



NAWMP Continental Assessment PHJV TRIENNIAL REPORT

August 2009





The Canadian Prairie Pothole Region has long been acknowledged as the most important breeding area for continental waterfowl populations and for also providing crucial habitat for a wide array of shorebirds, waterbirds and landbirds. About half of North America's mid-continent ducks breed within this region which contains some of the best waterfowl habitat in North America. The Prairie Habitat Joint Venture is one of the founding JVs, established in the late 1980s, to deliver the North American Waterfowl Management Plan in the Canadian Prairie/Parkland region.

Spanning three decades, the benefits of NAWMP continentally are numerous and far reaching and the PHJV partnership is proud to be part of that success. The NAWMP International Plan Committee's Continental Assessment Review was a pivotal step for all partners to build upon past successes and strategically move forward more cohesively to achieve NAWMP goals. Regular interactions with the Plan Committee and the broader NAWMP community are welcomed by the PHJV and we appreciate this opportunity to provide an update on our progress.

The PHJV undertook a detailed review of all recommendations identified in the PHJV-specific letter, the Continental Assessment Report general recommendations and the recommendations in Appendix F. (Characteristics of Effective JVs and Examples to Consider of Effective JVs). All recommendations applicable to the PHJV were discussed and assigned to a lead committee. This report provides an update on the recommendations that have been addressed, noting that some are ongoing.

Table of Contents

In this report, the PHJV has demonstrated progress toward all primary NAWMP reporting elements:

- Demonstrable Progress Toward Accomplishing Biological Goals,
- Demonstrable Progress in Adaptive Management and Testing Key Planning Assumptions,
- Progress in Cooperating and Sharing Ideas Outside the PHJV,
- The State of the PHJV Partnership.

These reporting elements and the Assessment recommendations align well with PHJV Priorities and Strategic Actions and the recently completed PHJV Implementation Plan 2007-2012. To streamline reporting, we have addressed the NAWMP reporting elements through the following sections.

PHJV Strategic Plan 2006 - 2011	1
PHJV Bird Population Goals	1
PHJV Habitat Goals	1
PHJV Priorities and Strategic Actions	1
PHJV Landscape Profile	2
Biological Foundation	4
Science - A Legacy of Learning	4
<i>Addressing key program uncertainties – SpATS</i>	4
<i>Species of Concern – Scaup, Scoters and Pintails</i>	5
<i>Wetland Loss and Carrying Capacity of the Canadian PPR</i>	5
<i>Wetland Loss – EGS and Policy</i>	6
<i>Other Vital Rates</i>	6
<i>Other Taxa</i>	6
Integrated Landscape Management/PHJV Implementation Plan 2007-2012	7
Updating Habitat Objectives: How Much Have We Lost? and How Much is Enough?	7
<i>Upland Habitat</i>	8
<i>Wetland Habitat</i>	10
<i>Impact of Changes on Duck Productivity</i>	11
<i>Setting Habitat Objectives – Removing the Deficit</i>	12
<i>Target Landscapes</i>	13
<i>Habitat Objective Setting Process</i>	13
A Landscape Example	15
2007-2012 Habitat Objectives (from Implementation Plan Summary)	16
Gap Analysis	17
Policy Leadership	18
Policy Needs	18
Policy Actions	19

Accomplishments	20
PHJV Operations	21
PHJV Partnership	21
Communications	22
Addressing the Western Boreal Forest	24
Shorebirds, Waterbirds, and Landbirds	25
PHJV and Climate Change	26
Looking Forward	28
APPENDIX: NAWMP Continental Assessment Recommendations Addressed by PHJV Reporting Theme	30
Reference Material	34
PHJV partners	35

PHJV Strategic Plan 2006 - 2011

The NAWMP Continental Assessment Review in 2006 coincided well with the development of the PHJV Strategic Plan 2006-2011.

PHJV Vision is for healthy prairie, parkland and boreal landscapes that support sustainable bird populations and provide ecological and economic benefits for society.

PHJV Mission is to provide leadership to achieve healthy and diverse waterfowl and other bird populations through conservation partnerships. These partnerships strive for sustainable and responsible management of the landscape taking into account social, economic and environmental factors.

Key highlights from the PHJV Strategic Plan are emphasized here to provide a basis for reporting on our progress.

PHJV Bird Population Goals

- Sustain average waterfowl populations of the 1970s.
- Set population objectives for the priority species for landbirds, shorebirds and waterbirds.

PHJV Habitat Goals

1. Stop further wetland loss
2. Stop further loss of native lands, especially native grasslands
3. Restore lost wetlands, especially small basins
4. Restore function of upland habitats in landscapes conducive for maintenance of bird populations
5. Set habitat objectives for the priority species of waterfowl, landbirds, shorebirds and waterbirds

PHJV Priorities and Strategic Actions

PHJV has set strategic priorities to address its goals. An integrated landscape management approach is needed to sustain bird populations at goal levels. Presently, protection of existing wetlands and restoration of lost wetlands are among the PHJV's highest conservation priorities.

The PHJV strategic plan identifies the following strategic priorities for the PHJV. The PHJV has set several strategic actions for each of these priorities (see PHJV Strategic Plan):

- Integrated Landscape Management
- Biological Foundation
- Policy Leadership
- Marketing, Communications and Education
- PHJV Capacity

PHJV Landscape Profile

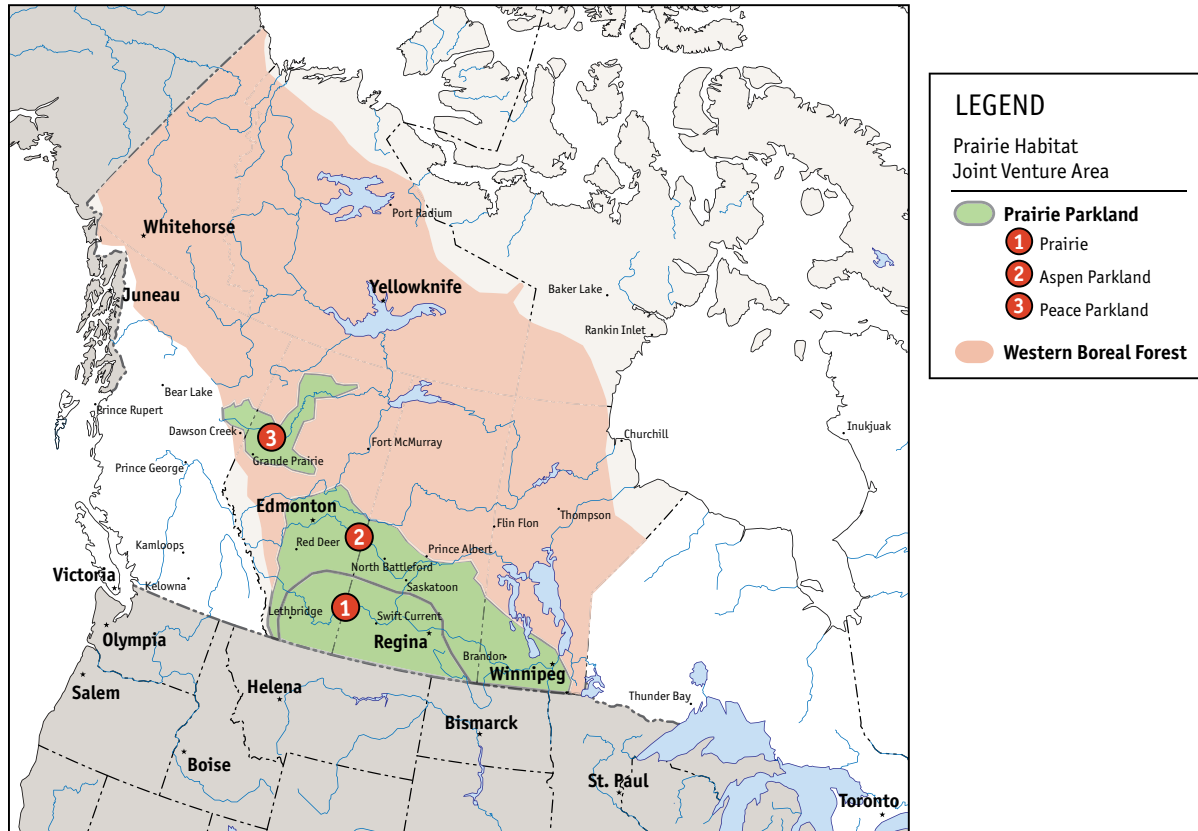


Figure 1. PHJV/Boreal Map

Geographically, the Prairie Habitat Joint Venture is a vast, 158 million acre prairie and parkland landscape in Alberta, Saskatchewan, Manitoba and the Peace Parkland region of British Columbia (Figure 1). By way of comparison, this Canadian “Prairie Pothole Region” (PPR) is a land area that’s nearly the size of the State of Texas. The PHJV is also the breeding area for roughly half of North America’s mid-continental waterfowl, supporting an annual average of approximately 12.5 million breeding ducks.

The PHJV is a working landscape: it is primarily privately owned and dominated by agricultural production. PHJV partners must ensure that their programs are relevant to farmers and rural communities. Flexible and diverse options, such as conservation easements, land purchases, leases, tax incentives, crop-choice incentives and other landowner-friendly alternatives, combined with landscape-scale policy and stewardship initiatives, are all key to program success. All of these land use incentives and adjustments are focused on achieving PHJV and NAWMP goals for continental waterfowl populations.

Since the 1970s, a period where North American habitat conditions were assumed to be adequate to support waterfowl populations at NAWMP goal levels, habitats have been in constant change. In the PHJV, landscape analyses suggest that for the five primary dabbling duck species (mallard, pintail, blue-winged teal, shoveler and gadwall), reproductive success has been affected by upland and wetland changes. Conversion of native prairie and other perennial cover habitats to annual cropland limits nesting success while ongoing loss of wetlands due to drainage, infilling and climate change is reducing the carrying capacity of the prairie pothole region. Combined, these impacts have reduced

the ability of the PPR to attract and produce waterfowl. PHJV is working to positively influence wetland and upland components of the PHJV landscape.

While conservation actions taken by PHJV partners result in conservation and restoration of habitat, they are but one of many influences, positive and negative, on waterfowl habitat. Understanding and accounting for these changes, and their potential impact on waterfowl populations, is a significant challenge to PHJV planners, one that is met by ongoing, landscape-based monitoring and evaluation initiatives.

In a landscape as vast and diverse as the PHJV, identifying target landscapes has been a key step in setting habitat objectives. PHJVs direct programs are targeted to landscapes where waterfowl breeding populations are estimated to exceed 30 pairs per square mile. Given the importance of northern pintail to overall PHJV objectives, priority landscapes should also have an estimated pintail population exceeding 6 pairs per square mile.

In the last decade, PHJV partners have created new conservation program approaches for the western boreal forest (WBF) region, found to the north of the PPR (Figure 1). The challenges in the WBF are uniquely different than the PPR: a much larger area at approximately 750 million acres, primarily government owned lands, more scattered distribution of ducks, and different species. In addition to supporting an annual average of about 10.7 million breeding ducks, WBF is especially important to lesser scaup and scoters, waterfowl species of concern. While there are significant differences in the nature of wetland and associated habitats, land use patterns and habitat stressors between the PPR and the WBF, there are significant spatial and biological linkages between these key regions from the perspective of mid-continent waterfowl populations.





Biological Foundation

Science - A Legacy of Learning

Sound waterfowl science has always been the foundation of the PHJV. The PHJV invests in science to reduce key uncertainties and adapt its conservation programs. The PHJV has conducted a series of programmatic evaluations (see Literature Cited, Devries et al. 2004 for a summary) and from between 1993-2000 conducted the PHJV Assessment--a comprehensive evaluation of the planning tools and the relative efficiencies of the various PHJV habitat programs. During the course of the Assessment, reproductive histories of >3,600 radio-marked female mallards were collected, fates of >19,000 duck nests were monitored, and the habitat selection and survival of >650 mallards broods were documented at 27 study sites with varying levels of PHJV habitat programs across Manitoba, Saskatchewan, and Alberta. This investment has provided information to facilitate adaptation of many habitat programs, allowed the development of 2nd-generation planning tools, and has resulted in >30 post-graduate theses and peer-reviewed scientific publications to date (see www.ducks.ca/conservation/research/publications/phjv/pdf/phjvpubs.pdf for a list).

