

Prairie Pothole Joint Venture Implementation Plan

Executive Summary – The Prairie Pothole Joint Venture boundaries (PPJV) include one-third (100,000 square miles) of North America’s Prairie Pothole Region (PPR). Its uniqueness lies in the millions of depressional wetlands that constitute one of the richest wetland systems in the world. These “prairie potholes” and their surrounding grasslands are highly productive and support an incredible diversity of bird life. The PPR is breeding habitat for myriad wetland and grassland birds and also supports significant numbers of spring and fall migrants.

Once a vast grassland, the PPR is now an agrarian system dominated by cropland. Changes in land use have, for the most part, been detrimental to the migratory birds that use the PPR. Many wetlands have been drained or degraded, and the loss of native prairie—particularly in the eastern portion of the PPJV—has been extensive. Despite these losses, millions of wetlands and large tracts of native prairie still remain. The PPR is one of the most altered—yet also one of the most important—migratory bird habitats in the Western Hemisphere. It is the backbone of North America’s “duck factory,” and critical habitat for many wetland- and grassland-dependent migratory birds.

The PPR is envisioned as a place where abundant populations of wetland and grassland birds can be sustained in perpetuity for the benefit of all people who enjoy these species. Accordingly, the mission of the PPJV is to implement conservation programs that sustain populations of waterfowl, shorebirds, other waterbirds, and prairie landbirds at objective levels through targeted wetland and grassland protection, restoration, and enhancement programs. The PPJV operates through partnerships that implement conservation using a mix of habitat protection, restoration, and enhancement programs.

The U.S. PPR is a dynamic place, socially as well as climatically. Nowhere is that more apparent than in rural communities, which are experiencing difficult social stresses due in large part to depopulation and changing economies. Several factors are involved, including human demography, new land uses, advances in farm equipment, new crops, and energy development. These factors affect migratory bird resources as well as human populations and economies. The PPJV recognizes these inter-relationships and believes that by addressing factors that impact both people and birds, we can have positive impacts on both communities and avian conservation.

This plan provides a road map for integrating the conservation of all migratory birds under one framework. The process involves stepping down the objectives of the four, international “species groups” plans for waterfowl, shorebirds, waterbirds, and landbirds as they apply to the PPJV. Population and habitat trends, coupled with knowledge of how species respond to landscape change, will then be used to build a biological foundation and set quantifiable goals. Focal species will be selected to represent groups of birds of special interest, and associated threats and limiting factors will be identified. Conservation actions and treatments will be proposed, and models will be developed that depict where to implement particular

conservation actions. After each species group has set spatial and programmatic priorities, an integrated landscape design will be developed by overlaying priority habitats for focal species from each bird group. Conservation actions will then be partitioned into protection, restoration, or enhancement projects for on-the-ground delivery. Monitoring and evaluation will be used to measure performance and provide feedback to improve future management performance.

Currently, the four bird groups differ markedly in what is known concerning their population status, habitat requirements, and understanding of factors that most affect population change. Goals and objectives of the four bird plans reflect this diverse state of knowledge.

For waterfowl, the duck population boom that occurred during 1994-2003 is considered evidence of the potential capacity of the PPJV to recruit ducks when wet conditions prevail. Accordingly, the foundation of the waterfowl plan advocates the notion of “keeping the table set” for periodic duck population rebounds by keeping critical wetland and grassland habitats intact. This will require securing 1.4 million additional wetland acres and 10.4 million grassland acres. In addition, the waterfowl plan sets a goal of restoring wetlands sufficient to accommodate an additional 492,000 total breeding duck pairs, and 393,000 acres of grasslands associated with high density wetland communities. Because waterfowl populations utilize habitats on both sides of the U.S.- Canadian border, it will be important to coordinate with the Prairie Habitat Joint Venture as we move forward in implementation. Detailed plans for implementing programs will be provided in “tactical plans” that are currently in development.

The shorebird plan recognizes the importance of the PPJV to breeders (13 species) as well as those birds that use the PPJV for stopover habitat during migration (30 species that breed in the arctic). Much basic research needs to be conducted to better understand habitat use, distribution, and vital rates. Recently developed, spatially-explicit Geographic Information System (GIS) models have proven useful for predicting shorebird abundance in the PPR. Highest priority management needs relate to Piping Plover and Mountain Plover. Protecting existing wetland and grasslands are high priority, but to recover declining populations will require additional focus on enhancement of these habitats that have been degraded.

Waterbirds constitute an important group of species in the PPJV. The PPR contains over 60% of the continental breeding population of Franklin’s Gull; over 50% of the continental population of Pied-billed Grebe, American Bittern, Sora, American Coot, and Black Tern; and approximately 30% of the American White Pelican and California Gull populations. The first objective of waterbird conservation in the PPJV is protection of existing wetlands and grassland. Areas to be conserved can be prioritized through application of spatially explicit habitat models, and risk assessment should also be included in the prioritization process. Retention and development of wildlife-friendly agriculture programs (e.g., “Swampbuster” provision in U.S. Farm Bill) will also have a major impact on waterbird conservation in the PPR by helping preserve the existing wetland and upland habitat base.

The landbird plan recognizes the importance of grasslands – particularly native prairie – to declining populations of grassland songbirds. Approximately 186 species of birds breed in

the Prairie Potholes Bird Conservation Region (BCR 11), which closely approximates the area encompassed by the Prairie Pothole Joint Venture in the United States and the Prairie Habitat Joint Venture in Canada. Thirty-three bird species have more than 25% of their continental breeding population in the PPR. At the top of this list are three landbirds considered to be high priorities by Partners In Flight: the Baird's Sparrow, with >90% of its population in the PPR, the Sprague's Pipit, and the Chestnut-collared Longspur. The theme of Partners In Flight has always been to "keep common birds common." As a starting point for PIF Watch List species, the continental plan set population objectives to maintain current populations, or to return declining populations to their numbers in the late 1960s, when the Breeding Bird Survey began. Habitat conservation strategies for other prairie wildlife, including the migratory birds addressed by the other bird initiatives, will generally not differ substantially from those strategies implemented to meet the needs of waterfowl. Implementation strategies will focus on the protection, restoration, and enhancement of prairie wetland, riparian, and grassland communities.

The common thread that runs through each plan is the protection of existing wetlands and native grasslands. At this juncture, there is potential for rapid progress in integrated planning and conservation. However, as we embrace the philosophy of integrated, all-bird conservation, there are some important principles to bear in mind. These include: (1) the merits of separate planning but integrated action, (2) the potential pitfalls of identifying geographic priorities strictly on the basis of spatial overlap, and (3) an awareness that managing for one species will impact the welfare of another. These concerns notwithstanding, the planning framework presented here should provide for future growth and opportunities under the paradigm of integrated, "all-bird" conservation.

Introduction to the Prairie Pothole Region

“A hunter’s paradise to-day, what must it have been during the days of the buffalo before the white man drove the great herds across the Missouri never to return?”

