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# Powell Marsh State Wildlife Area

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## Draft Master Plan and Environmental Analysis

September 2016

Wisconsin Department of Natural Resources  
DNR PUB-LF-099 (2016)



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**Cover Photo:** *Trumpeter Swans on the Vista Flowage (Photo by Michele Woodford)*

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## CHAPTER ONE: INTRODUCTION AND PLAN OVERVIEW



The Powell Marsh State Wildlife Area (PMSWA) lies in western Vilas County, 3 miles south of Manitowish Waters and 10 miles north of Lac du Flambeau (Map A). There are 390 acres of private land within the 4,850 acre wildlife area. PMSWA is bounded on three sides by the Northern Highland – American Legion State Forest and by the Lac du Flambeau Indian Reservation on the south. Several cranberry producers are adjacent to the property.

PMSWA is primarily an open peatland with several small flowages and small lakes. It encompasses only a portion of a 20,000 acre wetland complex that is mostly owned and managed by the Lac du Flambeau Reservation. About 12,000 acres of the tribally owned lands have leatherleaf bog habitat similar to the wildlife area. While lakes are abundant in the region, large, open peatlands are rare across northern Wisconsin. Without intervention, these peatlands naturally convert to tamarack forest and black spruce muskeg.

Powell Marsh is a locally important waterfowl production area and trappers use the area seasonally to pursue muskrat, mink and beaver. The upland fringe is used regularly for deer, turkey, and grouse hunting. Powell Marsh has been highlighted as a stop on the Great Wisconsin Birding and Nature Trail and is part of an Important Birding Area. The wildlife area provides significant, local wildlife-based recreation, particularly deer and waterfowl hunting and birding.

The open wetland system currently seen at Powell Marsh was maintained by wildfires for thousands of years. The last of the wildfires were in the 1930's and 1940's. In 1955, the PMSWA was established with the intent to attract and produce more geese for hunters. For a number of reasons, large flocks of migrating geese no longer visit the property. However, the wildlife area has become an important habitat area for bird species that require open wetland and grassland habitat. Many are listed as species of greatest conservation need (SGCN).

The primary habitat values for Powell Marsh State Wildlife Area (PMSWA) are the semi-permanent water for waterfowl and semi-aquatic furbearers and the expansive, open wetland ecosystem that supports many Species of Greatest Conservation Need (SGCN). From a recreational perspective, the PMSWA is an important destination for local deer and waterfowl hunters, and is renowned by birders looking for unusual species.

Iron precipitate and iron bacteria both naturally occur in nearby lakes and ditches in Iron and Vilas Counties. However, the management of the Powell Marsh ditch system contributes to the production of iron floc (precipitate) and discharge to Dead Pike Lake when there is no water flow. Since the initiation of minimum flow through the main ditch in 2007, iron floc formation has been reduced and aesthetic quality of the discharge water improved. Additional improvement is sought.

## Purpose of the Property and Management Authority

The scope of use and management of a state property is governed by its official designation. Wildlife Areas are acquired and managed under the authority of Sec. 23.09 (2) (d) 3 Wis. Statutes and Administrative Code NR 1.51. Wildlife Areas are set aside to provide habitat for wildlife and a place where people can hunt, trap, and fish. Wildlife areas are also open for traditional outdoor uses of walking, skiing, snow shoeing, nature study, berry picking, etc. As directed by NR 1.51 and NR 1.61, other recreational uses may be allowed by the property's Master Plan if those uses do not detract from the primary purpose of the property.

The use of funding from the Federal Wildlife Restoration Act (also known as the Pittman-Robertson Act, authorizing an excise tax on sporting arms and ammunition) to acquire, develop or manage Wildlife Areas comes with guidance to state fish and wildlife agencies based on the authorizing legislation. The statutes and applicable regulations prohibit a state fish and wildlife agency from allowing recreational activities and related facilities that would interfere with the purpose for which the State acquired, developed, or is managing the land.

## Public Lands: An Investment in Wisconsin's Future

Wisconsin is known for its abundant natural resources, for the value our citizens place on the rich traditions of hunting, fishing, trapping, camping and hiking, and for the ease of access to recreational land and wild places for everyone who lives here, including those who live in our largest metropolitan areas. We are defined by our clean lakes and rivers, vast forests, and abundant fish and wildlife. Conserving these resources is not an expense, but an investment that pays many dividends, both economic and social. A University of Minnesota study found that for every \$1 invested in conserving natural areas in that state, there is a return of up to \$4 (MEP 2011). Although similar data are not available for Wisconsin, one can imagine that a similar return of \$4 on each \$1 investment in public land in Wisconsin is quite possible.

The State of Wisconsin manages about 1.6 million acres of publicly-owned forests, barrens and savannas, grasslands, wetlands, shrub-lands, streams and lakes. Most of these lands are open to hunting, fishing, trapping, hiking, cross-county skiing, wildlife watching, and other outdoor, nature-based recreation. The economic impact of fishing, hunting and wildlife watching in Wisconsin is considerable. According to the 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, Wisconsin report (USFWS and USCB 2014), a total of 3.5 million residents and non-residents aged 16 years and older fished, hunted and/or watched wildlife in Wisconsin in 2011, spending \$5.5 billion in the process.

Total wildlife-watching participants numbered 2.4 million, with over 6 million days of participation and total expenditures of almost \$1.5 billion (USFWS and USCB 2014). Over 1.2 million anglers spent over 21 million days fishing in 2011, accounting for nearly \$1.5 billion in retail sales and \$2.26 billion in overall economic output. This generated \$148 million in state and local taxes and provided over 21,000 jobs (Southwick Associates 2013). Over 894,000 hunters spent over 12.1 million days hunting in 2011, accounting for over \$2.5 billion in retail sales, almost \$4 billion in overall economic impact, and generating over \$228 million in state and local tax revenue and over 34,000 jobs (Southwick Associates 2012).

In addition, Wisconsin's \$17.5 billion/year tourism industry (TFW 2014) and \$23 billion/year forest industry (DNR 2012) both are inextricably linked to abundant natural resources and a vibrant public land base.

All DNR-managed lands have been certified as sustainable by two separate third-party audit firms, indicating that these lands meet the social, ecological, and economic rights and needs of the present generation without compromising those of future generations. All timber harvested from state lands can be marketed as sustainable and therefore has an enhanced value.

Even those citizens who do not engage in hunting, fishing, hiking, camping, or other outdoor activities on public lands have a reason to value them. These lands provide "ecosystem services" that improve our quality of life in various ways. Ecosystem services are conditions or processes associated with natural ecosystems that provide benefits to humans.

For example, land conservation protects human health by keeping our drinking water clean and is a cost-effective tool in protecting water quality. A growing understanding of the role that forests and natural lands play in filtering pollutants and maintaining water quantity and quality has led many municipalities and water suppliers, particularly those in growing communities, to consider land protection as part of a multiple-barrier approach to providing safe drinking water. A study conducted by the Trust for Public Land and the American Water Works Association showed that forestland in particular greatly reduces the cost of treating drinking water. For every 10 percent increase in the source area's forest cover (up to 60 percent), treatment and chemical costs decreased approximately 20 percent (Ernst 2004).

Wetlands provide natural flood insurance by acting as sponges, storing rain that runs off the land and slowly releasing it to the atmosphere, groundwater, and adjacent lakes, rivers and streams. Strategic wetland protection and restoration can help reduce flood peaks and damage, protect human health and safety, and reduce the need for expensive projects such as levees, detention ponds, and the reconstruction of flood-damaged roads.

Ingraham and Foster (2008) estimated the value of some of these basic ecosystem services. They calculated an economic value for the wildlife habitat, carbon sequestration, disturbance prevention (e.g., flood control), freshwater management and supply, nutrient regulation, and waste management provided by USFWS National Wildlife Refuges in the contiguous United States. The value of services provided by forests, shrub-lands, grasslands, and wetlands amounted to \$2,900/acre/year. Using the same approach, Wisconsin's public lands provide a total return of \$3.33 billion/year or \$2,400/acre/year.

Our wild lands also provide a cultural and historical connection to whom we are and where we've been. They provide a sense of place in the landscape and are important habitats for people. They include historic and archaeological sites, scenic views, water access, bridges and more. Trails, for example, are links to our natural resources. They play an important role in providing access to the outdoors for people with varied physical abilities, support environmental education, and build a public commitment to environmental conservation.

The majority of Americans agree that preserving undeveloped land for outdoor recreation is important (Outdoor Foundation 2011). Lack of access to, and interest in, nature keeps kids from experiencing the outdoors, leading to a growing disparity between the time children spend indoors wired to technology and the time they spend outside enjoying nature (TNC 2011). Evidence suggests that children and adults benefit so much from contact with nature that land conservation can now be viewed as a public health strategy (Frumkin and Louv 2007).

It can be difficult to weigh the ultimate value of purchasing, conserving, and managing public land in Wisconsin. Upfront costs are obvious and immediate, while benefits are usually long-term and may seem vague by comparison. However, in addition to dollars and cents, land conservation also should be measured in the currency of recreation, environmental benefits, connections to nature, and land health. Expenditures for public land conservation and management are best understood not as a cost but as an investment that will pay dividends,

including economic ones, long into the future (Gies 2009). Likewise, the land acquisition and management strategies outlined in this master plan will pay commensurate dividends to the region and its residents, long into the future.

## Tribal Resources in Ceded Territory

The Powell Marsh State Wildlife Area lies within the Ceded Territory of the state and is located adjacent to and north of the Lac du Flambeau Reservation.

Native American tribes are independent, sovereign nations, as they were prior to the arrival of Europeans in North America. The Ojibwe Tribes ceded lands in the northern one-third of Wisconsin to the United States government in the Treaties of 1837 and 1842. In those Treaties, they reserved their rights to hunt, trap, fish and gather within various publicly-owned lands. Treaty rights are currently being exercised and implemented by the Ojibwe Tribes within the Ceded Territory.

The Lac du Flambeau Band uses the Powell Marsh to provide hunting, fishing and gathering opportunities for the tribal membership. The marsh is a very important resource because it provides clean water, air and land that support many species of plants and animals. For example, there are well over 130 species of birds that utilize the marsh, especially during the spring migration. The hydrology of the marsh, the interaction between land, ground water and surface water, is another important feature of this ecosystem. The Lac du Flambeau Band manages the marsh through the Integrated Resource Management Plan (IRMP). The IRMP is a strategic-level document describing tribal resources and management policies, based on the Band's vision to protect and conserve the natural resources for present and future generations.



## Purpose and Need for the Proposed Action

The proposed action is the Natural Resources Board's (NRB) approval of the revised property master plan for the PMSWA.

The NRB has determined that a property master plan is required for most department managed properties. PMSWA is among those properties where a plan is required. The current master plan is over 35 years old (approved in 1980) and is in need of revision, as conditions on the property have changed over time and the current plan does not meet the newer NR 44 requirements for property master plans.

## Plan Overview

This plan lowers the potential for iron floc production on the property by reducing the length of ditches and increasing the level of water that “filters” through marsh/wetland before discharging to Dead Pike Lake. Collectively, these actions further reduce the potential for iron floc to be generated in PMSWA’s ditch system. The current amount and types of habitats are maintained under the plan. This management regime largely maintains the current open habitats that many Species of Greatest Conservation Need depend on and provides significant habitat for ducks, geese and semi-aquatic furbearers that optimizes hunting and trapping opportunities.

The proposed plan provides improved public access, more hiking and ADA accessible trails and facilities, improved watercraft access, and also offers new educational and information features.

## Habitat and Wildlife

The plan will maintain and enhance the quality and composition of the habitats on the property. Vegetation management objectives include maintaining the ecologically important large, open wetland habitats and providing early successional forest habitat on the marsh’s fringe.

Management of the marsh’s upland forested fringe with a focus on maintaining early successional forest habitat (oak and aspen) will continue to provide habitat diversity and maintain habitat for species such as ruffed grouse, turkey, and deer.

The plan maintains the diverse wetland, grassland, shrub, forest, and aquatic habitats needed by the resident and migratory wildlife populations; continuing to support the current array of resident and migratory wildlife populations. The proposed management is especially beneficial to grassland nesting waterfowl, shorebirds and grassland birds.

Currently, an 1,800-acre wildlife refuge area is closed to all public access from September 1<sup>st</sup> to December 31<sup>st</sup>. The refuge protects migrating waterbirds during the waterfowl hunting season. The plan would redraw the existing refuge boundary to allow year-round public foot access across to the interior of the property, which is now blocked during the fall refuge closed period. The new refuge would encompass 850 acres, including the primary and most important area used by waterfowl in the fall. The re-opening date for the refuge would be changed to October

31<sup>st</sup>, to increase opportunities for furbearer harvest. Most waterfowl have left the area by this time due to frozen water conditions.

PMSWA offers rich opportunities to continue to provide habitat for Threatened, Endangered, Special Concern Species, and for Wildlife Species of Greatest Conservation Need (SGCN), which are identified by the Wisconsin's Wildlife Action Plan (DNR, 2006). Some are ranked as having the highest management concern.

The large open wetland habitat with shallow open water habitat of Powell Marsh is unique in the region. Its open water and early successional wetlands provide essential habitat for migrating waterfowl, shore birds and grassland birds. Also, the property provides regionally significant nesting habitat for a number of uncommon to rare bird species. The plan will maintain and enhance habitats for these species.

### Bird and Wildlife Monitoring

Wildlife surveys are conducted at regional and local scales to assess trends in game and nongame wildlife populations. Some examples of annual wildlife surveys include but are not limited to: waterfowl banding, annual USFWS Crane Count, furbearer and carnivore tracking, spring and midwinter waterfowl surveys, gamebird brood counts and summer deer observation surveys. Other surveys conducted on a less regular basis include, breeding bird atlas, bat monitoring, and herpetology surveys. Rare bird and animal reports are submitted to the Natural Heritage Inventory (NHI) by the public and by department staff.

### Water Management

Overall, the water management capabilities remain generally unchanged under this plan, allowing the current existing amount, variety and quality of wetland habitats on the PMSWA to be maintained. Managing flowage water levels will continue to be a primary management tool for maintaining the variety and quality of wetland habitats. Prescribed burning will also continue, under managed conditions, to help control brush and tree invasion.

#### *Water management strategy for water quality*

Main Ditch has been a primary source for collecting and passing iron-rich and oxygen-poor ground water to Dead Pike Lake (DPL) as well as generating iron floc. This plan reduces the potential for the discharge of iron-rich ground water and floc to DPL. Specifically, this plan calls for:

- Altering Main Ditch to prevent flow and redirecting the primary water flow westward into the marsh/wetlands; allowing it to sheet-flow to the Powell Road culvert. A minimum water flow of 1.2 cfs would be maintained from spring break-up to fall freeze-up.

- Retaining the ability to manage water levels within the flowages, including Vista Flowage, to maintain desired wetland habitats.
- Altering or abandoning other selected ditches on the property to reduce the potential for floc production.
- Using adaptive management techniques to monitor the results of management activities and make corrections accordingly.

## Overview of Recreation and Public Access Proposals

### *Trails – Hiking, Skiing and Nature:*

- Establish a designated hiking trail loop circling Vista Flowage. A portion of the trail along the north shore of Vista Flowage will be ADA accessible and a nature trail as well.
- Place resting benches at appropriate locations, such as popular viewing sites and access points.
- Provide year-round trail access along the entire trail by relocating the refuge boundary.
- Provide carry-in watercraft access to Homestead Lake and Vista Flowage.
- Construct a board-walk trail segment into the marsh.

### *Information, Education, and Wildlife Viewing:*

- Expand the views from the Vista overlook.
- Establish a nature trail along Vista Flowage's north shore.
- Provide one or more accessible blind(s) for viewing wildlife.
- Work with partners to develop, deliver, and maintain an interpretive program.

### *Hunting and Trapping:*

- Maintain the open peatlands and water habitat for waterfowl and furbearers. Maintain the wooded upland fringe with a focus on early successional species for deer, turkey and Ruffed Grouse habitat.

### *Bicycle Access:*

- Bicycles will be allowed on management roads and dikes unless signed closed.

## Projected Benefits

The proposed actions are anticipated to have positive long-term effects on the quality of the natural environment and recreational users. The habitat management and recreational use enhancements are expected to provide cumulative benefits to property users and the natural environment, including:

- Maintenance and enhancement of recreational opportunities for users through improved facilities and sustainable wildlife populations for harvest and observation.
- Maintained high quality habitats for the long-term benefit of game and non-game species, including many rare species and other species of special concern.
- The modifications to the management of the flowage/ditch/dike system cumulatively are expected to improve the quality of water discharged from PMSWA and benefit Dead Pike Lake.

## CHAPTER TWO: MANAGEMENT, DEVELOPMENT AND USE

### Vision

The Powell Marsh Wildlife Area is an expansive, open wetland ecosystem that supports a wide variety of plant and animal species, particularly waterfowl. The property provides hunting, trapping, bird watching, other compatible recreational pursuits, and educational opportunities. The area's natural, cultural, and historical resources are managed and enhanced with the cooperation of tribal governments and adjacent landowners.



### Goals

1. Provide a large area of high quality open wetland habitats for migratory and resident birds, semi-aquatic furbearers, and other wildlife. Protect wildlife Species of Greatest Conservation Need, and enhance their habitats whenever possible.
2. Maintain and enhance hunting, trapping, wildlife viewing, and other compatible recreational opportunities and public access within the physical capabilities of the property. Provide opportunities for natural history and environmental interpretation and education.
3. Assure the Powell Marsh State Wildlife Area waters and the water flowing from the property meet water quality standards.

## Land Management Classification

All of the PMSWA is classified as a **Habitat Management Area**. A Habitat Management Area is managed to provide or enhance habitat, whether upland, wetland or aquatic, to support specific species of plants and animals.

A management classification generally describes the primary management objective for a property or areas within a property. The land management classification system is further defined in *Chapter NR 44.06 and 44.07 of the Wisconsin Administrative Code*.

## Resource Management – Habitats

### Wetland/peatland Habitats

#### Objectives

- Maintain a mosaic of high quality, wetland habitats ranging from open water to forested, with an emphasis on unforested open-wetlands. Specifically:
  - Maintain Vista Pool as a permanent or semi-permanent deeper, open water pool,
  - Maintain areas of emergent marsh (open water with submerged and floating aquatic plants) to the degree practicable,
  - Maintain areas of sedge meadows; alder and willow fens, bogs with low shrubs, sphagnum moss, and stunted spruce and tamarack, and
  - Retain some larger areas and small, scattered pockets of forested peatlands in various degrees of succession.

#### Prescriptions

- Use water level manipulation, prescribed burning, and shearing to aggressively control woody vegetation (particularly tamarack) to the degree practicable to maintain the open and semi-open habitat.
- Water level manipulation includes flooding, drawdowns, and partial drawdowns of flowages to mimic and restore the habitat types found within natural fluctuating wetlands.
- Retain some shrub vegetation along flowage where it does not adversely impact dikes.
- In order to maintain a ratio of forested to unforested wetland succession, regenerate merchantable timber forest stands following guidelines outlined in the DNR Silviculture and Forest Aesthetics Handbook.
- Establish wild rice in flowages if possible. Restrict rice to Marsh flowages, do not allow it to establish in Dead Pike Lake.

## Upland Habitats

### Objectives

- Provide deer, Ruffed grouse, and turkey habitat on the upland forested fringe of the Marsh; maintain a young forest mix comprised of aspen, oak, and red and white pine, with patches of larger, older pine and oak on appropriate sites.
- Provide grassland habitat on non-forested upland sites to support the overall open-habitat objectives.