Scientific evaluation of habitat programs and adaptive management continue to be hallmarks of the PHJV. PHJV science programs continue to help ensure conservation investments return good value. A sampling of recently completed and ongoing research projects follows:

Addressing key program uncertainties - SpATS

PHJV upland programs are based on the premises that (1) nesting success is the vital rate to which variation in duck demography is most sensitive, and (2) that nesting success is primarily determined by the amount of nesting cover on the landscape. Previous studies provided strong evidence to support the former assumption, but results to support the latter has been equivocal in the Canadian PPR, to date. We are evaluating this key assumption by monitoring nesting success on 120 41-km² study sites across Manitoba, Saskatchewan and Alberta stratified according to the amount of perennial cover they contain. Sites will be visited twice over the course of the study to allow partitioning of spatial and temporal variation. Data from this study are currently being used to update the PHJV conservation planning model.

We also just completed a mid-project review to assess whether continuing SpATS through 2012, as originally planned, is likely to contribute additional information commensurate with projected costs. One key result from SpATS thus far is that given similar wetness conditions, average duck nesting success in Prairie sites is greater than Parkland sites, and that in both biomes nesting success appears to increase with more perennial cover at about the same rate. While we need additional data to firm up our understanding of this relationship in the prairies, we have sufficient data already from parkland sites. Thus, we scaled back our investment in SpATS for 2009 by 50%, by focusing on only prairie sites, and will make a further 50% reduction in 2010. For more information about SpATS, visit www.ducks.ca/conservation/research/projects/spats/index.html

Species of Concern – Scaup, Scoters and Pintails

Scaup, scoters and northern pintail populations have declined substantially in the core parts of their breeding ranges over the last three decades, and breeding populations remained well below NAWMP goals in spring 2008. In accordance with advice provided during the Continental Assessment, we have undertaken several studies to attempt to elucidate the causes of these declines.

Two separate studies examined the influence of landscape attributes on pintail nesting. One study, conducted in the Milk River Ridge area of southern Alberta, examined settling rates, nest-site selection and reproductive success in landscapes with differing amounts of spring-seeded cropland. Results suggest that pintail densities and breeding success are greater on large grassland areas than in agricultural areas dominated by spring-seeded cropland. A second study conducted in southern Alberta and southern Saskatchewan relates nesting success to landscape attributes with a specific focus on fall-seeded cereals as a potential management action. Preliminary results suggest that fall cereals provide attractive and relatively secure nesting habitats for pintails. For additional details about pintail investigations, visit www.ducks.ca/conservation/research/projects/pintail/index.html

We initiated several multi-year studies examining leading hypotheses (e.g., spring condition hypothesis, contaminants hypothesis) about drivers of population declines for scaup and scoters in the boreal forest. Neither selenium levels nor body condition of boreal-breeding female lesser scaup appear to be sufficient explanations for current low populations (e.g., Devink et al. 2008a,b,c). Analyses of mark-recapture information for adult lesser scaup from northern boreal forest are ongoing. Additionally, we are in the final year of a decade-long study of white-winged scoter nesting ecology at Redberry Lake in central Saskatchewan.

In addition to individual studies, PHJV scientists have begun collaborating on new synthetic projects linking regional models that connect land use and reproduction with larger-scale models of pintail and scaup annual survival and recruitment. Together these models from breeding and wintering areas may form a new integrated framework for management of these species in Canada and the United States. These efforts for pintails and scaup are being led by the Pintail Action Group and Scaup Action Team, and PHJV science staff are directly involved in these initiatives.

Wetland Loss and Carrying Capacity of the Canadian PPR

Continued loss of wetlands has been estimated to be the primary factor affecting carrying capacity in the PHJV (Devries et al. 2004). We supported two studies examining the relationship between wetlands and breeding duck populations. The first examined broad-scale relationships between duck and pond counts from the USFWS/CWS-led Waterfowl Breeding Population and Habitat Survey (WBPHS), climate variables, and upland landuse changes based on US and Canadian censuses of agriculture. The second study developed predictive models of pair abundance using WBPHS data

and fine-resolution habitat data collected as part of the PHJV monitoring program (Bartzen 2008; library2.usask.ca/theses/available/etd-12212008-220138/).

Wetland Loss - EGS and Policy

Newly revised implementation plans reflect the impact of wetland conservation on accomplishing our population goals and demonstrate a renewed effort to retain existing wetland and restore wetlands where they previously have been lost. In addition to ongoing direct programs targeted at wetland conservation, public policy seems to afford an opportunity to realize gains in wetland protection and restoration. To support public policy debates, we have sponsored studies quantifying the social costs of wetland drainage through degraded water quality, increased flooding, and altered carbon budgets. We also are accelerating economic and social research related to natural capital policy matters and landowner adoption of conservation practices. For additional information, visit:

- www.phjv.ca
- www.ducks.ca/conservation/research/projects/broughtons/index.html

Other Vital Rates

Beyond nesting success, population dynamics of mallards are sensitive to variation in both adult (Devries et al 2003) and duckling survival (www.ducks.ca/conservation/research/projects/fellowships/pauline-bloom.html). In addition, two recent publications stemming from data collected on radio-marked mallards as part of the PHJV Assessment (1) examine how age and body condition affect nesting propensity (Devries et al. 2008), and (2) evaluate factors affecting the likelihood of re-nesting if a previous nest is lost (Arnold et al, *in press*).

Other Taxa

Forty-seven species of shorebirds are observed to breed or migrate through the prairies. At least two-thirds of these species are thought to be in decline (CWS, 2007). Currently, efforts are underway to develop conservation plans for shorebirds in the Prairie Provinces under the guidance of the PHJV; however, plans to meet the life-cycle requirements of shorebirds require better knowledge about population processes on the prairies. In concert with the SpATS and pintail nesting studies, we are gathering nest-site selection and nesting success data for 4 species of shorebirds (Willet [*Tringa semipalmata*], Upland Sandpiper [*Bartramia longicauda*], Long-billed Curlew [*Numenius americanus*], and Marbled Godwit [*Limosa fedoa*]); for which gaining a better understanding of factors that affect productivity has been identified as a priority action (Gratto-Trevor et al. 2001: Appendix C addendum).

Many species of grassland-nesting birds are undergoing sweeping population declines. Agricultural expansion and habitat fragmentation have been identified as potential causes of these declines. We supported a study to examine the effect of landscape composition on habitat selection of priority grassland birds. Species such as Sprague's pipit and Baird's sparrow are most abundant in large continuous parcels of native grasslands. However, these species will nest in planted grasslands in some regions, though the specific conditions under which this occurs are unknown. The goal of this research was to examine local and landscape factors that influence abundance of grassland passerines in native and planted grasslands. Preliminary results suggest that the abundance of the four most common species was related to both local management practices (native-grazed, tame-grazed and tame-hay) and amount of grassland within 800m of survey locations.

Integrated Landscape Management/PHJV Implementation Plan 2007-2012

Recently completed and ongoing PHJV evaluations have provided a wealth of information on the response of waterfowl to habitats and habitat changes across the PHJV (reviewed in previous section). One of the most important consequences of this work has been the development of the Waterfowl and Pintail Productivity Models (WPM, PPM). These spatially explicit models have allowed us to estimate how wetland and upland changes, and PHJV conservation programs specifically, have impacted duck production in the Canadian PPR. In this way, these tools provided the basis for the recently completed PHJV Provincial Implementation Plans outlining habitat objectives to support the NAWMP goal over the next 25 years.

Updating Habitat Objectives: How Much Have We Lost? and How Much is Enough?

Previously, Devries et al. (2004) described a process for updating PHJV habitat objectives that estimated the influence of wetland and upland changes on waterfowl productivity in the Canadian PPR from 1971 to 2001 (Figure 2). The year 1971 was chosen because it was an Agricultural Census year near the beginning of the period of NAWMP population objectives and 2001 was chosen as the most recently available (at the time) Agricultural Census of landscape conditions. Inclusion of habitats delivered under NAWMP since 1986 also were incorporated (Appendix D of Devries et al.



2004). Changes in waterfowl pair population carrying capacity over this time period were estimated using simulation models that converted wetland loss estimates at the province-ecoregion scale into change in population carrying capacity from 1971 to 2001 (Appendix E of Devries et al. 2004). This approach recognized that duck productivity from the region was impacted by both the amount of wetland habitat present (i.e., its carrying capacity for duck pairs) and the type and amount of upland habitat available for use by nesting female ducks. The difference between 1971 and 2001 productivity provided a “deficit” to be eliminated by PHJV action and formed the basis upon which habitat objectives could be set.

While conservation activities undertaken by PHJV partners result in restoration and protection of habitat, they are but one of many influences, both positive and negative, on waterfowl habitat. Understanding and accounting for these changes and their potential impact on waterfowl populations is the challenge to PHJV planners. Below, we provide a broad synopsis of current upland and wetland habitat status and trends from 1971 through 2006 as estimated from various sources (see also provincial PHJV Implementation Plans).

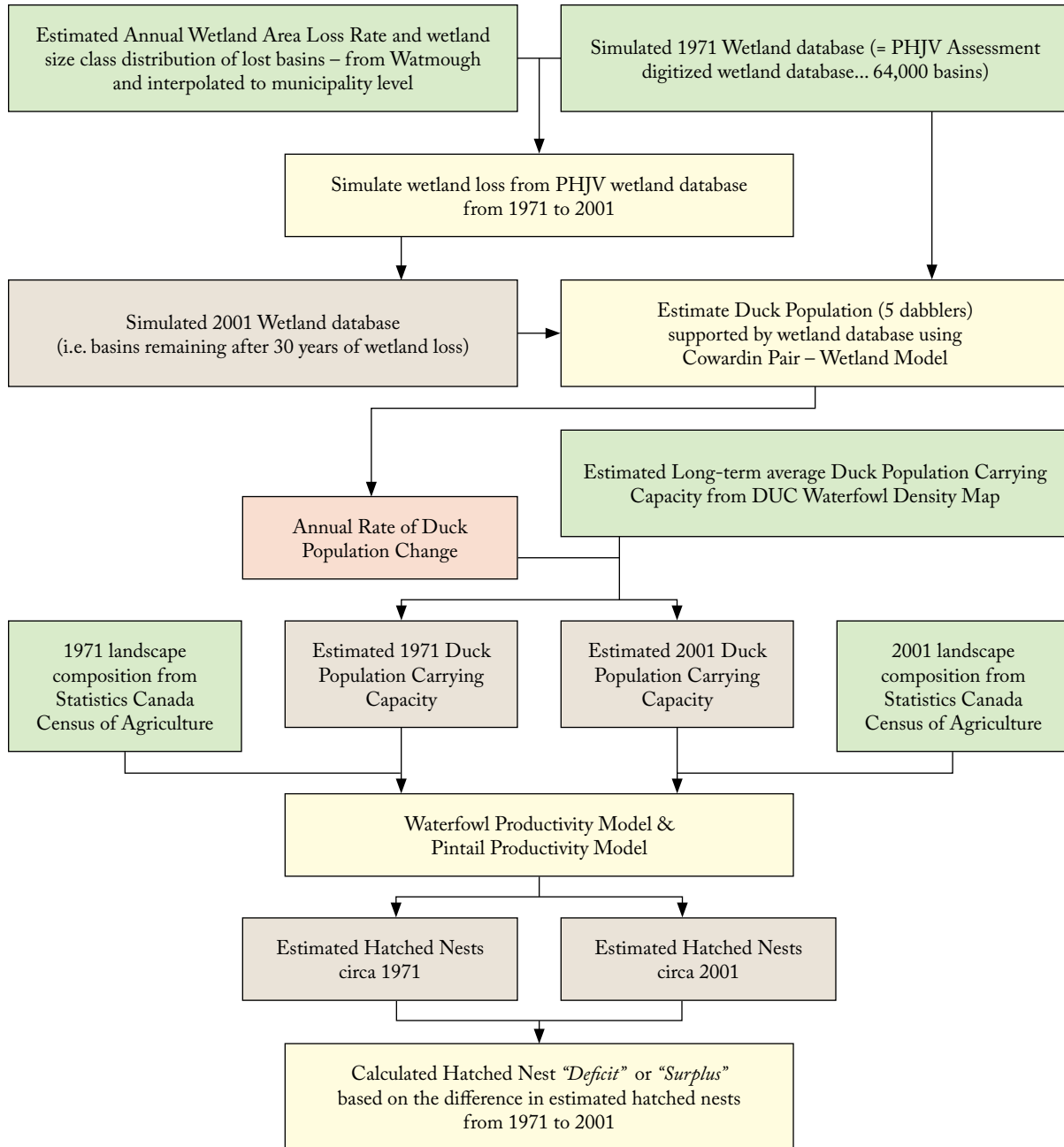


Figure 2. Process used to estimate change in waterfowl productivity potential (estimated hatched nests) at the municipality scale from 1971 to 2001.

