lost. Key elements of this new policy will be a commitment to better science, better restoration and conservation techniques, prediction models to guide planning, economic tools to reward wetland reservation, and collaboration among all interests.

In Saskatchewan, Dale Hjertaas (Saskatchewan Watershed Authority) described the progress of wetland policy based on effectiveness, “doability,” and acceptability. Policies must restore/retain wetlands in the long run and use practical methods that are acceptable to all interests. Consultation is proceeding within government and among other government stakeholders as a prelude to policy development.

Rhonda McDougal (Manitoba Water Stewardship) described the development of wetland policies in Manitoba beginning in 1985 with the Manitoba Habitat Heritage Act, and continuing more recently with the Manitoba Water Strategy (2003) and the Water Protection Act (2006). She noted that Manitoba has the largest wetland area of any province, and that, although the policy support for water and habitat conservation continues to be deepened, Manitoba continues to lose wetlands. More than 57% of wetlands have been lost and a large area is threatened.

Randy Milton (Nova Scotia Department of Natural Resources) spoke of the provincial and federal “gradual awareness” of the importance of wetland policy, noting that this often means an appeal to the public and politicians to recognize the importance of wetlands. He showed the

commonality of policies in Nova Scotia, New Brunswick, and Prince Edward Island and appealed for an increase in the science behind the policy and increased monitoring.

Lyle Saigeon (Nature Conservancy of Canada) noted the progress that has been made by the three prairie provinces and Canada in the last decade. These initiatives have included major policy statements and legislation, the adoption of integrated watershed planning, and recognition of the importance of aquatic habitats to healthy ecosystems. At the same time, government has not created the policy process that will ensure no net loss of wetlands going forward. Some legislation is ineffective, and the current grain prices will intensify the conversion of wetlands to agricultural use. No overall planning has occurred to deal with the drivers of wetland loss, and government and the public remain unconvinced or unaware of the benefits of wetlands. An understanding, by governments and the public, of the innovative methods to preserve wetlands remains weak.

Finally Patricia Farnese (University of Saskatchewan) identified key legal issues in wetland policy. She noted that when no commonly accepted wetland definition exists, the courts can determine what constitutes a wetland. A review of wetland definitions across Canada reveals significant variation and inconsistencies that lawyers will exploit. For example a landowner can appeal orders to avoid affecting a wetland if it can be shown that the property does not conform to a definition. In addition to definitions, an inventory of wetlands is very useful in helping regulators and the courts decide on the proper classification of any land in question. The courts have little experience in this area and rely on science and expertise to assist the legal process. The critical idea is that without clear definitions of wetlands, it will be very hard to create the legislative and policy framework for any wetland policy.

**Key messages:**

**Despite increasing the policy basis for wetland and habitat conservation, the prairie provinces continue to lose wetlands.**

**Forum participants see the current policy and legislative framework as inadequate to reach a no loss status, let alone reverse current trends.**

**The ambiguity in the definition of a wetland and the lack of a national inventory of wetlands are important weaknesses in the foundation of a wetland policy.**

#### 4.0 Actions and recommendations

The concluding session used small groups and a plenary session to develop policies and recommendations. A total of 58 Forum attendees participated in the plenary session, which divided participants into seven groups, with each group receiving one question/issue to discuss and then present their findings to the rest of the Forum attendees. Following the presentations, participants voted on the importance and urgency for PHJV to address each question/issue. Participants received five votes for the importance of an issue (they could agree or disagree that an issue was important) and one vote for urgency. The participants ranked priority areas, as shown in Table 1.

<b>Table 1: Plenary session voting outcome</b>			
<b>Issue</b>	<b>Urgent</b>	<b>Agree</b>	<b>Disagree</b>
1. The Forum believes that we cannot achieve our goals given the current rate of wetland loss.	19	43	0
2. The Forum believes that in situations where policy interventions are necessary to protect wetlands, a combination of incentives and regulations should be the preferred approach to achieving our goals.	13	43	1
3. The Forum believes there is a need for stronger national leadership in Wetland Policy.	11	44	0
4. The Forum believes that there is currently insufficient data and investment in wetland inventory and monitoring and that this is necessary to facilitate the evaluation of effectiveness of wetland policies and other conservation efforts.	10	54	0
5. Communication of the importance of wetlands and the roles they play should be a priority.	5	35	1

The responses come from participants who remained for the afternoon. It also excludes neutral votes.

This voting pattern accurately reflects the concerns raised at the Forum, the most important of which is that despite increased policy focus, wetlands continue to be lost. Further, the science is more strongly indicating that this loss will have serious consequences for water quality and control, which expands the interest in waterfowl and wildlife to include urban populations and others interested in long-term water supply. Although wetland inventory and monitoring was not ranked as one of the most urgent concerns, it was seen as one the most important and is needed to address the issue of wetland loss. A post-Forum teleconference with three experts and ongoing discussions with three PHJV representatives also assisted in refining key actions needed by government, NGOs, and other stakeholders.

Bringing the findings of the two-day Forum forward, it is clear that the key points and recommendations for government and the public are as follows:

#### 4.1 Key findings

1. The science linking conservation of wetlands to waterfowl populations is strong, but less is known about the link between wetlands and water quality and supply as well as maintenance of other EG&S. Scientists and experts agree that the evidence to date indicates that this relationship is strong, but more research is needed to support public education and motivate policy makers.
2. Despite a growing policy and legislative framework across the PHJV, wetland losses continue; over the last several decades, many wetlands have disappeared due to agricultural and infrastructure developments.
3. An inventory of wetlands, supported by some current studies, remains a crucial missing resource necessary to allow scientists to measure progress in conservation. An inventory presupposes a viable and consistent definition of wetlands; in turn a developed inventory increases understanding of wetlands since their location and attributes would be documented.
4. The “no net loss” goals of two decades ago have not found universal acceptance and, not surprisingly, have not been met, suggesting that, in addition, restoration of wetlands is important to regain lost ground.
5. Wetland losses and the link between wetlands and water quality will become an ever more important issue as North America runs out of cheap clean water. Maintaining supplies of clean water will become an important health issue as well as an economic issue.
6. Canada does not have consistent definitions of wetlands. This complicates policy and creates legal ambiguity. A landowner wishing to appeal a regulation that limits the use of the wetland can find loopholes unless the definition is precise. Further, since court decisions in one jurisdiction act as precedents for decisions in other jurisdictions, a consistent usage across Canada (and even across North America) is needed.
7. In addition to a clear definition of wetlands to support regulation, government must work with NGOs, industry and private land owners to develop and, to the extent needed, to provide support for market-based approaches and incentives. This requires more research to establish the value of wetlands and to develop market institutions that better communicate public demand and willingness to pay for wetland services to prairie land stewards.
8. The Canadian Federal Policy on Wetland Conservation (1991) is an important policy, but this applies only to federal lands. Much of the conservation has been in parks, when in fact the growing threat is on private lands where two-thirds of Canada’s wetlands exist. Provinces are developing their own policies and approaches, but, as in the case of definitions, a consistent policy across all jurisdictions is essential.

9. Wetlands not only provide critical habitat for waterfowl and other wildlife, but also can be viewed as a form of natural capital that produce a flow of EG&S in the form of water quality that supports the health and incomes of current and future generations as well as recreational activity, water control, and a range of other benefits. These services confer benefits – now and in the future – on other people besides the immediate owners, who may seek to maximize personal income by converting the wetland to agricultural, residential, or industrial uses.
10. Most experts believe that a two-pronged policy is needed to conserve wetlands. Market-based approaches and program incentives are needed to recognize and reward landowners who retain wetlands. Concurrently, regulations and policy are also essential to institutionalize environmental markets, establish no net loss expectations and provide a regulatory backstop to protect both public and private wetlands.
11. Federal leadership is needed to coordinate and fund a broad initiative of science, education, and policy development. Provincial and municipal governments have important responsibilities in this initiative since they directly control land use.

## 4.2 Recommendations

The Forum proposed the following recommendations:

- ▶ The Government of Canada must assume a much stronger leadership role in developing a wetland conservation policy that moves beyond no net loss to recovery.
- ▶ Provincial governments must coordinate their policies to ensure consistency of treatment and programming and to ensure that there is a clear legal framework for wetlands.
- ▶ Government should consider creating and funding a national secretariat to coordinate and advance a “wetlands science and policy agenda.” Such a secretariat would:
  - accelerate the development and evaluation of market-based compensation schemes, increase the understanding of the water and ecosystem benefits arising from wetland preservation, and support cross-jurisdictional development of wetland policy
  - develop and maintain a comprehensive national wetland inventory
  - develop a consistent definition of wetlands and act as a source of expertise on wetland function and conservation
  - communicate the benefits of wetlands to resource agencies and the public.