### Prescriptions

- Use primarily even-aged silvicultural systems (i.e. 'coppice with standards' techniques) to regenerate and maintain oak and aspen as outlined in the DNR Silviculture Handbook.
- Use uneven-aged silvicultural systems (i.e. selective harvesting techniques) on sites suited to maintain larger, older oak and pine.
- Maintain current grassy upland areas in permanent grass cover.

**Table 1: Current and Projected Future Cover Type Acreage.**

Cover Type	Current		Predicted 50 year	
	Acres	% Cover	Acreage Objective	Future % Cover
Open Water	210	5%	210	5%
Unforested Wetlands	2,415	53%	2,415	53%
Forested Wetlands	1,284	28%	1,284	28%
Grassy Upland Islands	62	1%	62	1%
Upland Forest Fringe	580	13%	580	13%
<b>Total</b>	<b>4,551</b>	<b>100%</b>	<b>4,551</b>	<b>100%</b>

### Authorized Management Activities and Tools

All activities listed above in the management prescriptions and those listed below are authorized on the property as may be appropriate.

- Chemical Application
- Mechanical/mowing or shearing
- Hand cutting (chainsaw & girdling)
- Prescribed burning
- Timber sales
- Bio-fuel harvest
- Seeding grass cover
- Control of invasive species via chemical application or approved biocontrol
- Placement of nest boxes, platforms or similar devices to enhance reproduction of desired wildlife species

## Refuge

### Objective

Provide an area for waterfowl to rest undisturbed during the fall migration in balance with public access needs.

### Prescriptions

*The current refuge blocks all three major access points into the property from Sept 1- Dec 31st, reducing round trip access and essentially preventing any looped trails.*

- Modify the existing refuge boundary (as shown on Map D) to allow year-round public access on the southern perimeter of Vista Flowage. Also, change the closed time period to be September 1st – October 31<sup>st</sup>, to provide more furbearer harvest opportunities.

## Resource Management – Flowages and Water Quality

This plan element focuses on providing open wetland habitats, maintaining clear water discharge to Dead Pike Lake, and reducing the level of phosphorus discharged from the marsh.

*Overview of the proposed water management strategy. Specifically, this plan calls for:*

- *Alter Main Ditch to eliminate flow from the portion of Main Ditch that runs along the north-south Vista Pool dike and redirect the flow into the marsh/wetland area to the west; allowing it to sheet-flow to the outlet to Dead Pike Lake at Powell Road.*
- *Maintain a minimum water flow of 1.2 cfs out of the Main WCS into the marsh area from spring break-up to fall freeze-up.*
- *Retain the ability to manage water levels within the flowages, including Vista Flowage to maintain desired wetland habitats.*
- *Alter or abandon other selected ditches on the property to reduce the potential for floc production.*
- *Use adaptive management techniques to monitor the results of management activities and make corrections accordingly.*

### Objectives

- Provide and maintain a variety of primarily open high quality wetland habitats,
- Assure the clarity of water leaving PMSWA in the discharge to Dead Pike Lake is equal to or better than nearby streams,
- Reduce the level of phosphorus discharged from PMSWA to Dead Pike Lake.



## Flowage System and Water Management

### Prescriptions

Refer to Figure 1 for the locations of the following actions:

- Plug, alter or eliminate Ditch #3 in one or more locations (this is the north/south portion of Main Ditch that runs along the Vista Flowage dike) to reduce or eliminate ground water infiltration into the ditch and redirect surface water flow to the marsh/wetland areas west of the main ditch. Encourage sheet-flow of surface water through as much of this area as possible, utilizing native vegetation to slow and filter water flow before exiting the marsh via the existing culvert at Powell Road. Engineering evaluation is needed to determine the appropriate locations, size, length, and number of ditch plugs or other ditch alterations.

*Main Ditch is a primary source for collecting and passing on iron-rich and oxygen-poor ground water to DPL as well as generating iron floc. This action reduces the potential for the discharge of iron-rich ground water and floc to DPL. (Installing one or more ditch plugs is recommended as an initial action rather than filling the ditch because it would be readily reversible if necessary.)*

Evaluate the potential and feasibility of altering (to speed flow and reduce ponding) the east-west portion of Main Ditch (that portion running along Powell Road) to reduce iron floc formation in the ditch. Also, evaluate the potential and feasibility of filling or plugging the ditch and redirecting the discharge from Vista Flowage into the marsh area to sheet-flow. *(This portion of ditch has been determined to potentially have stream history, which may limit the legally permissible options.)*

- Install a diffuser basin below the Main WCS to slow and spread outflow and to prevent flow from cutting new channels.
- Replace the Main WCS to improve the ability to capture and divert spring runoff and high water events.
- Manage flowage water levels following current practices for maintaining habitats and providing minimum flow. Maintain all existing water control structures, and maintain the dikes and ditches not targeted for abandonment. Water control structures and spillways may be replaced, upgraded, or relocated as necessary to meet water management objectives.
- Widen the west dike of the Main Pool to improve stability and integrity of dike and improve use for service vehicles.

*This falls under the category of ditch maintenance but due to age of dike we want to upgrade design standards while maintaining current pool elevations.*

- During spring run-off, store as much water as possible in all flowages to supply water to maintain minimum flow (1.2 cfs) from spring breakup through fall freeze-up. Discharge excess water through the Main WCS.
- Maintain a full or nearly full pool in Vista Flowage, except when drawn down for management purposes.
- Evaluate the alteration of the ditch that flows into “Pete’s Creek” to reduce iron floc.
 

*This ditch has historically accumulated concentrations of iron floc that drains into “Pete’s Creek”, which in turn flows into Dead Pike Lake. It is recommended that a decision on this ditch elimination/alteration and the timing of it be based on the success of other previously noted ditch alterations.*
- Remove the water control structure on the east end of the Little Trout Lake ditch at Little Trout Lake shore, and fill the end of the ditch and restore the shoreline to a natural appearing condition. (*This existing water control structure is no longer functional and is not needed for management purposes.*) The length of ditch to be filled will be determined after additional study of costs and benefits and the potential risk of backing water up into the cranberry beds.
- Combine the South Main and East Main Flowages by passively abandoning the dike and ditch between the two flowages (labeled East Main on Figure 1). Over time the dike will deteriorate eliminating about 7,000 ft of ditch and 5,500 ft of dike. Once the abandoned ditch

### Current Water Management Practices

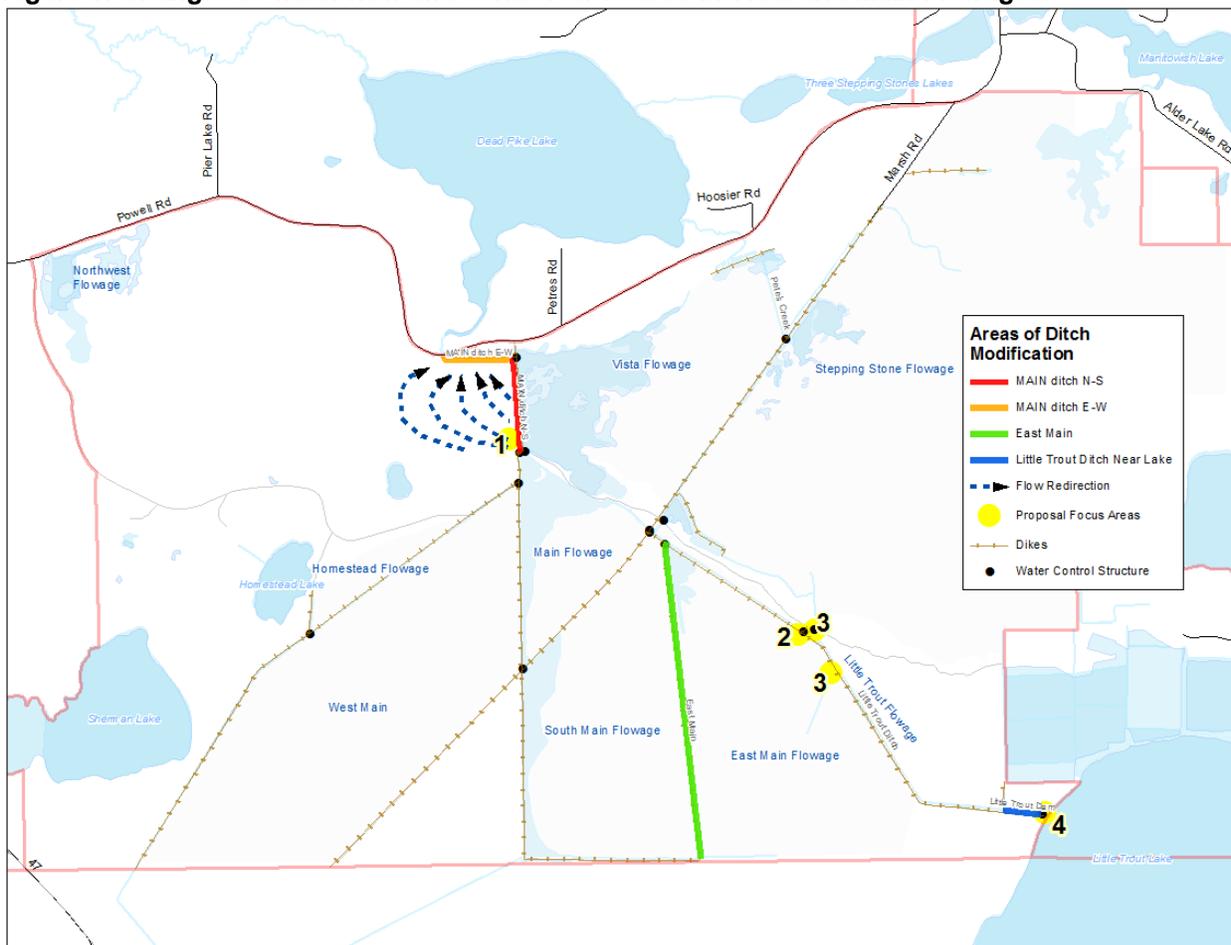
Annually, the pools are filled as much as possible during spring run-off. Any surplus water flows out of each pool over the top boards of control structures. For Main Flowage this discharge to Main Ditch usually ranges between 2 to 5 cfs with higher flows in spring and during rain events (~5 to 15 cfs).

As has been done since 2007, a minimum flow of 1.2 cfs has been maintained through the outfall to DPL from spring breakup through fall freeze-up. The flowage compartments upstream of Main Flowage are sequentially drained during drought to meet the minimum flow. The pool in Vista is maintained as full as possible year round. The primary source of water discharged to DPL from the property comes directly from the various compartments of Main Flowage. In years of high water; the pool in Main Flowage is partially drawn down in the fall to anticipate winter precipitation.

and dike are no longer functional, remove the “South Main 3” WCS and replace with a ditch plug or spillway as deemed appropriate by water quality specialists.

- Monitor beaver activity in the ditch system and at the culvert at Powell Road and the stream to DPL. Remove dams if they hinder flow.
- Prior to initiating any changes to the ditch and dike system or water management protocols, conduct any additional monitoring that may be necessary to establish a baseline of existing water quality and flow rates at appropriate locations within the marsh and at the outfall to Dead Pike Lake. (Also see the monitoring section below.)
- Retain the ability to control water levels within the marsh, including Vista Pond, to maintain the positive features of the marsh, which include open space and a variety of habitat types.

**Figure 1: Changes to water flow and control structures in Vista and Main Flowages.**



Highlighted areas depict the following: 1) Main Ditch Flow redirection structure. 2) Replace “Little Trout” WCS. 3) Spillway installation. 4) Removal of “Little Trout Dam” WCS.

## Phosphorus Reduction

*At certain times water flowing through the PMSWA ditch system is high in phosphorus. Particularly, higher -flows of phosphorus-rich water occur in the Little Trout Ditch . The level of phosphorus being discharged from the PMSWA potentially may be reduced by diverting excess water from the ditch into the South-East Main Flowage. There, the diverted waters would be filtered through the wetlands enabling a portion of the phosphorus to settle out or be taken up by wetland plants.*

### Prescriptions

- Install two new high-water overflow spillways on the Little Trout Flowage dike to redirect excess water out of the Little Trout Ditch into the wetlands (see Figure 1). One spillway will replace the smaller of the two WCS on the north side of Little Trout ditch; the other spillway will be installed further upstream on the south side of the dike. The exact placement of the new overflow spillway would be determined by engineers.
- Renovate 800 feet of dike associated with Little Trout Flowage to ensure functionality of spillways. *Renovation of this section of dike will ensure that water is diverted out into wetland vegetation instead of into the ditch system. (Removal of this dike and ditch segment has been proposed. Abandonment may cause water to backup into the adjacent private cranberry beds).*
- Maintain normal base flow through the Little Trout WCS and downstream. If necessary, replace the larger of the two WCS on Little Trout ditch with a new structure that will allow diversion of water to the new spillways when needed.

## Manage Powell Marsh on a Watershed-basis

- When making management decisions recognize the interrelationship that Powell Marsh has on connecting waters (including Dead Pike Lake). Using water quality and water level data, consider the effect on the entire watershed.

## Water Quality and Flow Monitoring and Evaluation

- Establish an on-going monitoring and evaluation program to measure, evaluate, and document the results of incremental management changes on the marsh and the water discharge to Dead Pike Lake (see Implementation Plan below for additional details).
- Monitor and evaluate the results of the alterations to the ditch system and water management actions (i.e. changes in water quality, habitat, or hydrology). If the desired results are not realized or if unanticipated and unacceptable impacts occur, make adaptive adjustments to management as needed. Significant changes to the management prescriptions may require a master plan variance.

## Flowage Management Implementation Plan

- Develop and maintain an implementation plan to direct the year to year activities and priorities for the orderly and calculated implementation of the property master plan, particularly as it relates to initiating management changes to the flowages, ditches, dikes and water flow. At a minimum the plan should cover the elements listed below. The plan should be reviewed annually and revised as needed by an integrated staff team that

includes the property manager, water resources specialists, wildlife biologists, ecologists and other department technical experts as appropriate.

- The implementation plan and any changes shall be approved by the Director of the Bureau of Wildlife Management and posted on the PMSWA web page.

Ditch/dike system and water management: Changes to the ditches, dikes, water control structures, and other aspects of water management should be conducted in a strategic, step by step staged approach. Any studies deemed necessary should be conducted prior to initiating an action. The implantation plan should detail the order that changes will be made and other aspects of timing as may be necessary. The implantation plan should also detail any parameters that should be met prior to initiating an action, as well as any approvals (or permits) necessary.

Water quality and flow monitoring and evaluation: Develop a monitoring and evaluation plan to measure and track changes in water quality resulting after implementation of the alternation of flowage management. This plan should include a plan for collecting any additional data needed to establish a baseline of existing conditions prior to initiating changes to the system, and a detailed plan for ongoing monitoring as changes in flowage management are made. The monitoring plan shall detail the parameters to be monitored, locations to sample, and sampling schedule, and methods where necessary. Monitoring parameters may include but are not limited to monitoring at various locations within the marsh and at the outfall for flow rates, turbidity, total suspended solids, total iron, and iron floc accumulation. Additionally, record flow management practices so those actions may be potentially correlated to changes in water quality. The monitoring results shall be posted on the PMSWA web page.

Evaluation of improving water quality through plant management: Evaluate specific native plant species to determine their effectiveness in promoting nutrient uptake and filtration of surface water; and whether any can be specifically managed to improve water quality within the marsh, particularly as it relates to the removal of suspended solids and total phosphorus. As practicable, implement management strategies that favor desired species and disfavor undesirable ones.

Public use facilities: Develop a plan outlining the prospective development schedule for the new public use infrastructure or improvements.

### Routine Ditch and Dike Management

The PMSWA has a network of dikes and ditches that are used for wetland management. Dikes additionally allow public walking access deep into the interior of the property. Dam Failure analysis reports exist for both the Main Pool Dam and the Vista Pool Dam. An Inspection, Operation and Maintenance Plan (IOMP) and Emergency Action Plan (EAP) exists for the PMSWA's Vista Pool and Main Pool Dams and will be updated as needed.

The following management prescriptions apply to department managed dikes and ditches:

- Maintain existing dikes (e.g. mow, patch, control invasive species) and water control structures, with major maintenance on approximately 20-30 + year rotations. Structures may be removed where deemed necessary after evaluation and consultation by an integrated staff team that includes the property manager, water resources specialists, wildlife biologists, ecologists and other department technical experts as appropriate.
- Keep the tops and sides of dikes clear of woody vegetation (shrubs and trees), and invasive species whose roots may undermine the dike structure.
- Control beaver and muskrat populations to mitigate dike damage and damming of control structures.
- Regularly inspect water control structures, especially after heavy storm events. Clear debris as needed from culverts and ditches to decrease unsafe conditions and prevent damage.
- Dikes may be signed closed or temporarily gated if seasonal maintenance is needed.

#### *Authorized Management Activities – Ditches/Dikes and Water Management*

- Actions related to the routine maintenance of ditches and dikes, or to their improvement or removal as prescribed in this plan.
- Activities related to the routine maintenance or replacement of water control structures and spillways or to their addition or removal as prescribed in this plan.
- Actions related to water quality and flow monitoring.

## Recreation Management

The wildlife area is open to traditional outdoor recreational uses including hunting, fishing, trapping, walking, nature study, and berry picking. Overall, PMSWA's potential for recreational use is greatly limited by its wet and unstable soils. The property is most suited to hunting, trapping, and wildlife watching from selected viewing sites. It is particularly well-suited for bird watching and is a popular destination for birders.

### Trails – Hiking, Skiing and Nature

#### *Objective*

Provide PMSWA visitors opportunities for walking, hiking, cross country skiing to experience the marsh and its wildlife.

## Prescriptions

### Hiking

- **Designated trails:** Establish a designated hiking trail loop circling Vista Flowage. This trail would be approximately 3.7 miles long. As shown on Map D, this trail will follow Vista, Main and Stepping Stone Dikes then circle back on a new trail to be constructed on an old logging road through the woods along the north Vista Flowage shoreline. In winter this trail will be open for skiing and snowshoeing, but it will not be groomed. A portion of the trail along the north shore of Vista Flowage will be developed and maintained as a moderately developed trail (NR 44.07(3) and be ADA accessible; it will also be developed as a nature trail (described below in the *Information, Education, and Wildlife Viewing* section.) The remaining segments of the trail will be developed and maintained as a lightly developed trail (NR 44.07(3))

#### Related supporting actions:

- Provide improved trail access for less mobile people:
  - Vista Overlook parking lot: Install a graded switchback trail down the hill on the front side of the overlook to provide wheelchair accessible access.
  - Maintain the gate on the Marsh Road/Stepping Stone Dike on the flat area near the parking lot to allow wheelchair access around the gate.
- Place resting benches at appropriate locations, such as popular viewing sites and access points.
- Provide for year-round trail access along the entire trail:
  - The location of the refuge boundary is proposed to be adjusted to allow year-round hiking on the trail route.
- Non-designated access-ways:
  - Miles of hiking opportunity are also available throughout the property on non-designated access-ways, such as management roads, dikes tops and volunteer trails. All of the property is open for foot travel year round, except within the refuge during the closed period.