Upland Habitat

For consistency in reporting, we primarily rely on Statistics Canada Census of Agriculture (Statistics Canada 2006) data to track broad upland change over time. Some portions of the Boreal Transition ecoregion along the northern PHJV boundary and the Alberta Peace Lowlands are not captured in this analysis. To capture general trends in land use from Census data, we extracted the acreage of spring crops, fall crops, summerfallow and hayland for each Consolidated Census Subdivision (i.e., municipality; Figure 3) within the Canadian PPR. The balance of upland area within CCSs was assumed to be “natural” (i.e., lands generally in grassland or woodland pasture and idle habitat

remnants). Hence, this analysis tracks cropland, summerfallow, hayland, natural, and tilled (cropland + summerfallow).

Upland change since 1971 is characterized by an increase in tilled land until ~1986 followed by a decline of ~10 million acres to levels considerably below those of 1971 (Table 1). Formerly tilled land has generally reverted to forage lands leading to observed increases in hayland and natural lands. Contributing factors to landscape change include removal of grain transportation subsidies in 1995, federal and provincial programs encouraging conversion of marginal cropland, and NAWMP programs. Further, expansion of the cattle industry has increased the demand for pasture and hayland forage. As of 2006, landscape composition of the PHJV planning area, excluding the Peace Lowlands was approximately 47% cultivated (seeded cropland or summerfallow), 44.3% grass/tree/shrub/wetland vegetation, and 8.2% hayland (Table 1).



Figure 3. Statistics Canada Census of Agriculture CCS units (municipalities) used to characterize landscape change in the PHJV planning area.

Table 1. Change in the four primary land use types composing the land base within the majority of the PHJV planning area, 1971, 1986, 2001, and 2006 (source: Statistics Canada Census of Agriculture).

Land use	Acres within the the PHJV planning area ^a			
	1971	1986	2001	2006
Summerfallow	23,518,601	18,557,972	10,464,029	7,841,333
Spring/Fall-seeded Cropland	41,007,513	50,346,640	52,328,805	49,814,256
Tilled (sum of above)	64,526,115	68,904,612	62,892,834	57,655,589
Hayland	3,949,547	4,596,159	8,167,833	9,906,601
Natural ^b	52,953,159	47,928,050	50,368,153	53,866,630

^a see Figure 3 for covered portion of the PHJV planning area.

^b calculated as the balance of uplands that are not tilled or hayland (includes grazed and ungrazed grassland, woodlands, shrublands, and wetland vegetation)

An important caveat to the above trend in ‘natural’ land is that while these lands have increased since 1986, the native prairie grassland component has continued to decline. Native grasslands declined by ~10% within the PHJV from 1985-2001 (Watmough and Schmoll 2007). Native prairie is a unique and valuable habitat component that, once lost to cultivation, is virtually impossible to restore. Initial analysis suggests the risk of native prairie loss is influenced by patch size (higher for smaller patches), land ownership (higher on privately owned), and soil characteristics (higher for land productive as cropland).

Winter wheat is of specific interest to waterfowl managers given its use for nesting by most species of dabbling ducks. PHJV partners have been very active in supporting winter wheat variety development and promoting this crop type as a viable alternative to spring-seeded wheat. Winter wheat has seen strong gains within the PHJV since the early 1990's, most notably in southeastern Saskatchewan and Manitoba. Approximately 1.2 million acres of winter wheat were grown within the PHJV planning area in 2006 and current trends are strongly upward.

Land use change not captured in the above analysis includes changes along the northern PHJV boundary generally within the Boreal Transition ecoregion. Land use change in these areas has been substantial since the early 1970's. Typically, expansion of agriculture into the boreal fringe results in large decreases in forest cover and wetlands in these areas (e.g., Hobson et al. 2002, Cumming et al. 2001). Deforestation rates in this region have been estimated at approximately 1% per year (Hobson et al. 2002, Cumming et al. 2001). From 1985 to 2001 in the Boreal Transition ecoregion, cropland decreased by ~11%, tame pasture increased by ~112%, hayland increased by ~116%, and treed habitat decreased by ~4% (Watmough and Schmoll 2007).

Wetland Habitat

Wetland habitat as a percent of the landscape shows much regional variability across the PHJV planning area (Fernandes et al. 2001; Figure 4) resulting in landscapes of varying quality as waterfowl habitat. Excluding large lakes and riverine systems, Watmough and Schmoll (2007) estimated that the PHJV planning area (excluding the Peace Lowlands) contained ~11.3 (± 1.1) million wetland acres. Generally, wetland habitat becomes more prevalent moving from the grasslands to the parklands and into the boreal fringe regions. This occurs in conjunction with a change from small potholes and sloughs to larger lake, marsh and bog systems further north.

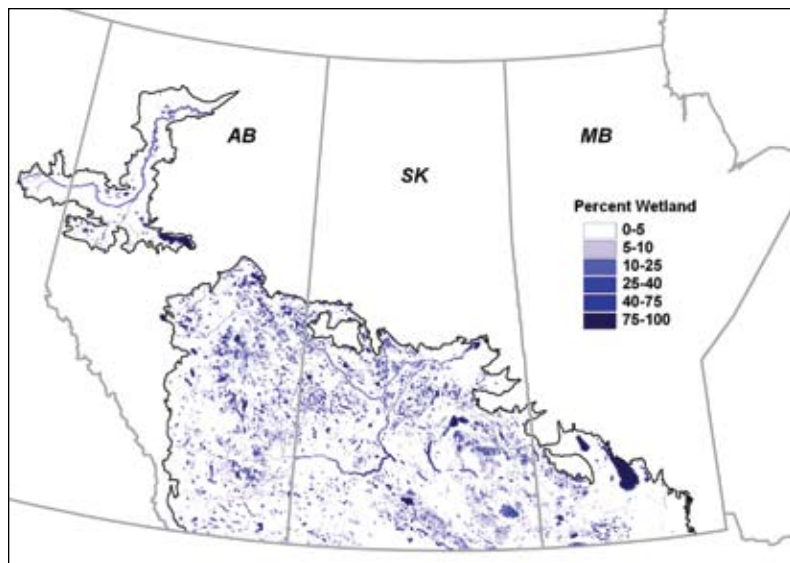


Figure 4. Percent wetland area by 1km x 1km grid cell within the PHJV planning area (source: Fernandez et al. 2001).

Estimates of wetland loss since settlement are scarce and fraught with methodological issues (e.g., drought influence) that confound regional generalizations. Prairie-wide, Goodman and Pryor (1972) reported a decrease of 13% in wetland area between 1940 and 1970 within the Aspen Parkland ecoregion. Watmough and Schmoll (2007), examining wetland loss on 141 transects within the PHJV boundary, indicated an overall gross loss of 5% of wetland area from 1985 to 2001 (-0.31%/year) or ~560,000 ($\pm 47,000$) acres. Wetland area lost varied among transects from 0 to 61% and these figures are expected to be conservative given the strict definition of wetland loss applied. Wetland loss varied also among ecoregions; Boreal Transition -5%, Aspen Parkland -5%, Moist Mixed Grassland -4%, Mixed Grassland -8%, Fescue Grassland -5%, and Lake Manitoba Plain -5% (Watmough and Schmoll 2007).

In provincial PHJV Implementation Plans, a process was developed to estimate wetland loss rates at the municipality scale within the PHJV planning area. The process used the segment-specific wetland loss rates measured by Watmough and Schmoll (2007) on 141 May Breeding Waterfowl Survey segments between 1985 and 2001. Loss rates were generally applied to municipalities containing segments and estimated for

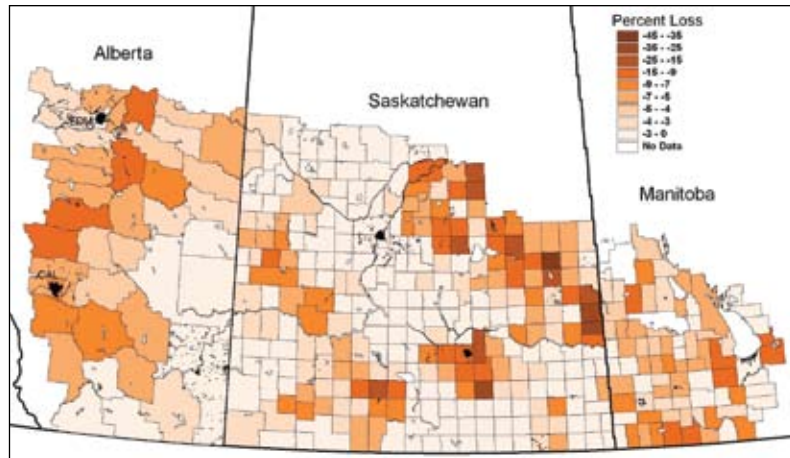


Figure 5. Estimated municipality-specific wetland loss rates for the period 1985-2001.

other municipalities using modeled relationships (MB) or rankings (SK) with provincial wetland drainage license databases in conjunction with PHJV partner expert opinion (Figure 5). Municipality-specific loss rates in Alberta were based on simple interpolation among measured segments only. High wetland loss rates are generally common in areas of high wetland density and hence the impact on waterfowl carrying capacity is significant. While highly variable across the PHJV, overall wetland loss rates have shown no sign of abatement over the last several decades (Watmough and Schmoll 2007) and this presents a significant challenge to the PHJV.

Impact of Changes on Duck Productivity

Following the methodology of Devries et al. (2004), waterfowl production deficits (or surpluses) were recalculated through 2006 at the municipality scale using the upland change information above and municipality-specific wetland loss estimates. To update deficit calculations, Census of Agriculture data was first converted into categories used in the Waterfowl and Pintail Productivity Models. Methods followed those outlined in Appendix D of Devries et al. (2004) and included estimation of suppressed acres and unreported habitats (e.g., woodlands). PHJV program acres were tallied by municipality and program type and attributed to appropriate categories. For example, PHJV ‘delayed hay’ acres were assumed to be captured by ‘hayland’ reported in the Census and hence, these acres were removed from ‘hayland’ and added to a new category “delayed hay”. Planted nesting cover acres were removed from the ‘natural-idle’ pool and a new “DNC” (Dense nesting Cover) category was added. Existing natural land ‘secured’ (through Easements, leases, etc.) was documented as being part of the existing pool of Natural or Wooded, Idle or Grazed, depending on the information provided.



We ran the Waterfowl and Pintail Productivity Models on all municipalities for each of the 4 time periods and estimated PPR-wide changes in breeding pairs as influenced by wetland loss and changes in overall hatched nests (Table 2).