## **Appendix A**

Forum Agenda, Presentation Abstracts, Speaker Biographies, and Participant List

## Agenda



## PHJV Science & Policy Forum 2008 Agenda

### Monday, April 7

7:00pm      Evening registration and Reception

### Tuesday, April 8

Time/Moderator	Topic	Speaker
7:00am	<i>Continental Breakfast</i>	
<b>Bob MacFarlane</b> <i>Theme Leader</i>	<b>Theme: Conservation by Science and Policy</b>	<i>(PHJV Policy &amp; Communications Coordinator)</i>
8:00am	Welcome and Message from the Saskatchewan Ministry of Environment	David Phillips (Saskatchewan Environment)
8:10am	Context and PHJV Welcome NAWMP/PHJV, Successes and Challenges	Bill Gummer (PHJV Chair, Environment Canada)
8:35am	PHJV Strategic Plan & Provincial Implementation Plans 2008-2012	Pat Kehoe (PHJV Waterfowl Working Group Chair, Ducks Unlimited Canada)
9:00am	Is Wetland Mitigation and Compensation Getting Anywhere in Canada?	Clayton Rubec (Environment Canada)
9:30am	Guiding Policy with Science – New Opportunities for NAWMP and PHJV to work in Prairie Canada	Dan Wicklum (Environment Canada)
10:00am	<i>Break</i>	
<b>Jim Devries</b> <i>Theme Leader</i>	<b>Theme: Our Changing Landscape – Cause for Concern</b>	<i>(PHJV Waterfowl Working Group, Policy Committee, Ducks Unlimited Canada)</i>
10:30am	Magnitude of Wetland Loss in Prairie Canada	Mike Watmough (Environment Canada)
11:00am	Drivers of Change – Climate	Mike Anderson (Institute for Wetland and Waterfowl Research)
11:30am	Drivers of Change – Biofuels	Jeff Nelson (Ducks Unlimited Canada)
12:00	<i>Buffet Lunch</i>	
<b>Cynthia Edwards</b> <i>Theme Leader</i>	<b>Theme: Our Changing Landscape- Agricultural Role</b>	<i>(PHJV Policy Committee, Ducks Unlimited Canada)</i>
1:00pm	Canadian Agri-Environmental Initiatives & Impacts on Wetlands	Dean Smith (Agriculture & Agri-Food Canada)
1:30pm	U.S. Experience, Conservation Reserve Program & Wetlands	Jim Jost, (USDA Farm Service Agency)
2:00pm	Future Agricultural Drivers: Who's Going to Take Over the Farm?	Lyndon Carlson (Farm Credit Canada)
2:30pm	Panel Discussion & Questions	
3:00pm	<i>Break</i>	



David Howerter Theme Leader	<b>Theme: Valuing Wetlands</b>	<i>(PHJV Waterfowl Working Group, Institute for Wetlands and Waterfowl Research)</i>
3:30pm	Wetland Values	W.L. (Vic) Adamowicz (University of Alberta)
4:00pm	Wetland Conservation and Restoration to Maintain the Ecological Integrity of Watersheds	Shane Gabor (Institute for Wetlands and Waterfowl Research)
4:30pm	Prairie Hydrology Model & Applications for Assessing Drainage, Restoration & Land Use Change	John Pomeroy (University of Saskatchewan)
5:00pm	Day 1 Adjourn	

### Evening Banquet

Master of Ceremonies: Bob Carles, PHJV Board, Saskatchewan Watershed Authority

- 6:00pm Cash Bar
- 6:30 – 7:30pm Supper
- 7:30 – 8:30pm Special Presentation: Dr. David W. Schindler, Killam Memorial Professor of Ecology, University of Alberta to speak on Climate Change and Water in Prairie Canada
- 9:00pm Wrap –up



<b>Time</b>	<b>Topic</b>	<b>Potential Speaker</b>
7:00am	<i>Continental Breakfast</i>	
<b>Peter Joyce</b> <b>Theme Leader</b>	<b>Theme: Applying Innovative Approaches</b>	(PHJV Policy Committee, Agriculture & Agri-Food Canada)
8:00am	A Policy Tool Box for Wetland Conservation and Restoration	Ken Belcher (University of Saskatchewan)
8:30am	Integrating EG&S Concepts into Agri-Environmental Policy – Lessons from Current Research and Pilot Projects	Ian Campbell (Agriculture & Agri-Food Canada)
9:00am	Testing Reverse Auctions to Increase Producer Adoption of Water Quality BMPs	Peter Boxall (University of Alberta)
9:30am	Water Quality Trading in the South Nation Watershed of Ontario	Dennis O’Grady (South Nation Conservation Authority, Ontario)
10:00am	<i>Break</i>	
<b>Michael Barr</b> <b>Theme Leader</b>	<b>Theme: Building Wetland Policy</b>	<i>(Ducks Unlimited Canada)</i>
10:30am	Challenges & Success in Wetland Policy Development in Alberta	Petra Rowell (Alberta Environment)
10:50am	Wetland Conservation Policy for Southern Saskatchewan	Dale Hjertaas (PHJV Policy Committee, SWA)
11:10am	Wetland Policy Development in Manitoba	Rhonda McDougal (Manitoba Water Stewardship)
11:30am	Wetland Policy – Is it Worth the Paper?	Randy Milton (Nova Scotia Department of Natural Resources)
11:50am	Desired Direction for Policy Change: A PHJV Perspective	Lyle Saigeon (PHJV Board, Nature Conservancy of Canada)
12:10pm	Future Directions for Wetland Policy in Canada	Patricia Farnese (University of Saskatchewan)
12:30pm	<i>Buffet Lunch</i>	
<b>Pat Kehoe</b> <b>Theme Leader</b>	<b>Theme: Actions &amp; Recommendations</b>	<i>Facilitated by Paul Thoroughgood</i>
1:30pm	Recommendations	
2:30pm	Performance Measures	
3:30pm	<i>End of Forum</i>	

## Presentation Abstracts

# PHJV Science & Policy Forum 2008

## Presentation Abstracts

Tuesday, April 8, 8:00am to 10:00am

Theme: Conservation by Science and Policy

Theme Leader: Bob MacFarlane, PHJV Policy & Communications Coordinator

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**Title:** Context and PHJV Welcome, NAWMP/PHJV, Successes and Challenges

**Speaker:** Bill Gummer, PHJV Chair, Environment Canada

**Abstract:** Since the inception of the North American Waterfowl Management Plan in 1986, non-government organizations, state, provincial and federal governments, industry, and the public, have partnered in one of the world's largest and most successful conservation programs. This presentation focuses on the evolution of the Prairie Habitat Joint Venture, its successes, and the key challenges that remain. It stresses the importance of knowing the biological foundation (of all birds) and integrating the results from monitoring and research programs into decision-making and the development of its provincial implementation plans. Wetland drainage continues across the prairies as does the loss of associated upland habitat. It is clear that leadership from both national and regional governments is urgently required in order to reduce the rate of habitat loss in the prairies, and to restore habitats, particularly given the increasing economic pressures and climate change. The purpose of the Science and Policy Forum will be reviewed.

**Title:** PHJV Strategic Plan & Provincial Implementation Plans 2008-2012

**Speaker:** Pat Kehoe, PHJV Waterfowl Working Group Chair, Ducks Unlimited Canada

**Abstract:** In 2006, the PHJV partnership renewed a conservation vision and goals and set a strategic direction for all bird conservation in Prairie and Boreal Canada. At the same time analyses were being completed on data collected during the 11 year PHJV assessment study. This study had followed the success of some 2500 radio marked mallards breeding in various habitats across the prairies and parklands. Many programmatic changes resulted from information collected during the assessment study. However one of the most important developments resulting from the study was the Waterfowl Productivity Model (WPM). This spatially explicit model allows us to examine how landscape changes have impacted the productive capacity of the Canadian prairie. The WPM also allows us to evaluate the impact PHJV conservation programs have had on duck production. Based upon these analyses the PHJV is currently about 25% of the way to attaining the NAWMP goal of creating landscape condition capable of sustaining waterfowl production at 1970's levels. The WPM has also been employed by provincial implementation teams to develop habitat objectives to support the NAWMP goal over the next 25 years. Implementation plans are now in place for 2008-2012. Plans include a mix of well targeted direct program, agricultural extension and policy reform. Strong wetlands protection policy, policies that retain perennial cover and incentive based programs that promote the retention and restoration of critical habitats are essential to the continued success of the PHJV.