### **Powell Marsh Ski Trail**

The 8.5 mile long, lightly developed Powell Marsh Ski Trail, near Sherman Lake (shown on Map D), is primarily located within the NHAL but a portion of one loop extends into the PMSWA. It is a non-groomed ski trail. All of this trail system is managed by NHAL staff. In the non-snow seasons the trail is open for hiking. In order to maintain continuity on the entire Powell Marsh Trail system, that segment of trail lying within the PMSWA will be designated as a lightly developed ski and hiking trail.

### **Potential Future Regional Bike Trail**

- There is a potential in the future for local units of government and cooperating partners to fund and develop a paved regional bike trail connecting Manitowish Waters and Lac du Flambeau. The route may follow the Powell Road corridor, but would be constructed off the roadway. If the regional trail is established, routing a fully developed bike trail

across the PMSWA is authorized on a route lying adjacent to the Powell Road right-of-way located on the north boundary of the property.

## Canoe/kayak Access

### Objective

Provide a carry-in watercraft access to Vista Flowage.

### Prescriptions

- Improve and maintain a barrier-free, carry-in watercraft access to Vista Flowage from the Vista parking lot.

## Information, Education, and Wildlife Viewing

### Objective

Through facilities and programs, provide opportunities for persons of all abilities to learn about, appreciate, and enjoy the rich wildlife and ecological resources of PMSWA.

### Prescriptions

- **Vista overlook:** Improve viewing by removing trees that block the view of the Vista Flowage from the overlook.
- **Nature trail:** Develop the new trail along Vista Flowage's north shore as an ADA accessible nature trail. This trail will be developed and maintained as a moderately developed trail, NR 44.07(3).
- **Accessible wildlife viewing blind:** Provide one or more accessible blind(s) for viewing wildlife. Potential locations are along the new wooded trail on the north side of Vista Pool and a site somewhere on the Main Pool which gets high use by migratory birds in the spring. Blinds located outside of the refuge may potentially serve as an accessible hunting blind as well.
- **Boardwalk:** If determined feasible, construct a boardwalk trail segment at an appropriate location that would allow visitors to get out "in" the marsh where they can "get a feel" for the marsh habitat. Incorporate a raised viewing platform. *Conduct further analysis to determine the potential locations, design options, and the construction and maintenance costs. (Funding support from cooperating partners may be needed to make building the project feasible.)*
- **Interpretive program:** Work with partners to develop, deliver, and maintain an interpretive program for the property focusing on topics such as marsh management activities and information on notable wildlife and bird species on the marsh. This program may include but is not limited to:
  - Interpretive signs at key locations, such as at the Vista Overlook, primary parking lots, and along key hiking trails and at viewing locations.
  - If resources are available, develop a smartphone/tablet-accessible information program about the marsh and its wildlife. Content may include such things as a self-guided bird brochure and map.

## Hunting and Trapping

### Objective

Provide hunting and trapping opportunities, especially waterfowl hunting.

### Prescriptions

- As described in the resource management section of this plan: maintain the open peatlands and water habitat for waterfowl and furbearers. Maintain wooded upland fringe in early succession stage, other than on appropriate oak or pine sites that would be managed more selectively. Focus on shade intolerant tree species (especially oak and aspen) wherever possible to optimize habitat for deer and Ruffed Grouse.
- Provide one or two accessible hunting blind(s) at appropriate locations. It may or may not be the same one developed for general wildlife viewing.

## Motorized Vehicle and Bicycle Access

### Objective

Provide public vehicle and bicycle access on PMSWA to support improved access for hunting, trapping, and wildlife viewing. Maintain the current level of public vehicle access

### Prescriptions

- Maintain the current level of public vehicle access and parking lots on the PMSWA, as shown on Map F.
- Maintain public access portion of Powell Marsh Road as a moderately developed road [NR 44.07(3)]. The road will be closed when the roadbed is soft and rutting may occur.
- Maintain Marsh Road (on the northeastern end of Stepping Stone Grade) and its terminal parking lot to the lightly developed standard for management access and as part of the trail system.
- There is a long history of bike use on the property. Management roads and dikes will be open for bicycle use for access, unless signed closed. The property manager shall determine which roads or dikes are open or closed based on site conditions and the potential for conflicts with wildlife or other property users.
- Provide Power Driven Mobility Device (PDMD) permitted access on routes determined by property manager.

## Using Dikes as Roadways

Opening Vista and Stepping Stone Dikes as public access roads was considered. This alternative was not recommended based on the determination that these dikes are not designed and constructed to safely handle the level of traffic that would occur.

*While the top of a dike may visually look like a road, under the surface they are not designed to support regular motor vehicle traffic. Dikes are dams are designed and constructed for one purpose, holding back water. They are not necessarily designed and built to support sustained vehicle traffic. On the other hand, dikes are well-suited for use as pedestrian and other non-motorized vehicle routes.*

*A very particular set of engineering standards must be met to safely allow a dam to be used as a public road. Only a very small number of the department's dikes meet road standards. Any use of the structure beyond its intended design purpose, like heavy vehicles or sustained light motor vehicle traffic that is beyond incidental use can easily degrade the dam and cause it to fail. The risks and liability are high if dams are used for public road purposes unless they have been specifically engineered and constructed for that use. Very few of the department dikes (dams) have been designed and constructed for use as a regularly traveled road. Not only do they need to have a base capable of bearing sustained vehicle traffic under a wide variety of environmental conditions they also must have sufficient travel lane width plus shoulder width, and side slopes gentle enough that roll-overs will not occur if a vehicle goes off the side. Generally dikes cannot be retro-fitted with guard rails or similar vehicle restraints as they would severely compromise the dam's integrity in overflow events. In most cases, re-engineering (i.e. remodeling) a dike to meet road use standards would be extensive and cost prohibitive. If a dike (dam) top is proposed to be used as a public vehicle road an engineering review/study is required to determine if the structure is capable of supporting such use, and approval of the department's Dam Safety Program is required before it can be opened as a public road.*

## Road Management

The PMSWA has a network of roads that are used for management purposes and public access. Powell Marsh Road and Marsh Road provide public vehicle access into the property. Most of the management access roads are located on dike tops; they are closed to public vehicles. Closed roads are gated or signed.

The following management prescriptions apply to department managed roads:

- Maintain permanent service roads and public access roads in a sustainable condition according to Wisconsin Forestry's Best Management Practices for Water Quality.
- Regularly inspect active roads, especially after heavy storm events. Clear debris as needed from the road surfaces, culverts and ditches to decrease unsafe conditions and prevent damage.
- Maintain stable road surfaces to facilitate proper drainage and reduce degradation from traffic during wet or soft conditions; or close the road when these conditions exist.
- Monitor soil disturbance and take measures to prevent excessive damage.
- Restore roads used in timber harvests to non-erosive conditions, in accordance with Wisconsin Forestry's Best Management Practices for Water Quality.

## Real Estate Modifications

No real estate modifications are proposed.

## Administration Management Policies and Provisions

The following section describes the general property administration and management policies and provisions that apply to the PMSWA.

### Required Permit Approvals

Waterway or wetland approvals from the department, Army Corps of Engineers or county zoning office are required for actions that involve work in navigable waters (ch 30, Wis. Stats.), wetlands (s. 281.36 Wis. Stats.) or dam alterations (ch 31, Wis. Stats.). Table 2 lists the permits that are anticipated to be needed for the actions proposed in the plan.

A stream history search was conducted on Main Ditch (Water Regulations and Zoning, Lois Simon) and found only the ditch segment near the outlet at Powell Road that may have stream history.

**Table 2: State and federal permits.**

Actions	Permits Required
<ul style="list-style-type: none"> <li>• Maintenance or reconstruction of ditches and plugging ditches</li> <li>• Construction activity within a wetland</li> <li>• Replacement or removal of existing WCS, installation of new WCS or spillways</li> <li>• Improvements to dikes</li> </ul>	<ul style="list-style-type: none"> <li>• NR 353 wetland restoration permit. Includes 30.19 connected enlargement authorization, wetland impacts under s. 281.36, ch. 30.20 dredging and ch. 30.195 stream realignment for any portion with stream history.</li> </ul>
<ul style="list-style-type: none"> <li>• Abandon dikes (i.e. dams)</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter 31, Wis. Stats. (dam abandonment permit)</li> </ul>

## Research

Research projects that support or are consistent with the PMSWA goals, objectives, or management prescriptions may be authorized and conducted on the PMSWA.

## Facility Management Authority

The PMSWA manager may relocate or temporarily close road and trail segments or other public use facilities; or replace, relocate, add or abandon water control structures or overflow spillways

as deemed necessary to meet management objective after appropriate authorization through normal department approval processes.

### Cultural Resource Protection

All requirements for the protection of archeological sites and historic structures will be complied with. Federal Section 106 (commonly called SHPO) and state cultural resources law (s. 44.40) and requires review of actions that may impact significant (eligible for listing in the National Register of Historic Places) cultural resources regardless of whether there are any recorded in the area. Surveys to search for unreported sites may be required.

Section E, Part 2, [Manual Code 1810.1 \[PDF 287KB\]](#) contains a list of items that must comply with historic preservation laws for activities on department lands using Sport Fish Restoration funds, and for fisheries lands, access sites and wildlife areas.

### Public Health and Safety

All facilities will comply with federal, state, and local health and sanitation codes. The PMSWA manager has the authority to close areas or facilities to access if necessary due to health, safety, or environmental damage concerns. In designated public use areas, such as designated parking lots and designated trails, trees or other natural elements that are deemed public hazards will be removed.

### Refuse Management

Visitors are required to carry out any refuse they bring in because no designated refuse or recycling receptacles are available. Burying of refuse is not allowed anywhere on the property.

### Disabled Accessibility

All new construction and renovation of infrastructure will follow guidelines set forth within the Americans with Disabilities Act. Following standard department protocol, the PMSWA manager has the authority to make reasonable accommodations, including motorized vehicle access, for people with disabilities.

### Funding Constraints

Implementation of the master plan is dependent upon staffing and funding allocations that are set by a process outside of the master plan. Operational funding for the department is

established by the state legislature. Development projects also follow an administrative funding and approval process outside of the master plan. Many of the initiatives contained within the plan are dependent upon additional funding and staffing support. Therefore, a number of legislative and administrative processes outside of the master plan will determine the rate this master plan will be implemented.

### **Management Restrictions - Federal Funding Related**

Funding for much of the acquisition of land in Powell Marsh State Wildlife Area came from the Federal Wildlife Restoration Program (Pittman-Robertson). This program requires that the land purchased with federal funds be used for its original public purpose in perpetuity. Prior to engaging in any major land management activity or development it is important to determine whether the proposal conflicts with federal post-grant funding regulations. Review and approval of the U.S. Fish and Wildlife Service may be required.

Activities undertaken on lands purchased with Federal funds or utilizing Federal dollars on development projects (and other land management activities that disturb the intact soils) require property managers to complete Federal compliance requirements. The requirements are addressed during project submission for work planning. In all cases, the requirements listed below, if applicable, must be completed before the activity or construction commences.

#### *Vista Flowage Restoration Agreement*

In exchange for funding assistance from Ducks Unlimited and the Lac du Flambeau Band of Lake Superior Chippewa for restoration of the Vista Flowage dikes the department entered into a long-term agreement to maintain Vista Flowage as a shallow water pool for a minimum of 25 years (2027).

### **Endangered, Threatened and Species of Special Concern Protection**

Implementation of all management prescriptions in the master plan will be carried out with consideration of the needs of endangered, threatened, and species of special concern and the potential impacts to the species and their habitat. Management actions planned during plan implementation will be checked against a database of listed species to assure that no department actions results in the direct taking of any known endangered or threatened resource.

### **Best Management Practices for Water Quality**

All forest management activities will comply with the most recent version of the guidelines in the Wisconsin Forestry's Best Management Practices for Water Quality (BMPs).

## Pest Control

Wisconsin Statute 26.30 states; “It is the public policy of the state to control forest pests on or threatening forests of the state...” Any significant forest pest events will be evaluated with consideration given to the property management goals and the potential threat of the pest to other landowners. Infestations of the non-native gypsy moth caterpillar will be managed according to the Forest’s Gypsy Moth Management Plan. Responses to significant infestations from other forest pests may include timber salvage or pesticide treatments. Any response to a significant pest outbreak will be evaluated by an interdisciplinary team of scientists and communicated through press releases and notices to interested parties.

## Control of Invasive Species

Invasive plants will be regularly monitored and controlled using appropriate and effective methods, including but not limited to the use of bio-control, herbicides, cutting, hand removal, or fire. Control methods may be restricted in certain sensitive management areas.

## Chemical Use

Herbicides and pesticides may be used for various purposes such as the control of invasive plants or to control plant competition in vegetation regeneration areas and insect control except as restricted in the management prescriptions in this master plan. All department procedures and herbicide and pesticides label requirements will be followed.

## Fire Suppression

As stated in Wisconsin Statutes 26.11, “The department is vested with power, authority and jurisdiction in all matters relating to the prevention, detection and suppression of forest fires outside the limits of incorporated villages and cities in the state except as provided in sub (2), and to do all things necessary in the exercise of such power, authority and jurisdiction.” Forest fire suppression actions will consider the property management goals and the threats of the fire to life and property. Appropriate techniques will be used in each event to provide effective fire suppression while minimizing resource damage.

## Authorized Response to Catastrophic Events

Wildfires, timber diseases and insect infestations are natural occurrences but shall be controlled to the degree appropriate to protect the values of the property. Necessary emergency actions may be taken to protect public health and safety. Appropriate management responses to catastrophic events are determined on a case-by-case basis, and action will be taken as appropriate.

## Non-Metallic Mining

The department may use sand, gravel, fill dirt, or other fill material from department-owned lands for Department use.

## General Real Estate Management

### Acquisition Policies

It is the policy of the Natural Resources Board and the DNR to acquire lands from willing sellers only. As required by state and federal laws, the department pays just compensation for property, which is the estimated market value based on an appraisal. At times, it is in the interest of the department and the landowner for the department to acquire only part of the rights to a property, or an easement. The department has a number of easement options available to address these situations.

### Aides in Lieu of Taxes

For all State properties purchased after 1992, the department makes an annual payment in lieu of property taxes to replace property taxes that would have been paid if the property had remained in private ownership. More detailed information on how the department pays property taxes may be found in a publication titled, Public Land Property Taxes, PUB-LF-001 and can also be found at: <http://dnr.wi.gov/org/land/facilities/realestate/pilt.html>.

### Easements, Access Permits, and Land Use Agreements

Easements, access permits, land use agreements, and leases provide access across state property for utilities, public roads, snowmobile trails, or other public-benefit infrastructure, access to private ownership within a property boundary, and provide for a variety of temporary uses on a department property. Such arrangements require consultation and joint action by the

affected program and the Bureau of Facilities and Lands, Real Estate Program staff. While such situations may serve a public purpose (e.g., a utility corridor or a road) they may adversely affect a management unit by:

- Restricting the department's future management options;
- Limiting the public's full use and enjoyment of a property;
- Preventing natural succession of cover types;
- Introducing exotic and invasive species to the property;
- Introducing additional herbicides and other contaminants to the property; and
- Creating liability concerns.

The conveyance of easements and other agreements is subject to sections NR 1.48 and NR 1.485, Wis. Adm. Code. Before any rights are conveyed, the Bureau of Facilities and Lands Real Estate staff must determine if federal funds were used to acquire the land and, if so, obtain the appropriate approvals.

## Public Communications Plan

The public and other governments may be provided opportunities to have on-going involvement in the implementation of this master plan. This communication plan describes how the public will be periodically informed about activities and developing issues on the PMSWA and it provides information on how the public will be notified of opportunities for involvement when significant, new issues related to management of the property arises. Annually the department will issue a [monitoring] report that summarizes the following items.

- For the past year, the primary management and development activities that were completed and other significant issues that were addressed.
- For the up-coming year, outline any planned management and development activities and any changing management actions or approaches.

The annual report may also include other information of interest to the public on various topics related to management and use of the properties. Some of the additional types of information that may be included from time to time are: the status of forest insect or disease problems, storm damage, new information on endangered or threatened species, recreational management problems or new opportunities, and any significant recreational use changes or trends on the property. The annual report will be available on the DNR internet web site.

The department will meet annually, or more frequently as deemed appropriate, with Lac du Flambeau and local government officials to discuss mutual issues related to management of the PMSWA.

In the event the department considers a change to the master plan (via a plan variance or amendment) the public will be informed of the proposal and the review and comment process. As appropriate, news releases will be used to announce master plan amendment/variance proposals and review procedures. The department will also maintain a contact list of persons, groups, and governments who have requested to be notified of potential plan changes.

### DNR Contact

The following department staff may be contacted regarding questions about the PMSWA or the master plan. At the time of this publication, the contact information is:

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## CHAPTER THREE: BACKGROUND AND SUPPORTING INFORMATION



The data in this chapter is drawn from the *Regional and Property Analysis, Powell Marsh State Wildlife Area (DNR 2015)*. More information on the regional context of the PMSWA may be found in this document.

### Introduction to the Property

The Powell Marsh State Wildlife Area (PMSWA) lies in western Vilas County, 3 miles south of Manitowish Waters and 10 miles north of Lac du Flambeau (Map A). The 4,850 acre wildlife area is bounded on three sides by the Northern Highland – American Legion State Forest and by the Lac du Flambeau Indian Reservation on the south. There are 390 acres of private land within the wildlife area boundary. Several cranberry producers own land adjacent to the property. The current property master plan was approved in 1980.

PMSWA is primarily an open peatland with several small flowages and small lakes. It encompasses a portion of a 20,000 acre wetland complex mostly owned and managed by the Lac du Flambeau Reservation. About 12,000 acres of the tribally owned lands have leatherleaf bog habitat similar to the wildlife area. While lakes are abundant in the region, large, open peatlands, like Powell Marsh, are rare across northern Wisconsin. Without management intervention, these peatlands naturally convert to tamarack forest and black spruce muskeg.

Powell Marsh is a locally important waterfowl production area and trappers use the area seasonally to pursue muskrat, mink and beaver. The upland fringe lands are used regularly for deer and grouse hunting. Powell Marsh has been highlighted as a stop on the Great Wisconsin Birding and Nature Trail and is part of an Important Birding Area.

## Past Management

Historic photos from the 1930's show that a railroad grade used for logging ran diagonally across the Marsh significantly impacting the original hydrology. Historically, multiple farmsteads existed in the area and photos show that row crops were planted in drained areas.

The open wetland system currently seen at Powell Marsh was maintained by wildfires for thousands of years. The last of the wildfires were in the 1930's and 1940's. Railroad equipment was believed to have caused large scale fires that burned deep down into the wetland peat layers. Consequently, these fires stimulated new vegetation growth that attracted large flocks of migrating geese. Sportsmen recognized the potential to attract geese to the area and petitioned the Wisconsin Conservation Commission to establish a goose management project on the Marsh. In 1955, the PMSWA was established to produce more geese for hunters.

Early management at PMSWA was one of the pioneering efforts to manipulate an extensive northern sedge leatherleaf bog for geese. Managers used prescribed fire to stimulate new growth for fall waterfowl migrations, similar to the conditions that resulted after the historic wildfires. A system of ditches and dikes was also constructed to provide water level control to enable prescribed burning and allow limited planting of food patches for waterfowl. A decoy flock of 50-150 Canada Geese was established in 1957 to attract migrating geese. This effort was initially successful, but fall populations declined over time. In 1974 the flock was disbanded.