While wetland loss resulted in an estimated decrease in waterfowl carrying capacity of just under 100,000 pairs from 2001 to 2006, upland changes substantially reduced the hatched nest ‘deficit’ from ~150,000 to ~113,000 hatched nests (Table 2; Figure 6). Without PHJV influenced habitat on the ground in 2006, the annual hatched nest deficit would be ~ -148,000 or ~ 35,000 fewer hatched nests than estimated with PHJV habitat program (Table 2; Figure 6). Hence, PHJV program has decreased the projected deficit by approximately 24% as of 2006.

Table 2. Estimated pair population (mallard, gadwall, blue-winged teal, shoveler, pintail), estimated hatched nests, and estimated productivity ‘deficits’ (relative to 1971) for 1971, 1986, 2001, and 2006 across the Canadian PPR.

Year	1971	1986	2001	2006	2006 (no PHJV)
Est. Pair Population ^a	4,248,904	3,920,602	3,662,897	3,564,018	3,564,018
Total Hatch	1,160,897	1,034,522	1,009,426	1,047,874	1,012,709
Deficit ^b	0	-126,376	-151,472	-113,024	-148,189

^a decline in pair population over time is a result of modeled effect of wetland loss on carrying capacity.

^b relative to 1971 Total Hatch.

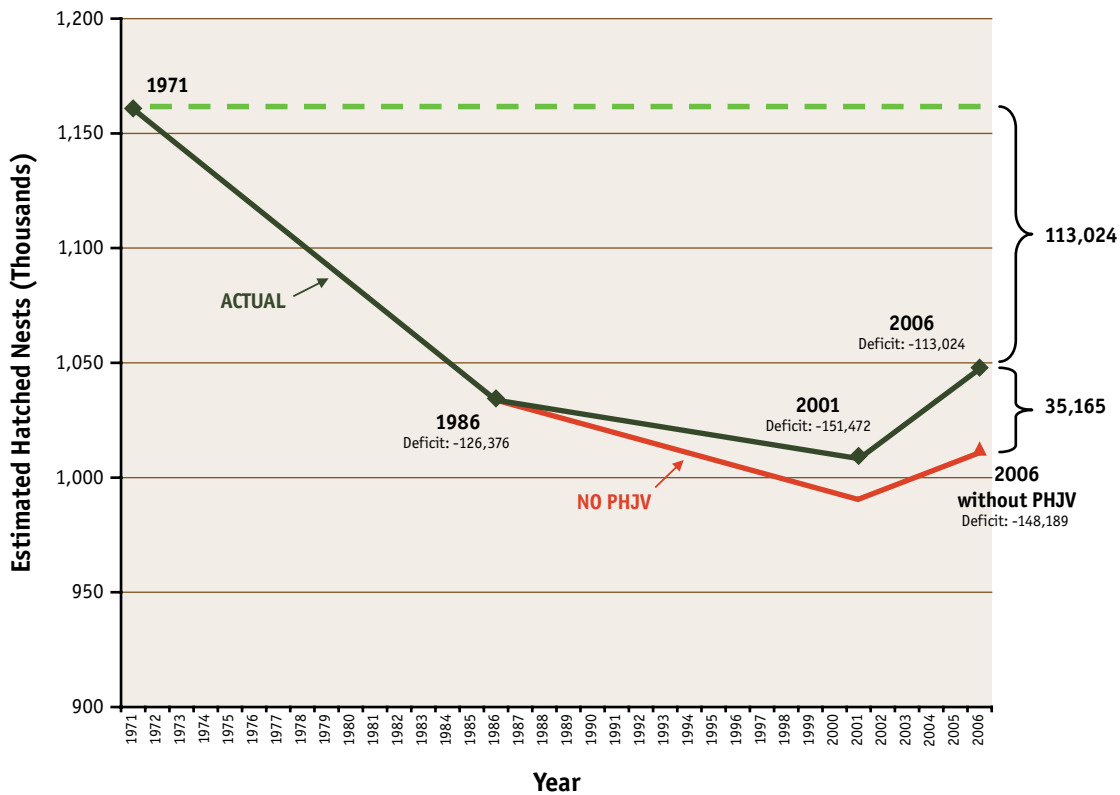


Figure 6. Estimated hatched nests in 1971, 1986, 2001, and 2006 (green line), and projected hatched nests in the absence of PHJV habitat influences (red line). ‘Deficits’ are indicated relative to hatched nest levels of 1971 (green dashed).

Setting Habitat Objectives – Removing the Deficit

Target Landscapes

To reduce hatched nest deficits is the objective of the PHJV habitat objective setting process. Because waterfowl are not uniformly distributed on the landscape, we defined regions where the most waterfowl in general (or in some cases specifically pintails) could benefit from PHJV activities. Hence, we defined target landscapes based on estimated breeding pair density as per the Waterfowl and Pintail Breeding Pair Distribution maps developed by Ducks Unlimited Canada. Target Landscapes were defined as areas with long-term average waterfowl pair densities ≥ 30 pairs/mi² of the seven primary waterfowl species in Prairie Canada (mallard, gadwall, blue-winged teal, northern shoveler, pintail, redhead, canvasback) and areas estimated to have ≥ 6 pairs/mi² of pintails alone (Figure 7). In some instances, Target Landscape boundaries were modified based on local knowledge. Non-Target Areas were defined as all areas outside Target Landscapes but within the traditional PHJV boundary excluding the Peace-Boreal.

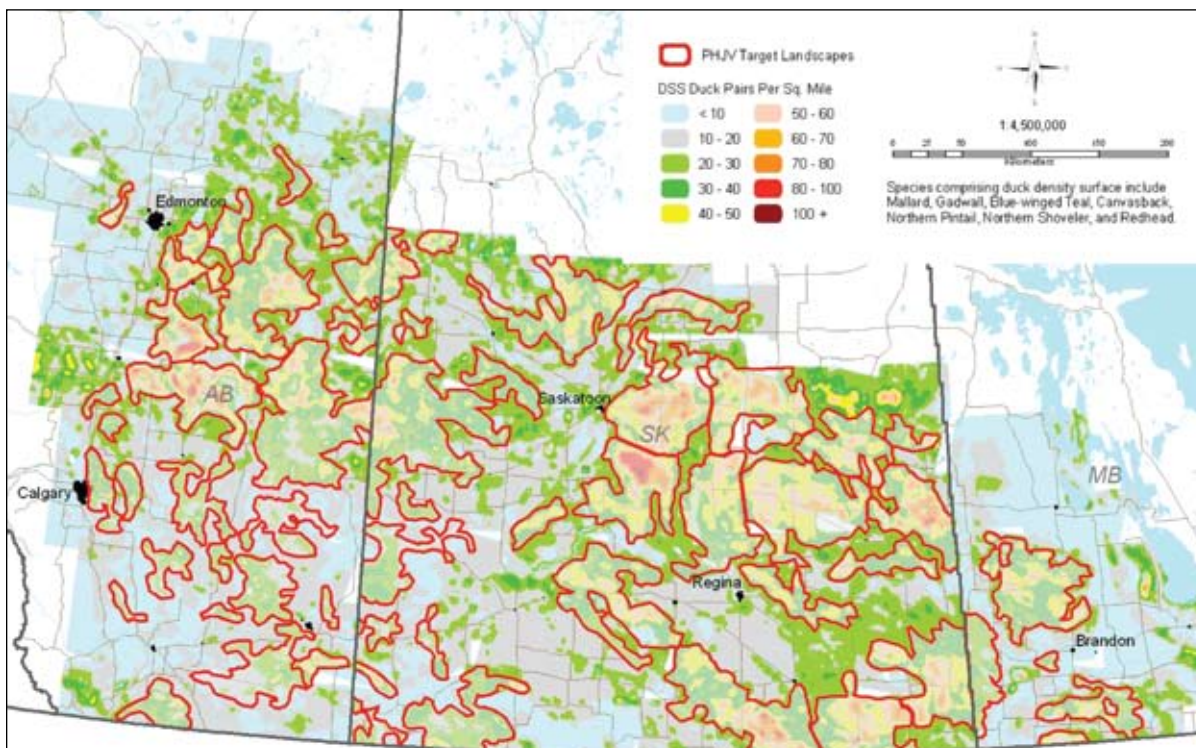


Figure 7. Location of Target Landscapes within the PHJV delivery area. Target Landscapes represent areas of ≥ 30 pairs/mi² of the seven primary breeding waterfowl species and ≥ 6 pairs/mi² of pintails as indicated by underlying DUC Waterfowl Breeding Pair Distribution (“thunderstorm”) map. Map courtesy of Ducks Unlimited Canada, August 18, 2008

Habitat Objective Setting Process

We first attributed productivity deficits (or surpluses) from municipalities to Target Landscapes and Non-Target Areas relative to the proportion of the local waterfowl population falling within and outside the Landscape. Specific wetland and upland habitat restoration objectives were then set based on a series of simulation runs of the WPM and PPM with a minimum objective of removing productivity deficits over the 25 year planning horizon. Landscape change scenarios involving both prescriptive and non-prescriptive influences both within Target Landscapes and in Non-target Areas.

All scenarios included the influence of existing wetland loss rates continuing for a further 10 years (i.e., increasing deficits to 2011) after which we assumed wetland loss would have been stopped by policy efforts.

Scenarios were reviewed by Provincial Implementation Teams and individual habitat change scenarios were selected with the objective of eliminating provincial deficits in hatched nests (1971-2001) for the 5 dabbling duck species. Scenarios examined included;

1. wetland restoration with the assumption that basins restored would match the size class distribution of wetlands most frequently drained (as per Watmough data),
2. conversion of cropland to hayland or tame pasture,
3. adoption of winter wheat into cropping rotations,
4. conversion of cropland to planted nesting cover (DNC), and
5. delivery of nesting tunnels (Manitoba only).

Habitat objectives reflect the following habitat changes within and outside target landscapes.

Wetland Restorations - The number of basins set as the restoration objective for each Target Landscape was generally a function of landscape size, historic wetland loss, and the percentage of cropland present. Target areas with higher historic loss have higher wetland restoration objectives for their size and target areas with less cropland will have relatively higher objectives than those with much cropland. The rationale here was to avoid attracting ducks back into landscapes thought to have lower recruitment potential.

Adding Hay and Pasture - Cropland conversion to hay and pasture (at a fixed ratio of 60% pasture/ 40% hay) was estimated based on projections of cropland conversion from the 1996-2001 cultivated acre (crop + summerfallow) trend observed in the Census of Agriculture for each Rural Municipality. The observed rate of change in each municipality was assumed to continue for a further 10 year period after which cultivated acres were assumed to remain unchanged for the balance of the planning horizon. Estimated change by Target Landscape was determined based on an area-weighted balance of change among the portions of municipalities falling within a given Target Landscape.



Winter Wheat - To estimate the potential for winter wheat acres, we projected the current growth trend in acres across the prairies out to 25 years. Based on the projection, an estimated 15-20% of all wheat acres would be winter wheat varieties at that point in time. In each municipality we therefore set the objective as the percent of the Target Landscape in winter wheat when winter wheat made up 15-20% of all wheat acres currently grown (we assumed that overall wheat acres would remain relatively constant). Linking potential winter wheat acres as a percent of all wheat acres currently grown gives us a way to vary the acres spatially in a realistic manner. Estimated potential winter wheat acres in each Target Landscape and in Non-target Areas were attributed as described for hay and pasture. Based on the opinion of DUC's Regional Agrologist, the maximum potential for winter wheat is likely ~30% of all wheat acres.

Planted Nesting Cover (DNC) - We generally set 1.0% of the Target Landscape as the upper (realistic) limit for conversion of cropland to planted nesting cover. Where current levels exceeded 1.0%, no further additions were made. Where planted nesting cover currently exists at levels below 1.0%, addition of the balance was set as the objective. Exceptions to this occurred in Alberta where planted nesting cover was planned for only 2 landscapes. No planted nesting cover was added in Non-Target Areas.