**Title:** Is Wetland Mitigation and Compensation Getting Anywhere in Canada?

**Speaker:** Clayton Rubec, Environment Canada

**Abstract:** This presentation will provide an overview of the state of wetland mitigation and compensation policy and legislative initiatives in place in Canada's various jurisdictions. It will also take a more detailed look at Environment Canada's regional experience in interpreting the mitigation sequence since the Government's adoption of the Federal Policy on Wetland Conservation in 1991. Observations on next steps will be discussed.

**Title:** Guiding Policy with Science – New Opportunities for NAWMP and PHJV to Work in Prairie Canada

**Speaker:** Dan Wicklum, Environment Canada

**Abstract:** Environment Canada (EC) has undergone major transformations during the past 5 years, with changes to organizational and priority-setting structures. While this has created challenges, both internally and with partners, opportunities exist to evaluate and strengthen policies and programs while delivering operational programs to address conservation priorities in Prairie Canada. Recent and ongoing evaluations of NAWMP and EC programs and priorities lay the foundation for developing coordinated broad-scale, cost-effective landscape monitoring; PHJV is well-positioned to provide leadership for this initiative. This information is urgently needed by decision-makers to react in a timely manner, to deliver better-designed and focused conservation programs and policies for all wildlife in PHJV, and contribute to improvements in North American duck harvest management.



**Tuesday, April 8, 10:30am to Noon**  
**Theme: Our Changing Landscape – Cause for Concern**  
**Theme Leader: Jim Devries, PHJV Waterfowl Working Group,**  
**Ducks Unlimited Canada**

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**Title:** **Magnitude of Wetland Loss in Prairie Canada**

**Speaker:** **Mike Watmough, Environment Canada**

**Abstract:** Wetlands in Canada continue to be at threat from degradation and loss. Expansion and development in the areas of agriculture, urbanization, transportation networks, resource extraction, recreational properties, forestry, etc. continue to result in losses to the wetland resource base in Canada. In many areas of Canada this continued loss of wetland area has resulted in significant alterations to entire ecoregions, thus compromising the overall ecosystem function for these landscapes. One such landscape that is the current focus of extensive wetland status and trends monitoring is the Prairie province region of Canada.

The magnitude of wetland loss on the prairies over time can only be surmised through piecing together various studies. Most of the reported historical loss rates originate from independent and unrelated studies with varying definitions, scales, geographic locations and methods. Canada does not have a national wetland inventory or a national wetland status and trends monitoring program. The status and trends of wetlands in Canada has been estimated, over time, in several independent studies, most of which provide information at local scales and occasionally regional scales.

Environment Canada's Canadian Wildlife Service (CWS) is working to develop new and innovative ways to quantify and report on wetland status and trends in the prairie region of Canada. Since 1985, the CWS has implemented a wetland habitat monitoring program which periodically samples the Prairie ecozone of Canada to determine wetland status and trends. Data from this monitoring program is helping to direct the wetland conservation efforts of the CWS and its conservation partners. Recent results from the habitat monitoring program indicate that between the years 1985 and circa 2001, wetland loss in the Prairie Habitat Joint Venture (PHJV) delivery area was still occurring.

This presentation reviews the methods and results of the PHJV habitat monitoring program as well as summarizes historical studies of wetland loss in the prairies. The objective of this presentation is to communicate the findings of current wetland status and trends work being done by the Canadian Wildlife Service.

**Title:** **Drivers of Change - Climate**

**Speaker:** **Mike Anderson, Institute for Wetland and Waterfowl Research**

**Abstract:** Climate change is expected to alter wetland habitats of waterfowl across the continent and in numerous ways. While exact outcomes are impossible to predict, climate change is sure to place yet another stress on landscapes important to waterfowl and challenge the Prairie Habitat Joint Venture's (PHJV) goal of retaining the current abundance of prairie wetlands. The scientific community now overwhelmingly accepts that human-induced climate change is significant and most people believe that aggressive action is warranted to reduce and mitigate greenhouse gas (GHG) emissions and avoid more costly consequences in the future. Wetland conservationists; however, are just beginning to think about adaptation strategies to changing climate, including actions such as targeting long-term investments to parts of the prairies that might be more resilient to climate change, anticipating and preparing for strong inter-annual variability, securing access to water for large managed wetlands, and working to reduce land conversion in areas primed for agricultural expansion (e.g., boreal transition zone). PHJV conservation actions (e.g., protection or restoration of wetlands and perennial vegetation) can also contribute to GHG loss prevention and mitigation. The focus of current PHJV policy efforts on quantifying and promoting the ecological services provided by waterfowl habitats and waterfowl-friendly agricultural practices seems appropriate. Going forward we should encourage land managers to adapt conservation programs and agricultural production practices to changing climate. We should continue to educate policy makers and the public about the potential impacts of climate change on wetlands and waterfowl and the role that wetlands and associated habitats could play in carbon sequestration. We also should pursue additional research to determine how water permanence and soil chemistry influence the capacity of wetlands to capture and store GHGs. Finally we should develop better long-term monitoring programs and more fine-grained predictive models to help reduce uncertainty about the impacts of climate change on wetlands and waterfowl populations.

**Title:** Drivers of Change - Biofuels  
**Speaker:** Jeff Nelson, Ducks Unlimited Canada

**Abstract:** The issue of biofuels is getting a great deal of attention in both Canada and the US as a driver of high commodity prices, an environmental issue, and a means to address energy security. To the casual observer the biofuel debate is, at best, confusing. It is easy to find an argument in the media, scientific community, or among environmentalists regarding the merits of the expanding biofuel industry. The key items of contention surround the net gain or loss of energy and greenhouse gasses (GHG) from the production of biofuels. From a waterfowl perspective, organizations like ours are primarily interested in the potential impacts an expanding biofuel industry could have on habitat. Whether or not biofuels is good, bad, or indifferent for waterfowl depends upon the feedstock used to produce it. This presentation highlights some of the differences between Canada and the US and identifies areas of concern and potential opportunities from a waterfowl perspective. It briefly touches on other issues to consider when contemplating biofuel expansion and concludes by providing some thoughts on what we can do to minimize negative impacts and take advantage of opportunities.

**Tuesday, April 8, 1:00pm to 3:00pm**  
**Theme: Our Changing Landscape – Agricultural Role**  
**Theme Leader: Cynthia Edwards, PHJV Policy Committee,**  
**Ducks Unlimited Canada**

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**Title:** Canadian Agri-Environmental Initiatives & Impacts on Wetlands  
**Speaker:** Dean Smith, PHJV Policy Committee Chair, Agriculture and Agri-Food Canada

**Abstract:** The Government of Canada and provincial and territorial governments agreed to the Agricultural Policy Framework (APF) to advance Canadian agriculture as a world leader in environmentally responsible agricultural production. The APF included a comprehensive plan for environmental action to achieve measurable and meaningful goals for soil, water, air, and biodiversity. The National Environmental Farm Planning (EFP) Initiative, the National Farm Stewardship Program (NFSP), and Greencover Canada provided technical and financial support to encourage producers to develop environmental farm plans and implement beneficial management practices. The initiatives helped the agriculture sector recognize its impact on the environment and promoted the continuous growth of the stewardship ethic within the agriculture industry.

The direct impact of the on-farm agri-environmental initiatives is very difficult to measure due to the short implementation period of the APF. The available data, however, indicates the programs have successfully encouraged farmers to adopt practices which positively impact wetlands and waterfowl habitat. For example, in the Canadian Prairies, over 30% of the agricultural land is now covered by EFPs. Farms with environmental farm plans are 25% more likely to maintain a bufferstrip around both permanent and ephemeral wetlands. Farmers have converted over one million acres of environmentally sensitive cultivated land to forages with support from Greencover Canada and other federal programs since 1988. Canadian agri-environmental initiatives will continue to assist the agricultural industry to proactively undertake measures which contribute to sustainable development and management of environmental resources.