The DNR determined that the decline of goose use of PMSWA was affected by:

- the limited amount of food available,
- the natural succession of woody vegetation within the marsh,
- the dark, shallow water was not optimal for waterfowl, and
- migration patterns shifting west

Beginning in 1966, a bait site was established to attract and trap ducks for banding. During the late 1960's, 1,500-4,000 ducks used the bait site annually. Duck use declined steadily and trapping was discontinued in the late 1970's. Powell Marsh still provides significant, local wildlife-based recreation, particularly deer and waterfowl hunting and birding.

## Current Management

Management emphasizes habitat for game and nongame bird species that require open wetland and grassland habitat. A key management tool is water level control. Water levels are adjusted by installing and removing stop logs in the water control structures to hold back or release water. Deeper, open water provides duck brood habitat, migration habitat, viewing and educational benefits and prevents brush encroachment. Seasonal drawdowns expose mudflats and concentrate invertebrates, favorite foods for

shorebirds. Drawdowns and re-flooding also promote desirable vegetation such as moist soil plants that are preferred by ducks and geese. The ditches are linear semi-permanent wetlands that provide excellent habitat for furbearers like mink and muskrat. Due to the low wet terrain, drawdowns are essential to conduct prescribed burns, or to access areas for mowing or shearing trees. The ditches and dikes also act as firebreaks during prescribed burns.

Prescribed burns are used to suppress woody vegetation, promote sedges, grasses, forbs (wildflowers and other perennials), and keep the marsh and grasslands open.

These open grasslands provide nesting habitat for a variety of waterfowl, including Mallard, Blue-winged Teal, and Black Duck. Many of the rare bird species found at PMSWA require this open habitat. Fire also stimulates fruit production; cranberry and blueberry production improves in the years after an area is burned. In areas



*Main Flowage (Photo by Michele Woodford).*

where fire cannot be used, trees and brush are mowed and sheared.

In early spring, the shallow impoundments at PMSWA are the first regional waters to be free of ice. Thousands of migratory birds can be found feeding and resting in the open waters of the PMSWA before the surrounding lakes have open water. Migrating birds such as White Pelicans, Northern Pintail, Scaup, Redheads, Red-necked Grebes, Snowy Owls, Blue-winged Teal and Green-Winged Teal have been sited on the property during the spring thaw.

Routine maintenance work on the property includes filling in muskrat holes in dikes, adding gravel to roads or parking lots, treating invasive plant species, mowing roadsides and dikes, repairing and replacing old or damaged water control structures and signs and maintaining storage buildings.

A 1,800 acre wildlife refuge located within PMSWA protects wildlife from hunting and other disturbances from September 1 – December 31. The refuge protects migrating waterbirds during the waterfowl hunting season.

## Federal Funding

Funding for much of the acquisition of land in Powell Marsh State Wildlife Area came from the Federal Wildlife Restoration Program (Pittman-Robertson). This program requires that the land purchased with federal funds be used for its original public purpose in perpetuity.

## Regional Ecological Setting

The ecological characteristics of the Powell Marsh region can be defined by the Ecological Landscape classification system. This system divides the state into 16 ecologically similar regions based on soils, existing and pre-European settlement vegetation, topography, and types of aquatic features present. The PMSWA lies within the Northern Highlands Ecological Landscape and is made up of three Land type Associations (LTAs): Powell Marsh (212Xb04), Vilas-Oneida Sandy Hills (212Xb02), and Vilas-Oneida Outwash Plains (212Xb03). The majority of the property is located within the Powell Marsh LTA.



The Northern Highlands Ecological Landscape is a complex of lakes, upland forests, and wetland communities, both forested and unforested. In the upland forests, dominant cover types include aspen, paper birch, oak, naturally-occurring pine stands, northern hardwoods and pine plantations. Upland forest communities account for 65% of the Northern Highlands.

Prior to European settlement, the upland forests of the region were dominated by red and white pine, with a mixture of white birch, aspen, jack pine, and red oak. Beginning in the middle of the 19<sup>th</sup> century, loggers drastically changed the landscape by removing all major stands of white pine. Selective cutting of hardwood species followed in the early part of the 20<sup>th</sup> century, and left us with the early to mid-successional upland forests we see in this region today.

Most wetlands in the Northern Highlands are acidic, having accumulated layers of sphagnum peat over several millennia. Open bog, muskeg, poor fen, black spruce swamp, and tamarack swamp are common peatland communities within this Ecological Landscape. Other wetland types are also present, including white cedar swamp, hardwood swamp, emergent and submergent marsh, fen, sedge meadow, alder thicket,

shrub-carr, and small patches of floodplain forest along the major rivers. (See Appendix A for more information on wetland types of Northern Wisconsin.)

Unforested Wetlands: About 12% of the total area in the Northern Highland Ecological Landscape is unforested wetlands. Most of the unforested wetlands are areas of open sphagnum moss, while some are lowland brush (i.e. alder thickets or wet meadows). These community types support many rare species and are valued for watershed protection. Unforested wetlands are typically stable, though some are succeeding to tamarack and black spruce. Management such as prescribed burning in unforested wetlands maintains the open habitat, though most unforested wetlands are unmanaged. According to the NHAL's Regional Ecology Assessment, wetland habitats most in need of management attention are lakes, sedge meadows, and bogs.

Forested Wetlands: About 10% of the Northern Highland Ecological Landscape are forested wetlands including, in order of significance, black spruce, tamarack, northern white cedar, and swamp hardwoods. Forested wetlands are widespread on private non-industrial forest, state owned land, industrial forest, and county forest. Forested wetlands have considerable value for a range of wildlife species such as neotropical migrants, rare species such as yellow-bellied flycatchers, and watershed protection. Forested wetlands have slow succession, little harvest, and low potential for the land to support other types of forests. Before European settlement tamarack was by far the leading dominant tree species in forested wetlands with black spruce as a common associate. The peatlands were cut at the turn of the century and have regenerated naturally, with a slow increase in tamarack in open areas. Over time there has been a shift from tamarack to later-successional black spruce.

Within the context of the Northern Highlands, Powell Marsh exists as a unique habitat type, providing an island of nesting, foraging, and stop-over habitat for a number of animal species. Across Wisconsin, wetlands have been drained, filled and otherwise altered, with approximately 50% of the original wetland acreage remaining compared to Pre-European settlement. PMSWA is a wetland that has been altered to improve wildlife habitat. The presence of open water and early successional wetlands at Powell Marsh provides essential habitat for migrating waterfowl, wading birds and grassland birds. PMSWA is located in an area with a high density of lakes and other wetlands. The majority of lakes in the area are highly developed with many year round and seasonal homes as well as resorts and other businesses. With development, the lakeshore around these lakes has been altered by removing aquatic vegetation and coarse woody debris, thus eliminating waterfowl habitat. Water based recreation has increased drastically in recent decades and is one of the most frequent causes of disturbance to waterfowl and other water birds. Disturbances displace these birds from feeding areas, resulting in increased energy expenditure, and may lower productivity of nesting or brooding waterfowl. In contrast, shallow open water supports aquatic plants with adjacent nesting cover at PMSWA. Also, the ability to manipulate water levels benefits a wide variety of bird species.

According to the Ecological Landscapes of Wisconsin Handbook (DNR 2005), the protection and management of extensive peatlands is an important ecological management opportunity in the Northern Highlands Ecological Landscape. Powell Marsh is also part of the [Manitowish/Powell Peatlands Conservation Opportunity Area](#) of Upper Midwest/Regional Significance in Wisconsin's Wildlife Action Plan.

In addition, Wisconsin's Wildlife Action Plan identifies the natural communities of Wisconsin, and the significance of each of these within the context of specific ecological landscapes. There are major or important opportunities to manage several natural communities at PMSWA (Table 3).

*A major opportunity* (for Natural Community Management) exists when a community type is represented by many significant occurrences within an Ecological Landscape, or the Ecological Landscape is appropriate for major restoration activities.

*An important opportunity* means that a community type is not extensive or common in an Ecological Landscape but has a minimum of one to several significant intact occurrences that should be considered for preservation and/or management. Or, it means that the natural community type is restricted to just one or a few Ecological Landscapes within the state and should be considered for management there because of limited geographic distribution and a lack of better opportunities elsewhere.

**Table 3: Regionally important natural communities of PMSWA.**

Natural Community Type	Management Opportunity
Emergent Marsh	Major
Inland lakes	Major
Northern Sedge Meadow	Major
Northern Wet Forest	Major
Open Bog	Major
Submergent Marsh	Major
Submergent Marsh - Oligotrophic	Major
Alder Thicket	Important
Impoundments/Reservoirs	Important
Northern Wet-mesic Forest	Important
Shrub Carr	Important

## The Property and Its Resources

### Purpose of the Property and Management Authority

The scope of use and management of a state property is governed by its official designation. Wildlife Areas are acquired and managed under the authority of Sec. 23.09 (2) (d) 3 Wis. Statutes and Administrative Code NR 1.51. Wildlife Areas are set aside to provide habitat for wildlife and a place where people can hunt, trap, and fish. Wildlife areas are also open for traditional outdoor uses of walking, skiing, snow shoeing, nature study, berry picking, etc. As directed by NR 1.51 and NR 1.61, other recreational uses may be allowed by the property's Master Plan if those uses do not detract from the primary purpose of the property.

The use of funding from the Federal Wildlife Restoration Act (also known as the Pittman-Robertson Act, authorizing an excise tax on sporting arms and ammunition) to acquire, develop or manage Wildlife Areas comes with guidance to state fish and wildlife agencies based on the authorizing legislation. The statutes and applicable regulations prohibit a state fish and wildlife agency from allowing recreational activities and related facilities that would interfere with the purpose for which the State acquired, developed, or is managing the land.

### Adjacent Land Use

The PMSWA is bounded on the West, North, and East by the NHAL State Forest; and on the South by the Lac du Flambeau Indian Reservation. Private lands in the area include several major cranberry growing operations abutting the eastern boundary of PMSWA on Little Trout Lake, and a number of smaller tracts with cabins and homes on nearby lakes to the north (Maps B). Nearby lakes include Dead Pike Lake, Three Stepping Stones Lakes, Little Star Lake, Manitowish Lake and Bolin Lake.

### Physical Environment

#### *Topography and soils*

PMSWA is mostly bog on nearly level topography with nutrient-poor wet organic soils that provide severe limitations for growing vegetation. Only a small fringe of land along the northern boundary and a small area north of Sherman Lake are high enough to support upland forest. The upland forest areas occur on sandy textured soils with low nutrient content that are excessively drained to well drained sands and loamy sands, but grade to poorly drained sands in the northeast corner of the Marsh. Several small areas of spoils along the dikes are slightly higher and drier.

### Water Resources

Lakes within the PMSWA include Homestead Lake, Sherman Lake, and a small unnamed lake, (Table 4). The wildlife area also borders Little Trout Lake, (Maps B). The natural lakes within PMSWA are relatively dark, shallow, infertile and prone to winterkill. Fishing pressure on Sherman and Homestead Lakes is light. There is a seasonal boat landing on Sherman Lake.

The flowages are also very shallow and subject to winterkill, so no sport fishery exists. There are some minnows present and the public harvests a limited amount for bait. The amount of open water in



*Aerial photo of the Vista Flowage (Photo by Ronald Eckstein).*

each flowage depends on season, precipitation and level of evapotranspiration. As this is a headwaters area the watershed for these flowages is very small. The seven PMSWA flowages range in size from six to 291 acres, with a total acreage of 764 acres, 196 acres being open water. Data on the flowages is summarized on Table 4. A more detailed description of each flowage is given below.

**Table 4: Summary of lakes and flowages of PMSWA.**

Lake or Flowage	Size	Open water (flowages)	Maximum Depth
Homestead Lake	22 acres	-	17 ft
Sherman Lake	123 acres	-	19 ft
Un-named Lake	6 acres	-	unknown
Little Trout Lake <sup>1</sup>	978 acres	-	98ft
Bolin Lake <sup>2</sup>	67 acres	-	35 ft
Northwest Flowage	40 acres	20 acres	-
Homestead Lake Flowage	16 acres	4 acres	-
Main Flowage	158 acres	20 to 50 acres	-
Southeast Flowage	139 acres	4 acres	-
Little Trout Lake Flowage	6 acres	3 acres	-
Vista Flowage	114 acres	74 acres	-
Stepping Stone Flowage	291 acres	85 acres	-

<sup>1</sup> Only a small portion of Little Trout Lake's shoreline is within the wildlife area.

<sup>2</sup> Bolin Lake is surrounded by private lands but lies within the project boundary.

Northwest Flowage: The flowage at the northwest corner of the property has about 20 acres of open water. This is a semi-permanent flowage with no water control structure. The flowage is recharged by precipitation.

Homestead Lake Flowage: A small flowage near Homestead Lake has 4 acres of open water. The water comes from the Main Flowage and flows to the southwest.

Main Flowage: The main flowage is filled through the main ditch from the south and from precipitation and flows to the north. On average it has from 20 to 60 acres of open water depending on precipitation levels and vegetation growth.

Southeast Flowage: The flowage towards the southeast part of the property with 4 acres of open water flows to the northwest. This flowage is filled via the Main Ditch and precipitation.

Little Trout Lake Flowage: A very small flowage towards Little Trout Lake holds about 3 acres of open water. This is filled by adding boards to the Little Trout water control structure. The flow would be to the northwest via the Main Ditch.

Vista Flowage: The Vista flowage has 74 acres of open water and flows to the north. This flowage can be refilled with precipitation from the snow melt and, during high water years, spring runoff from the Main Flowage and to some extent through the Stepping Stone Flowage.

Stepping Stone Flowage: The Stepping Stone Flowage has 85 acres of open water. Water flows to the north. The flowage is recharged via precipitation.

### *Water Management*

The flowage system operation plan calls for maintaining Vista Pool at full pool level or as full as possible throughout the year. The other flowages are filled in the spring and drawn down sequentially through the summer as needed to maintain at least the minimum flow of 1.2 cfs through the Main WCS (Water Control Structure). The current water flow management scheme is shown on Figures 2 & 3. From time to time one of the flowages may be drawn down and held at a low level temporarily for habitat management or maintenance purposes.

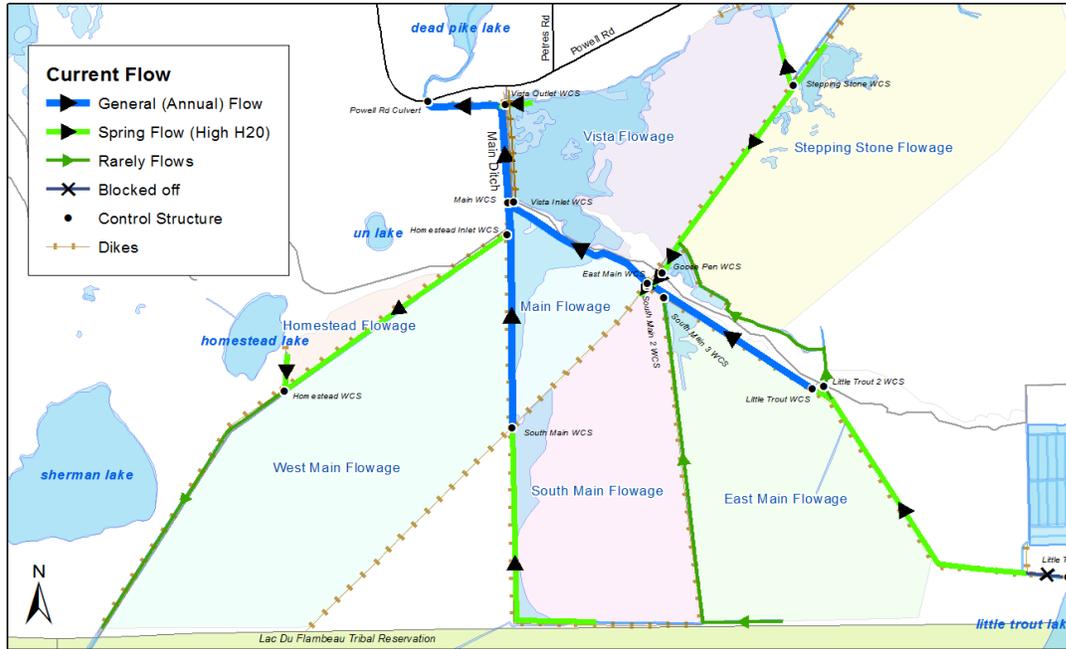


Figure 2: Current water flow management with minimum flow (2007 to present).

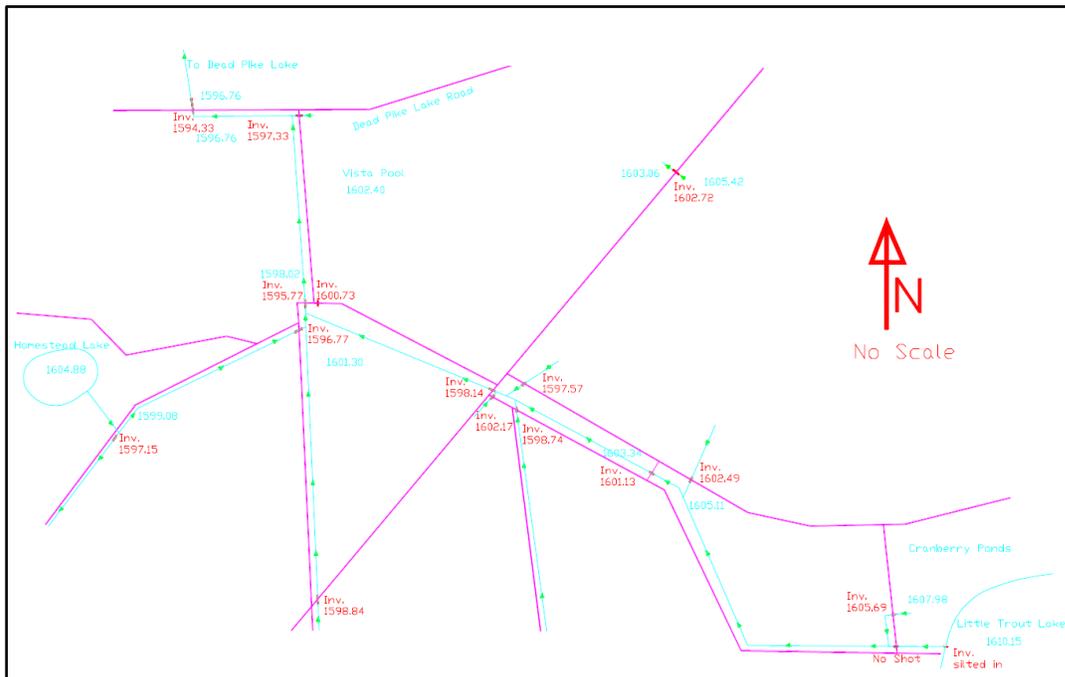


Figure 3: CAD water flow schematic for existing management conditions (created by N. Benoy, DNR Engineer, Rhinelander).

### *Water Quality and Minimum Flow*

In 2007, Main Ditch (the primary ditch draining the Powell Marsh flowages) was defined as a navigable stream. On navigable streams, a minimum flow through water control structures is required. That flow has been estimated at 1.2 cfs by use of the Base Flow Index and at 0.6 CFS by use of the Area Weighted method (Lenz, 2007). Since 2007 a minimum flow of 1.2 cfs has been maintained by water discharge from the pools. Previous to this, water management primarily entailed capturing spring runoff to fill the ponds and fall drawdowns for vegetation management. Minimum flows in the ditch were not historically maintained.