Nest Tunnels - Nest Tunnels were only planned for landscapes in Manitoba. A greater emphasis on tunnels has not been made given that tunnels do not address some of the broader habitat issues most detrimentally affecting waterfowl production.

A Landscape Example

In the Kimoff Landscape of Saskatchewan, wetland loss and upland change was estimated to have decreased waterfowl production from the early 1970's by approximately 851 hatched nests. To restore the productive capacity of this landscape, a series of scenarios were run through the Waterfowl and Pintail Productivity Models to estimate the gains from various combinations of habitat conservation actions. The selected conservation plan for the Kimoff landscape included:

- Restoration of 919 wetland basins (+ 261 hatched nests)
- Conversion of 8,270 acres of cropland to hayland (+148 hatched nests)
- Conversion of 12,410 acres of cropland to pasture (+214 hatched nests)
- Adoption of 8,260 acres of winter wheat (+135 hatched nests)
- Planting of 1,910 acres of Planted Nesting Cover (+93 hatched nests)
- Total increase in hatched nests from this landscape plan was 851 hatched nests.

Achieving the wetland restorations and upland changes projected in the Kimoff landscape plan will contribute to sustained waterfowl production at 1970's levels, and hence achieve the NAWMP and PHJV goals provided that wetland loss can be curtailed in the near future.



2007-2012 Habitat Objectives (from Implementation Plan Summary)

The Waterfowl Productivity Model was applied to all target landscapes in the PHJV to prescribe conservation programs that would restore the protective capacity of the entire PHJV area. A 25-year planning horizon was used, with specific objectives for an initial 5-year implementation plan. The results of this planning exercise are identified in Table 3. Based on current program delivery costs, a 5-year expenditure forecast was developed.

Table 3. PHJV five-year habitat objectives and expenditure forecast relative to the 25-year habitat objectives.

Habitat Restoration	25-Year Habitat Objective Acres	5-Year Objectives Acres					% 25-Year Habitat Objective	Total 5-Year Expenditure Forecast
		Direct NAWMP	Extension NAWMP	Policy NAWMP	Industry Trend *	Total		
Winter Wheat	2,759,300	194,500	401,900	-	-	596,400	22%	\$ 5,492,000
Tame Pasture	4,235,800	234,100	91,000	-	511,300	836,400	20%	\$ 12,239,000
Tame Hay	2,824,400	179,700	64,000	-	332,000	575,700	20%	\$ 9,689,000
Planted Cover	79,200	8,800	-	-	-	8,800	11%	\$ 17,553,100
Wetlands **	278,200	7,000	-	3,800	-	10,800	4%	\$ 9,557,300
Nesting Tunnels (structures)***	2,200	800	-	-	-	800	36%	\$ 223,000
Restoration Subtotal	10,176,900	624,100	556,900	3,800	843,300	2,028,100	20%	\$ 54,753,400

Habitat Retention	25-Year Habitat Objective Acres	5-Year Objectives					% 25-Year Habitat Objective	Total 5-Year Expenditure Forecast
		Direct NAWMP	Extension NAWMP	Policy NAWMP	Industry Trend *	Total		
Wetland	2,867,600	53,900	14,400	1,372,000	-	1,440,300	50%	\$ 13,497,100
Upland ****	2,847,200	315,100	108,000	-	-	423,100	15%	\$ 65,440,000
Retention Subtotal	5,714,800	369,000	122,400	1,372,000	-	1,863,400	33%	\$ 78,937,100
Support Activities								
Policy								\$ 7,056,300
Management								\$ 36,894,500
Research and Evaluation								\$ 18,855,800
Communication								\$ 7,465,300
Coordination								\$ 25,740,500
Support Activities Subtotal								\$ 96,012,400
Grand Total	15,891,700	993,100	679,300	1,375,800	843,300	3,891,500		\$ 229,702,900

* An estimate of change of specific land use types based on current, broad-scale data (Ag Census).

** Assumes small basins are primary restoration target (range 0.5-1.0 acre, average 0.75 acre)

*** No additional acres are associated with nesting structures (i.e. excluded from totals).

**** May include tame or native grass acres

Gap Analysis

An analysis of the 2007 – 2012 PHJV Implementation Plan expenditure forecast indicated that additional funds over and above levels of funding experienced during Fiscal Year 2008 (April 1, 2007 to March 31, 2008) would be required to meet the objectives outlined in the plan. Amounts varied by province but overall approximately \$33 M extra are required over the five-year period of the plan. At the same time delivery of certain habitat programs will also need to be ramped up in order to accomplish the objectives. Most notably, habitat delivery agencies need to increase the wetland restoration program over the period of the plan.

The habitat objectives of the PHJV are based on two major planning assumptions:

1. Wetland loss will be curtailed in the next 10 years.
2. The perennial cover currently on the PHJV landscape will remain.

To ensure these assumptions are met, the PHJV has set these as the main focus of our policy efforts. All habitat restoration programs except wetland restoration are well on track to meeting 20% of the 25-year objective in the next five years. Clearly developing new wetland restoration tools needs to be a focus on the PHJV partnership if we are to achieve our wetland restoration goals over the long term.

It should also be noted that wetland retention at the level projected in the next 5 years is highly dependent on the implementation of wetland protection policy in Alberta.



Policy Leadership

Achieving the PHJV habitat goals will require policy initiatives in addition to stewardship and direct programs. PHJV policy leadership is shared between the PHJV Policy Committee and action with Provincial NAWMP Boards and Committees and will effect change through actions of government policy and programming at the municipal, provincial, territorial and federal levels. The emphasis will be on provincial jurisdictions for wetlands.



PHJV policy initiatives are guided by science and focused on the habitat objectives of stopping further wetland loss; restoring small basin wetlands; stopping further loss of native grasslands; and restoring function of upland habitats. Effecting change on private agricultural lands in the prairie and parkland regions of Alberta, Saskatchewan and Manitoba will be critical. Most critical to the PHJV Implementation Plan 2007-2012, are the retention of existing wetlands coupled with the restoration of drained wetlands.

In the initial five years, the overall wetland retention objective is over 1.4 million acres or 50% of the 25-year objective. Policy change is forecast to account for retention of 1,372,000 acres of wetlands. As wetland retention is increased, restoration of wetlands will be progressively expanded to a five year objective of 10,800 acres of which 3,800 acres are forecast to result from policy change. Measuring the effect of policy leadership will be an important challenge for the PHJV.

Policy Needs

Current opportunities exist to link PHJV habitat objectives with government policies for broader sustainable land and water strategies plus climate change strategies and carbon sequestration, in addition to emerging policies for market-based ecological goods and services. The potential exists to develop new partnerships with governments, industry and NGOs, and thereby contribute to policy change and implementation of new programs.

In response to the *PHJV Science and Policy Forum 2008*, the PHJV developed a *Prescription for Action on Wetland Conservation* that calls for:

1. Improved national leadership of the North America Wetlands Conservation Council (Canada) to support provincial wetland policy and programming by:
 - Completing efforts begun under the Canadian Wetland Inventory,
 - Providing scientific expertise on wetland functions,
 - Establishing a consistent definition of wetlands,
 - Contributing to the development and evaluation of market-based incentives,
 - Increasing the understanding of environmental benefits from wetland conservation,
 - Sharing information to support cross-jurisdictional development of wetland policy, and
 - Building a knowledge network and communicating the benefits of wetlands to resource agencies and the public.
2. A stronger national leadership role by the Government of Canada for wetland conservation on federal lands that moves beyond no net loss to recovery of wetlands.
3. Leadership in the development and implementation of Canada's National Water Strategy and

in the inclusion of wetland restoration and retention as part of *Growing Forward*, Canada’s new agricultural policy framework.

4. Development and implementation of water and land use strategies that include wetland policy in the three Prairie Provinces of Alberta, Saskatchewan and Manitoba. The PHJV supports the development of water strategies that conserve wetlands as part of efforts to improve water quality and to help mitigate and adapt to the impacts of climate change.
5. Communication among the Prairie Provinces/Territories and the Federal government regarding wetland policy and programming. Where applicable, consistency in programming can provide synergy in delivery of components such as mitigation.
6. Mitigation sequences embedded within wetland policy that stress avoidance and minimization before moving to compensation of impacts that cannot be avoided or minimized.
7. Coordinated science programs to both regularly monitor the abundance and condition of wetlands and to undertake research to inform wetland policy development.

Policy Actions

Policy actions align with the PHJV Implementation Plan. Actions completed to date and proposed include:

Objectives	Specific Activities
Federal and provincial wetland policy for Prairie Canada (focus on retention, restoration and wetland values)	<p>Funded research and technology transfer to watershed planners and policy makers for a Prairie Hydrology Model with Application to Effects of Land Use Changes, Wetland Drainage and Wetland Restoration</p> <p>Strengthening provincial and federal wetland policy and NAWMP programming through partnerships (governments of Canada, Alberta, Saskatchewan and Manitoba). For example, April 15, 2009 a joint meeting of NAWMP and the Government of Alberta increased awareness and understanding of NAWMP; reviewed environmental strategies and programs ; and identified opportunities for NAWMP to improve integration with the Government of Alberta initiatives.</p> <p>Investigation of the potential for a wetland policy research study to develop a methodology to measure the impact of wetland policy change on wetland retention and restoration in Prairie Canada</p>
Ecological goods and services policy development	<p>National Ecological Goods and Services Technical Meeting, April, 2009 in Ottawa (Agriculture and Agri-Food Canada with PHJV and EHJV) focusing on results of Canadian pilot projects and other studies. Over 100 participants from agriculture and environmental sectors, representing 62 organizations. Proceedings will be posted on the PHJV website.</p> <p>Investigation of potential contributions to the design and funding of a market-based ecological goods and services initiative for prairie wetlands and surrounding natural lands.</p>
Promoting policies that support sustainable land and water use management (potential initiatives)	Proposed: PHJV to explore the development of various workshops to engage partners in agriculture and other policies to advance NAWMP goals.

Accomplishments

Since 1986, the PHJV has been actively securing and influencing millions of habitat acres. Of the 6.6 million acres secured, 671,826 acres are permanently protected while the remainder have minimum 10 year agreements (Table 4). Influenced acres are areas of habitat voluntarily managed as waterfowl habitat with no binding agreement.

Table 4. PHJV acre accomplishments by Securement and Stewardship programs in the Prairie/Parkland and Western Boreal Forest from 1986 to 2008.

Prairie/Parkland Securement Type	Existing Acres	Western Boreal Securement Type	Existing Acres
Conservation Agreement	3,534,589	Conservation Agreement	153
Conservation Easement	284,914	Conservation Easement	0
Cooperative Land Use Agreement	2,007,458	Cooperative Land Use Agreement	0
Crown Land Transfer	24,004	Crown Designation	4,200,000
Fee Simple Acquisition	357,958	Fee Simple Acquisition	107
Land Donation	4,950	Non Acquisition Other	0
Lease Agreement	66,378	Sub-Total Securement:	4,200,260
Non Acquisition Other	0	Western Boreal Stewardship Type	Existing Acres
Sub-Total Securement:	6,280,251	None	30,842,586
Prairie/Parkland Stewardship Type	Existing Acres	Sub-Total Stewardship:	30,842,586
None	6,628,032	Total WBF:	35,042,846
Sub-Total Stewardship:	6,628,032	Grand Total:	Securement
Total PHJV:	NA*		10,480,511
			Stewardship
			37,470,618

*secured and influenced acres in the Prairie/Parkland may not be exclusive and therefore cannot be added.

The PHJV outlined new habitat objectives in the PHJV Implementation Plan 2007-2012. Currently, the Joint Venture is developing the most appropriate mechanism for tracking and reporting achievements towards these new objectives.