Douglas Leffingwell, *An October Day at Dead Buffalo Lake [North Dakota]*, 1901. *The American Field*.

The Prairie Pothole Region (Fig. 1) is a unique and extraordinary biome. Before crop-based agriculture began to transform the landscape (circa 1890), the region was part of one of the largest grassland-wetland ecosystems on earth. In the late 1700’s, between 7 and 8 million acres of wetlands existed in just the Dakotas portion of the U.S. Prairie Pothole Region alone (PPR; Dahl 1990). Early pioneers described portions of southern Minnesota and northern Iowa as impassable during spring and early summer due to the abundant ponds and marshes. The innumerable wetlands and vast grasslands were exceptionally important to Western Hemispheric avifauna, particularly migratory waterfowl, shorebirds, and grassland birds.

Unfortunately, the lure of fertile soils and a strong northern European work ethic converged in an unprecedented effort to plow the prairie and drain its wetlands. Wetland drainage accelerated dramatically during the 1940s (Johnson and Higgins 1997).



Figure 1. The Prairie Pothole Region.

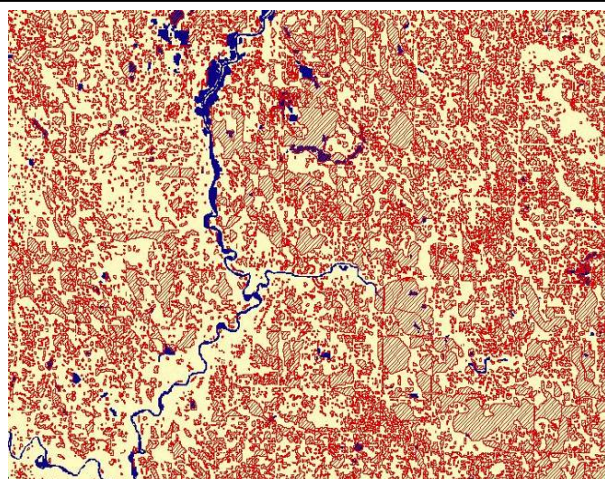


Figure 2. Drained (red) and existing (blue) wetlands in a 100 mi² area of Swift County, MN.

Today, more than half of the historic PPR wetlands are gone (Dahl and Johnson 1991), and in the eastern parts of the region fewer than 10% of the original potholes and less than 1% of the native prairie still exist. Nearly 70% of the original grasslands now support crop production. The conversion of grassland to cropland peaked in the 1920s, and by 1960 it was generally believed that all of the tillable ground had been converted to cropland. However, technological advancements and economic drivers continue to re-define the meaning of “tillable ground”.

The consequences of wholesale wetland and grassland conversion are alarming, and are most evident in the eastern portion of the PPR where the damage is greatest (Fig. 2). Here,

communities are experiencing significant water quality degradation in lakes, rivers, and groundwater; increased flood frequency and intensity along main stem rivers and their major tributaries; and a marked decline in nearly all migratory bird species. Without aggressive action, the PPR portions of the Dakotas and Montana appear to be headed toward the same fate. On the other hand, the more intact grasslands characteristic of the western portion of the U.S. PPR, along with the larger ranches associated with this area, afford good opportunities for retaining existing habitat if we act soon.

Importance to Birds

Despite these historic changes and continuing pressures, the PPR – its wildlife and its people – remain a national treasure. Consider, for example, that the remaining PPR wetlands support about 4.2 million duck pairs. Ducks produced in the region are harvested in all 49 mainland states (Fig. 3), which helps explain why the PPR is known as “the duck factory” of the continent.

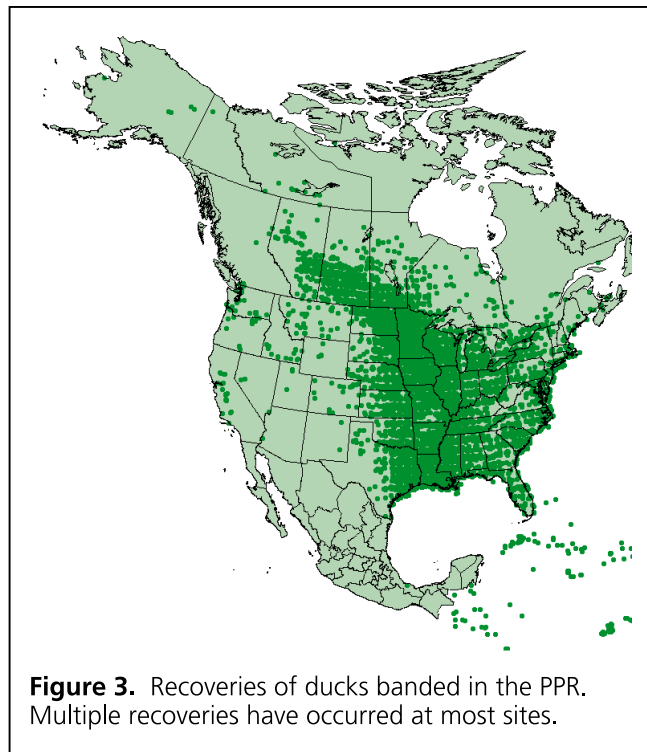


Figure 3. Recoveries of ducks banded in the PPR. Multiple recoveries have occurred at most sites.

Breeding ducks concentrate in extremely high densities in portions of the U.S. PPR. For example, the eastern Dakotas, which comprise only 7% of the area within the “traditionally surveyed area” of the May Waterfowl Breeding Population and Habitat Survey, has in recent

“In the future, (North American Waterfowl Management) Plan success will continue to be linked to long-term trends in waterfowl habitat conditions in the PPR”.

– 2004 Update to the North American Waterfowl Management Plan.

years accommodated 21% of the ducks observed in that survey (R. Reynolds, U.S. Fish and Wildlife Service, personal communications). During the last decade, eight PPR-nesting duck species have comprised 80% of the U.S. duck harvest, suggesting that even minor degradation of the habitat

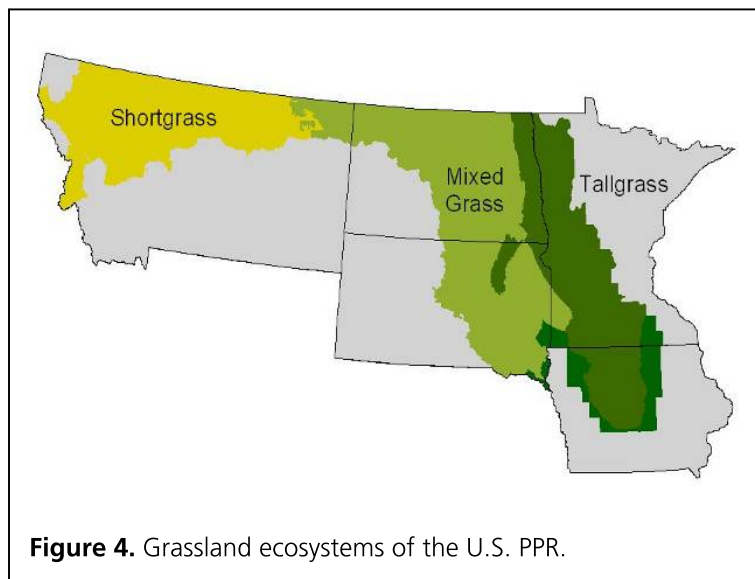
could have far-reaching effects on waterfowl hunters. But clearly the impacts of the PPR reach beyond hunters to bird watchers and other outdoor enthusiasts.