Both iron precipitate and iron bacteria naturally occur in nearby lakes and ditches in Iron and Vilas Counties. However, the management of the Powell Marsh ditch system contributes to the production of iron floc (precipitate) when there is no water flow. In the past, this management regime seasonally produced a plume that discharged downstream into Dead Pike Lake. Since the initiation of minimum flow through the main dike in 2007, water program staff have observed greatly reduced iron floc formation and improved aesthetic quality in the ditch system.

The master plan revision for Powell Marsh State Wildlife Area must include management actions necessary to maintain minimum flow and to manage the formation of iron precipitate and /iron bacteria in the ditch system. Currently there is no formal operating order (under Chapter 31) for the Powell Marsh Wildlife Area. Most water management options will require review and approval by water regulators within the Department of Natural Resources as required by Manual Code 3565.1. The Master Planning process could be used to develop an operating order.

Iron floc production: Ground water in the vicinity of Powell Marsh is low in dissolved oxygen and contains high concentrations of dissolved iron. When this ground water flows into a surface ditch or into a water body containing high levels of dissolved oxygen, the dissolved iron will solidify or “precipitate.” The process of “precipitation” produces energy and iron bacteria depend on this process

for survival. These iron bacteria produce rusty, oily looking plumes around their colonies, which remain in suspension in water. This inflow from PMSWA affects the aesthetic quality of Dead Pike Lake and may cause variation in water level of the lake.



*Lily pad and iron floc at South Bay, Dead Pike Lake.*

This precipitation process occurs in the ditches of PMWSA. In periods of low flow (or when water is held back in the impounded ponds), the primary source of water entering the ditch system is groundwater. The groundwater table is shallow (2-3 feet below the ground surface) and is naturally high in dissolved iron. Dissolved iron in the groundwater is precipitated (contact with oxygen) as it enters the ditch system. This causes an orange coloration in the water. The problem may be magnified by the formation of plumes of iron bacteria. When the water is released from the flowages or when rainfall occurs, water in the ditch system flows into Dead Pike Lake. If the ditches have been stagnant for some time, the initial flows out of the flowages produce a plume at the inlet to Dead Pike Lake.

Naturally occurring dissolved iron is the source of iron floc in the Powell Marsh ditches. It is not uncommon to see iron floc formation in natural systems in Northern Wisconsin. It should also be noted that iron floc is also formed on the near shore environment of Dead Pike Lake as a result of direct ground water recharge around the lake. Aggregate of iron hydroxide (precipitate, or floc) can be found throughout the shallows of Dead Pike Lake.



*Floc on beach at Dead Pike Lake.*

The hydraulic-head from the impoundments may increase or force more groundwater into the ditches adjacent to the pools (i.e. Vista Pool and Main Ditch). When the wildlife impoundments are full, much of the remaining ditch system (that lying upstream of Main Ditch) lies within the impounded areas and are flooded. Therefore, the potential for iron hydroxide formation is reduced overall when the pools are full. A review of water quality data from Dead Pike Lake indicates normal levels of phosphorus, pH, alkalinity and conductivity when compared to other drainage lakes in the north central part of Wisconsin. Water color is quite high (stained), but is also typical for a lake that drains a large wetland area.

*The process of iron floc production in PMSWA flowages and ditches:*

*Naturally occurring dissolved iron is the source of iron floc in the Powell Marsh ditches. The groundwater table is shallow (2-3 feet below the ground surface) and is naturally high in dissolved iron. In periods of low flow (or when managers hold water in the pools), groundwater is the primary source of water entering the ditch system. When the pools are full, much of the ditch system is under water; therefore, iron hydroxide formation is reduced (less groundwater entering the ditches because of the hydraulic head). An exception is that the hydraulic head of the Vista Pool may increase or force more groundwater into Main Ditch. Main Ditch is the primary discharge into Dead Pike Lake.*

*Dissolved iron in the groundwater is precipitated (contact with oxygen) as it enters the ditch system. This causes an orange coloration in the water. The problem is magnified by the formation of plumes of iron bacteria. Then, when the water is released from the flowages or when rainfall occurs, water in the ditch system flows into Dead Pike Lake. If the ditches have been stagnant for some time, the initial flush out of the flowages produce a plume at the inlet to Dead Pike Lake. Keeping a minimum amount of water moving through the primary ditch system (Main Ditch) (1.2 cfs) year round has substantially reduced the formation of iron floc in the discharge.*

*Water Resource Studies:*

DNR-USGS Powell Marsh – Dead Pike Lake Study: The United States Geological Survey and the DNR studied the immediate hydrology associated with PMSWA and its connection to Dead Pike Lake (Krohelski, James T., Rose, William J., and Hunt, Randall J. 2002.) A ground-water-flow model indicates ground water generally flowing from Powell Marsh northwest toward Dead Pike Lake and west toward Little Lost Creek. Simulation results indicate that Dead Pike Lake receives about 77% of its water from ground water and 23% of its water as surface water. The surface water is mostly from the PMSWA. If the Powell Marsh water control structures were removed, Dead Pike Lake would receive about 88% of its water as ground water and 12% as surface water. These results show that Powell Marsh water control structures change the distribution of the water budget components but only slightly affect the overall water budget for Dead Pike Lake.

The report also concluded that on the PMSWA water moves from Vista Pond and the marsh and discharges into the ditches where the iron floc is formed. If ditches were removed, this floc would not be present in the surface water that flows into Dead Pike Lake from the PMSWA. The report also states that “if the ditches were removed, it is likely that floc formation would be redirected to near-shore areas of DPL where increased groundwater discharge is expected.”

Dead Pike Lake Management Plan, BARR Engineering and Dead Pike Lake Association: In June 2007, the Dead Pike Lake Association committed to engage in a scientific study to investigate the cause and effect of elevated iron and manganese

discharges from the Powell Marsh into Dead Pike Lake and to determine the extent to which current management practices on the Marsh contribute to excessive water level fluctuations within the lake. The lake management plan (Barr Engineering, 2011) was supported by three Wisconsin Department of Natural Resource grants (LPL-1188-09, LPL-1189-08, LPL-1348-10). In addition the DNR arranged for and funded an aquatic plant survey of Dead Pike Lake which then became an integral part of the Management Plan. The study included the following evaluations: (1) Dead Pike Lake water quality and effects of Powell Marsh discharge on water quality, (2) hydrologic evaluation of Powell Marsh and effect of Powell Marsh management on Dead Pike Lake water levels, (3) Powell Marsh iron and manganese export; quantification and mechanisms. (4) fisheries in Dead Pike Lake, (5) aquatic plants in Dead Pike Lake, (6) potential toxicity of iron discharges from the Powell Marsh and its effect upon Dead Pike Lake aquatic life, (7) survey of Dead Pike Lake users and residents. Lake sediment core analysis indicates changes in the lake that correlate to past human disturbances on the marsh.

*Water quality data, particularly for phosphorous and iron loading, are contained in the USGS and the Barr studies described above. Each study used different data sets and models to estimate the surface water and groundwater flows and phosphorous and iron loading to DPL. Consequently they reached different conclusions. Paul Garrison, DNR Fisheries and Aquatic Sciences Research Section, compared the data of both reports. His analysis is presented in Appendix C.*

Dam Failure Analysis: A Dam Failure Analysis was conducted during summer 2007 on pool # 2 also referred to as 'Main Flowage' or 'Main Pool' (see Figure 2). This analysis contained two separate evaluations. The first was an evaluation of the area that would be inundated by a failure of the Main Pool Dam. This was required in accordance with s. NR 333.05(2), Wis. Adm. Code for the proposed reconstruction of the dam. As a result of that analysis, the consultant recommended that the main water control structure be rated as a Low Hazard dam.

Minimum Flow Analysis (to Main Ditch): A second hydrologic analysis was included in the study. This analysis was conducted to determine the minimum low flow rate from the flowage system. This minimum flow must be discharged into Main Ditch to be compliant with s. 31.34, Wis. Stats (Lenz, 2007).

The minimum flow (Q7, 10) was estimated by use of two models: The Base Flow Index estimated minimum flow at 1.2 cubic feet per second (cfs), while the Area Weighted method estimated minimum flow at 0.6cfs. Consultants estimated the storage capacity of 3 compartments within the main pool (Appendix B). When filled to capacity (1605' elev.), the compartments would hold 272, 892 and 684 ac-ft of water, totaling 1,848 ac-ft of water. This capacity would accommodate minimum flows for 114, 374 and 287 days, respectively, at 1.2cfs (total = 775 days). These estimates were used to develop a minimum flow discharge requirement of 1.2 cfs to Main Ditch, which has been in place since 2007 but not contained in any formalized operating order (Lenz, 2007).

### Differences in Water Chemistry of the Powell Marsh Ditch System as it Relates to Holding or Passing Water from the Wildlife Impoundments:

This study evaluated differences in water chemistry variables in the Powell Marsh ditch system as it relates to holding or passing surface water from the wildlife impoundments. Based on this study, passing more water does have a positive impact and could reduce the frequency of slug discharges of aesthetically displeasing water entering Dead Pike Lake (DNR 2007). (See Appendix D for more information.)

### *Vegetation and Natural Habitats of PMSWA*

Historically, the Powell Marsh State Wildlife Area was a mosaic of sedge meadow, emergent marsh, open bog and forested wetlands. These cover types were interspersed with forested uplands of predominantly white and red pines. It is not a true marsh, but is a large peatland complex containing several wetland types and plant communities. The property is currently comprised of forested and unforested wetlands, open water, and a small amount of forested upland (Map C). Additionally, an area of sand blows and old fields, remnants of past management, included planting food plots for wildlife, lie adjacent to one of the dikes.

Approximately 2,500 acres at Powell Marsh have been managed with prescribed fire and/or mechanical removal of woody species at some point in the past. Tamarack, black spruce, speckled alder and willow species pioneer into these managed areas and exist in scattered thickets or as individual trees. The result is a complex of open wetlands in various stages of succession across the majority of the property.

The forested wetlands include northern wet forest, dominated by black spruce and tamarack, and scattered areas of northern wet-mesic forest, with white cedar as the dominant tree species. Unforested wetland types include poor fen, sedge meadow and open bog. Some areas of open bog include muskeg, which is essentially identical to open bog, but contains scattered tamarack and/or black spruce with a stunted growth form.

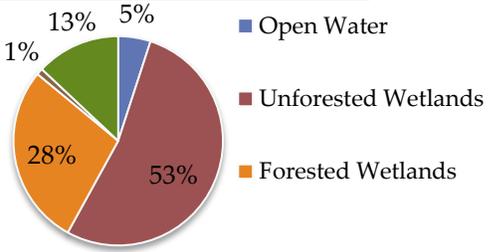
The remainder of the natural communities on the property consists of scattered upland wooded areas that primarily contain quaking aspen, red oak, red maple and white birch. These areas account for a small percentage of the overall property, and exist as small islands or around the perimeter of the wetland communities. There are minimal amounts of spotted knapweed along service roads that are treated annually.

The primary plant communities of PMSWA include:

- Open water flowages with submerged and floating aquatic plants
- Unforested wetlands comprised of sedge meadows; alder and willow fens; and bogs with low shrubs, sphagnum moss and stunted spruce and tamarack
- Forested wetlands of black spruce and tamarack
- Grassy upland islands
- Upland forest of aspen, white birch, red maple, red oak and white pine

**Table 5: Summary of vegetation cover on PMSWA.**

Cover Type	Acres	Percent
Open Water	210	5
Unforested Wetlands	2,415	53
Forested Wetlands	1,284	28
Grassy Upland Islands	62	1
Upland Forest Fringe	580	13
<b>Total:</b>	<b>4,551</b>	<b>100</b>



\* Private land within the project boundary is 392 acres, which is not reflected in the table. The total of GIS derived acreage within the boundary is 4,943 acres.

### Wildlife

The plant communities of PMSWA support a wide variety of wildlife. Forest and wetland game and furbearers are abundant. The wetlands host a variety of waterfowl and semi-aquatic furbearers, including Mallard, Blue-winged Teal, Canada Goose, muskrat, mink and beaver. The forests host deer, Ruffed Grouse and American Woodcock. Other common mammals include thirteen lined ground squirrel, red squirrel, snowshoe hare, star-nosed mole, the southern bog lemming, and various shrews, mice and voles.

There are also a variety of reptiles and amphibians at PMSWA, such as wood frog, American toad, spring peeper, several species of snakes, red-backed salamander, western painted turtle and snapping turtle. Uncommon amphibians are four-toed salamander, northern leopard frog, eastern gray tree frog, green frog, western chorus frog and mink frog.

Powell has been highlighted as a stop on the [Great Wisconsin Birding and Nature trail](#). It is also part of the [Manitowish Peatlands](#), an area designated as a state Important Bird Area (IBA). Important Bird Areas are an international effort to protect birds and their habitat. The IBA program in the United States is administered by the National Audubon Society. In Wisconsin, the IBA program is being implemented as a part of the overall strategy of the Wisconsin Bird Conservation Initiative. To qualify as an IBA, a site must:

- Support species listed as endangered or threatened in Wisconsin,
- Be important to species identified as high conservation priorities in Wisconsin,
- Have an assemblage or species associated with a habitat type that is representative, rare or threatened in Wisconsin
- Provide a place where significant numbers of birds concentrate for breeding, migration/staging, or wintering, and
- Be important for long-term research and/or monitoring projects that contribute substantially to ornithology, bird conservation and/or education.

A wide variety of birds are known to occur at PMSWA. Birders submitted sightings of 205 bird species at “Powell Marsh SWA” on the eBird.org website; 130 different bird species were reported there during 2016. Table 6 provides a list of birds that have been observed by biologists and experienced bird watchers. This is not a complete list, but represents a variety of bird guilds that use the property. A more complete list can be found in Appendix F.



*American Woodcock hiding in the reeds along Steppingstone dike (photo by Michele Woodford).*

**Table 6: Representative birds known to use PMSWA.**

Common name	Status*	Type of use	Cover type
American Bittern	SC	Nesting	Unforested Wetland
American Black Duck	SC	Migratory	Unforested Wetland
American Golden-Plover	SC	Migratory	Unforested Wetland
American Woodcock	SC	Nesting	Upland Forest Fringe
Black Tern	END	Nesting	Unforested Wetland
Black-billed Cuckoo	SC	Nesting	Upland Forest Fringe
Blue-winged Teal	SC	Nesting	Unforested Wetland
Bobolink	SC	Nesting	Unforested Wetland /Grassy Upland
Boreal Chickadee	SC	Nesting/resident	Forested Wetland
Brown Thrasher	SC	Nesting	Upland Forest Fringe
Buff-breasted Sandpiper	SC	Migratory	Unforested Wetland
Canada Warbler	SC	Nesting	Upland Forest Fringe
Common Loon	PRO	Nesting	Open Water
Dunlin	SC	Migratory	Unforested Wetland
Eastern Meadowlark	SC	Observed	Grassy Upland
Golden-winged Warbler	SC	Nesting	Upland Forest Fringe
Gray Jay	SC	Nesting	Forested Wetland
Henslow's Sparrow	THR	Observed	Unforested Wetland
Least Bittern	SC	Observed	Unforested Wetland
Least Flycatcher	SC	Observed	Upland Forest Fringe
Lesser Scaup	SC	Migratory	Open Water
Merlin	SC	Observed	Unforested Wetland
Northern Harrier	SC	Observed	Sedge Meadow /Grassy Uplands
Northern Pintail	SC	Migratory	Unforested Wetland
Rusty Blackbird	SC	Migratory	Unforested Wetland
Sandhill Crane	PRO	Nesting	Unforested Wetland
Sharp-tailed Grouse	SC	Nesting/resident	Unforested Wetland
Short-billed Dowitcher	SC	Migratory	Unforested Wetland
Short-eared Owl	SC	Nesting	Unforested Wetland
Solitary Sandpiper	SC	Migratory	Unforested Wetland
Trumpeter Swan <sup>#</sup>	SC	Observed	Open Water
Veery	SC	Nesting	Upland Forest Fringe
Whimbrel	SC	Migratory	Unforested Wetland
Whip-poor-will	SC	Observed	Upland Forest Fringe
Wilson's Phalarope	SC	Migratory	Unforested Wetland

\* Status: PRO=Protected, SC=Special Concern, THR=Threatened, END=Endangered

<sup>#</sup> this species is also recorded in the DNR's Natural Heritage Inventory (NHI) database

### *Threatened, Endangered, and Special Concern Species*

The Wisconsin Wildlife Action Plan recognized the Powell Marsh as part of the Manitowish/Powell Peatlands Conservation Opportunity Area (COA). This COA is of regional significance within the Upper Midwest for large sedge meadows, fens and prairies (DNR, 2008). These open landscape communities are home to several bird Species of Greatest Conservation Need.

Biotic inventories conducted at Powell Marsh from 1997 – 2007 by Department of Natural Resources staff have revealed the presence of several rare plant and animal species. In addition, the DNR's Natural Heritage Inventory lists a number of rare species

present at Powell Marsh. A list of Special Concern, Threatened, and Endangered species found on the property as a result of recent inventories, or are listed in the NHI database follows (Table 7).

**Table 7: Documented rare species at PMSWA.**

<b>Common Name</b>	<b>Scientific Name</b>	<b>State/Federal Status</b>
<b><u>Mammals</u></b>		
Gray Wolf	<i>Canis lupus</i>	SC / None / SGCN
Hoary Bat	<i>Lasiurus cinereus</i>	SC / None / SGCN
Little Brown Bat	<i>Myotis lucifugus</i>	THR / None
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	SC / None / SGCN
<b><u>Herpetiles</u></b>		
American Bullfrog	<i>Rana catesbeiana</i>	SC / None
Mink Frog	<i>Rana septentrionalis</i>	SC / None / SGCN
<b><u>Invertebrates</u></b>		
Wingless Mtn. Grasshopper	<i>Booneacris glacialis</i>	SC / None
Bog Copper (Butterfly)	<i>Lycaena epixanthe</i>	SC / None
Frigga Fritillary (Butterfly)	<i>Boloria frigga</i>	SC / None
<b><u>Plants</u></b>		
Swamp-pink orchid	<i>Arethusa bulbosa</i>	SC / None
Sparse-flowered sedge	<i>Carex tenuiflora</i>	SC / None
<b>SC – Special Concern; Thr – Threatened; End – Endangered; P – Protected species</b>		

### *Rare Birds of Powell Marsh*

#### **Northern Sedge Meadow Birds**

Sedge meadows, like those of Powell Marsh, offer conditions favorable to many bird species. Migration can bring numbers of waterfowl, shorebirds and passerines into sedge meadows for short periods of time. About 50 species of birds regularly nest in northern sedge meadows. Species commonly found in northern sedge meadows, and at Powell Marsh, include the Red-winged Blackbird, Sedge Wren, Bobolink, Common Snipe, Song Sparrow and Swamp Sparrow.

Several uncommon to rare species, limited to larger tracts of sedge meadow, also can be found at Powell Marsh. These species include Nelson's sharp-tailed sparrow, LeConte's Sparrow, Yellow Rail, Short-eared Owl, Northern Harrier, American Bittern and Merlin. In addition, two special concern species and one threatened species are found in consistent numbers at Powell Marsh. Powell Marsh is one of only three places

in the state where all three of these species nest, and precautions should be considered to assure their continuance.

**Yellow Rail (*Thr*):** This secretive species is the smallest rail found in Wisconsin. Its preferred habitat is wet sedge meadows. If woody vegetation, such as willow or bog birch, become too abundant, the Yellow Rail will vacate the site. They also tend to avoid cattails. The Yellow Rail feeds mostly on snails, insects and occasional seeds. The population in Wisconsin is limited to a few large sedge meadows, being known from about 10 sites.