PHJV Operations

The NAWMP Continental Assessment recommendations reaffirmed the importance of the mid-continental prairies and the need for “greater progress, and therefore substantially more diverse and leveraged funding, is needed in breeding areas...”. Maintaining a strong partnership and increased emphasis on communications and funding are key components to the PHJV and to the NAWMP partnership continentally. While there is agreement in Canada to ensure the breeding areas are maintained as the highest priority in terms of existing allocations, the key message is that more new resources are required across all joint ventures to achieve success in NAWMP.

PHJV Partnership

PHJV partners continually strive to engage new partners and seek new funding. 17,000 landowners and over 400 partners participate in the PHJV. The PHJV structure (Figure 8) is designed to address the key elements for optimal success in reaching NAWMP goals. This structure is periodically reviewed and adjusted to meet new challenges and opportunities. Most recently, Bird Studies Canada has been invited to participate on the PHJV Advisory Board.

Key operational documents are important in the JV to engage partners and clarify actions and roles. Key documents for the PHJV include the PHJV Implementation Agreement, the Strategic Plan, the Regional and Provincial Implementation Plans, a set of common values agreed upon in the PHJV Partnership Charter, and JV committee work plans. Operational documents will be updated regularly, and new ones developed as appropriate. This will ensure JV priorities and programs are clearly identified, JV partner roles are clarified, and JV committee work is prioritized and focused.



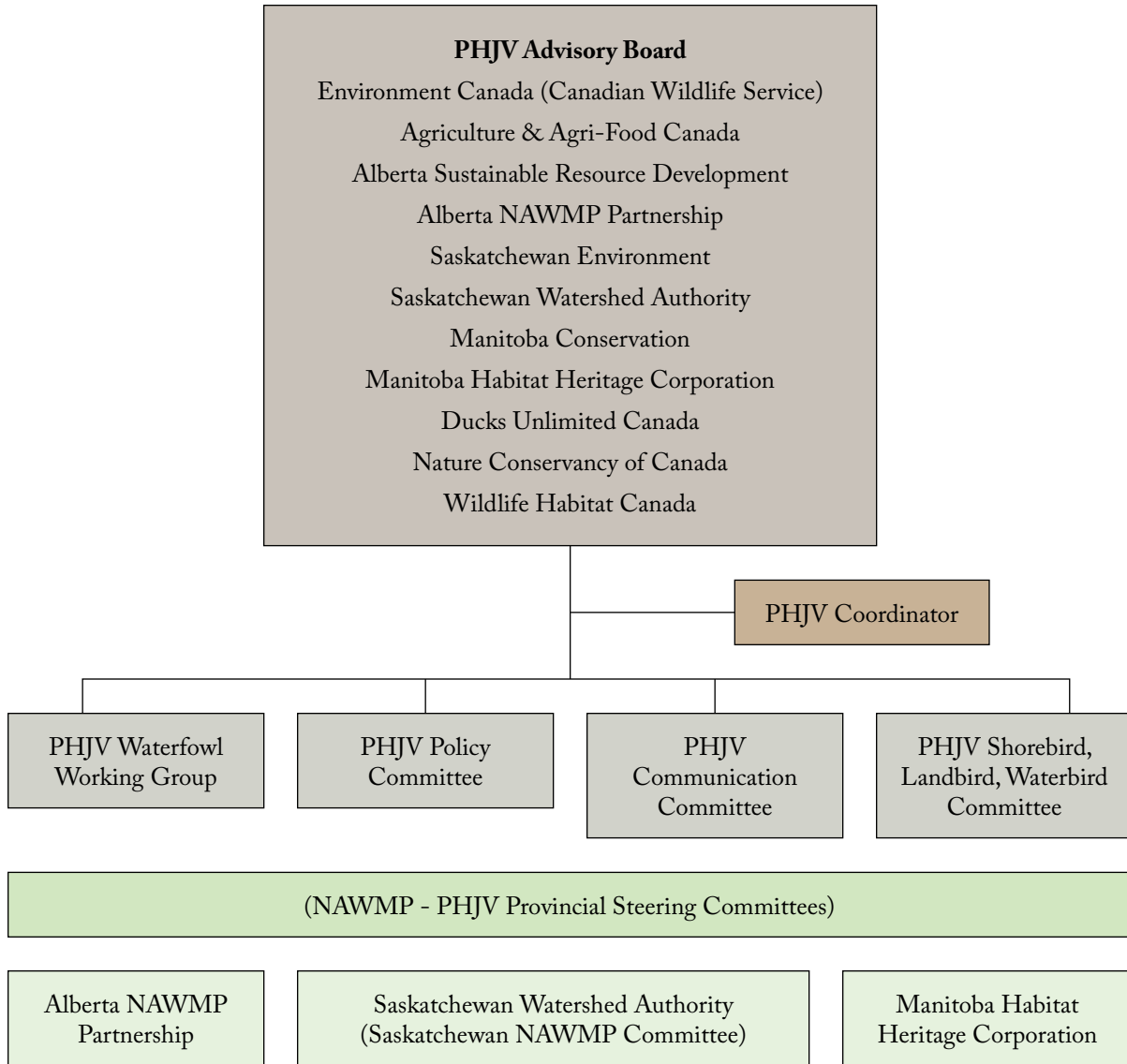


Figure 8. PHJV Organization Structure

Communications

The PHJV identified increased emphasis on communications as an important component of the 2006-2011 Strategic Plan and in recent years, has significantly stepped up efforts to address a number of communications and marketing issues and opportunities. The results of the investments made through the Joint Venture need to be deliberately communicated to those who have the ability to directly influence the health of the landscape and the viability of waterfowl populations, other birds and biological communities. It is equally important that funding partners know how their contributions have affected or can affect conservation. The breadth and strength of the partnership also provides an important opportunity for the JV to present views on critical issues influencing the prairie and boreal landscapes. In addition to the recent completion of the Provincial and Regional Implementation Plans, which are described in detail above, a number of other tools and initiatives have been implemented to address these key communications elements and the Assessment recommendations.

The PHJV Communications Committee, through the development of a Communications Plan, 2007, and annual work plans, has identified and carried out specific actions, some highlighted as follows:

Products:

- **Fact Sheets:** The PHJV developed a fact sheet series in early 2007, to address a number of requests for more clarification on the PHJV program. The accomplishments fact sheet from that series was updated in 2008, and future updates will be developed periodically.
- **Website:** The PHJV website is another important tool in communicating the comprehensive and balanced “tool kit” of the PHJV, providing an overview of the program for general audiences and accessibility to more detailed program materials for all partners.
- **Map:** The PHJV map provides a comprehensive visual of all the projects to emphasize the breadth and magnitude of the program.

Implementation Plan Summary: This brief summary of the detailed Implementation Plan was developed to provide information to a much broader audience base.

Direct Interactions: Regular face to face meetings and site visits with our key partners is critical to common understanding of goals and objectives, program activities and accomplishments. PHJV is striving to utilize as many opportunities as possible to engage in meaningful discussions with partners in the United States and Canada. Recent examples include:

- Joint United States/Canada NAWCC Council Staff meetings provide an excellent opportunity to provide detailed information, address specific questions and increase the understanding of the Canadian and PHJV program. PHJV partners are actively involved in these meetings, developing materials, hosting field site visits, etc.
- PHJV updates at the AFWA Waterfowl Working Group, spring and fall, allow the PHJV to highlight current program activities. March, 2009 the PHJV highlighted the regional implementation plan and September, 2009 the emphasis will be on policy initiatives.
- Prairie Pothole Joint Venture. PHJV/PPJV meetings, at the board level and issue specific, are held periodically, however closer involvement for issues of common concern would be beneficial.
- PHJV updates at Flyways will occur this summer, and more regularly than in the past.
- North American Duck Symposium is a tremendous opportunity to discuss science and program elements with the broader waterfowl science community. PHJV Science Chair will be onsite with the PHJV display, handout materials, and PHJV map.
- NAWMP Plan Committee (August 2009) and U.S. NAWCC Council (July 2010). PHJV welcomes these opportunities to showcase PHJV programs and discuss regional, national and international challenges and opportunities for NAWMP continentally.
- All Canadian JVs work together annually to prepare a presentation to U.S. NAWCC Staff, provide input to the annual Canadian Habitat Matters, host Canada Night, and work independently and collectively through a variety of other meetings to provide valuable information to a wide variety of partners.
- **Special Workshops:** The PHJV has hosted a number of science and policy forums and will continue to do so as opportunities and needs arise. These sessions provide added value of renewed energy for the PHJV to lead, make new contacts, to promote publicly, and to educate.

Addressing the Western Boreal Forest

The Western Boreal Forest (WBF) has been acknowledged as second only to the Prairie Pothole Region as an important waterfowl breeding area. The WBF is unique in that the vast majority of its land base is owned by the Canadian federal government, provincial or territorial governments or by First Nations governments.

The Western Boreal Forest Program, led by Ducks Unlimited Canada, has been overseen administratively by the Prairie Habitat Joint Venture since 2001. This program has been tremendously successful, with 4.2 million acres permanently protected, 30.8 million acres under interim protection, and a further 11.8 million acres underway. The Western Boreal Forest has been identified in both the PHJV Strategic Plan 2006-2011 and PHJV Implementation Plan 2007-2012 as an important program requiring further emphasis. The PHJV hosted a western boreal forum in December, 2008. The purpose of the forum was to:

1. Familiarize the PHJV partners with the conservation issues facing the boreal forest region of interest to the PHJV and key players influencing boreal conservation and their activities.
2. Highlight current roles of PHJV partners engaged in boreal conservation initiatives.
3. Provide the PHJV with a sufficient foundation to determine how to effectively engage in boreal forest conservation initiatives.
4. Facilitate discussion of the appropriate role for the PHJV, the level of involvement and mechanisms for engagement in boreal conservation.

In follow-up to the forum, the PHJV is currently initiating consultations with specific WBF stakeholders and will be working with interested groups to develop an implementation framework (prospectus) that will address the most effective mechanism for engagement, key partners, roles, priorities, goals and opportunities. The overall intent is to add value to the successful program already underway in the western boreal. This framework or prospectus will be drafted for consideration by NABCI/NAWCC Canada and the NAWMP Plan Committee.





Shorebirds, Waterbirds, and Landbirds

All bird conservation has been an important component of the PHJV's vision, mission, and strategic plan since 1998. Drawing on existing regional, national, and international bird conservation plans, priority species, population trends and objectives (where possible) were established for shorebirds, waterbirds and landbirds for the prairie/parkland portion of the PHJV (see Table 2 on page 8 of the PHJV Implementation Plan).

More recently, BCR planning is underway in Canada which will involve PHJV partners. The draft plan for BCR 11 is scheduled to be completed in June 2010.

Bird Studies Canada is an organization dedicated to the study and conservation of wild birds in Canada and has been invited to become a new member of the PHJV Advisory Board. Their participation will further enhance PHJV's role in all bird conservation.

PHJV and Climate Change

In February, 2009, the North American Wetlands Conservation Council (NAWCC) (Canada) hosted a Climate Change Workshop in Gatineau, QC. The workshop provided an opportunity for Canadian climate change experts to inform the NAWCC (Canada) membership of some of the key elements of the science of global climate change, as well as the potential general impact of climate change in Canada.

The PHJV was well represented at the workshop. The key outcome was a NAWCC (Canada) consensus that each Joint Venture undertake to review their current Joint Venture planning, and evaluate those plans in the context of how they might not attain desired goals given, so far unconsidered, effects of climate change. The Council proposed a two step process.