**Title:** United States Experience, Conservation Reserve Program (CRP) and Wetlands

**Speaker:** Jim Jost, U.S. Dept. of Agriculture, Farm Service Agency

**Abstract:** The prices for most crops grown in North Dakota are at or near record highs. Because of this and in spite of input costs that are also at record highs, all crops except for oats and rye should be profitable. The profit potential will impact wetlands and grassland in North Dakota and throughout the U.S. portion of the prairie pothole region.

Because of the profit potential, demand for cropland has gone up and the land values and rents have increased dramatically. Payments under conservation programs have not kept up with the increasing land value. Some cropland that was enrolled in the conservation reserve program is going back into crop production. Other farmland that is currently in grass is being converted to annual cropping.

North Dakota has lost about 400,000 acres of CRP since September 30, 2007. This represents 11 percent of the total enrollment. South Dakota has lost 270,000 acres. This represents 17 percent of the CRP acreage in the State.

Despite the commodity prices and acreage losses, there are still over 3 million acres of CRP in North Dakota. That is more acreage than there was in the State from the beginning of the program in 1985 through 1997.

There are also opportunities to enroll additional acreage in CRP. Those opportunities are greater in the prairie pothole region than other parts of North Dakota. The CRP initiatives that target the Prairie Pothole Region and wetland restorations include the Farmable Wetlands Program, Duck Nesting Habitat Program, CP23 Wetland Restoration, and State Acres for Wildlife Enhancement.

Crop insurance may impact participation in conservation programs and will reduce the risk of breaking marginal land currently in grass. Crop insurance indemnity payments compete with conservation payments on upland and wetland acres. Producer may be receiving indemnity payments for prevented planting that exceeds payments that would have been received under CRP. Crop insurance also reduces the risk associated with farming marginal cropland.

Banking organizations, commodity groups, grain handlers and other agribusiness groups are supporting early releases from CRP contracts without penalties. Normally, when CRP contracts are terminated, the participant must refund all prior payments plus interest.

Current information on the status of the farm bill will be provided and the potential impact on CRP and wetlands.

**Title:** Future Agricultural Drivers: Who's Going to Take Over the Farm?

**Speaker:** Lyndon Carlson, Farm Credit Canada

**Abstract:** This presentation will look at the business of agriculture and what trends are shaping the future of the industry. Canadian agriculture is in the midst of dramatic change and opportunity, as the next generation of producers prepares to take over the family farm. We'll also explore the attributes of today's farm families as well as farm size, multi and single-generation farms, young farmers, and how today's market environment has an impact on stewardship and land use.

**Tuesday, April 8, 3:30pm to 5:00pm**

**Theme: Valuing Wetlands**

**Theme Leader: David Howerter, PHJV Waterfowl Working Group, Institute for Wetlands and Waterfowl Research**

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**Title:** Wetland Values

**Speaker:** W.L. (Vic) Adamowicz, University of Alberta

**Abstract:** A great deal of research has been conducted on the value of wetlands including analysis of the role of wetlands in ecological systems as well as the economic importance of wetlands. This presentation will examine the role of monetary valuation of wetlands and associated ecosystem services. What are the components of wetland values? When is the monetary valuation of wetland services important and useful? How much confidence is there in wetland service values? Are there any drawbacks of monetary valuation of wetlands? The presentation will include several examples of the use of monetary valuation as well as a discussion of the areas where additional research is required.



**Title:** Wetland Conservation and Restoration to Maintain the Ecological Integrity of Watersheds

**Speaker:** Shane Gabor, Institute for Wetlands and Waterfowl Research

**Abstract:** Natural capital consists of natural resources, environmental and ecosystem resources, and land. These resources yield ecological goods and services that are essential to the sustained health of our environment and economy. Protection and enhancement of natural capital will improve water quality, mitigate flooding, decrease net greenhouse gas emissions, improve air quality, provide habitat, sustain food production and produce many more benefits to society.

It is widely recognized that Prairie wetlands have important ecological functions in terms of providing habitats for waterfowl and other wildlife. However, the water quantity and quality benefits of these wetlands at a landscape scale are not well examined. Wetlands retain flood water and serve as sinks for pollutants delivered from the surrounding upland. Research shows that wetlands are linked to regional hydrology through intermittent surface runoff or groundwater flow. Wetland degradation and drainage reduces water storage and thus leads to loss of pollutants that could be potentially intercepted by these wetlands to surface water.

Ducks Unlimited Canada is working in partnership to understand the economic and environmental benefits of wetlands at a watershed scale. The primary objectives of the research are:

1. to develop an integrated hydrologic modelling system to estimate water quantity and quality benefits of prairie wetlands at the watershed scale;
2. to determine market uptake and satisfaction of a wetland program; and
3. to determine non-market valuation of wetland programs.

The research will address the valuation of wetlands to help formulate Provincial and Federal wetland policies. In addition, the results will have implications for governments and conservation organizations that conduct watershed planning and subsequently design and implement wetland conservation and restoration programs to maintain watershed sustainability. Interim results on this research will be discussed.

**Title:** Prairie Hydrology Model & Applications for Assessing Drainage, Restoration & Land Use Change

**Speaker:** John Pomeroy, University of Saskatchewan

**Abstract:** The Prairie Hydrology Model is a project created using the Cold Regions Hydrological Model platform. This project has the capability to model hydrology of prairie basins on the landscape basis using physical hydrological processes. Processes modelled include snow redistribution, melt, infiltration, interception, evapotranspiration, runoff, streamflow and percolation to groundwater. Storage elements tracked are snowpack, depression storage, soil moisture, wetland volume, lake volume. Fluxes of water as blowing snow, evaporation, runoff and streamflow are also calculated. The model has special provision for varying contributing area, intermittent flow, fill and spill pond discharge and changing surface water storage – important features of prairie hydrology. Evaluations using the model to assess the impact of land use and climate change on prairie basins are shown.

**Tuesday, April 8, 7:30pm to 8:30pm**  
**Special Presentation**

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**Title:** Climate Change, Human Use and Prairie Water Supplies

**Speaker:** David W. Schindler, University of Alberta

**Abstract:** Climate warming is predicted to increase the average annual temperature of the western prairies by about 3 degrees C by mid-century, and 6 or more by 2100. The former is almost certain, as politicians continue to dither over controlling greenhouse gas emissions. We still have time to moderate warming by 2100, if action is taken very soon. Annual temperatures at most prairie sites have already increased by 2-4 C during the period of record, with accompanying reductions lake levels, river flows, and the extent of wetland complexes.

Present climate conditions are already comparable to the mid-Holocene, when the prairies were almost devoid of wetlands, and large prairie lakes were dry or reduced in area. Despite the short period of recent warming, decreases in lake levels, river flows and the extent of wetlands are visible. Anecdotal evidence also suggests that groundwater supplies are dwindling in many areas.

Aggravating the effects of climate are human changes to the landscape, including land clearing, draining and filling of wetlands, urbanization, building of transportation corridors, reduction of beaver ponds on the prairie landscape, and modification of riparian zones.

Aggressive wetland and land-use policies are necessary to minimize the effects of climate warming on prairie ecosystems and prairie livelihoods.



**Wednesday, April 9, 8:00am to 10:00am**  
**Theme: Applying Innovative Approaches**  
**Theme Leader: Peter Joyce, PHJV Policy Committee,**  
**Agriculture and Agri-Food Canada**

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**Title:** A Policy Tool Box for Wetland Conservation and Restoration

**Speaker:** Ken Belcher, University of Saskatchewan

**Abstract:** Many of the benefits provided by wetlands have public good characteristics. As a result, societal concerns over the degradation and loss of wetlands are usually addressed through the development of appropriate wetland conservation and restoration policy by governments at the national and regional level. In general, wetland policy tools can be categorized as representing i) regulatory, ii) economic incentive and/or iii) extension approaches. Each of these approaches has strengths and weaknesses when applied to wetland conservation and restoration. This presentation will examine the range of policy tools available to address concerns over the loss of wetlands and wetland function. The characteristics of wetlands, and in particular the characteristics of prairie wetland systems, that may influence the effectiveness of certain tools will also be discussed. The discussion will also focus on the role that policy targeting will have in influencing the effectiveness and efficiency of the primary policy tools.