The PPR offers unique resources for shorebirds, including breeding and/or migration stopover habitat for 37 of the 50 species that regularly occur in the U.S.; breeding habitat for 13 of 20 species that breed in the lower 48 states; and important stopover habitat for most (30 of 37) species of arctic breeders. During spring migration, shorebirds must refuel on protein rich foods

available in superabundance in small, shallow PPR wetlands. Greater than 98% of all migrating shorebirds occupy these small wetlands, often doubling their body weight in as little as a few days.

Wetlands in the Prairie Pothole Joint Venture (PPJV) provide habitat for 40 species of breeding waterbirds such as American White Pelicans, rails, and herons. The largest colonies in the world of Franklin Gulls are found here, and PPJV wetlands provide habitat for significant numbers of Black Terns.

Grassland bird populations are in a persistent decline that is steeper than that for any other guild of North American bird species (Knopf 1994). Of the three grassland ecosystems that exist in



the PPR (Fig. 4), the tallgrass ecosystem has suffered the greatest losses, followed by the mixed grass and shortgrass systems. In general, the magnitude of grassland bird decline mirrors the differential grassland loss rates observed in these ecosystems.

Some grassland bird species are “area sensitive”, and therefore require large tracts of contiguous native prairie for successful breeding. Others seek out suitable patches of grassland within a matrix of cropland and other land uses. In both cases, fragmentation

and loss of grassland creates unsuitable breeding habitat or circumstances that may cause nesting success and nestling survival to decline below the level needed for population maintenance.

Be they waterfowl, shorebirds, or landbirds, most avian species in the PPR are long-distance migrants that spend much of their time in the southern U.S., Central America, or South America. Thus, even though the PPR is located at the northern edge of the U.S., for arctic-nesters it is a mid-latitude nexus used during critical migration periods. In this hemispheric perspective, the PPR—along with the expanses of grasslands that remain—are but one link in a chain of migratory habitats.

Effects of Landscape Change on Predators of PPR Avifauna

An important consideration for avian conservation in the PPR is the population trends of certain avian and mammalian species that prey on nesting birds, their newly-hatched young, and unhatched eggs. When the northern plains were first settled, farmsteads, towns, and cities increased coincident with the initial conversion to cropland. The number of farms peaked in the 1920s but have declined since. The resulting “rural depopulation” of the PPR has left many abandoned farmsteads and human structures on the landscape. These features—coupled with abundant agricultural foods, the extirpation of some “keystone” species (i.e., bison and wolves), and an increase in trees and suppression of fire—have had the net effect of changing the

distribution and increasing the abundance of species such as coyotes, red fox, raccoons, skunks, badgers, mink, ground squirrels, along with avian predators such as Red-tailed Hawks, and Great-Horned Owls (Sargeant et al. 1993). These species prey on nesting birds, chicks, and/or eggs, and their impact is magnified by fragmented habitats that give rise to edges, perches, and other features that enhance predator foraging efficiency. Although long-term decreases in nesting success are well documented for ducks (Drever et al. 2004), there is evidence that other avian groups may have suffered the same fate. A concern over high (some would say “unnaturally high”) predation rates underlies many of the conservation programs in the PPJV.

Geography of the PPR

The PPJV includes counties in Iowa, Minnesota, North Dakota, South Dakota and Montana (Fig. 5), west of the Mississippi River, east of the Rocky Mountains, and east and north of the Missouri River.