- Each Joint Venture to undertake an initial, conceptual, assessment of the potential impacts of climate change for their Joint Venture.
- Each Joint Venture to undertake a detailed technical assessment of how climate change is likely to impact the desired outcomes for the Joint Venture. To assist the Joint Ventures with this task, the Council anticipates that the following general questions and considerations could inform a technical review:
 - How vulnerable are your current conservation assets (e.g., for existing wetlands) to projected climate change effects (e.g., sea level rise, changing temperature and moisture regimes)?
 - Are the Joint Venture's current suite of land conservation activities likely to be maintainable and affordable if predicted future climate scenarios are realized?
 - How likely is it that there will need to be a shift, latitudinally or longitudinally, in your habitat or species conservation focus to meet NAWMP continental population objectives?
 - Can your Joint Venture quantify and contribute to the lowering of atmospheric carbon dioxide over the next decade, and the next 50 years? (It would be valuable to consider this on both a global and local footprint scale.)
 - How do your Joint Venture goals supplement more general environmental goals related to climate change, such as water conservation and purification, storm surge mitigation? Can the benefits be measured?
 - What easy (low-risk) adaptations should you incorporate now into Joint Venture planning, even if you are unsure of future costs and outcomes?
 - What key information gaps must be filled (from bio-physical predictions to monitoring and research under your control) so that you can make the most informed and most adaptable biological and economic decisions in the future?

The PHJV recognizes the challenge of maintaining the productive capacity of the prairie pothole and boreal regions for waterfowl populations remains daunting, even without the added challenges of climate change. The Prairies warmed by about 1.5 °C during the 20th century; expect warmer, drier summers and warmer wetter winters and springs. Variability and the future balance of grass-based agriculture vs. annual cropping will be major issues for wetland conservation. For the PPR, protecting intact wetlands and native grasslands avoids Greenhouse Gas loss in the near term and may maximize system resilience in the long term. The central Boreal Forest is predicted to warm 40% more than any other North American ecoregion.

The PHJV will seek low-risk opportunities for adapting to climate change and position ourselves to learn and adapt in the future. Monitoring for adaptation needs to focus on key unknowns that would impact management decisions, and it must be cheap and sustainable for a long time. Moving forward, PHJV will:

1. *Consider climate variability in management plans.*
2. *Manage for resilience; re-double efforts to reduce existing environmental stresses on wetlands and grasslands (e.g., drainage, filling, nutrient loading, road impacts, overgrazing, intensive tillage).*
3. *Encourage cross-jurisdictional planning where shifts in ecosystems are likely.* Shifting climate will challenge conventional thinking about the most useful geographic areas, time scales, and institutions for executing conservation plans.
4. *Seek opportunities to link habitat conservation and carbon markets.*
5. *Employ adaptive management; invest in research and monitoring to improve management decisions.*
6. *Be nimble; respond to new knowledge, threats and opportunities.* Emerging trends in agricultural land use will merit special attention.
7. *Maintain managed water.*
8. *Work with climate experts, thinking explicitly about climate change, Joint Venture programs, key uncertainties, and monitoring needs.*





Looking Forward

For the next 1-3 years, actions will follow the direction outlined by the PHJV Strategic Plan 2006-2011, the PHJV Implementation Plan 2007-2012 and the Continental Assessment Report.

Building on 23 years of experience in program delivery by partnerships and measurable habitat accomplishments, the PHJV is uniquely positioned to now lead through effectively linking science, policy and communications. This is reflected in strong confidence in the integrated landscape approach to conservation planning and the evaluation of benefits to waterfowl and other wetland associated wildlife. In short, our business-like approach to conservation investment is both solid and yet adaptive.

Looking forward, PHJV is confronting the historic and most important threat of wetland drainage and degradation across the joint venture. Waterfowl benefits of habitat conservation programs would have been much higher if wetland loss had been arrested in 1986 as initially assumed. To be successful, the PHJV must stop further wetland loss and restore lost wetlands, especially small basins. To achieve these goals requires a focused policy effort in addition to well targeted direct programs.

Several other important challenges, including retaining and restoring perennial cover, agriculture and landscape drivers and trends, effective monitoring of landscape change, are more fully addressed in the PHJV Implementation Plan 2007-2012.

PHJV has developed stronger and more creative approaches to partnering conservation programming of land securement and stewardship with new policy actions. PHJV is engaging partners to build relationships with governments and offering solutions for a healthier environment. This is consistent with the PHJV vision for healthy prairie, parkland and boreal landscapes that support sustainable ecological and economic benefits for society. The PHJV leads science based efforts to quantify the value of wetland habitat and to facilitate changes in legislation and programs that will lead to greater retention and restoration of wetland habitat.

Provincial and national policy reform is required in the areas of agriculture, water, energy and climate change. Achieving PHJV goals is dependent on progressive government policies and programs that affect habitat through wetlands policy, environmental farm planning, beneficial farm management practices, ecological goods & services market development, land use and watershed planning, cumulative environmental effects assessment and climate change adaptation programs for drought and flood control.

Policy changes have resulted in a number of benefits on the landscape for waterfowl and other wildlife. These impacts have resulted in:

- increased acres converted from croplands to haylands and pastures,
- increased recognition and conservation of wetlands,
- increased conservation of native wildlife habitat,
- increased payments for agricultural beneficial management practices,
- increased tax credits for conservation practices in Manitoba, and on a pilot project in Saskatchewan.

Current actions range from PHJV member participation in wetland policy development as part of a provincial water management strategy underway by the Government of Alberta; PHJV partnership with development and now implementation of new wetland restoration programming led by the Government of Manitoba as part of their climate change adaptation initiative and; the PHJV co-hosting a national workshop to inform the Canadian public and governments on pilot projects for ecological goods and services that include measuring the value of wetlands and their potential for restoration.

In summary, the look forward is both positive and challenging! The PHJV partnership is strong and adaptive to change and will continue to evolve NAWMP program delivery in both policy and conservation actions. The PHJV is committed to communicating progress and sharing experiences with partners and other joint ventures.

APPENDIX: NAWMP Continental Assessment Recommendations Addressed by PHJV Reporting Theme

As noted above, the PHJV undertook a detailed review of all recommendations identified in the PHJV-specific letter, the Continental Assessment Report general recommendations, the recommendations in Appendix F. Characteristics of Effective JVs and Examples to Consider of Effective JVs. All recommendations applicable to the PHJV were discussed and assigned to a lead committee. Numbering for each recommendation below remains consistent with the numbering of the recommendations identified in their original document.

Biological Foundation and Integrated Landscape Management/PHJV Implementation Plan

PHJV Specific Recommendations:

3. As your JV begins to tackle waterfowl issues in the boreal forest region, we recommend that scaup and scoters be given particular attention as their populations are declining for unknown reasons which might be linked to events there.
5. While we understand your JV's desire to pursue extension and policy strategies, we recommend that you simultaneously increase your emphasis on wetland protection and maintain a balanced approach of protection of existing wetlands and grasslands, and restoration of lost wetlands and upland habitat functions. We urge you to keep proven intensive techniques as part of the management mix.
6. If the PHJV now believes that "direct programs alone are not going to get them there", then we recommend you need to clearly deliver that message to the Plan Committee and the funding partners south of the border.
7. While we acknowledge that reporting annual acreage accomplishments is important, we recommend that your JV not lose sight of incremental ducks as the ultimate measure of success. We are encouraged by your JV's early efforts to estimate "net landscape change" and the effects of those changes on duck demography, and recognize it as something needed broadly across the NAWMP community.
9. Your JV has identified the development of a tracking system to measure the success of extension and policy efforts as a priority and we concur.
10. Your JV has identified the need for a common database to track accomplishments at the quarter section level as a priority and we concur.
12. Your JV is developing a scientific model and staff handbook for field level managers to enhance opportunities for NAWMP to be more beneficial to other bird groups. We recommend that this handbook be given a closer examination to determine if it can be used as a model for other JVs to follow.

General Recommendations:

- 8) Joint Venture actions should be guided by explicit biological models. This should be the standard planning method in all JVs.

Plan Committee Statement: The Plan Committee expects that each JV will clearly state their objectives. With these objectives in mind, a vision of needed landscape characteristics and/or population levels should be identified. Science should guide the programs, practices and/or treatments needed to achieve stated objectives. An adaptive management mindset needs to be employed to address changes in social, economic, and biological parameters so that plans change as managers learn.
- 9) In biological planning, diving ducks, sea ducks, over-abundant goose species, and species of special concern (e.g., lesser scaup, northern pintails) deserve greater attention.

Plan Committee Statement: The Plan Committee encourages the NSST, Joint Ventures and Flyway Councils to develop and implement habitat actions and population management for those species of high conservation need (e.g. pintails, scaup, and sea ducks) as defined in the latest Plan Update, and for overabundant species causing habitat degradation. The Plan Committee recommends specific working groups be established and charged with the responsibility of developing assessments/action plans for such species as warranted.
13. b. For breeding areas, increasing the scale of perpetual easement programs for intact wetland systems should be a priority. Even though Plan partners cannot buy enough land to achieve their conservation visions, some investment in land gives Plan partners clear standing as stakeholders in these vital ecosystems and should complement efforts in extension and public policy. Policy efforts that maintain or increase funding for such programs also should be a priority for Plan partners.

Recommendations Appendix F. Characteristics of Effective JVs:

7. Prioritization

It is essential that implementation objectives are prioritized (i.e., identifying what needs to be done first, where and why). These priorities must be based on sound biological planning and their rationale should be stated clearly in the JV Implementation Plan. Planning priorities should be reviewed at regular intervals. Purely opportunistic conservation efforts should be discouraged.

8. Monitoring and Evaluation

Joint Ventures should establish explicit monitoring and evaluation priorities, and ensure that these activities are supported, minimally, from existing JV funds. Priorities should be reviewed on a regular basis to ensure they address key assumptions, uncertainties and implementation efforts. Some JVs maintain an information matrix that is regularly updated to incorporate new information, remove completed items and re-order priorities. Other JVs have developed focused teams dedicated to particular regions or initiative areas within the JV to undertake planning, monitoring and evaluation for each area. Monitoring and evaluation of implementation methods/activities and development of research priorities should be an integral part of the waterfowl technical committee's oversight responsibilities.

9. Formal and Regular Updating Process

Joint Ventures should update key documents on a set cycle (recommended every five years). External peer review should be used more as JV planning documents are developed, revised and updated. The NSST and JV coordinators who have been successful in implementing sound biological models for planning could serve as valuable peer reviewers to guide the development of similar planning models for other JVs.

Examples to Consider of Characteristics of Effective JVs:

7. The Rainwater Basin JV (RBJV) Great Plains GIS Partnership was formed in conjunction with the Playa Lakes JV (PLJV) and other partners and provides a particularly innovative and successful approach to collaboratively meeting their GIS needs.

10. Some JVs have BCR coordinators (e.g., ACJV) and this may be worth considering in JVs with multiple BCRs and those undertaking extensive all-bird planning.

11. A few JVs stand out (e.g., PLJV, Intermountain West JV [IWJV], and ACJV) as good examples of how to integrate BCR and other bird initiative plans into existing NAWMP delivery frameworks.

17. The RBJV has used two retired farmers rather than traditional biologists to deliver private lands conservation and has had great success.

21. The PPJV does periodic updating of its work in a unique and innovative process that it calls Dynamic Objective Setting.

Policy Leadership

General Recommendations:

12) Increasing engagement in public policy will require development of new funding sources, new expertise, new measures of accomplishment, and new approaches to evaluation. Policy initiatives should be subjected to the same sort of evaluation rigor as is necessary for traditional wildlife programs.

Plan Committee Statement: Understanding that no one program or approach will achieve Plan goals, the Plan Committee and Plan partners will work to influence public policy and legislation related to water quality, agricultural programs, transportation, and energy developments at the local and national levels. Related metrics and evaluations of the effectiveness of policy work must be developed by Plan partners to assess progress toward Plan goals.

14) North American Waterfowl Management Plan partners should continue to promote farming practices that are economically appealing to producers and benefit waterfowl. (Responsibility = JVs).

Plan Committee Statement: The Plan Committee will advocate for extension programs that promote benefits to waterfowl and are economically appealing to producers and other landowners.

15) Maintaining or strengthening conservation provisions of the U.S. Farm Bill are crucial for both breeding and non-breeding JVs. Of similar importance should be expansion and further development of wildlife-friendly farm policies in Canada.