**Title:** Integrating EG&S Concepts into Agri-Environmental Policy – Lessons from Current Research and Pilot Projects

**Speaker:** Ian Campbell, Agriculture and Agri-Food Canada

**Abstract:** Federal and provincial Ministers of Agriculture established a Working Group to explore policy options that increase ecosystem services from agriculture. This Federal-Provincial WG has initiated research studies, an international symposium, consultations, stakeholder pilot projects and a cost-benefit analysis. The ideas generated from these efforts will contribute to agri-environmental policy in *Growing Forward*, and subsequent agricultural policies.

With support from AAFC, eight stakeholder projects are currently testing innovative approaches such as modelling ecosystem services from wetland restoration, annual payments for wetland retention, peer pressure mechanisms for source water protection, Beneficial Management Practices (BMPs) for agro-forestry, and community based planning for wildlife habitat in an Equivalent Agri-Environmental Group Plan watershed.

International experience in this policy area is mixed. Agri-environmental programs can efficiently encourage environmental benefits, but can also cause perverse effects, such as excessive land values and distorted land use. Existing programs in Canada, such as the National Farm Stewardship Program, support some practices that can enhance certain ecosystem services. Adjustments to these programs could increase their provision, such as adding new BMPs, changing payment mechanisms and adjusting support levels to target public goods, key services and key areas. There appears to be potential for market-based instruments such as reverse auctions and water quality trading. Discussions underscore the need for policy developers to involve both agricultural and non-agricultural stakeholders, such as the conservation community.

Further results of on-going research will be forthcoming over the next year, which will provide more detailed results to inform policies that will be included under *Growing Forward*.

**Title:** Testing Reverse Auctions to Increase Producer Adoption of Water Quality BMPs

**Speaker:** Peter Boxall, University of Alberta

**Abstract:** Market based instruments such as reverse auctions are promising potential additions to the existing suite of natural resource management tools because they use market-like approaches and features, such as competition, price discovery and trade, to deliver environmental outcomes in a fair and cost effective manner.

Typically a sole buyer (e.g. the government, NGOs or a partnership) solicits bids for specified land uses and practices from land managers, based on a pre-set budget. The environmental value of each bid is then assessed, usually using an environmental benefits index, and bids are selected to optimize environmental outcomes. Other methods of selecting bids are possible in an absence of environmental information.

This presentation will summarize results of a study undertaken in conjunction with the watershed Evaluation of BMPs (WEBs) project to develop and test various reverse auction frameworks to generate water quality improvements through the adoption of specific Beneficial Management Practices (BMPs) among producers in the South Tobacco Creek watershed, Manitoba. Steps to estimate producer costs of BMP adoption, to model phosphorous, nitrogen and sediment abatement resulting from practice changes, to develop cost functions and to develop reverse auction strategies will be reviewed. The presentation will then summarize results from laboratory experiments that used University of Alberta students to estimate the potential for devised reverse auction mechanisms to achieve BMP adoption targets in STC. The outcomes of the different auction formats to different agri-environmental policy objectives such as fairness, cost discovery, administrative costs, and cost minimization, as well as implications for wetland and natural resource conservation will also be discussed.

**Title:** Water Quality Trading in the South Nation Watershed of Ontario

**Speaker:** Dennis O'Grady, South Nation Conservation Authority, Ontario

**Abstract:** As part of its integrated watershed management approach, the South Nation Conservation Authority leads a regulated water quality trading system called the Clean Water Program. By provincial law, waste water dischargers must control their phosphorus (P) loadings into the receiving waters of the South Nation watershed. Wastewater dischargers buy P-credits from rural landowners, primarily farmers, who in turn implement cost shared surface and ground water improvement projects that reduce net P-loadings into the watershed. The Clean Water Program is considered a true credit trading program because incentives to support improvement projects are provided by wastewater dischargers through the purchase of P-credits.

South Nation Conservation Authority, a community based watershed organization, is the broker for P credits. The program is run by a multi-stakeholder committee, and utilizes local farmers to conduct field visits. Between 1993 and 2006, approximately \$1.8 million was granted to local farmers and landowners for 509 projects that address non-point source pollution and protect surface and ground water quality. These projects have reduced the annual phosphorus contributions to the watershed's rivers by an estimated 11,762 Kg.

Trading systems can be an effective part of a broader stewardship approach but require community support and buy in, the right legal and policy infrastructure, sound science and strong communications capacity, among other things. These implementation considerations along with implications for wetland stewardship will be discussed.

**Wednesday, April 9, 10:30am to 12:30pm**

**Theme: Building Wetland Policy**

**Theme Leader: Michael Barr, Ducks Unlimited Canada**

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**Title:** Challenges & Success in Wetland Policy Development in Alberta

**Speaker:** Petra Rowell, Alberta Environment

**Abstract:** Under the 2003 *Water for Life* strategy, the Government of Alberta (GOA) committed to working with Albertans on a new wetland policy and implementation plan for the province. Since that time, a multi-stakeholder team has been grappling with the many challenges of elevating wetlands as a consideration on a very busy landscape. Fortunately, the current holistic approach to managing water scarcity brings wetlands into the discussion as a contributing factor to watershed health and resiliency. Additionally, that these discussions are occurring, throughout GOA and across many jurisdictional and sectoral boundaries, is in itself a good indicator that upon its completion, the policy will have the leadership needed for successful implementation.



**Title:** Wetland Conservation Policy for Southern Saskatchewan

**Speaker:** Dale Hjertaas, PHJV Policy Committee, Saskatchewan Watershed Authority

**Abstract:** Saskatchewan is in the final stages of developing an implementation policy for wetland conservation. The foundations of effective policy are effectiveness, doability and acceptability. Effectiveness implies that the policy will achieve conservation objectives and advance us toward our long-term goals. Doability considers the practicality of the policy and whether or not it is achievable given the scope of the issue, the resources required, and the risks involved. Acceptability is the measure of public support the policy will garner. The presentation examines the draft Saskatchewan policy in the context of these measures.

**Title:** Wetland Policy Development in Manitoba

**Speaker:** Rhonda McDougal, Manitoba Water Stewardship

**Abstract:** The importance of protecting wetlands is increasingly recognized as an integral part of aquatic ecosystem health. In Manitoba, starting in 1985 with the Manitoba Habitat Heritage Act and the creation of the Manitoba Habitat Heritage Corporation, the province of Manitoba has implemented a number of policies and statutes that explicitly and implicitly recognize the need for wetland conservation. These include The *Manitoba Water Policies 1990*, the *Conservation Agreements Act 1990*, the *Manitoba Water Strategy 2003*, and the *Water Protection Act 2006*. While these policies and statutes have been used effectively in a number of instances to conserve threatened wetlands, Manitoba continues to lose wetlands. We recognize the need to develop a wetland policy that acknowledges the inherent value of these ecosystems and the need to conserve and protect them in their own right.

**Title:** Wetland Policy – Worth the Paper?

**Speaker:** Randy Milton, Nova Scotia Department of Natural Resources

**Abstract:** Beginning with the Federal Wetland Policy in 1991, Canadian jurisdictions have been gradually embracing a greater awareness of their wetland resources. The outward expression of this awareness is usually a call from civil society to recognize wetlands within or as separate government policy. The provinces of Nova Scotia, New Brunswick and Prince Edward Island have responded with wetland policy or changes to legislation. We will evaluate the strengths and deficiencies of these initiatives, identify the science and social foundation necessary for effective wetland policy, and assess whether these initiatives are worth the paper required in their drafting.