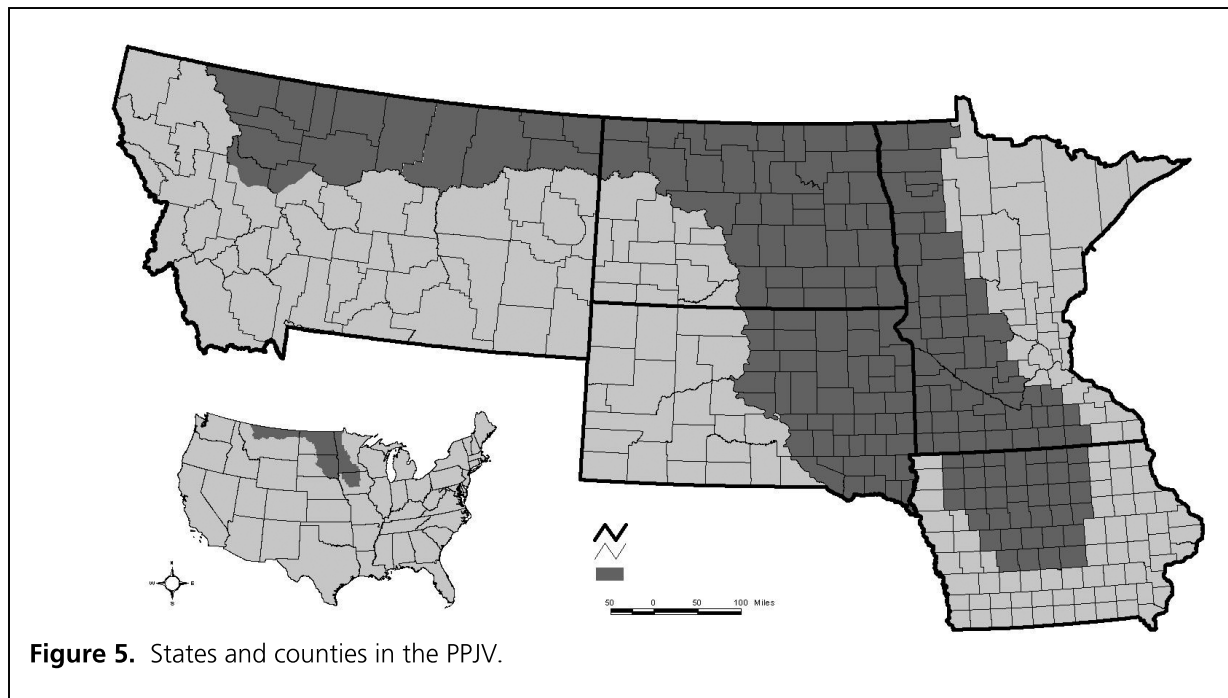
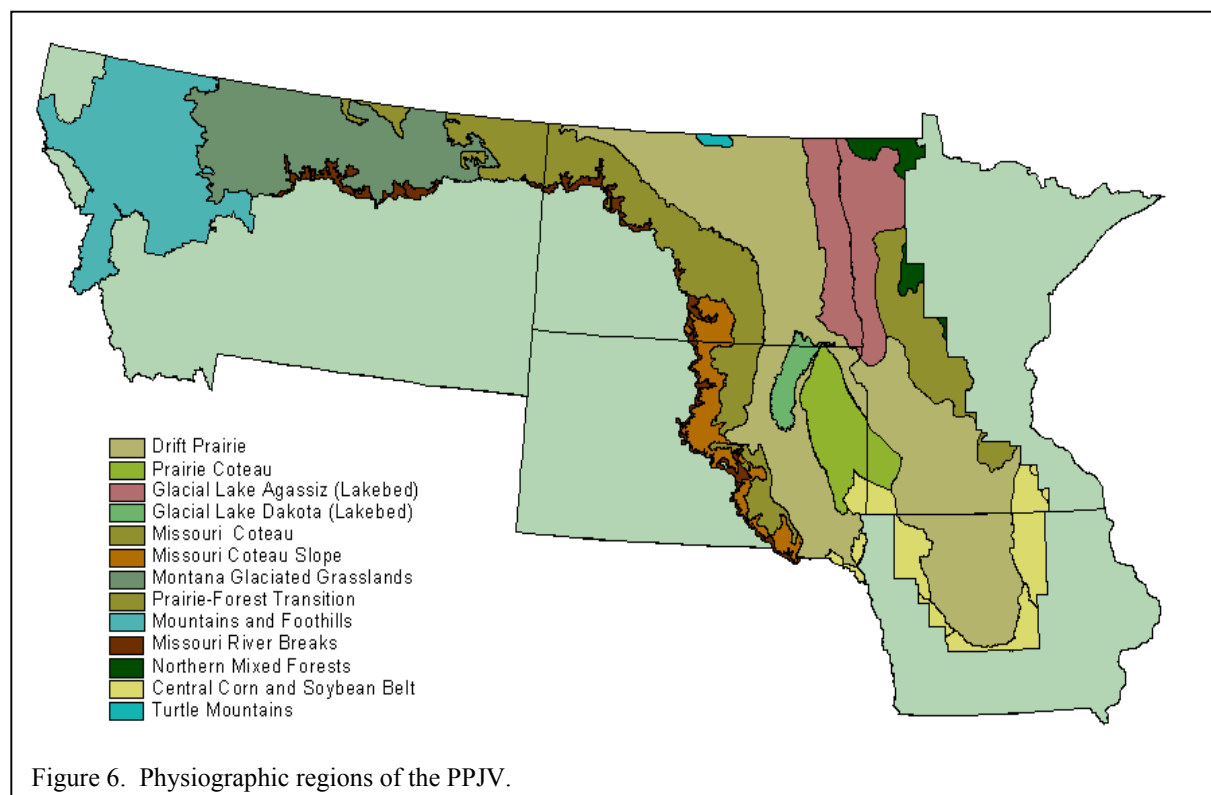


Figure 5. States and counties in the PPJV.

All of these areas share a common characteristic—the impact of the glaciers that covered the northern half of the continent during the late Pleistocene epoch then retreated between 10-15,000 years ago. The retreating glacial ice sheet left in its wake the region’s vast number of “potholes” (Kantrud et al. 1989). Yet subtle differences in landscape morphology exist across the PPR. These differences are attributable to the pre-glacial topography and the pace and manner of glacial melting. Coupled with current climatic factors, these differences shape current land use and conservation actions. These major physiographic regions (Fig. 6) are described below.

Glacial Lakes Agassiz and Dakota – Glacial Lake Agassiz and Lake Dakota cut drainage outlets during the period of glacial retreat. These outlets ultimately became the Minnesota, Red, and James Rivers. The lacustrine sediments deposited beneath the lakes is exceptionally flat, and the historic prairie was often saturated with scattered small, shallow wetland basins. The bed of



Lake Agassiz, commonly called the Red River Valley of the North, was undoubtedly once one of the most impressive spring migration staging areas for waterfowl and shorebirds in North America. Today the area has been drained so heavily that in many areas no wetlands or grassland remains. The bed of Lake Dakota has been less heavily drained, and temporary and seasonal wetlands are abundant, but deeper wetlands are few. These wetlands remain important migration habitat and their protection as such is a priority. Over most of the Red River Valley, intensive restoration of the grassland-wetland complex is the only available conservation practice. High agricultural production potential (particularly for the heavily subsidized sugar beet industry) and high land values have prohibited most habitat restoration, although USDA programs directed primarily at flood damage reduction are promising. The sandy beach ridges that border the Valley in Minnesota and North Dakota still support some large grasslands and the conservation of these for grassland land birds and shorebirds is a priority.

Prairie Coteau – This region is a wedge-shaped, pre-glacial plateau. It was created when glaciers advanced and scoured up sediment from the slopes and deposited it, along with embedded blocks of ice, on the surface. After glacial retreat, the result was a landscape of moderate to high relief with numerous small, steep-sided, semi-permanent wetland basins. Steep topographic relief, especially at the northern end along the margins of the Coteau, has prohibited some tillage agriculture and wetland drainage to date. Thus, the northern end of the Prairie

Coteau is one of the eastern-most, relatively intact grasslands in North America. Deeper basins and relatively abundant precipitation make this area a stronghold of waterfowl production when more westerly areas of the PPR are dry. Wetland and grassland protection through fee title and easement acquisitions are priority conservation actions. The Prairie Coteau slopes inward and southward, where its characteristics and conservation priorities are more similar to the Drift Prairie.

Drift Prairie – This region demarks the primary paths of glacial advance and retreat. Its glacial history caused the Drift Prairie to be shaped like an inverted Y, the western lobe extending to the Missouri River in eastern South Dakota, and the eastern (or Des Moines) lobe extending through western Minnesota into central Iowa. Terrain relief is generally low, and wetlands tend to be small and shallow, with temporary and seasonal wetland basins predominating. This area is well suited to tillage agriculture, and the associated conversion of wetlands and grasslands has been extensive. Habitat loss has been most severe in the east. In the west, a drier climate has slowed the expansion of tillage agriculture but pressures on wetlands and grasslands have escalated. During wet periods when seasonal basins retain water throughout the brood-raising period, the Drift Prairie provides valuable migration habitat and may help facilitate periodic “booms” in continental waterfowl populations like that which occurred in the 1990s. A mixed approach of habitat protection and restoration, complemented by enhancement techniques in a few key areas, characterizes the approach of PPJV partners. The positive impact of agricultural programs, especially the Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP), can not be over emphasized.

Intact grasslands and abundant seasonal wetland basins make the Missouri Coteau a continental mainstay for many species of waterfowl and other wetland and grassland birds.