**LeConte's Sparrow (*SC*):** This small, secretive sparrow is found in wet prairies, sedge meadows and old, wet fields. The secretive nature of this bird keeps it well hidden in vegetation at most times. LeConte's Sparrow feeds mostly on seeds, but takes many insects, especially during nesting. Concerns about populations focus mostly on habitat loss or degradation through brush growth.

**Nelson's Sharp-tailed Sparrow (*SC*):** This bird, found at only three places in the state on a regular basis, is another secretive member of the sedge meadow-wet prairie bird community. Sharp-tails occupy areas with denser grass and sedge vegetation, but do not tolerate many woody plants in their territories. Food consists of insects, spiders, amphipods and seeds. Habitat destruction and conversion to woody species are the primary management concerns.

**Black Tern (*END*):** Black Terns build floating nests in hemi-marshes; areas that have a 50:50 ratio of open water and patches of emergent vegetation, often laying eggs atop muskrat houses. Food consists of insects, crustaceans, and small fish. Wetland loss across the state has affected much of its breeding habitat and recent surveys still show significant declines in populations. This bird was recommended for listing in 2010 and added to the State Endangered list in 2013.

**Management Needs for These Species:** Large, open sedge meadows are preferred habitat for Yellow Rail, LeConte's Sparrow and Nelson's Sharp-tailed Sparrow. These open meadows are the only place that Nelson's Sharp-tailed Sparrow and the Yellow Rail will nest. Woody species control is the primary requirement of habitat manipulation; changes in water levels, prescription burning, and mowing help control woody growth.

### *Recreational Facilities and Uses*

Many people visit PMSWA each year. They include hunters, trappers, berry pickers, bird watchers, and photographers. The most common hunting activities are for waterfowl and deer. The marsh also is an important resource for local trappers pursuing muskrat, mink and beaver. The upland fringe is used regularly for grouse and deer hunting. Powell Marsh has been highlighted as a stop on the Great Wisconsin Birding and Nature Trail and is part of an Important Birding Area.

A drive-in scenic overlook is located at the north end of the marsh. There are four designated parking areas. Walking access throughout much of the wildlife area is provided by management roads and dike tops. There are no open public roads or designated trails, except for a portion of the Powell ski trail, on the wildlife area. The Powell ski trail is managed by the NHAL State Forest. A short portion of the trail loops into the wildlife area on the western side of the property.

Naturalists from the NHAL State Forest and private naturalists offer 7 to 12 guided interpretive programs annually at Powell Marsh. The most common programs include birding/wildflower hikes, and full moon night hikes. There are no interpretive trails within the property. The Powell Road overlook and parking lot is a popular spot for visitors view the marsh and wildlife and to enter the marsh on Vista Dike. The management roads and dike tops provide excellent non-motorized access to the different habitat types throughout the wildlife area.

Larger areas of habitat that raise, attract, and hold waterfowl are highly limited within this region. While not as productive as wildlife areas in other parts of the state, this site is locally important for waterfowl hunters. It is also highly valued for hunting by the members of the Lac du Flambeau Band, who live nearby. Trapping for muskrat, mink and beaver is locally important as well. While the acres of upland are small, those sites are popular for grouse, turkey and deer hunting.

#### *Historical / Archeological Resources*

The Vilas County Archaeological and Historical Sites map (DNR, 2012) indicates one Historical site on this property. This site includes the service buildings.

#### *Infrastructure*

There are 4 parking lots, 7 gates, 14 water control structures, 9 miles of ditches, 8.5 miles of dikes and 6 miles of access roads (Map D). Four of the 6 miles of access roads are in good condition and are regularly used. About 1 mile of the sandy upland management access road is in fair condition, and the southern 1 mile of the Stepping Stone grade is in poor condition. Currently the parking lots and gates are in good condition.

The dikes and ditches on the wildlife area were constructed in the mid-1950s and many are now in disrepair. Dikes constructed of peat are especially vulnerable to muskrat burrowing. The Main water control structure is original to the property and due for replacement. The control structure at Little Trout Lake is currently inoperable and could be removed. About 6 miles of the dikes are in fair to poor condition and are used mainly by tractors or heavy equipment. The remaining dikes are in good condition and can be traveled with pickup trucks.

## Findings and Conclusions

### Purpose of the Property

The scope of use and management of a property is governed by its official designation. The PMSWA is designated as a State Wildlife Area. Wildlife Areas are managed under the authority of Sec. 23.09 (2) (d) 3 Wis. Stats. and ch. NR 1.51, the administrative code on management of state wildlife areas. Wildlife areas are to provide an area where people can hunt, trap, and fish. Wildlife areas are also open for traditional outdoor uses of walking, nature study, berry picking. As directed by ch. NR 1.51 and ch. NR 1.61, other recreational uses may be allowed by the property's Master Plan if those uses do not detract from the primary purpose of the property.

Funding from the Federal Wildlife Restoration Act (also known as the Pittman-Robertson Act) was used on the marsh. Lands acquired and managed with these funds are to be used for wildlife restoration, acquisition and improvement of wildlife habitat.

### Existing Conditions

#### *Habitat*

Approximately 85 percent of this property is wetland and about 57 percent is open wetland. Currently, the open habitats are maintained by seasonal manipulation of water levels in the flowages and ditches, the periodic use of prescribed fire and cutting and shearing brush and trees.

#### *Infrastructure*

The dikes and ditches on the wildlife area were constructed in the mid-1950s and many are in disrepair. The ditches have silted in. The main water control structure is original to the property and due for replacement. The control structure at Little Trout Lake is currently inoperable. Four of the six miles of access roads are in good condition.

Main Ditch, located adjacent to the Vista flowage, has recently been defined as a navigable channel by the DNR, which requires that a minimum flow be discharged from the pools to the ditch. Minimum flow has not been historically discharged from the pools and management must be changed to allow this discharge. That flow has been estimated at 1.2 cfs or more.

#### *Iron Precipitate*

Groundwater and surface water generally flows from PMSWA northwest toward Dead Pike Lake. Nearly all of the surface water input to Dead Pike Lake, which is about 23 percent of the lake's water originates in PMSWA, and it flows out through Main Ditch.

The groundwater in the PMSWA area has high natural levels of dissolved iron that precipitates, forming a rusty or oily appearing floc in area waters. Prior to 2007 low-flow to no-flow conditions occurred seasonally in the Powell Marsh ditches that were especially favorable for the production and accumulation of iron floc. Rain events following low-flow conditions flush the accumulated floc out of the ditches and into Dead Pike Lake, further impacting the aesthetic quality of water in that lake. Since 2007 a minimum water flow of 1.2 cfs has been maintained from Main Ditch to Dead Pike Lake. Since the initiation of minimum flow, iron floc formation in the ditch system has been greatly reduced and there has been improved aesthetic quality of water in the ditch system.

### Significant Ecological Opportunities, Capabilities, and Limitations

The Northern Highlands Ecological Landscape is a complex of lakes, upland forests, and wetland communities. The large open wetland habitat with shallow open water habitat of Powell Marsh is unique in the region. While Powell Marsh does not lie on a major waterfowl flyway, its open water and early successional wetlands provide essential habitat for migrating waterfowl, shore birds and grassland birds. Powell is a locally important production area for waterfowl and semi-aquatic furbearers. It also provides regionally significant nesting habitat for a number of uncommon to rare bird species.

#### *Natural succession*

Without active management intervention or wildfire, this open peatland habitat will succeed to tamarack forest and black spruce muskeg. A combination of manipulation of water levels in the flowages and ditches, prescribed fire, hand cutting, mowing and shearing prevents the growth of shrubs and trees.

#### *Upland forest management*

The property has a small amount of upland forest, located primarily on the fringe of the marsh. This may be managed as young brushy forest, left to mature or converted to grassy upland to further expand the open-habitat acreage. However, this small fringe should be considered in a landscape scale context as part of the extensive, adjacent state forest.

#### *Wildlife food plots*

Overall, Powell Marsh has nutrient-poor soils. Crops such as corn, buckwheat or legumes do not grow well because of the infertile soils and frequent frosts. Further, these soils tend to be subject to wind erosion if tilled. The upland fields are better suited for permanent grasslands.

### *Fisheries management*

The lakes and flowages on the PMSWA have poor potential as a productive fishery, as they are infertile and relatively shallow, making them prone to winter kill.

### **Management Opportunities for Conservation of Biological Diversity**

PMSWA offers rich opportunities to continue to provide habitat for Threatened, Endangered, Special Concern species and for wildlife Species of Greatest Conservation Need (SGCN), which are identified by the Wisconsin's Wildlife Action Plan (DNR, 2006). Some are ranked as having the highest management concern. Management to maintain the open aspect of the wildlife area and management of the flowages benefits all of these species.

Sharp-tailed Grouse are regionally scarce and occur in small, scattered locations in northern Wisconsin. Powell Marsh historically contained a small, remnant population of these birds. Maintenance of this small population would require managing much of the wildlife area as well as adjacent lands outside of the wildlife area for open, brushy habitat.

### **Significant Recreation Opportunities, Capabilities, and Limitations**

Larger areas of habitat that raise, attract and hold waterfowl are highly limited within this region. While not as productive as wildlife areas in other parts of the state, this site is locally important for waterfowl hunters. It is also highly valued for hunting by the members of the Lac du Flambeau Band, who live nearby. Trapping for muskrat, mink and beaver is locally important. While the acres of upland are small, those sites are popular for grouse, turkey and deer hunting.

Overall, PMSWA's potential for recreational use is greatly limited by its wet and unstable soils. The property is most suited to hunting, trapping, and wildlife watching from selected viewing sites. Limited trails could be developed on the higher ground along the northern boundary and along the roads and dikes. Much of this property is not suited for motorized uses due to unsafe travel conditions on the dikes, disturbance of wildlife and recreational users.

PMSWA is a rich resource for nature interpretation and education, but its remote location limits the opportunities for naturalist-led programs. Therefore, the property is better suited for self-guided interpretive and educational opportunities.

## CHAPTER FOUR: IMPACT ANALYSIS

### Introduction

This chapter, in combination with Chapters Two, Three and Five collectively constitute the Environmental Analysis for the PMSWA Master Plan. The intent of the analysis is to disclose the environmental effects of an action to decision-makers and the public.

Chapter Two of this document describes the elements of the proposed action, sometimes referred to as the preferred alternative. Chapter Five describes and evaluates the various alternatives that were considered in the planning process but not selected.

This analysis meets the requirements of the Wisconsin Environmental Policy Act (WEPA) and Chapter NR 150 of Wisconsin Administrative Code. Based on information presented in this chapter the proposed actions in the master plan are not anticipated to cause significant adverse environmental effects.

### State or Federal Approvals Required

Approvals or regulatory permits would be required for a number of actions proposed in the plan, particularly those that involve disturbance of wetlands.

Various state and federal regulatory permits are required to do modifications to ditches, dikes, water control structures and other actions that disturb wetlands. The specific permits that are required to complete the proposed actions in the plan are listed below:

Actions	Permits Required
<ul style="list-style-type: none"> <li>• Maintenance or reconstruction of ditches and plugging ditches</li> <li>• Construction activity within a wetland</li> <li>• Replacement or removal of existing WCS, installation of new WCS or spillways</li> <li>• Improvements to dikes</li> </ul>	<ul style="list-style-type: none"> <li>• NR 353 wetland restoration permit. Includes 30.19 connected enlargement authorization, wetland impacts under s. 281.36, ch. 30.20 dredging and ch. 30.195 stream realignment for any portion with stream history.</li> </ul>
<ul style="list-style-type: none"> <li>• Abandon dikes (i.e. dams)</li> </ul>	<ul style="list-style-type: none"> <li>• Chapter 31, Wis. Stats. (dam abandonment permit)</li> </ul>

The use of funding from the Federal Wildlife Restoration Act (also known as the Pittman-Robertson Act, authorizing an excise tax on sporting arms and ammunition) to acquire, develop or manage Wildlife Areas comes with guidance to state fish and wildlife agencies based on the authorizing legislation. The statutes and applicable regulations prohibit a state fish and wildlife agency from allowing recreational activities and related facilities that would interfere with the purpose for which the State acquired, developed, or is managing the land. Funding from the Federal Wildlife Restoration program was used to purchase of a number of parcels of land on the PMSWA. Review and administrative approval by the U.S. Fish and Wildlife Service may be required if significant changes in management are pursued.

## Minimum Flow Requirement

In 2007, Main Ditch (the primary ditch draining the Powell Marsh flowages) was defined as a navigable stream. On navigable streams, a minimum flow through water control structures is required. That flow has been estimated at 1.2 cfs by use of the Base Flow Index and at 0.6 CFS by use of the Area Weighted method (Lenz, 2007). Since 2007 a minimum flow of 1.2 cfs has been maintained by discharge into Main Ditch. Previous to 2007, there was no minimum flow; water management focused on capturing spring runoff to fill the ponds and conducting fall drawdowns for vegetation management.

## Impacts to Natural Resources

### Air Quality

Potential impacts to air quality would come primarily from prescribed burns, and would not be significantly changed from current management. Prescribed (controlled) burns are a management tool that mimics natural fire disturbance and helps control many woody plants to maintain wetlands in an open condition. Prescribed burns would continue to occur seasonally (typically spring and fall) as they have in the past on wetland and grassland areas. Controlled burns may occur on a property every year though the area burned may be rotated between different locations on the property. The burn plan contains best management practices and procedures to safely manage the fire and includes measures to minimize nuisance smoke impacts.

Minor air emissions that would be generated on the property include 1) short-term dust from construction, road maintenance and 2) vehicle emissions generated by DNR motor vehicles, property users and certain management activities, such as logging. These emissions would be insignificant compared to emissions from adjacent roadways and other motorized activities in the area.

## Geological Resources and Landforms

No geological resources or landforms would be impacted by the proposed actions.

### Soils

The probability of significant short-term or long-term cumulative impacts to the soil resources is low for the management activities prescribed in the Master Plan. No prime or unique farmlands would be impacted by this action.

Soils would be disturbed by ditch maintenance or renovation, ditch plug installation, and by the installation, replacement, or removal of water control structures. These disturbances would cover only a small area and be short-term. The construction or maintenance of roads and parking lots may also create small, short-term soil disturbances. These activities would not cause significant adverse impacts.

Timber harvesting activities would be confined to upland sites (580 acres) or on frozen ground conditions for productive forested wetlands. Soil erosion from forest harvesting operations would be minimized by the application of the strict standards of the Best Management Practices (BMPs) for Water Quality. All trails and primitive logging roads would be monitored for signs of excessive soil erosion caused by management activities or recreational use and actions would be taken to minimize the erosion potential.

Non-forested upland areas would be maintained in a vegetated condition, which would reduce the potential for soil erosion.

## Water Resources

### *Impacts due to plugging Main Ditch and redirecting water into the marsh*

*The proposal calls for the majority of the water flowing from the pools upstream of the Main WCS to be discharged into the marsh/wetland area to the west of Vista Flowage. That portion of Main Ditch running along the Vista dike would be plugged. All flowages would be filled in the spring and held high to provide water for a minimum flow into the marsh area through low water periods, which normally extends through much of the summer.*

- The process of “filtering” the majority of the outflow from the flowages through approximately 85 acres of marsh/wetland vegetation before discharge to Dead Pike Lake and eliminating flow through the lower segment of Main Ditch is projected to reduce the potential for iron floc production. This portion of Main Ditch that will be plugged historically has been a primary site of iron floc production. Currently iron floc production there is substantially controlled by the minimum flow through the ditch; but it is projected that elimination of flow through this ditch will further reduce the level of iron floc contributed to Dead Pike Lake. The level of potential floc reduction is not known.
- There is a potential for hydrologic impacts on adjoining lands to the west. For example: water tables may change and create pools or flooding non-DNR managed lands. The specific impacts, their locations and projected impact levels are unknown. Engineering and

elevation studies are required to determine what impacts, if any, increasing flows into the marsh area would have on adjoining, neighboring lands.

- Iron floc reduction benefits may be reduced if a new channel forms in the marsh/wetland area. A new channel (ditch) may form in the marsh as a result of the new water discharge from the Main WCS. A new channel may become a source of iron floc production that cannot be easily managed. The options to keep it open and flowing to minimize floc production would be very limited and expensive, as the wet soils would prevent access. Beaver activity there would be likely which would increase the probability of stagnate, iron floc forming pools forming. If this occurs, it may negate much of the intended benefit of decommissioning Main Ditch. The level of potential impact is unknown.

#### **Sheet-flow or Stream-flow?**

*It is not known for certain whether or not a natural stream thread would develop across the restored portion of the marsh, or if water would perpetually move only by sheet-flow over and through the marsh. However, there is a possibility that there would be sufficient flow during high water periods to cut a channel across the marsh to the Dead Pike Lake outlet. Water flowing at velocities greater than 3 feet per second may cause scouring or channeling. Engineering surveys are needed to evaluate the potential. Historic photos show that a stream most likely ran through the property before it was bisected by the railroad grade (Stepping Stone Grade) that was built in the early 1900s.*

*If a new channel forms, there will be a scenario where iron-rich groundwater meets oxygen; iron will precipitate, iron bacteria will flourish, and floc will form. The best solution at that point would be to keep water flowing (i.e. maintain minimum flow). This may be much more difficult to do than it is today with the current ditch system. Beaver blockages on the stream are one reason. They would be likely and would be a significant impediment to preventing iron floc formation. Beaver impoundments would stop the flow and the stagnant water will promote growth of iron bacteria. Overflow would accelerate stream cutting just below the dam. Beaver blockages occur now in the ditch system but the ditches are close to roads and can be monitored and the dams quickly removed. A new channel would likely be away from any service road and difficult to monitor. Any beaver dams would be difficult to approach and costly to remove.*

#### *Impacts due to the elimination of other ditches*

Flow in two ditches, in addition to Main Ditch that was previously discussed, would be eliminated or altered. Under low water conditions the ditches in the upper watershed (upstream of the Main WCS) collect iron-rich/oxygen-poor groundwater and under very low flow conditions they hold that water there and produce iron floc. The proposed plugging of a portion (800 ft) of the Little Trout Lake ditch, the potential altering of 1,000 ft ditch that flows into “Pete’s Creek”, and the passive abandonment of approximately 5,500 ft. of ditch in East and South Main Flowages would improve the overall quality of the PMSWA discharge by reducing the level

of iron-rich/oxygen-poor water contributed to the system. The level of improvement that could be expected is unknown, as the level of inflow groundwater in these ditches is unknown.

#### *Impacts on phosphorus discharge levels*

At certain times water flowing into the PMSWA ditch system from the watershed near Little Trout Lake to the east is high in phosphorus. The level of phosphorus being discharged from the PMSWA to Dead Pike Lake is projected to be reduced by diverting the water flowing out of the ditch system into the marsh where some of the phosphorus may be taken up by wetland plants. The amount of phosphorus reduction that may occur in the discharge to Dead Pike Lake is unknown.

#### *Impacts due to construction activities*

There may be short-term slight increases in water turbidity during construction activities related to the installation of ditch plugs, ditch maintenance, and the installation or removal of water control structures. These activities would not have a significant negative impact on water quality or fish and aquatic life. Water quality BMPs would be followed for all projects that would have the potential to affect water resources and would be timed to minimize impacts to fish spawning and wildlife nesting periods. Erosion control measures to meet the technical standards for erosion control approved by the department may be found here:

<http://dnr.wi.gov/topic/stormwater/standards/>. Any area where topsoil is exposed during construction would be immediately seeded and mulched or riprapped to stabilize disturbed areas and prevent soils from being eroded and washed into the waterway. Installation also must follow all DNR invasive species decontamination and control protocol and practices.