**Title:** Desired Direction for Policy Change: A PHJV Perspective

**Speaker:** Lyle Saigeon, PHJV Advisory Board, Nature Conservancy of Canada

**Abstract:** Looking back at the past decade progress has been made toward conservation of wetlands and riparian areas through the Alberta Water Strategy for Life, Manitoba's Water Protection Act and Saskatchewan's newly proposed Wetland Conservation Policy. This has led each of the three provinces to adopt principals of integrated watershed planning, support principals of source water protection and recognize that healthy aquatic habitats are integral to ecosystem and basin planning. Efforts to restore lost wetlands through incentive programs and mitigation are being explored by NGOs in all three jurisdictions in order to advance the development of supporting government policies within these areas. Positive policy changes supporting the conservation of natural cover and restored perennial cover around wetlands have resulted from stewardship incentives and grassland conversion incentives to landowners by both government and NGOs. The PHJV and its partners have recognized the importance of economic incentives balanced with regulatory measures. The Agricultural Policy Framework has played an important role in new incentives and partnerships. The critical work that has not come to pass over the past decade include; a government position that all classes of wetlands are to be conserved going forward, and that future loss requires mitigation efforts to ensure no net loss across the three jurisdictions. Some of the current legislation that protects wetlands remains ineffective. Challenges remain in ensuring that there are mechanisms in place to maintain the large number of acres of restored perennial cover, given the current cycle of rising grain prices and diminishing livestock revenue. Despite local successes in community-based watershed planning and program implementation, the major forces of change on the landscape are often not part of integrated land use discussions prior to decision making. Much work remains to convince governments and the public of the tangible, long term economic benefits that our natural capital provides. New and creative methods of providing landowner incentive for preserving existing natural capital are slow to evolve. The good news is that within the PHJV we have collectively created changes to programming and policy. Our Strategic Plan and new Implementation Plan set this stage for new partnership and program opportunities. The Joint Venture continues to support the Provinces and Government of Canada in their commitment to integrated land use planning and wetland policy on protection and restoration. We will be encouraging the change process further as the results of this forum unfold.

**Title:** Future Directions for Wetland Policy in Canada

**Speaker:** Patricia Farnese, University of Saskatchewan

**Abstract:** Recently, the Québec Superior Court in *9047-478 Québec inc. v. Béchard* was essentially asked to decide whether land must be “wet” to be considered a wetland. This presentation will discuss the implications of the court’s answer to that question for future wetland policies in Canada. Specifically, the approach taken by Canadian law-makers to define wetlands will be compared with the approach taken in the United States and assessed in terms of its impact on wetland protection.

**Wednesday, April 9, 1:30pm to 3:30pm**

**Theme: Actions & Recommendations**

**Theme Leader: Pat Kehoe, PHJV Waterfowl Working Group,  
Ducks Unlimited Canada**

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## Speaker Biographies

## **PHJV Science & Policy Forum 2008**

### **Saskatoon, April 8-9, 2008**

### **Speaker Biographies**

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#### **Dr. W.L. (Vic) Adamowicz, Canada Research Chair (Environmental Economics) and Professor in the Department of Rural Economy, Faculty of Agricultural, Life & Environmental Sciences, University of Alberta**

Vic Adamowicz is Canada Research Chair (Environmental Economics) and Professor in the Department of Rural Economy, Faculty of Agricultural, Life & Environmental Sciences, University of Alberta. He obtained his BSc and MSc from the University of Alberta and his PhD from the University of Minnesota.

Adamowicz's research interests are in developing methods that integrate environmental goods and services into economic analysis and designing policies and institutions that help capture the importance of environmental services in economic decision-making. His main research areas include environmental valuation, economic assessment of environmental changes, and consumer choice modeling. His research interests also include the incorporation of economic perspectives into sustainable forest management and the development and implementation of economic instruments for environmental protection.

Adamowicz was the Scientific Director of the Sustainable Forest Management Network of Centres of Excellence, one of Canada's Networks of Centres of Excellence, from 1998 to 2004. He was awarded the J Gordin Kaplan Award for Excellence in Research in March 2005 and the Canadian Institute of Forestry's Canadian Forestry Scientific Achievement Award in October, 2004. He was elected to be a Fellow of the Royal Society of Canada, Academy II – Social Sciences, in 2007. In 2001-2002 Adamowicz was a Gilbert White Visiting Fellow at Resources for the Future in Washington DC and in 1998/99 he was a Killam Annual Professor at the University of Alberta.

#### **Dr. Michael Anderson, Director, Science and Adaptation, Ducks Unlimited Canada, and Director of DUC Institute for Wetland and Waterfowl Research**

Mike Anderson is the Director of Science and Adaptation for DU Canada and Director of DUC's research arm, the Institute for Wetland and Waterfowl Research. He helped found the Institute and has been with Ducks Unlimited since 1990. Prior to that he spent 18 years at the Delta Waterfowl and Wetlands Research Station on Lake Manitoba.

Mike grew up in North Dakota, received B.S. and M.S. degrees in wildlife biology from Colorado State University and Utah State University, respectively, a Ph.D. in ecology, evolution and behavior from the University of Minnesota.

Before he began living in airplanes and meeting rooms, his research focused mostly on the ecology of prairie waterfowl and wetlands, in particular canvasbacks and other prairie-nesting ducks. He has been involved in waterfowl management issues throughout North America.

#### **Dr. Ken Belcher, Associate Professor, Department of Bioresource Policy, Business & Economics, College of Agriculture and Bioresources**

Ken Belcher is an associate professor in the department of Bioresource Policy, Business and Economics at the University of Saskatchewan. He received his Ph.D. in Agricultural Economics from the University of Saskatchewan and also holds a Masters of Natural Resource Management from the University of Manitoba and a degree in agriculture also from the University of Manitoba. He has a strongly interdisciplinary work and education background with experience in waterfowl and waterfowl habitat conservation, environmental and agriculture policy and agricultural sustainability. His research falls within the broad categories of renewable resource economics and ecological economics. More specifically he is interested in environmental concerns within agricultural landscapes and has done research on climate change, environmental and agri-environmental policy and agricultural sustainability

**Dr. Peter Boxall, Professor of Environmental and Resource Economics, Department of Rural Economy, University of Alberta**

Peter Boxall is currently a Professor of Environmental and Resource Economics in the Department of Rural Economy, University of Alberta. His principal research interests lie in the economic valuation of changes in environmental quality. His research program involves developing and improving non-market valuation methods, as well as utilizing these methods in high quality empirical research efforts. He and his colleagues and students have applied economic methods in examining a number of Canadian and international issues such as: aboriginal land use issues and the preservation of cultural artifacts, recreation values at risk of loss from wildfire, the demand for non-timber forest products, economic indicators of sustainable forest management, economic assessments of industrial development on residential property values and remote tourism prices. More recently his research programme has involved agri-environmental issues, such as BMP adoption in agriculture for environmental improvements, the economics of wetland drainage, and the economic valuation of wetland area maintenance and enhancement.

**Ian Campbell, Manager, Long-Term Strategic Policy, Agri-Environmental Policy Bureau, Strategic Policy Branch, Agriculture and Agri-Food Canada**

Ian Campbell was raised in Kingston, Ontario by expatriated Manitoban parents. He has a Bachelor of Arts in Mathematics and a Masters degree in Economics from the University of Ottawa. Since 1989, he has worked for the federal department of agriculture, except for a year spent with the conservation group Ducks Unlimited Canada. His wide experience includes market research for the tourism and food industries, environmental assessments of agricultural programs and development of farm income stabilization programs. He is currently responsible for developing policy on Environmental Goods and Services and other environmental issues within the Strategic Policy Branch of Agriculture and Agri-Food Canada.

**Lyndon Carlson, Senior VP, Marketing, Farm Credit Canada**

Lyndon is responsible for marketing, brand, enterprise and market research, product development, AgriAssurances (insurance), AgriSuccess (knowledge and training) and AgExpert (agriculture software solutions). Lyndon has over 25 years of experience in several areas of agribusiness. He holds a Bachelor of Science in Agriculture from the University of Saskatchewan. In addition to volunteering with his church, Lyndon serves as the Vice-President of the Canadian 4-H Foundation, Director of Agrivita Canada Inc., and Director of the Canadian Centre for Health and Safety in Agriculture.

**Patricia Farnese, Senior Law Fellow, Centre for Studies in Agriculture, Law & Environment, University of Saskatchewan**

Professor Farnese holds a joint appointment at both the College of Law and the Centre for Studies in Agriculture, Law and the Environment (CSALE) where she is the Senior Law Fellow. She has also been a faculty member with the Indigenous Peoples Resource Management Program and the Program of Legal Studies for Native People. Her current research activities include on-farm liability and risk, wetland policy, the legal framework for animal health and the role of science in law. Prior to doing graduate work, Professor Farnese clerked with the Saskatchewan Court of Appeal and was admitted to the bar in 2002.

**Shane Gabor, Research Biologist, Ducks Unlimited Canada**

Shane Gabor currently works for Ducks Unlimited Canada as a research biologist. He holds a degree in Wildlife Biology from the University of Montana and a Master's Degree from McGill University. Shane manages Ducks Unlimited Canada's Freshwater Initiative, a program designed to identify and address information needs related to the ecological goods and services provided by wetlands and other natural areas. His activities and research are focused on evaluating and communicating the ecological, social and economic values of natural capital for the development of effective policies and programs. Shane works extensively with government and non-government agencies.