Missouri Coteau and Coteau Slope – A national conservation priority area, the Missouri Coteau was formed in ways similar to the Prairie Coteau.

Comparatively steep terrain and relatively poor soils have, until recently, limited tillage agriculture. However, new crops and crop varieties, coupled with favorable commodity support policies, have increased the rate of grassland loss in recent years. Intact grasslands and abundant seasonal wetland basins make the Missouri Coteau a continental mainstay for many species of waterfowl and other wetland and grassland birds. The Coteau Slope has an older glacial history and is characterized by fewer depressional wetlands and more coulees and streams, many of which are dry for most of the year. Consequently, the Coteau Slope is a lower priority for waterfowl, but is critical habitat for many priority species of grassland land birds. Grassland and wetland protection are the primary goals in these physiographic regions.

Montana Glaciated Grasslands – An area of slight to moderate relief, the Montana Glaciated Grasslands (Fig. 5) are dry because of the “rain-shadow effect” of the Rocky Mountains. This is true short-grass prairie, adapted to the natural forces of drought, wind, and fire. For wetland-dependent birds, it is a boom-and-bust system. During periods of deluge, wetland communities of the Montana grasslands can be extremely productive breeding habitats for ducks. Several

species, most notably Northern Pintails, settle to breed in this region when wetlands are flooded in early spring. Owing to its droughty nature, the Montana Glaciated Grasslands were once thought suitable only for grazing. However, the development of new, drought-tolerant crops has stimulated the plowing and cultivation of vast tracts of prairie. As in other locales, intensification of agriculture has caused the loss and degradation of wetlands. Fortunately, large expanses of native prairie still exist in this region, which provide an opportunity for grassland and wetland easements to protect the remaining habitat. In addition, land owned and managed by federal agencies receives an added measure of protection because actions are subject to a suite of regulatory reviews and statutes. Wetland restorations and enhancements may also be viable and effective options in select areas.

To bring this part of the PPJV up to the same level of planning that exists for the Dakotas and Minnesota, there is a need to obtain a complete digital database of wetlands and landcover in this region, and to begin incorporating four-square-mile and other monitoring surveys. This may require that new methodologies be developed and implemented. This region is sometimes excluded from map products found in this plan simply because these data are unavailable.

Mission and Vision of the Prairie Pothole Joint Venture

The joint ventures formed under the North American Waterfowl Management Plan (NAWMP) are one of the most visible conservation successes of the last century. Joint ventures work for one simple reason: partners have realized that they can achieve more through collaboration than they can accomplish acting alone. Partnerships are the engines that drive joint ventures to success.

*The **mission** of the Prairie Pothole Joint Venture is to implement conservation programs that sustain populations of waterfowl, shorebirds, other waterbirds and prairie landbirds at objective levels through targeted wetland and grassland protection, restoration and enhancement programs. These activities will be based on science and implemented in collaboration with multiple stakeholders.*

*The **vision** of the Prairie Pothole Joint Venture is to have abundant populations of waterfowl and other wetland and grassland birds that can be sustained in perpetuity.*

A vital function of the PPJV is as an information/coordination resource for partners and external entities. To that end, The PPJV Management Board, the PPJV Technical Committee, and the agencies, organizations, and individuals share information and coordinate actions. PPJV members:

- Are guided by biologically-based planning that is refined through science-based research and evaluation.
- Work together to define and attain the landscape conditions needed to sustain abundant populations of wetland and grassland birds;

- Collaborate and forge alliances with a variety of conservation and community efforts in the development of conservation, economic and social policies and programs to sustain the ecological health of Prairie Pothole Region landscapes.
- Strive to continually improve the biological foundations of migratory bird conservation.

Since its inception, the PPJV has used the best available science to guide programmatic decisions and develop management tools. These tools include traditional wildlife management techniques targeted at one or more species, as well as broader conservation efforts intended to provide multiple social, economic, and environmental benefits. Most notable among the latter are USDA programs such as the Conservation Reserve Program, the Wetland Reserve Program, the Conservation Reserve Enhancement Program, and other farmland protection programs. The PPJV partners use existing and emerging conservation programs to enhance the collective benefits to waterfowl and other migratory birds, while respecting the unique priorities and purposes of each partner.

Since its inception, the PPJV has used the best available science to guide programmatic decisions.

History of the Prairie Pothole Joint Venture

Conservation creates a legacy by building on cumulative successes, but we also learn important lessons from our experiences and mistakes. For these reasons, it is important that this revised plan be built on a foundation of accumulated knowledge and that this knowledge be used as a context by which we set our future direction.

The Prairie Pothole Joint Venture (PPJV) was established in 1987 under the NAWMP, the largest cooperative effort ever initiated to protect wetlands, waterfowl, and other wildlife. The Plan committed the United States, Canada, and Mexico to reviving North American waterfowl populations through the retention and restoration of crucial wetland and upland habitats across the continent.

Six regional self-directed partnerships (called Joint Ventures) involving Federal, State and local government agencies, non-governmental conservation organizations, corporations, Tribes, and other entities were formed to implement the Plan. The Prairie Pothole Joint Venture (Prairie Pothole Region [PPR] of MT, ND, SD, MN, IA) is one of the six original joint ventures.

In late 1987, a PPJV Steering Committee that represented major partners in the prairies was formed and a Joint Venture Coordinator was identified. State Action Groups with respective Coordinators were established. Five PPJV “Specialty Teams” were created to develop an Implementation Plan, as well as address issues of Communications, Funding, Waterfowl Modeling, and Revenue Sharing. Over time, the organization and functions of the PPJV have

evolved to address the complex business of conservation. Readers are referred to **Appendix A. – Organization, Function and Responsibilities**, for additional details.

It is important that this revised plan be built on a foundation of accumulated knowledge and that this knowledge help guide our future direction.

A “step-down” planning process was begun in 1987 that used objectives from the NAWMP as a basis to establish plans for the PPJV. These plans, to be implemented at the state and project level, identified specific habitat retention, management and enhancement strategies. In June of 1988, the “Concept Plan for Waterfowl Habitat Protection – U.S. Portion of the Prairie

Potholes and Parklands” was released. The goals, objectives, and strategies for the retention of prime waterfowl breeding habitat were discussed in this 15-year plan. Emphasis was on actions that would be taken by the U.S. Fish and Wildlife Service. In addition to waterfowl, the Concept Plan noted that “the wetland and upland habitats of the Region provide breeding areas for numerous marsh, wading, and shorebirds; gulls and terns; raptors; song birds; and other avian species,” and suggested that “further protection of prairie potholes and their associated uplands will provide breeding habitat for many avian species, in addition to the ducks for which the areas are primarily managed.”