#### *Changes in Flow to Lac du Flambeau*

No change to water flow to the Lac du Flambeau Reservation is expected.

## **Habitat and Wildlife**

### Impacts to Habitats and Management Capability

The plant community management strategies described in Chapter Two would maintain and enhance the quality and composition of the habitats on the property. Vegetation management objectives outlined for the PMSWA plan include maintaining ecologically important large, open wetland habitats and also to a limited degree, providing early successional forest habitat on the marsh fringe, which includes aspen and oak.

#### **Natural succession**

Without active management intervention or wildfire, this open peatland habitat would succeed to tamarack forest and black spruce muskeg. A combination of manipulation of water levels in the flowages and ditches, prescribed fire, hand cutting, mowing and shearing prevents the growth of shrubs and trees.

Overall, the flowage management capabilities would remain generally unchanged under this plan, allowing the current existing amount, variety and quality of wetland habitats on the PMSWA to be maintained. Managing flowage water levels would continue to be a primary management tool for maintaining the variety and quality of wetland habitats. The proposed

plugging of a portion of the Little Trout Lake ditch and the ditch that flows into “Pete’s Creek” and the passive abandonment of the dikes and ditches in South Main and East Main Flowages would not cause a significant change in either habitat or management capability.

Prescribed burning would also continue to occur under managed condition to help control brush and tree invasion (See Figure 4). With the majority of the dikes remaining in place managers would continue to have good access across the property to conduct management activities. Management of the marsh’s upland forested fringe with a focus on maintaining early successional forest habitat (oak and aspen) would continue to provide habitat diversity and maintain habitat for species such as ruffed grouse and deer.



**Figure 4: Photo depicts how water management helps slow the transition of open habitats into forested wetlands (Photo by Ron Eckstein, 2007).**

### *Impacts to Wildlife – General*

The management objectives and prescriptions outlined in Chapter Two would maintain the existing diverse wetland, grassland, shrub, forest, and aquatic habitats needed by the resident and migratory wildlife populations; continuing to support the current array of resident and migratory wildlife populations. The proposed management would be especially beneficial to grassland nesting waterfowl, shorebirds and grassland birds.

Currently, a 1,800-acre wildlife refuge area is closed to all public access from September 1<sup>st</sup> to December 31<sup>st</sup> except deer hunting during the gun season. The refuge protects migrating waterbirds during the waterfowl hunting season. The current refuge boundary extends across the southern portion of Vista Flowage. In its current configuration, during the closed period it blocks all foot access from the major access points into the interior of the property (i.e. closing portions of Stepping Stone Grade and Vista Dike).

The plan would redraw the existing refuge boundary (shown on Map D) allowing year-round public access into the interior of the property from the Vista overlook and the Stepping Stone Grade access sites.

The new refuge boundary would encompass 850 acres of the primary and most important area used by waterfowl in the fall. The refuge reduction would not have significant negative impact on waterfowl. Property wildlife biologists no longer consider the presence of a refuge on PMSWA as critical for waterfowl, but its continuance in some form has strong public support. Opening the Vista dike trail loop to year-round public access would be a significant positive benefit to birders and hikers.

Also proposed is a change in the refuge's closed period. The new closed period would be from September 1st – October 31<sup>st</sup>; this "re-opening date" would provide more furbearer harvest opportunities. The reduction in the closed period would have a minimal impact on waterfowl because most waterfowl have flown out of the area by the end of October due to frozen water conditions.

#### *Fisheries*

The lakes and flowages on the PMSWA have poor potential as a productive fishery, as they are infertile and relatively shallow, making them prone to winter kill. No fishery management actions are proposed in this master plan.

#### *Endangered, Threatened and Rare Species, Native Communities and Scarce Ecological Resources*

PMSWA offers rich opportunities to continue to provide habitat for Threatened, Endangered, Special Concern Species, and for Wildlife Species of Greatest Conservation Need (SGCN), which are identified by the Wisconsin's Wildlife Action Plan (DNR, 2006). Some are ranked as having the highest management concern.

The large open wetland habitat with shallow open water habitat of Powell Marsh is unique in the region. Its open water and early successional wetlands provide essential habitat for migrating waterfowl, shore birds and grassland birds. Also, the property provides regionally significant nesting habitat for a number of uncommon to rare bird species.

The management actions described in Chapter Two would maintain and enhance habitats for these species. The management described in this plan is expected to cause few, if any, negative impacts to endangered, threatened and rare species, while yielding significant medium to long-term benefits. Implementation of the proposed recommendations would ensure continued safeguarding of these species and under-represented ecological communities. These actions also are compatible with DNR obligations to protect threatened and endangered species and plant communities.

### Sharp-tailed Grouse

Today, Sharp-tailed Grouse are regionally scarce and occur in small, scattered locations in northern Wisconsin. At one time Powell Marsh had a small, remnant population of these birds, but sharp-tails have not been recorded here recently.

Long-term (genetically) viable populations of Sharp-tail grouse require expansive acres of open and brushy (early successional) habitat at a scale larger than the open habitat at Powell Complex (PMSWA and LDF lands combined). Historically, high Sharp-tail grouse numbers in the north coincided with Wisconsin's settlement and logging history when expansive areas of woods were cleared in the early 1800's for agriculture and forestry uses. Now that the landscape in northern Wisconsin has reforested, sharp-tails are limited to large open barrens landscapes, such as exist in northeastern Wisconsin.

Much of the Manitowish area is now forested wetlands (Tamarack and Black spruce). In the past, the PMSWA was identified as having some potential for the restoration of Sharp-tail habitat. The State is currently focusing its Sharp-tail grouse restoration efforts in other, more suitable locations in Wisconsin. The wildlife management program's more recent 2011 Sharp-tail management plan does not include Powell Marsh within the habitat focus areas. Therefore, the PMSWA master plan does not attempt to restore Sharp-tail habitat on the property; however, efforts to maintain the open aspect of the marsh should benefit the remnant population, if still present.

## Impacts to Recreational Facilities and Public Use Opportunities

### *Hunting and Trapping*

The PMSWA is popular for hunting (particularly waterfowl and deer) and trapping. The proposed habitat management recommendations would maintain the quality and extent of the wildlife habitats that supports these recreational activities. The earlier re-opening date for the refuge closed area would allow beaver trapping on the on the early November season opener.

### *Hiking – Bird/Wildlife Watching – Scenic/Nature Appreciation*

Bird watching is a primary public use on the PMWA. Birders from across the region visit Powell. It is one of the stops highlighted on the Great Wisconsin Birding and Nature trail.

The property also is popular destination for people to walk and enjoy the expansive open landscape scenery and wildlife. This plan would maintain and enhance these opportunities and their quality. The enhancements would be by:

- Establishing a new ADA trail loop,
- Adjusting the refuge (closed-area) to provide year-round foot access on the Vista Flowage dikes and the interior of the property from the Vista parking lot and the Stepping Stone dike access,

- Adding a boardwalk out into a portion of the marsh for viewing,
- Adding benches along trails,
- Improving carry-in watercraft access to Vista Flowage,
- Adding a viewing blind,
- Improving views from the Vista overlook, and
- Adding interpretive signage at key locations

### *Public Access*

Foot access would be improved with the addition of a trail loop. Access would be substantially expanded in the fall months with the adjustment in the refuge (closed area) boundary that would allow public access across primary dike routes. The opening of the property to bike access is another significant plus for the public access to the property.

The plan would not bring any significant changes to general pedestrian public foot traffic to backland areas. The only change would be the gradual loss of access on the dike separating Southern Main and East Main Flowages, which would not be maintained in the future. Currently, this dike is lightly used.

In summary, the proposed plan would continue to provide connected dikes for trails and management roads, and easy access to most parts of the area as currently exists. Hunters, bird watchers and hikers would have good access to the property.

### *ADA Opportunities*

The plan would substantially improve opportunities for less mobile persons to enjoy the property and its wildlife. Key additions are the establishment of an ADA accessible trail with a nature trail component, construction of an accessible viewing blind, and providing a barrier-free access to the Vista Flowage boat landing. PDMD access at approved locations would continue to be provided.

### **Impacts to Cultural Resources**

One set of buildings, currently used for storage and as a shop, that date to the early 1900's lies on the property. It and any new sites with cultural or historical value that may be discovered in the future would be managed in accordance with guidance and statutory requirements (see Wis. Stats. 44.40 and Manual Code 1810.10). Federal section 106 cultural resource protection (commonly called SHPO) requirements would be also be complied with. This plan is not expected to have any adverse impacts on historical and cultural resources.

## Socio-Economic Impacts and Their Significance

### Noise

Noise impacts from the habitat management and hunting activities is expected to be occasional and minimal, not significantly different than currently exists. There would be short-term increase in noise from equipment while conducting the ditch/dike renovation and maintenance activities.

### Public Safety

There are no elements of the PMSWA master plan that are anticipated to have a negative effect on public safety.

Concern has been expressed about the potential risks to aircraft using the Manitowish Waters Airport by wildlife attracted to the PMSWA as the Manitowish Waters Airport is located 5,000 feet from the wildlife area's northern boundary. An assessment of the wildlife hazard risks at the Manitowish Waters Airport was prepared by Dan Hichert, a wildlife damage biologist with the DNR and an accredited FAA Qualified Biologist. His assessment report is in Appendix E. The conclusions of the assessment are that proposed management practices for the property are not likely to contribute an additional hazard to aircraft using the airport.

### Timber Products

The majority of PMSWA (86%) is comprised of wetland, both open unforested and forested. The forested component is non-commercial. Approximately 580 acres (13%) are upland forest where harvesting would occur primarily to provide food and cover for wildlife, provide diversify hunting habitats, and to add to the aesthetic character of the property. The production of forest products is a secondary benefit. Although the forested acreage is limited, it does provide some economic revenue and helps support the local forest products industry.

### Tourism

The proposed PMSWA plan continues to maintain the existing open wetland habitat and scenic values. The current draw of visitors for bird watching, hiking, and hunting should not diminish. The proposed enhancement of trails and related amenities may increase visitation levels. There may be some increased economic benefits for the local economy, primarily in the form of day visit tourist activities (purchases for food, gasoline, etc.) from visitors using the PMSWA. The proposed construction projects (outlined below) related to the proposed changes to the ditch/dike system would also generate a short-term economic benefit.

## Fiscal Effects on Local Government

The proposed plan would not generate any fiscal impact on local governments. The plan would not cause any change to the payments in lieu of property taxes (PILT).

## Fiscal Effects on State Government

Under the proposed plan there would be new costs incurred to implement the ditch and dike projects, shown on Table 8. The projected cost of construction of the new recreation and access facilities is shown on Table 9.

**Table 8: Water management infrastructure construction projects and estimated costs.**

Project	Estimated Cost*
<ul style="list-style-type: none"> <li>Plug Main Ditch</li> <li>Engineer a diffuser structure to redirect flow into marsh</li> </ul>	\$4,000/plug \$10K-\$30k
<ul style="list-style-type: none"> <li>Replace the Main WCS (Dept. has the WCS)</li> </ul>	\$40,000
<ul style="list-style-type: none"> <li>Improve 5,000 ft. of dike associated with Main &amp; South Main Flowage and install an emergency spillway (Estimate includes raising the western dike of the Main Flowage by ~1ft.)</li> </ul>	\$84,000
<ul style="list-style-type: none"> <li>Remove WCS and plug the east portion of the Little Trout Lake ditch</li> </ul>	\$10,000
<ul style="list-style-type: none"> <li>Phosphorous Reduction Project on Little Trout Flowage</li> </ul>	\$81,000

\* Cost estimates are based on best available information.

**Table 9: Recreation facility and public access construction projects and estimated costs.**

Project	Estimated Cost*
<ul style="list-style-type: none"> <li>Vista ADA accessibility project (graded switchback)</li> </ul>	\$5,000
<ul style="list-style-type: none"> <li>New Hiking trail with ADA accessible segments</li> </ul>	\$20K-\$30K/mile

\* Cost estimates are based on best available information.

### Summary of management costs:

- Current annual habitat management costs range from about \$3,000 to \$6,000 per year. Under the proposed plan, future annual habitat management costs would remain the same with the exception of inflation.
- Current routine annual costs to maintain infrastructure (i.e. ditches, dikes, WCS and roads/parking lots) range from \$2,000 to \$4,000 per year. Under the proposed plan the future costs are projected to remain the same with the exception of inflation.

Property management activities range in frequency from annual (e.g., trail mowing) to every three to five years (e.g., prescribed burns) to every 15-20 years or longer (e.g., timber harvests).

Large infrastructure, elements such as dikes have significantly longer life spans and their associated installation or renovation costs are much higher too. Dike renovations may cost

\$80,000 or more per mile, but no dike renovations other than those listed in Chapter 2 are anticipated over the 15 year life of this plan.

## Changes in Land Use

The proposed actions would not result in any change in land use on or off the property.

## Impacts on Energy Consumption

Due to the limited amount of infrastructure development and renovation proposed, no significant impacts to energy consumption are expected.

## Cumulative Effects, Risk and Precedent

### Significance of Cumulative Effects

The proposed actions are anticipated to have positive long-term effects on the quality of the natural environment and recreational users. The habitat management and recreational use enhancements are expected to provide the following cumulative benefits to property users and the natural environment:

- Maintain and enhance recreational opportunities for users through improved facilities and sustainable wildlife populations for harvest and observation.
- Maintained habitat for the long-term benefit of game and non-game species, including many rare species and other species of special concern.

The modifications to the management of the flowage/ditch/dike system cumulatively are expected to improve the quality of water discharged from PMSWA and benefit Dead Pike Lake.

### Significance of Risk

Management of the PMSWA poses a low overall potential for risk. Largely, the management activities continue to be similar to those that have been used over the last several decades. The most significant change would be in the operation of the flowage system by plugging ditches and redirecting flow into a marsh/wetland area to allow it to “sheet-flow” to the discharge point. It is unknown whether these actions will be successful in reducing iron floc and phosphorus discharge levels and improve the water quality of Dead Pike Lake. It is also unknown whether redirecting significant water into the marsh/wetland area will cause secondary hydrologic impacts on adjacent lands. The proposed water management changes are not high risk actions for property or public safety, nor do they involve an irretrievable commitment of resources. They

can be altered or reversed in the future if they do not produce the desired results or if they create unacceptable secondary impacts other lands or resources. During implementation, the results will be actively monitored and the management actions adjusted as needed to avoid unacceptable impacts.

The highest risk potentially is posed by the use of prescribed fire as a management tool. Necessary precautions and DNR procedures are always followed during prescribed burns, including having an approved burn plan and adequate fire-fighting equipment and personnel present on site. During periods of high fire danger, burning restrictions are put into effect and a complete burning ban may be implemented.

### Significance of Precedent

Approval of this management plan would not directly influence future decisions on other DNR property master plans. Implementation of the objectives contained in the master plan would not be precedent-setting, primarily because the proposed habitat management, development activities and recreation actions are not unique and regularly occur on state wildlife, fishery and natural areas lands across Wisconsin. Additionally, the proposed management activities are similar to those that have been used over the last several decades.

## CHAPTER FIVE: ALTERNATIVES AND THEIR IMPACTS

*The primary alternatives evaluated were two management approaches for reducing iron floc production and discharge to Dead Pike Lake.*

### Water Management Alternative A

*Restore Main Ditch and Reduce Phosphorus Levels*

#### Management Strategy

*Main Ditch has been one of the primary sites where iron-rich groundwater collected and pooled, producing iron floc. This alternative strives to improve the quality of water flowing to DPL by narrowing that portion of Main Ditch lying adjacent to Vista Dike to speed flow and reduce opportunity for stagnant water to collect and produce iron floc. A minimum flow of at least 1.2 cfs would be maintained from the Main WCS through the ditch from spring thaw to fall freeze up.*

This water management alternative focuses on reducing the potential for iron floc in the discharge to Dead Pike Lake by improving flow through Main Ditch and taking actions to reduce the level of phosphorus discharged from the marsh while maintaining the current level of open wetland habitats.

### Proposed Management Actions – Alternative A

#### Objectives 1 and 2:

- Provide and maintain a variety of primarily open high quality wetland habitats,
- Assure the clarity of water and phosphorus levels leaving PMSWA in the discharge to Dead Pike Lake is equal to or better than nearby streams,

#### Prescriptions

*Three primary actions are proposed to meet objectives one and two: 1) make changes that increase the manager's ability to manage flow in Main Ditch, reducing the potential for iron-rich water to collect in the ditch and produce iron floc; 2) reduce the amount of ditch in the upper portion of the marsh to reduce the potential for iron floc forming there; 3) implement a monitoring program to help manage water clarity (due to iron precipitate) and quality*

(phosphorus levels). They are detailed in the prescriptions below. All wetland construction actions are contingent upon securing the necessary permits.

1. Improve ability to manage water flow in Main Ditch

- Perform maintenance of Main Ditch (along Vista Pool) to restore the stream channel to its former narrower and deeper condition to increase the rate of flow and reduce the time water sits in the ditch system. (See Appendix B for additional details.)
- Replace the Main WCS to improve the ability to capture and divert spring runoff and high water events.
- Main flowage dike improvements: Raise and improve the north-south dike from Homestead Inlet WCS to South Main WCS to handle higher water levels.
- Replace the South Main WCS with new WCS or Spillway.  
Manage flowage water levels following current practices.
- Maintain a minimum flow of 1.2 cfs to Dead Pike Lake.
- Monitor Main Ditch for beaver activity and remove dams when they hinder flow.

**Current Water Management Practices**

Annually, the pools are filled as much as possible during spring run-off. Any surplus water flows out of each pool over the top boards of control structures. For Main Flowage this discharge to Main Ditch usually ranges between 2 to 5 cfs with higher flows in spring and during rain events (~5 to 15 cfs).

As has been done since 2007, a minimum flow of 1.2 cfs has been maintained through the outfall to DPL from spring breakup through fall freeze-up. The flowage compartments upstream of Main Flowage are sequentially drained during drought to meet the minimum flow. The pool in Vista is maintained as full as possible year round. The primary source of water discharged to DPL from the property is discharged directly from the various compartments of Main Flowage. In years of high water; the pool in Main is partially drawn down in the fall to anticipate winter precipitation.

2. Reduce the amount of ditch up-stream of Main Ditch

- Combine the South Main and East Main Flowages by passively abandoning the dike and ditch between the two flowages as shown on Figure 2. Over time the dike will deteriorate eliminating about 7,000ft of ditch and dike. Once the abandoned ditch and dike are no longer functional, remove the “South Main 3” WCS and replace with a ditch plug or spillway as deemed appropriate by water quality specialists.

3. Establish an on-going water quality monitoring program

- Every two weeks from May through October monitor flow and water clarity at the Main WCS and water clarity at the Powell Road culvert. Use photo documentation to help assess the aesthetic quality in addition to water clarity testing with a turbidity tube.
- If water clarity levels fall to 55 cm the ditches would be inspected for flow blockages and any would be removed to try and preclude water clarity from dropping further.
  - If water clarity falls below the 45 cm threshold:
    - Increase the discharge flow rate to meet the 45 cm clarity level, and if necessary, increase the flow rate in other areas of the marsh. The order of drawdown to maintain the desired minimum flow would be Main Pool, Stepping Stone Pool, and lastly, Vista Pool.
    - If monitoring shows water clarity is below the threshold after a 24 hour period, then conduct additional water clarity sampling at the reference streams for comparison.