**Wm. D. Gummer, Regional Director, Environmental Conservation Branch, Environment Canada, Prairie and Northern Region**

Twenty years direct experience in the field of water quality and 15 years with the Canadian Wildlife Service of Environment Canada. He has been with EC since 1973 and has been involved in the investigation and resolution of transboundary water issues including Chairing the International Red River Pollution Board and participation on the Prairie Provinces Water Board, and Committee on Water Quality. In 1989/90 he assumed the associate science director's position for the 5-year Northern River Basins Study. In 1993 he assumed a new position, Associate Science Director, Environmental Conservation Branch, PNR with responsibilities for both water and wildlife science as well as for promoting and facilitating regional EC excellence in science. Represented the region on EC's S&T Management Committee and provided leadership in the development of the department's wildlife and water research agenda and the adoption of an ecosystem approach to doing business. He has actively pursued the development of S&T and conservation partnerships with universities and other partners. In 2002, he assumed the Regional Director's position in PNR responsible for delivery of EC's regional wildlife program relating to migratory birds, habitat conservation, protected areas, species at risk, and the western boreal conservation initiative. His responsibilities have also included chairing the Prairie Habitat Joint Venture, the Habitat Stewardship Program Implementation Board, and a member of the Canadian Wildlife Directors' Committee and the international Plan Committee responsible for the North American Waterfowl Management Plan.

**Dale Hjertaas, Executive Director, Policy and Communications, Saskatchewan Watershed Authority**

Dale Hjertaas was born and raised on a farm near Wauchope, a now extinct Hamlet in southeastern Saskatchewan. He completed a Bachelor and Master of Science in Biology at the University of Saskatchewan. Dale and his wife Paule live in Regina. They have two children, Kerry and Estelle. Kerry is an engineer with Vecima Networks in Saskatoon and Estelle is studying at McGill University.

After working briefly for Ducks Unlimited Canada, Dale joined the Fish and Wildlife Branch of Saskatchewan Environment where he worked for 25 years. Over the years his duties included wildlife education, wetlands and waterfowl, endangered species recovery and policy development.

Dale moved to the Saskatchewan Watershed Authority as Executive Director, Policy and Communications, when it was created in 2002. He is responsible for leading major policy initiatives related to water including the Water Conservation Plan, revisions to Saskatchewan Watershed Authority Act and development of the Integrated Water Management Framework.

Dale is an enthusiastic naturalist who enjoys opportunities to be out in nature hiking, birding, cross country skiing, hunting, or just being out there. He has served various roles with local and provincial naturalist's organizations including a term as president of Nature Saskatchewan. Dale is currently the president of Nature Regina.

**Jim Jost, North Dakota Conservation Program Specialist, United States Department of Agriculture, Farm Service Agency**

Jim Jost is the North Dakota Conservation Program Specialist for USDA's Farm Service Agency. He is responsible for administration the Conservation Reserve Program and other programs in North Dakota. He has held this position since 1995 and has been involved in the administration of CRP since in conception in 1985. He has worked for USDA for over 30 years and is a graduate of North Dakota State University.

**Pat Kehoe, Manager, Conservation Programs – Prairies, Ducks Unlimited Canada**

Pat Kehoe has 25 years experience in waterfowl and wetlands conservation. Development of long term conservation plans for DUC's prairie programs, as well as leading the development of PHJV implementation plans, integrating science and organizational knowledge to set habitat objectives, combining policy, extension and traditional programs to restore the productive capacity of prairie landscapes.

Pat has a B.Sc. Ecology and Evolution- University of Western Ontario, and an M.Sc. Zoology- University of Guelph. From 1986-1997 he was the Manager of Wetlands and Coastal Habitat program at the New Brunswick Department of Natural Resources and Energy. From 1997 to present, he is the Manager of Conservation Programs – Prairies, at Ducks Unlimited Canada and is currently the Chair of the PHJV Waterfowl Working Group.



### **Dr. Rhonda McDougal, Director, Planning and Coordination Branch, Manitoba Water Stewardship**

Dr. Rhonda McDougal is the Director of the Planning and Coordination Branch of Manitoba Water Stewardship. Her Branch is responsible for the Integrated Watershed Management Planning Initiative and the Conservation Districts Program in Manitoba. In addition, her Branch oversees the policy, legislative, and communication needs of the Department. Rhonda has a Ph.D. in Aquatic Ecology and has conducted research on Prairie lake and wetland ecosystems over the past ten years, mainly in the areas of nutrient loading impacts and effects of climate change on aquatic systems. Prior to joining Manitoba Water Stewardship, Rhonda headed up a large national multi-agency research project for Ducks Unlimited Canada, focusing on the role of wetlands and agricultural management practices in carbon sequestration and greenhouse gas emission.

### **Randy Milton, Manager - Wetlands and Coastal Habitats Program Department of Natural Resources**

Originally from New Brunswick, Randy received his BSc for Mount Allison University and followed this with an MSc from Acadia University. In his early university experience, it was his intent to pursue a career with large mammals until an encounter in 1976 with a CWS habitat biologist opened his eyes, ears, and nose to the wetlands and birds of the Tantramar Marshes in the Upper Bay of Fundy. Since then his career has been mostly dedicated to wetlands and waterbirds in the Maritimes except for a couple of years in Indonesia. Since 1992 he has been employed with the Nova Scotia Department of Natural Resources to manage the provincial wetlands and coastal habitats program. He has served on working groups for the Eastern Habitat Joint; was a member of Technical Committees for the Black Duck and Sea Duck Joint Ventures and participated as a member of Canada's Delegation to the Ramsar Convention; has undertaken work with Ramsar's Scientific and Technical Review Panel on the wise use of wetlands, wetland inventory, and global action plan for peatlands; was a team member authoring the wetlands and water synthesis for the Millennium Ecosystem Assessment, and is presently a member of the NAWMP Plan Committee.

### **Jeffrey W. Nelson, Executive Vice President, Ducks Unlimited Canada**

Ducks Unlimited Canada named Jeff as the organization's executive vice president in January 2008. In that role he leads a large team of volunteers and professional staff, publishes the *Conservator*, and oversees the operation of four interpretive centres across Canada.

Jeff is a Minnesota native who has worked internationally for Ducks Unlimited throughout his 26-year professional career. His training includes waterfowl and wetlands research in Manitoba, an undergraduate degree in Wildlife Management from the University of Minnesota, and an M.S. degree in Wildlife Ecology from Utah State University. Early on, he worked as a research biologist for Ducks Unlimited Canada for 6 years, doing research and evaluations across Canada.

In 1988 Jeff transferred to Ducks Unlimited, Inc. as the Director of MARSH Programs at the National Headquarters. Since then he has served as the Group Manager for Conservation Programs and the Chief Biologist, living in both Chicago and Memphis. Jeff most recently served as Director of the Great Plains Regional Office in Bismarck, North Dakota, from July 1996 thru February 2008, where he spearheaded the development of *Grasslands for Tomorrow*, *Living Lakes*, and other conservation initiatives across an eight-state region. He has written numerous scientific papers, popular articles, and book chapters concerning wetlands and waterfowl ecology and testified at both state and federal government committee hearings on natural resource issues while working in the U.S.

**Dr. John W Pomeroy, FRGS, Canada Research Chair in Water Resources and Climate Change, and Director of the Centre for Hydrology, University of Saskatchewan, Saskatoon**

Professor Pomeroy is a graduate of the University of Saskatchewan Department of Agricultural Engineering and worked for the US Forest Service, Wyoming; University of East Anglia, Norwich, England; Environment Canada National Hydrology Research Institute; and University of Wales, Aberystwyth, Wales before returning to a Canada Research Chair at U of S in 2003. He has conducted research on snow, prairie, forest, arctic and mountain hydrology in Canada, US and UK with an emphasis on physical hydrological processes and modelling and an interest in linking hydrology to water resources, climate, ecology and chemistry. He has written or edited five books and written over 175 refereed papers in these fields. He serves on the editorial board of three scientific journals and is President of the Canadian Geophysical Union and of the International Commission on Snow and Ice Hydrology. He is currently leading a study of wetland hydrology and drainage effects in a basin in eastern Saskatchewan, co-leading a prairie drought study and leading a cold regions hydrology study.