In August 1988, the purpose of the PPJV was defined by partners as: “to involve the public in a broad scale, unified effort to increase waterfowl populations by preserving, restoring, and enhancing wildlife habitat in the PPR of the U.S.” Special emphasis was given to protecting and enhancing 1.1 million acres of breeding habitat, promoting habitat improvement on private lands; increasing waterfowl production on public wildlife areas (including habitat improvement, controlling disease and predators); addressing research issues to improve management performance; seeking to integrate wildlife, agriculture and water development programs; and evaluating PPJV efforts and the response of waterfowl to habitat projects.

In April of 1989, the first PPJV Implementation Plan was completed. The U.S. Fish and Wildlife Service (FWS) Concept Plan and the Central Flyway Mallard Management Plan (March 1985) provided background information. The Plan noted that “the strategies outlined in this plan provide general guidance for future management actions that will benefit at least 10 key duck species as well as migratory nongame birds that breed in the Region; contribute towards countless hours of consumptive and nonconsumptive wildlife related activities; and contribute millions of dollars to regional, national, and international economies”. Through the “step-down” planning process, State Plans would include those strategies and actions that would be most appropriate for each State in the PPJV.

Priority Actions included planning and evaluation, managing and enhancing public and private lands, communications and education, land acquisitions, fund raising, and affecting legislation and regulations.

The objective for the original Implementation Plan was to “*Maintain an average breeding population in years of average environmental conditions of 6.8 million ducks (1.2 million*

mallards and 1.1 million pintails) and 13.6 million ducks in the fall flight by the year 2000.” FWS Regional Directors were requested by the PPJV Steering Committee to continue to develop and implement a computerized modeling technique (Mallard Model) for planning beginning in 1990. State and project plans would use the Mallard Model as a tool to develop and evaluate habitat protection and enhancement strategies.

In 1989, at the request of the PPJV Steering Committee, Habitat and Population Evaluation Team (HAPET) offices were established in Bismarck, ND and Fergus Falls, MN to assist in the coordination and guidance of waterfowl management activities in the PPJV. Also in 1989, the North American Wetlands Conservation Act (NAWCA) was authorized. Designed to provide matching funds to partners who were carrying out wetland conservation projects in the U.S., Canada, and Mexico, NAWCA provided a sorely needed source of funding to PPJV activities.

In 1990, The PPJV Steering Committee changed its name to the PPJV Management Board, to provide more uniformity within the NAWMP. The “Partnerships in Progress” PPJV Accomplishment Report (1987-1993), documented major progress by the PPJV. State and project planning efforts were well underway or finished, Flagship Projects had been established in each State, accomplishments in the protection, restoration and enhancement of habitat were being measured, and numerous evaluation activities (from meeting waterfowl production goals, to intensive habitat management techniques, to surveys on shorebirds) were being completed. The PPJV recognized the importance of the Conservation Reserve Program, and issued a resolution calling for all Joint Ventures and the NAWMP U.S. Implementation Board to secure support for CRP.

The NAWMP was updated in 1994 to reflect accomplishments and changing times on a continent-wide basis. The emphasis was on achieving waterfowl objectives and broadening the NAWMP to include the maintenance and enhancement of associated ecological values. Recognizing the need to review guidance from 1994 forward, the PPJV Management Board appointed a PPJV Implementation Plan Update Committee to develop the 1995 PPJV Implementation Plan.

The 1995 Plan continued to recognize the importance of working with private landowners and USDA Conservation programs. Habitat acreage objectives developed by the States were then still in the process of being refined. After a review of nesting success data and with use of the Mallard Model, the PPJV Waterfowl Modeling Committee concluded that a 50% nesting success rate (originally recommended by NAWMP) was unrealistic across the PPJV landscape. The Committee subsequently recommended adopting a goal of a 0.6 recruitment rate overall for the PPJV and a 0.49 recruitment rate (population maintenance level) for all managed areas.

Framers of the 1995 PPJV plan also recognized the need to increase knowledge about other bird species in the prairies. Several species of grassland birds endemic to the PPR were showing steep population declines. Information on waterbirds and shorebirds was lacking. The PPJV Management Board approved a second objective of stabilizing or increasing populations of declining wetland/grassland-associated non-waterfowl migratory birds. Because of the lack of basic information, no habitat or population objectives were set.

Several organizational changes were made in 1995. A Technical Committee was created that brought together expertise in waterfowl and non-waterfowl migratory bird research and management. The Funding Committee was disbanded. The PPJV Management Board met with the Prairie Habitat Joint Venture Management Board to discuss common conservation issues and plan a joint technical exchange. Priority actions focused on planning and evaluation, legislation and regulation, fund raising, enhancing private lands management, communications/education, organization, and supporting research and literature reviews regarding predator management.

The period of 1995-2000 saw explosive growth in the conservation and joint venture world. The size and scope of NAWCA grants increased. National plans for landbirds, waterbirds, and shorebirds were being developed. New tools became available for use in landscape planning and design. The NAWMP was updated in 1998, and in 1999 the PPJV Management Board asked the Coordinator and a working group of the Board to review the 1995 PPJV Implementation Plan to see if revisions were needed. The group concluded that the 1995 Plan was ahead of the curve (particularly in the non-waterfowl arena). The Management Board accepted the recommendation to continue on course.

In 2005, the NAWMP update was signed by Canada, Mexico and the United States. Partners In Flight's Landbird Plan, the North American Waterbird Conservation Plan, and the U.S. Shorebird Conservation Plan are complete. NAWCA requires technical answers on waterfowl and wetland-associated migratory birds, the Neotropical Migratory Bird Conservation Act is in place, the North American Bird Conservation Initiative (NABCI) has created a bird conservation forum, Joint Ventures have built new budget requests to deliver conservation treatments for "all-birds", and Bird Conservation Coalitions have been developed to seek funding. These activities have stimulated a new wave of international cooperation. The PPJV's increasing role in international conservation is presented in **Appendix B – International Collaboration**.

Eighteen years of work in the PPJV have produced some spectacular results on the landscape, in building a scientific foundation, and in developing and maintaining partnerships.

In the PPJV, HAPET offices and partners have used the latest GIS technologies to create models to target conservation actions on the landscape for waterfowl. Data are being collected and similar models are being developed for shorebirds, grassland birds and eventually, waterbirds. Evaluation and monitoring programs are being implemented to refine models and guide management activities. The PPJV is looking beyond its boundaries, cooperating with the PHJV and other Joint Ventures in the U.S., and beginning to form linkages and connections with wintering sites in the Western Hemisphere that host birds that breed in the PPJV.

Eighteen years of work in the PPJV have produced some spectacular results on the landscape, in building a scientific foundation, and in developing and maintaining partnerships. During the first 18 years of the PPJV, (1987-2002), partners protected, restored or enhanced 3,772,025 acres of habitat at a cost of \$455,130,842 (North American Waterfowl Management Plan, Plan

Committee 2004). These funds were derived through a combination of partner funding and the North American Wetlands Conservation Act. The PPJV has also benefited immensely from a number of U.S. Department of Agriculture conservation programs, most notably the Conservation Reserve Program.