Plan Committee Statement: The Plan Committee recognizes that private lands in working landscapes are essential to waterfowl and that effective wildlife-friendly farm policies are critical if waterfowl populations are to be sustained. Therefore, JV partners should engage proactively with governments and with local, state/provincial and national agriculture officials to promote explicit strategies for conserving waterfowl in agricultural landscapes. The Plan Committee may wish to convene a bi-national workshop among these entities for the purpose of sharing experiences, coordinating actions and attracting high level attention.

16) Enhancing policy and legislative protection for wetlands should be a major priority in Canada, the U.S. and Mexico.

Plan Committee Statement: The Plan Committee agrees that increased protection for wetlands through policy and legislation should be a major priority in Canada, the U.S. and Mexico.

17) Plan partners should promote policy disincentives for converting native grassland to cropland in the U.S. and Canadian Prairies.

Plan Committee Statement: The Plan Committee will be advocates for regulatory and incentive programs that restrain conversion of native grasslands to cropland. Where analyses indicate continued grassland habitat losses, Joint Venture partners should develop local, regional, or national policies/regulations to preserve grasslands habitats.

PHJV Operations

PHJV Specific Recommendations:

1. Some outreach and communication efforts directed toward the US NAWMP community is recommended to clear up any misunderstanding or confusion regarding current PHJV strategies.
5. While we understand your JV's desire to pursue extension and policy strategies, we recommend that you simultaneously increase your emphasis on wetland protection and maintain a balanced approach of protection of existing wetlands and grasslands, and restoration of lost wetlands and upland habitat functions. We urge you to keep proven intensive techniques as part of the management mix.
6. If the PHJV now believes that "direct programs alone are not going to get them there", then we recommend you need to clearly deliver that message to the Plan Committee and the funding partners south of the border.
11. Your JV has successfully held periodic science forums to share timely information among partner agencies and to link researchers with field delivery staff. We recommend the PHJV be used as a model for other JVs to follow to help improve the interchange of information.

Examples to Consider of Characteristics of Effective JVs:

3. The AGJV and the ACJV have especially strong ties to Flyways, providing a good example of close cooperation between JVs and Flyways.
19. Many JVs have identified keystone species (e.g., GCJV) to help them market and focus their work. The concept of using keystone species to champion JV efforts merits further consideration.

General Recommendations:

7) Greater progress, and therefore substantially more diverse and leveraged funding, is needed in breeding areas where many duck populations seem to be most limited.

Plan Committee Statement: This assessment reaffirms the finding of the original 1986 Plan that improving reproductive success in the mid-continental prairies, continues to be the primary challenge in achieving Plan goals. To the extent that conservation needs in this region cannot be met by direct conservation programs alone, major advances in wildlife-friendly policy and legislation for agriculture, wetland protection, energy, transportation, water availability, and climate change challenges must be achieved in the U.S. and Canada.

26) Simultaneously, it is vital for Plan partners to find new, substantive, complementary sources of financial support for programs that are critical for achieving NAWMP objectives.

Plan Committee Statement: The challenge is to acquire sustained new funding to improve the delivery of the Plan. Finding new funds has been an ongoing challenge for all Joint Ventures. Seeking new resources and policy support must be based on a well developed plan of action complete with the identification of costed and time-bounded outcomes. Toward that end, the Plan Committee will establish a Funding Task Force to develop a "North American Waterfowl Management Plan value proposition" and opportunities for stakeholder investment. This needs to be tackled at two scales - continental (Plan Committee) and JV. The Joint Ventures should focus on new funding sources/partners within the JV area and on influencing increased investments from existing partners. The Plan Committee would focus on government programs and large corporate sources. The Plan Committee and Joint Ventures both require the same basic approach that could build upon the following model:

Identify needs for new investments in the Plan

- Develop a communication/marketing strategy which all parts of the Plan family can use to seek new resources and/or pursue re-allocations of existing funds.
- Package the outcomes to demonstrate what will be delivered for the new investments.

Cost the renewal in North American Waterfowl Management Plan.

- Identify the mission-critical new resource needs (outcomes) for delivering upon the priority recommendations contained in the Plan Committee management response to the Continental Progress Assessment.

Explore and exploit new and existing funding stakeholders.

- Identify the potential sources of new/existing funds and human resources, and tactics for gaining access to these.

Validate the product

- Stakeholder membership/engagement at Joint Ventures.
- Evaluation with performance metrics.

27) The Plan Community should continually strive to engage more stakeholders in NAWMP.

Plan Committee Statement: The Plan Committee supports this recommendation and will encourage all Joint Ventures to consider partnership expansion, particularly with those agencies and organizations whose land management policies and practices can have considerable impact on waterfowl and wetland conservation, and in order to broaden potential funding support for conservation

Recommendations Appendix F. Characteristics of Effective JVs:

1. Commitment & Responsibilities

All major JV partners should make a formal commitment to the JV strategic and implementation plans by signing them. Roles and responsibilities of each partner should be clearly spelled out. Some JVs have developed written planning principles to define partner roles; this approach could serve as a model for other JVs to follow.

9. Formal and Regular Updating Process

Joint Ventures should update key documents on a set cycle (recommended every five years). External peer review should be used more as JV planning documents are developed, revised and updated. The NSST and JV coordinators who have been successful in implementing sound biological models for planning could serve as valuable peer reviewers to guide the development of similar planning models for other JVs.

Examples to Consider of Characteristics of Effective JVs:

8. The PLJV is a private non-profit 501 C3 corporation built on a business model. We could not ascertain if this arrangement is more effective or efficient but this model could possibly be used by other JVs as an alternative approach to administration. PHJV Coordinator

12. We were particularly impressed with the IWJV's innovative Cost Share Program in terms of how it is structured, advertised, and managed. PHJV Coordinator

14. We noted that the RBJV efforts at "friend-raising" not fund-raising, were impressive and could provide a good approach for newly developing JV partnerships. PHJV Board

15. The RBJV has four landowners on its management board. This is a novel approach to encourage greater participation and feedback from the local community. PHJV Board

16. The Private Lands Working Group developed by the RBJV is viewed as being a particularly effective and noteworthy approach to working closely with private landowners. PHJV Board

18. We viewed the British Columbia Lands Forum (PCJV Canada and Canadian Intermountain JV) as a particularly good model for coordinating land conservation efforts of many groups over a large landscape. PHJV Board

Western Boreal Forest

PHJV Specific Recommendations:

4. We recommend your JV develop a prospectus for the western boreal region to be submitted to the Plan Committee laying out needs, threats, opportunities, and strategies.

General Recommendations:

11) Wetland conservation in the western Canadian and U.S. boreal forest regions should be more explicitly connected to the Plan.

Plan Committee Statement: Given the Western Boreal Forest's (WBF) importance to waterfowl, the Plan Committee supports the Prairie Habitat Joint Venture's expansion to include the WBF. The Plan Committee expects the PHJV to develop a WBF prospectus for review by the PC by June 2008.

Climate Change

PHJV Specific Recommendations:

2. We recommend the PHJV make better connections with experts in the global climate change arena to factor their predictions into future modeling scenarios for the prairies.

Note: There are a number of recommendations requiring secondary involvement from PHJV with other groups identified to lead. PHJV is working on these as well, but they are not specified in this interim report. There are also several recommendations not requiring any involvement from PHJV.

Reference Material

- Arnold, T. W., J. H. Devries, and D. W. Howerter. 2009. *in press*. Factors affecting reneesting behavior in Mallards. *Auk*.
- Bartzen, B. 2008. Wetland Characteristics and Abundance of Breeding Ducks in Prairie Canada. MSc thesis, Biology, University of Saskatchewan.
- [CWS] Canadian Wildlife Service. 2007. www.cws-scf.ec.gc.ca/mbs-com/default.asp?lang=ed&n=D1610AB7 accessed 2007 Mar 11.
- Cumming, E., K. A. Hobson, S. L. Van Wilgenburg. Breeding bird declines in the boreal forest fringe of western Canada: Insights from long-term BBS routes. *Canadian Field-Naturalist* 115:425-434.
- Devink, J.-M., R.G. Clark, S. Slattery & D. Trauger. 2008a. Spring body condition and breeding status of boreal-nesting female lesser scaup (*Aythya affinis*) and ring-necked ducks (*Aythya collaris*). *Auk* 125:291-298.
- Devink, J.-M., R.G. Clark, S. Slattery & M. Wayland. 2008b. Is selenium affecting body condition and reproduction in boreal-breeding scaup, scoters and ring-necked ducks? *Environmental Pollution* 152:116-122.
- Devink, J.-M., R.G. Clark, S. Slattery & A. Scheuhammer. 2008c. Effects of dietary selenium on reproduction and body mass of captive lesser scaup. *Environmental Toxicology & Chemistry* 27:471-477.
- Devries, J.H., J.J. Citta, M.S. Lindberg, D.W. Howerter and M.G. Anderson. 2003. Breeding-season survival of mallard females in the prairie pothole region of Canada. *Journal of Wildlife Management* 67:551-563.
- Devries, J. H., K. L. Guyn, R. G. Clark, M. G. Anderson, D. Caswell, S. K. Davis, D. G. McMaster, T. Sopuck, and D. Kay. 2004. Prairie Habitat Joint Venture (PHJV) waterfowl habitat goals update: phase 1.
- Devries, J.H., R.W. Brook, D.W. Howerter, and M.G. Anderson. 2008. Effects of Spring Body Condition and Age on Reproduction in Mallards (*Anas platyrhynchos*). *The Auk* 125(3):618-628.
- Drever, M.C., T.D. Nudds & R.G. Clark. 2007. Agricultural policy and nest success of prairie ducks in Canada and the United States. *Avian Conservation & Ecology* 2, open access.
- Koons, D.N., J.J. Rotella, D.W. Willey, M. Taper, R.G. Clark, S. Slattery, R.W. Brook, R.M. Corcoran & J.R. Lovvorn. 2006. Lesser scaup population dynamics: what can be learned from available data? *Avian Conservation & Ecology* 1, open access. [this paper included specific reference to the prairie/parklands, not just boreal]
- Fernandes, R. A., Pavlic, G., Chen, W., and Fraser, R. 2001. Canada-wide 1-km water fraction derived from National Topographic Data Base maps. Natural Resources Canada. geogratis.cgdi.gc.ca/download/WaterFraction/Waterfraction_metadata.txt
- Gratto-Trevor, C., G. Beyersbergen, L. Dickson, P. Erickson, B. MacFarlane, M. Raillard, and T. Sadler. 2001. Prairie Canada shorebird conservation plan. Prepared by Prairie Habitat Joint Venture and the Canadian Wildlife Service, Environment Canada.
- Hobson, K. A., E. M. Bayne, and S. L. Van Wilgenburg. 2002. Large-scale conversion of forest to agriculture in the Boreal Plains of Saskatchewan. *Conservation Biology* 16:1530-1541.
- Statistics Canada. 2006. 2006 Census: Census of agriculture. Statistics Canada, Ottawa, ON, Canada. www.statcan.ca/english/agcensus2006/index.htm
- Skinner, S.P. & R.G. Clark. 2008. Relationships between relative abundance and species richness of ducks and grassland birds in southern Saskatchewan. *Avian Conservation & Ecology* 3 (on-line, open access).
- Watmough, M. D., and M. J. Schmoll. 2007. Environment Canada's Prairie & Northern Habitat Monitoring Program Phase II : Recent habitat trends in the PHJV. Technical Report Series *in press*. Environment Canada, Canadian Wildlife Service, Edmonton, AB.



PHJV partners

Environment Canada

Agriculture & Agri-Food Canada

Alberta Sustainable Resource Development

Alberta NAWMP Partnership

Saskatchewan Environment

Saskatchewan Watershed Authority

Manitoba Conservation

Manitoba Habitat Heritage Corporation

Ducks Unlimited Canada

Nature Conservancy of Canada

Wildlife Habitat Canada



*North American Waterfowl
Management Plan*
*Plan nord-américain de
gestion de la sauvagine*
*Plan de Manejo de Aves
Acuáticas de Norteamérica*