**Dennis O'Grady, General Manager, South Nation River Conservation Authority.**

Dennis O'Grady has managed watersheds for Conservation Authorities across Ontario for 28 years. For the past 21 years, he has been the General Manager of South Nation Conservation, a 4,000 sq. km. watershed covering 15 municipalities. South Nation delivers a wide variety of programs in groundwater protection, forestry, fisheries, water quality, flood and erosion control and land use planning. The South Nation River Watershed's trading program for phosphorus started 11 years ago and it has completed over 200 verifiable trades. South Nation recently completed a contract for the Province of Ontario detailing how to implement a phosphorus trading program in the Province. Mr. O'Grady has a Masters Degree in Public Administration from Queen's University, and an undergraduate degree in Geography from the University of Western Ontario.

**Petra Rowell, Environmental Strategies Advisor, Alberta Environment**

Petra Rowell is a wildlife biologist by training involved over the past 20 years in Alberta in bird banding and census projects, species at risk work, and land stewardship programs. Today, she is an Environmental Strategies Advisor for Alberta Environment, with a focus on building capacity for watershed management under Alberta's *Water for Life* strategy. This includes working with partnerships to develop and implement policies and programs for wetlands.

**Clayton Rubec, Centre for Environmental Stewardship and Conservation, Ottawa, Ontario**

Clayton Rubec is expecting to retire in March 2008 after 33 years of service with the Government of Canada. He was previously Senior Policy Advisor and Acting Chief of the Stewardship Division of the Canadian Wildlife Service at Environment Canada in Ottawa. His educational background includes a B.Sc. (Queen's University) and an M.Sc. (McMaster University). He is an author or editor of over 175 publications including the *Canadian Wetland Classification System* and *Wetlands of Canada*. He has led national and international initiatives to develop cooperation on stewardship, wetland conservation and science, Arctic biophysical land surveys, wise use of natural resources, and landscape ecology. He led development of one of the World's first national wetland policies, the *Federal Policy on Wetland Conservation* in 1991 and the Ramsar Convention's *Guidelines on Developing and Implementing National Wetland Policies* in 2000; as well as the creation of the very successful Ecological Gifts Program, operating nationwide since 1995. In the last several years, he led preparation of *Canada's Stewardship Agenda* in 2002 and facilitated the evolution of the Canadian Land Trust Alliance and three national stewardship conferences. He was Associate Director of the Canada-Iraq Marshlands Initiative with the University of Waterloo from 2004-2007 and is currently acting as a Biodiversity Program Advisor to Nature Iraq and the Iraq Ministry of the Environment. He is a principal partner in the newly established Centre for Environmental Stewardship and Conservation in Ottawa.



### **Lyle Saigeon, Regional Vice President, Saskatchewan Region, Nature Conservancy of Canada**

Lyle Saigeon joined the Nature Conservancy of Canada in 2005 and is responsible for the overall operations of NCC within Saskatchewan. Lyle previously worked with the Province of Saskatchewan and Ducks Unlimited Canada in various aspects of conservation work for over 25 years. His work has ranged from conservation program administration, development of conservation programming, to public policy influence. Lyle has degrees in biology and agriculture from the University of Saskatchewan. He was born on a family farm in south central Saskatchewan and has remained in the province throughout his career. He currently resides in Regina with his wife and three children. They escape to the great outdoors whenever time permits.

### **Dr. David. W. Schindler, Killam Memorial Chair and Professor of Ecology, Department of Biological Sciences, University of Alberta**

Dr. Schindler holds the Killam Memorial Chair and is Professor of Ecology in the Department of Biological Sciences at the University of Alberta. His work on lakes has been widely used in formulating policy internationally. He received his doctorate from Oxford University, where he studied as a Rhodes Scholar. He has served as President of the American Society of Limnology and Oceanography, and as Canadian National Representative to the International Limnological Society. He is the author of over 275 scientific publications.

Dr. Schindler's international awards include the G.E. Hutchinson Medal of the American Society of Limnology and Oceanography, the Naumann-Thienemann Medal of the International Limnological Society, the first Stockholm Water Prize, the Volvo Environment Prize (1998), and the Tyler Prize for Environmental Achievement (2006). In 2001 he was awarded the National Science and Engineering Research Council's Gerhard Herzberg Gold Medal for Science and Engineering, Canada's highest scientific honour. He is a Fellow of the Royal Society of Canada, the Royal Society of London, the Royal Swedish Academy of Engineering Sciences, and a member of the U. S. National Academy of Sciences. He has received ten honorary doctorates from Canadian and US universities. He is an Officer in the Order of Canada.

### **Dean G. Smith, Manager, Stewardship Coordination, PFRA, Agriculture and Agri-Food Canada**

Dean Smith is the Manager of Stewardship Coordination for Agriculture and Agri-Food Canada, PFRA, in Regina, Saskatchewan. Under Canada's Agricultural Policy Framework he manages the program policy for three national agri-environmental initiatives: the National Environmental Farm Planning Initiative, the National Farm Stewardship Program, and Greencover Canada. In addition, Dean is responsible for development of concepts for Growing Forward – the new agriculture policy. Dean holds an MBA from Royal Roads University and a Bachelor of Science in Agriculture from the University of Saskatchewan, with specialization in Land Resource Management.

Dean has been a member of numerous strategic planning and policy development initiatives such as Environment Canada's Natural Capital Framework Task Team and the Federal-Provincial Working Group on Ecological Goods and Services. Dean is the chairperson of the PHJV's Policy Committee and a member of the Program Committee for the "Stewardship 2009" conference.

### **Michael Watmough, Wildlife Habitat Biologist, Canadian Wildlife Service, Environment Canada**

Michael Watmough is the project lead for the PHJV habitat monitoring program. Michael has been employed with CWS as a habitat biologist for 9 years. Michael's current portfolio includes active involvement in the Canadian Wetland Inventory, Environmental Assessment, and Emergency response programs within Environment Canada. Prior to coming to Environment Canada, Michael worked with Alberta Fish and Wildlife in the areas of Riparian Habitat assessment, Habitat stewardship, and fisheries and wildlife management. Michael's work experience also includes a stint in the Alberta oil patch as a "Roughneck". Michael holds a degree in Reclamation, Remediation and Land conservation from the U of A, and a diploma in Renewable Resource management from NAIT.

**Dr. Dan Wicklum, Director General, Wildlife and Landscape Science Directorate, Science and Technology Branch, Environment Canada**

Dan Wicklum was the Executive Director of the national NGO 'The Canadian Forest Innovation Council' before joining Environment Canada. Before that, Dan was Director of Strategic Alliances for Natural Resources Canada's Canadian Forest Service and a Senior Policy Advisor to the Minister of Natural Resources, Ralph Goodale. Dan's formal training is in aquatic ecology, receiving graduate degrees from the University of Calgary and the University of Montana. At the University of Montana he was on the faculty as Assistant Professor, after completing his post doc on the effects of exotic species introductions on aquatic foodweb structure and function.

Dan's original career was as a linebacker in the CFL, playing with both Winnipeg Blue Bombers and Calgary Stampeders.

## Participants

## PHJV Science & Policy Forum 2008 Attendees

### Speakers

**ADAMOWICZ**, Vic  
**ANDERSON**, Mike  
**BELCHER**, Ken  
**BOXALL**, Peter  
**CAMPBELL**, Ian  
**CARLSON**, Lyndon  
**FARNESE**, Patricia  
**GABOR**, Shane  
**GUMMER**, Bill  
**HJERTAAS**, Dale  
**JOST**, Jim  
**KEHOE**, Pat  
**McDOUGAL**, Rhonda  
**MILTON**, Randy  
**NELSON**, Jeff  
**O'GRADY**, Dennis  
**POMEROY**, John  
**ROWELL**, Petra  
**RUBEC**, Clayton  
**SAIGEON**, Lyle  
**SMITH**, Dean  
**WATMOUGH**, Mike  
**WICKLUM**, Dan

### Attendees

**ANDREWS**, Richard  
**BARNETT**, Andrea  
**BARNETT**, Ian  
**BARR**, Michael  
**BENNETT**, Ron  
**BIBIK**, Carrie  
**BILECKI**, Lori  
**BOGDAN**, Les  
**BRACKETT**, Dave  
**BRUCE**, Greg  
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