However, the prairie pothole states continue to lose grasslands and wetlands at alarming rates, fueling serious declines in a wide range of bird species. There is much still to be done. Building on the lessons learned over the past 18 years, we have developed this 2005 PPJV Implementation Plan that strives to look ahead, building on our successes, and anticipating future challenges.

Current and Emerging Issues in the PPJV: Challenges and Opportunities

The PPJV recognizes that the land and people of the PPR are inextricably intertwined. The hope and intent of the PPJV is that citizens, local, state, and federal agencies, and non-governmental organizations will work together toward sustainable land use, abundant wildlife populations, and vibrant rural communities. Here we review important issues that are creating new challenges for the people and wildlife of the Prairie Pothole Region.

Agriculture and U.S. Farm Policy

Contemporary landscapes of the PPJV are shaped by agriculture. The nature of that agriculture is determined by individual producers who make land use decisions based on tradition, expertise, life style choice, and economic profitability. There is a dynamic interplay among these factors. Individuals are generally reluctant to adopt new traditions and radically shift their expertise. A cattle rancher, for example, is unlikely to become a wheat farmer unless he is already a “mixed operator,” because he lacks the expertise and equipment to do so. The same can be said for a wheat farmer becoming a rancher. However, when land changes hands, the new owners may have the tradition and expertise to switch land use quickly. Typically, several factors weigh into that decision.

Changes in Crops and Technology – Changes in crop types and field sizes in the PPR have decreased the quality of farmland wildlife habitat. Row crops (corn and soybeans) that provide no habitat for grassland birds are replacing cereal crops (wheat and barley) that provide at least some—albeit marginal—nesting cover. The most evident change in crop types is the western expansion of soybeans into North and South Dakota, states that were considered too dry to grow soybeans just 60 years ago (Higgins et al. 2002). The use of genetically modified row crops is now common through the PPR (Krapu et al. 2004), and a current emphasis in crop research is to develop more drought-tolerant strains of corn and soybeans. New, herbicide-resistant crops, coupled with the low cost of herbicides, have been a major force behind the conversion of grassland to cropland.

Changes in Farm Equipment.— Loss of native rangeland and the decreasing number of farm families have coincided with changes in farm equipment that now enable fewer workers to more efficiently till, plant and harvest crops. Landowners today can work 2-3 times as many

corn and wheat acres in the same amount of time. This equipment is also highly mobile, allowing producers to work fields in different townships or counties while living “in town.” Changes in equipment have also led to “cleaner” farming practices where operators remove grass margins along fields and drain small wetlands that once served as important wildlife habitat, but are now perceived as “problem areas” that impede the movements of large machinery. Recent advances in “precision farming technology,” such as GPS guided implements and GIS calibrated planting and fertilizing rates, will continue to enhance the efficiency of tillage agriculture and exert additional pressure on wildlife habitats. Conservation planners will be challenged to develop programs that address the growing scale of farming yet make fiscal sense to landowners.

Changes in Rangeland and Livestock – Throughout PPR states, conversion of grassland to cropland has increased grazing intensity on remaining grasslands. Data from South Dakota indicate that 3.5 million acres of rangeland (14% decrease) were converted to cropland during 1977-1997 (Higgins et al. 2002). Similar patterns exist throughout North Dakota and Montana. Recent increases in animal size exacerbate poor range conditions because more forage must be produced on fewer acres to feed cattle that are 30% heavier now than 60 years ago (Higgins et al. 2002). These factors present an opportunity for PPR planners to promote grazing as a preferred land use while working with landowners to minimize adverse impacts of overgrazing. The recent growth of consumer interest in bison meat and rangeland beef have caused scores of ranching operations throughout the PPR to tailor their operations to capitalize on this emerging market. Continuation of this trend could present an expanded opportunity for landowners and conservationists to forge partnerships that benefit both.

Profitability – Profitability is obviously an important factor affecting land use. Although commodity prices and input costs are considerations in the profitability equation, they are sometimes overshadowed by the subsidy programs of the U.S Farm Bill. In recent years, direct and counter-cyclical payments, loan deficiency payments, and other subsidy programs of the USDA have accounted for as much as half of the net income of farmers in the Dakotas. Were it not for these subsidies and the financial safety net they provide, it is likely that land-use decisions made during the last two decades would have been very different.

On a positive note, the conservation provisions of the Farm Bill have been extremely beneficial to wildlife in the PPR (Reynolds et al. 2001). CRP has been responsible for the restoration and short-term protection of 7.8 million acres of grassland and wetlands . In Minnesota and Iowa, WRP has been extremely beneficial to waterfowl and other wetland birds. These programs have also helped stabilize farm incomes and provided alternative sources of revenue.

The Potential Loss of CRP – In 2005, we appear to be on the verge of a transition in federal farm policy that could have enormous implications for the PPR. A burgeoning federal deficit and tight budgets have raised the specter of dramatically reduced subsidies under the new farm bill. It is also reasonable to expect that conservation titles will be funded at lower levels, while nationwide competition for those funds will remain

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keen. Within the PPJV, contracts on half of the remaining CRP acres will expire in 2007, and current re-enrollment rates are dismal. Thus, millions of acres of expiring CRP may revert back to cropland beginning in 2007-09. This would have immense, negative consequences for the PPR and North American bird conservation.

Rural Farm Families: A Story of Demographic Change

Human demography in the PPR is rapidly changing as people from small towns move to urban centers and traditional, small family farms are replaced by large, often corporate, operations. Throughout the PPR, economic and demographic realities are forcing farmers and ranchers with small operations to seek off-farm employment. Many families have opted to sell their farms to larger operations and move to town to escape the strain of working multiple jobs. This mass exodus from farms and ranches is profoundly altering the rural identity of the region. In 1995, South Dakota's urban population exceeded its rural population for the first time since statehood (Higgins et al. 2002). Equally striking patterns are evident throughout the entire PPR. In North Dakota, the number of farms declined from 86,000 in 1933 to 30,300 in 2003, with similar trends in Minnesota (98,537 in 1974 to 80,865 in 2002) and Iowa (96,705 in 1997 to 90,634 in 2002).

Life style choice may be another cause of this exodus from the Northern Great Plains' countryside. The world-wide web and satellite television have exposed prairie residents to "the outside world". Many young adults—and some older ones—are deciding that there is a more comfortable lifestyle to be had in occupations other than agriculture. This is particularly true of ranching, which usually requires that families reside year-round in a place where they can tend to their animals. In contrast, crop farmers may and often do live in town, visit their fields a few times each year to plant, spray, and harvest, then remain in town or even travel out-of-state for the winter months.

Energy Developments

Between 1870 and 1980, energy development in the PPR was mainly focused on petroleum exploration and extraction, and replacement of windmill-powered electricity with hydro-, coal-, gas- or nuclear-powered electric generators. Concern about declining world-wide petroleum reserves, limited potential for hydro-powered energy, and environmental and health impacts related to coal and nuclear power developments has spurred interest in development of alternative, renewable energy sources. Four renewable energy sources being developed in the PPR include wind power, fuels from grass biomass products, ethanol from corn, and soy fuels from soybeans. Although it is difficult to assess future effects of alternative energy developments, the potential of these new sources needs to be considered by PPJV planners.

Wind Power – Recent concern for environmentally-friendly energy has brought wind power to the PPR. The first wind plant in the region was the Buffalo Ridge Wind Resource Area, a 354-turbine facility located southeast of Lake Benton, Minnesota. Since construction of Buffalo Ridge, five additional facilities with a total of 518 turbines have been developed in the PPR. Experts forecast that the number and size of wind plants in the region will continue to increase with as many as 1,000-2,000 turbines on some sites. Wind power has received strong public support as a renewable source of "green" electricity. The PPJV is working proactively with industry to strategically site wind power facilities to reduce adverse impacts on birds and

their habitats and still realize the benefits of “green” energy. Pre-site reconnaissance with natural resource professionals greatly reduces the chance that a facility will be constructed in a poor location (e.g., amid critical breeding, wintering, or migratory pathways).

Biomass Fuels – Use of biomass fuels for generation of electricity has the potential to reduce air pollution and carbon dioxide emissions from coal-fired power plants. Switchgrass (*Panicum virgatum*) has been identified as a potential biomass fuel crop for much of the PPR. Switchgrass biomass has been used in place of coal at an electrical generating plant in Ottumwa, Iowa, where an estimated 50,000 acres of cropland is needed to produce 35,000 tons of switchgrass fuel, which in turn could reduce coal fuel use by ~5%. Biomass fuel has the potential to provide additional habitat for numerous priority species of grassland nesting birds in the PPR. Potential benefits to wildlife from grasslands planted for biomass fuel production will largely depend upon the types of seed mixtures used and how and when they are harvested.

Ethanol and Soy Biodiesel Fuels – Ethanol is currently used as a blend additive in petroleum-based fuels. Its production already exceeds that of soy biodiesel or switchgrass biomass fuel. The potential for ethanol to reduce air pollution from vehicle emissions is a strong incentive for further development. Most biodiesel is made primarily from soybean oil. Biodiesel is produced from the reaction of soybean oil with methanol in the presence of a catalyst to yield glycerin (i.e., biodiesel). Of the eleven biodiesel plants in the U.S., three are in Iowa, and plans are to develop more in Minnesota and North Dakota. A surge in production of ethanol and soy biodiesel will accelerate loss of native grassland habitats across the PPR. Planners in the PPJV need to incorporate increasing demands for energy in their conservation framework.

Climate Change

Most scientists acknowledge that the earth is undergoing rapid climate change that is enhanced by human-induced carbon enrichment of the atmosphere. All global circulation models predict substantial warming for the PPR under a doubling of atmospheric carbon dioxide. Expected changes include fewer wetlands, shorter hydroperiods for seasonal and semipermanent wetlands, and longer periods of vegetated (i.e., choked marsh) wetland conditions. Decreased wetland abundance and shortened hydroperiods will likely result in lower recruitment for ducks as a result of decreases in reproductive effort, clutch sizes, renesting probability, and nesting success. Upland land use also likely plays a role in wetland water budgets; thus research is needed to evaluate whether modifications in land use practices could ameliorate impacts of climate change. The PPJV will strive to make climate change part of the planning process to ensure that decisions made today will provide habitat for birds in altered climatic conditions.

Societal Attitudes Towards Conservation

Residents of the PPJV have mixed views towards conservation, as do elected officials and organizations. In Minnesota and Iowa, several state funding sources have been developed to finance and promote habitat conservation and restoration. Conservation easements are embraced, and land acquisitions to secure more habitat and public access are generally encouraged. There are hundreds of lake associations in Minnesota, and in April 2005 there was a “rally for ducks and clean water” to highlight the need to restore quality waterfowl hunting

through habitat restorations and clean aquatic environments. Likewise, water quality has become a front-page issue in Iowa, and their Governor has made it one of his administration's priorities.

In the Dakotas and Montana, conservation is viewed differently. In North Dakota, there are prohibitions on perpetual conservation easements and restrictions on land purchases for conservation. South Dakota and Montana have experienced recent legislative attempts to impose similar limitations. In all three states, fewer state general fund dollars are available for easements, habitat acquisitions, and management than in Minnesota and Iowa. In the Dakotas and Montana, most such funding comes from state and federal wildlife agencies, and a few non-profit conservation organizations like Ducks Unlimited. Hunting and outdoor recreation are front page news, but not the need to protect or restore the wetland and grassland resources upon which these endeavors depend.

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For this Implementation Plan to be successful, we must build on the good programs and favorable attitudes where they exist, and help shape positive attitudes towards conservation wherever such programs are not viewed in a positive light. This will require educating the public and elected officials on the values of natural assets – not only to birds, but to the quality of life for people as well. We must also advertise our successes and market our programs to the public to further gain their support and involvement. Such communications will be given high priority by the PPJV, and are further described in **Appendix C – Communications Strategy**.

Future Directions for Wetland and Grassland Conservation Programs in the PPJV

The current pace of conservation actions in the PPJV is not likely to reverse previous wetland and grassland losses. As habitat destruction expands westward, current numbers of breeding waterfowl and grassland birds cannot be sustained unless conservation efforts are accelerated. Protection of existing habitats and restoration of lost or degraded habitats are the two principal strategies of the PPJV. The diversity of land use in the PPR necessitates multiple approaches to conservation.

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Sustain Native Grassland and Wetland Habitats – Land use directly impacts the ecological integrity and social perception of wetlands in the PPR. Wetlands within a native prairie matrix have very high bird use and are valued by ranchers for stock water and forage. Thus, a central strategy for the PPJV is to work with landowners to find ways to

secure native grasslands. In doing so, wetlands are also protected, because they are viewed by ranchers as valuable sources of water and hay. Effective techniques for conserving grassland and wetland habitat include a suite of short- and long-term stewardship programs and incentives for landowners. Conserving native rangeland directly benefits a host of waterfowl, shorebird, and other waterbird species that nest over water or in grassland habitat adjacent to wetlands.

Restore Grassland and Wetland Habitats – Habitat restoration will be essential to offset continuing habitat loss and to increase the productive capacity of landscapes for breeding birds. Wetlands in cropland are more likely to be drained than those in grassland. Thus, a second major conservation strategy for the PPJV is restoring historic grassland and wetland habitats. Cost of restoration efforts will be high and traditional wildlife conservation programs alone will be inadequate. Fortunately, habitat can be restored by a variety of state and federal programs seeking diverse natural resource and socio-economic benefits. Such benefits include enhanced water quality and floodwater retention capabilities that result from grassland and wetland restorations. The PPJV is committed to exploring new linkages with partners to deliver conservation programs that benefit public interests in multiple ways but remain consistent with the priority goals of this plan.