- Regularly monitor the culvert at Powell Road and the stream to DPL for flow blockages that may support iron floc formation. Control beaver and remove blockages as necessary. (This requires working with the Town and NHAL staff).

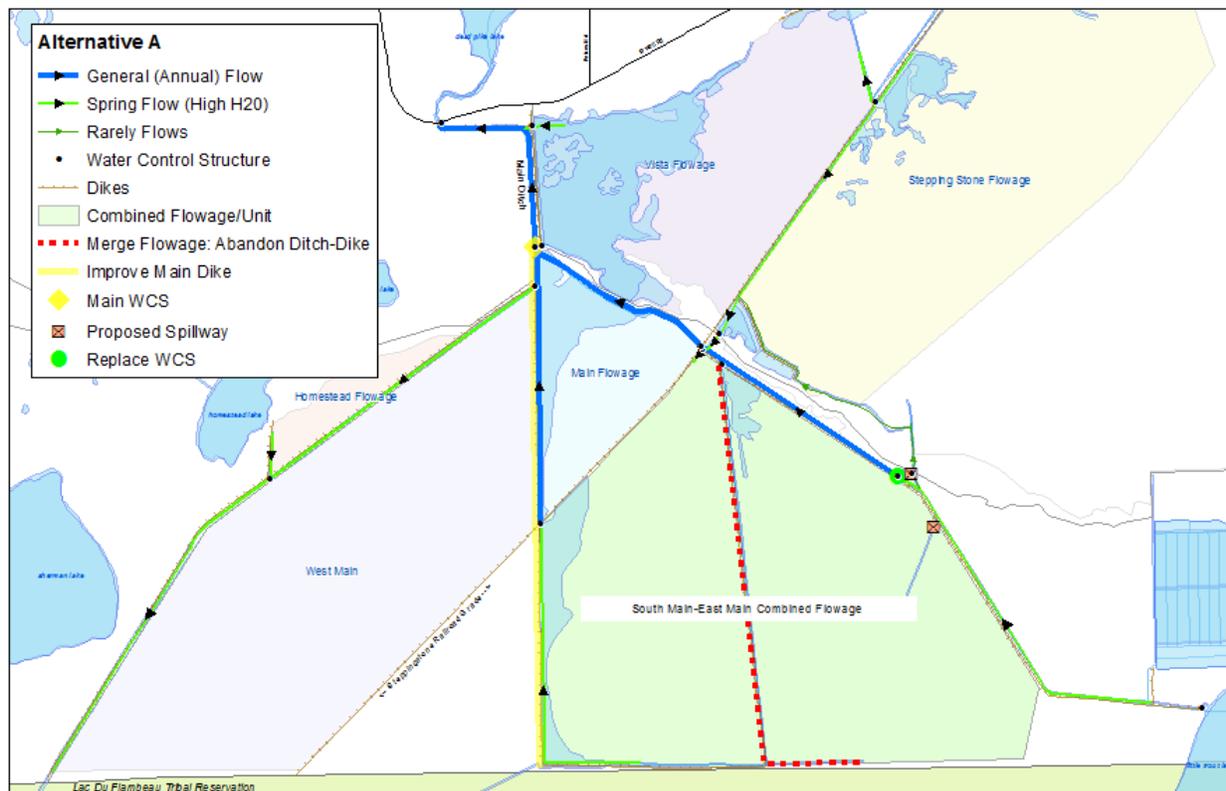


Figure 5: Alternative A - water flow enhancements plus a reduction in dikes and ditches.

Objective 3:

- Reduce the level of phosphorus discharged from PMSWA to Dead Pike Lake. *At certain times water flowing into PMSWA ditch system from the east is high in phosphorus. Particularly, high in-flows of phosphorus-rich water occur when the cranberry beds are flooded to prevent frost or during harvesting. The level of phosphorus being discharged from the PMSWA potentially may be reduced by diverting the excess water flowing from the cranberry operations out of the ditch system into the marsh. There, the diverted waters would be filtered through the wetlands enabling a portion of the phosphorus to settle out or be taken up by wetland plants.*

Prescriptions:

- Install two new high-water overflow spillways on the East Main Flowage dike to redirect excess water out of the Little Trout Ditch into the wetlands (shown on Figure 5). Replace one of the two WCS on the Little Trout ditch with one spillway, and install the other spillway further upstream on the dike. The exact placement of the new overflow spillway would be determined by engineers.
- Maintain normal base flow through the Little Trout WCS and downstream.

**Table 10: Alternative A - required construction projects and estimated costs.**

Project	Estimated Cost
<ul style="list-style-type: none"> <li>Remove “South Main 3” WCS and replace with ditch plug</li> </ul>	\$10,000
<ul style="list-style-type: none"> <li>Remove “Little Trout 2” WCS and add two spillways</li> </ul>	\$20,000
<ul style="list-style-type: none"> <li>Replace “Little Trout” WCS and improve the dike associated with the Little Trout Flowage</li> </ul>	\$60,000
<ul style="list-style-type: none"> <li>Replace Main WCS (~\$30,000-\$40,000) (Dept. has the WCS)</li> <li>Improve 5,000 ft. of dike associated with Main Flowage <i>(Estimate includes raising the western dike of Main Flowage by 1-1.5 ft.)</i></li> </ul>	\$30,000 -\$120,000

## Projected Results and Impacts – Alternative A

### *Impacts to water management and quality*

This strategy meets the aesthetic requirement described by EPA and would further reduce the potential for iron floc formation in Main Ditch and other ditches on the property. Maintaining a minimum 1.2 cfs flow into Main Ditch and the ditch along Powell Road has dramatically reduced the formation of rust and the growth of iron bacteria in ditches and subsequently in the discharge to Dead Pike Lake. Experience since the minimum flow was initiated in 2007 shows there has been a significant visible improvement in water turbidity and water clarity (due to iron precipitate) in the discharge from PMSWA. Recent water chemistry studies by Kreitlow, see Appendix D, shows that passing water has a positive impact on iron floc discharge. This supports the theory that positive results would be realized by speeding the flow rate in Main Ditch and closely monitoring water quality and taking corrective action if water clarity in the ditch falls below established levels.

Ditches in the upper watershed collect iron-rich/oxygen-poor groundwater and under very low flow conditions they hold that water there and produce iron floc. If the proposed passive abandonment of approximately 8,000 ft. of ditch in upper watershed (East and South Main Flowages) is done, overtime it would improve the overall quality of the PMSWA discharge by reducing the level of iron-rich/oxygen-poor water contributed to the system. The level of improvement that could be expected is unknown, as the level inflow of groundwater in these ditches is unknown.

Replacing the existing Main Water Control Structure (WCS) with a new WCS would enable managers to test various flow situations. This dynamic control of flow would allow managers to fine tune the flow and use continuing water quality monitoring to fine tune operations to further reduce iron floc formation in Main Ditch.

At certain times water flowing into PMSWA ditch system from the east is high in phosphorus. The level of phosphorus being discharged from the PMSWA to Dead Pike Lake potentially may

be reduced by diverting the excess water flowing from the cranberry operations out of the ditch system into the marsh where some of the phosphorus may be taken up by wetland plants. The amount of phosphorus reduction in the discharge to Dead Pike Lake is unknown. Continual phosphorus monitoring is proposed to help guide future management adjustments.

### *Impacts to Habitats and Wildlife*

The existing water management capabilities would remain generally unchanged under this alternative, allowing the current amount, variety and quality of wetland habitats on the PMSWA to be maintained. Managing flowage water levels would continue to be a primary management tool for maintaining the variety and quality of wetland habitats. Prescribed burning would also continue at the same level as in the past to control brush and tree invasion. With the majority of the dikes remaining in place managers would continue to have good access across the property for management purposes. The passive abandonment of the dikes and ditches in South Main and East Main Flowages would not cause a significant change in either habitat or management capability. The flowage management outlined in this alternative would maintain the current array of wetland habitats and game species and non-game species they sustain.

## Water Management Alternative B

*Restore sheet-flow on a portion of West Main Flowage, and eliminate flow in Main Ditch, routing all flow out through Vista Pool.*

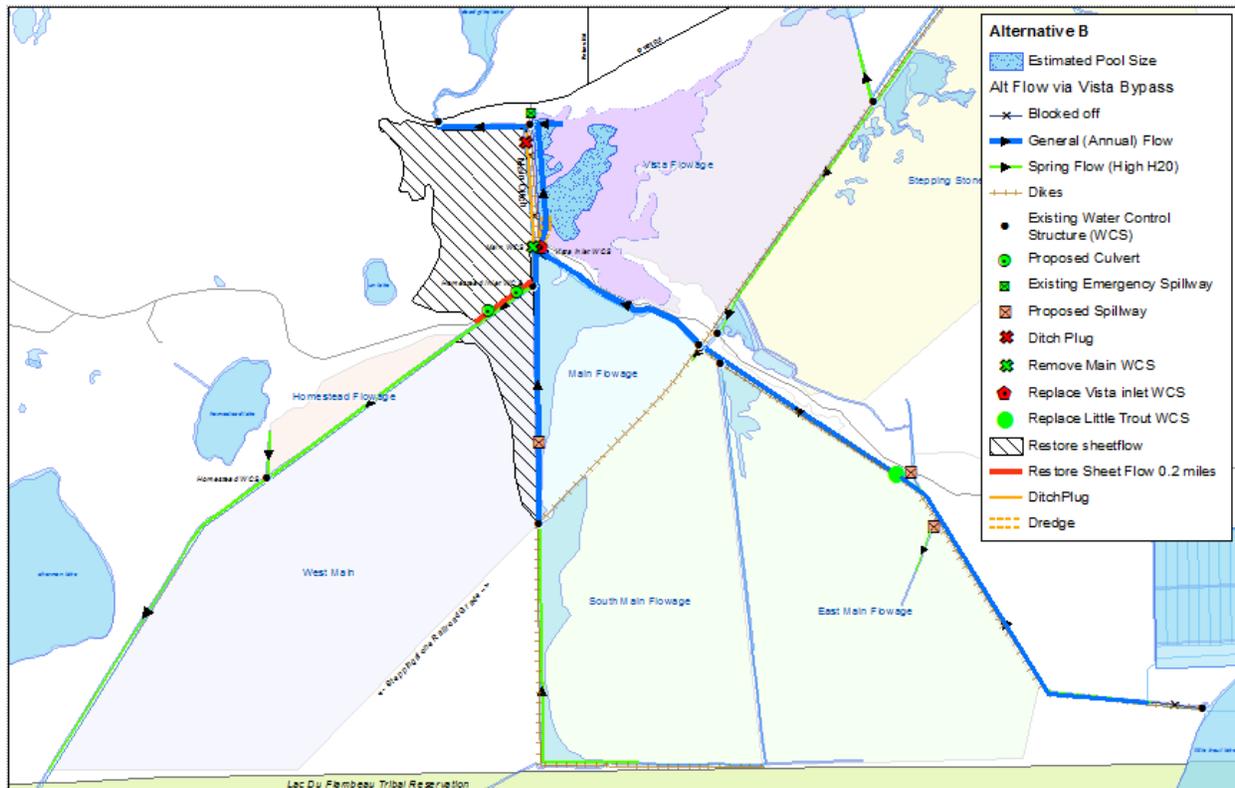
### Management Strategy

*Main Ditch has been one of the primary sites where iron-rich groundwater collected and pooled, producing iron floc. This alternative strives to improve the quality of water flowing to DPL by eliminating water flow in Main Ditch and routing flow through Vista Pool. A minimum flow of at least 1.2 cfs would be maintained from the Vista Pool outlet control structure to the Powell Road ditch from spring thaw to fall freeze up. Additionally, sheet-flow would be established in the northern portion of West Main Flowage by breaching Homestead Dike and plugging the Homestead Ditch water control structure.*

Main Ditch has been one of the primary sites for collecting iron-rich groundwater and producing iron floc flowing to DPL. This alternative strives to improve the quality of water flowing to DPL by plugging Main Ditch and routing all flow through Vista Pool into the ditch along Powell Road, which may have stream history. A minimum flow of 1.2 cfs would be maintained from the Vista Pool discharge. Sheet-flow of water would be established to the north out of West Main Flowage. The increased sheet flow is for the purpose of increasing the amount of water “filtered” by wetland vegetation before discharge to Dead Pike Lake.

Overall, the changes in flowage management under this alternative would result in a reduced level of open water and open marsh conditions on the property.

*The various components of this alternative are outlined in the sections below. Included is an analysis of estimated costs, and anticipated results and impacts on water quality, habitat and public access if this alternative were implemented. Additional studies that are needed to better determine the feasibility of this alternative are also discussed.*



**Figure 6: Alternative B - Plug Main Ditch, route flow through Vista Flowage and restore sheet-flow in West Main Flowage (32 acres). (The sheet-flow area north of Homestead Dike is 85 acres.)**

### Proposed Management Actions – Alternative B

#### Water and water quality management actions

- Plug Main Ditch.

*Main Ditch is a primary source for collecting and passing on iron-rich and oxygen-poor ground water to DPL as well as generating iron floc. This action reduces the potential for the discharge of iron-rich ground water and floc to DPL.*

- Dredge a new ditch from the Main Pool discharge point (the Vista Pool inlet WCS) into Vista Pool to conduct flow to the outlet.

*The Vista Pool outlet water control structure would become the primary water control structure for all the PMSWA impoundments. The new ditch offers potential to generate iron floc if Vista Pool is drawn down to a low level.*

- Store as much water as possible in all flowages during spring run-off. *This provides a supply of water for minimum flow (1.2 cfs) from Vista Pool into DPL from spring breakup through fall freeze-up.*
- Provide minimum flow out of the Vista Pool outlet to DPL by fully draining Vista Pool; then, sequentially draining the compartments of Main Pool and Steeping Stone, as needed, *There is insufficient gradient to move water from Main Pool north into Vista Pool without first drawing Vista Pool down. More specifically, Vista Pool must be mostly drained before water can be passed in from the pools upstream.*
- Breach Homestead Dike in two locations, install culverts and plug the Homestead Ditch WCS.

Required construction

The Main Ditch will be plugged near the Vista Outlet Control Structure. At least one ditch must be dredged into Vista Pool to aid flow from the upstream pools. Both existing water control structures on Vista Flowage will be replaced with larger ones, and the Main Pool control structure will be removed. An emergency spillway will be constructed at the south end of the Main Flowage dike. Culverts will be installed in Homestead Dike and the Homestead WCS plugged. (Plugging the WCS rather than removing it is a minimal cost, easily reversible action.)

**Table 11: Alternative B - required construction projects and estimated costs.**

Project	Estimated Cost
• Plug Main Ditch near Vista Pool outlet	\$4,000
• Remove Main pool WCS & upgrade Vista inlet WCS.	\$80,000
• Replace the Vista Pool outlet WCS with a larger control structure to handle the higher volume flow into the pool.	\$50,000
• Dredge a new ditch from the Main Pool discharge (the Vista Pool inlet WCS) into Vista Pool (~250? feet in length)	\$40,000-\$80,000
• Breach Homestead Dike in two locations, install culverts	\$10,000
• Install emergency spillway at south end of Main Flowage dike.	\$4,000

## Projected Results and Impacts – Alternative B

### *Water management and water quality*

If this alternative were implemented, the net result is that we would likely see little to no change in the quality of water discharged to DPL from the PMSWA. Water exiting the property would remain high in iron concentrations.

The break-down of results:

### *Ditches – no change in water quality discharge*

- Iron rich ground water will infiltrate Vista Pool and its ditches as the pool is dewatered. Minimum flow must be maintained to prevent iron floc from forming.

### *Flowages – no net change in water quality overall*

- Under current management, Vista Flowage is filled with surface water in spring. As evapotranspiration shrinks Vista Pool over the summer, ground water seeps in along the diminishing shoreline and in shallow ditches. Rust deposits form and iron bacteria starts to flourish. Any floc generated in Vista is “flushed” from the outlet when water levels rise again.
- Under this alternative, Vista Pool would be drawn down earlier and completely, which would increase the amount of groundwater seepage and floc formation. Maintaining a minimum flow in the ditch would not retard the production of floc in other areas of Vista. The amount of iron floc generated in Vista Flowage is likely similar to what currently is generated in the Main Flowage compartments.

### *Main Pool – Vista Pool trade-off*

The level of floc (and iron-rich water) contributed by the upstream flowages would likely be lower than currently exists because water levels would remain at a higher level longer (while Vista Pool is drained). However, there likely would be a comparable increase in floc production in Vista because it is drawn down sooner and further than is current practice.

### *Changes in Flow to LDF*

Water flow to the reservation from PMSWA would be reduced if the Homestead WCS is plugged to encourage sheet-flow toward Dead Pike Lake. Flow monitoring from August 2013 through October 2014 shows that over the monitoring period there was an

*An unavoidable impact of this alternative is that the complete drawdown of Vista Pool is in direct conflict with the existing long-term agreement with Ducks Unlimited to maintain Vista Flowage as a shallow water pool. That agreement would need to be renegotiated if the alternative were implemented.*

average flow of 1.36 cfs through the Homestead WCS to the Lac du Flambeau Reservation. Highest flow was during May/June when flow records ranged from 3.0 to 4.6 cfs, and there was no flow seasonally during some months. Below a certain water level in Main Pool water ceases to flow through the Homestead Inlet WCS.

*Changes to habitat or management opportunities*

Vista Pool, with less open water, would eventually look like the Main Pool currently does and would provide similar types of habitat. Currently the Vista Pool is the largest, open water pool on the property; deeper than the other flowages. It attracts Common loons, Trumpeter swans, and diving ducks year round. The Main flowage, while large in size, has less open water and is shallow with clumps of emergent vegetation and exposed mud that attracts migrating birds and provides important nesting and foraging habitat throughout the summer.

Under this proposal many Species of Greatest Conservation Need (SGCN) will benefit, but swans and loons will not be attracted to the property. Furbearer habitat will be diminished by the loss of semi-permanent deeper water in Vista Pool. Waterfowl habitat during all seasons would be reduced in quality and quantity. The current wildlife refuge on Vista Flowage (closed to entry from Sept 1 – Dec 31) would be of little value to migrating waterfowl as the pool would likely be very small in the fall.)

Managers would continue to have good access across the property to carry out management activities and burning would occur under managed conditions much as today.

Water Impoundment	Current open water	Expected open water (after drawdown)
Main Flowage (99 acre unit)	30-40 acres	30-40 acres
Vista Flowage (250 acre unit)	75 acres	20 acres

*Changes to public use opportunities*

The primary potential change for recreationists would be the loss of Vista Pool for much of the summer and fall. The degree of drawdown will be variable from year to year, depending upon precipitation levels. Vista is the largest pool and it is easily accessible and visible, lying near Powell Road and an overlook. The pool is highly valued for wildlife watching and scenic value. Also it is used some by paddlers. This alternative would maintain the existing connected dikes for trails and easy access to most parts of the property. Hunters, bird watchers and hikers would continue to have good access.

## Public Use Alternatives

### Dog Training Area

Provide a Class 2 dog training area. Figure 7 illustrates a potential location is a 60 acres area east of Homestead Lake, along Powell Marsh Road.

*This alternative was not proposed because of concerns that a dog training area and potential increase in public use and vehicle traffic would create conflict with breeding birds and nongame wildlife using the property. The level of public demand for a dog training site in the area is not known. Potential other locations on department managed properties in the county are limited.*

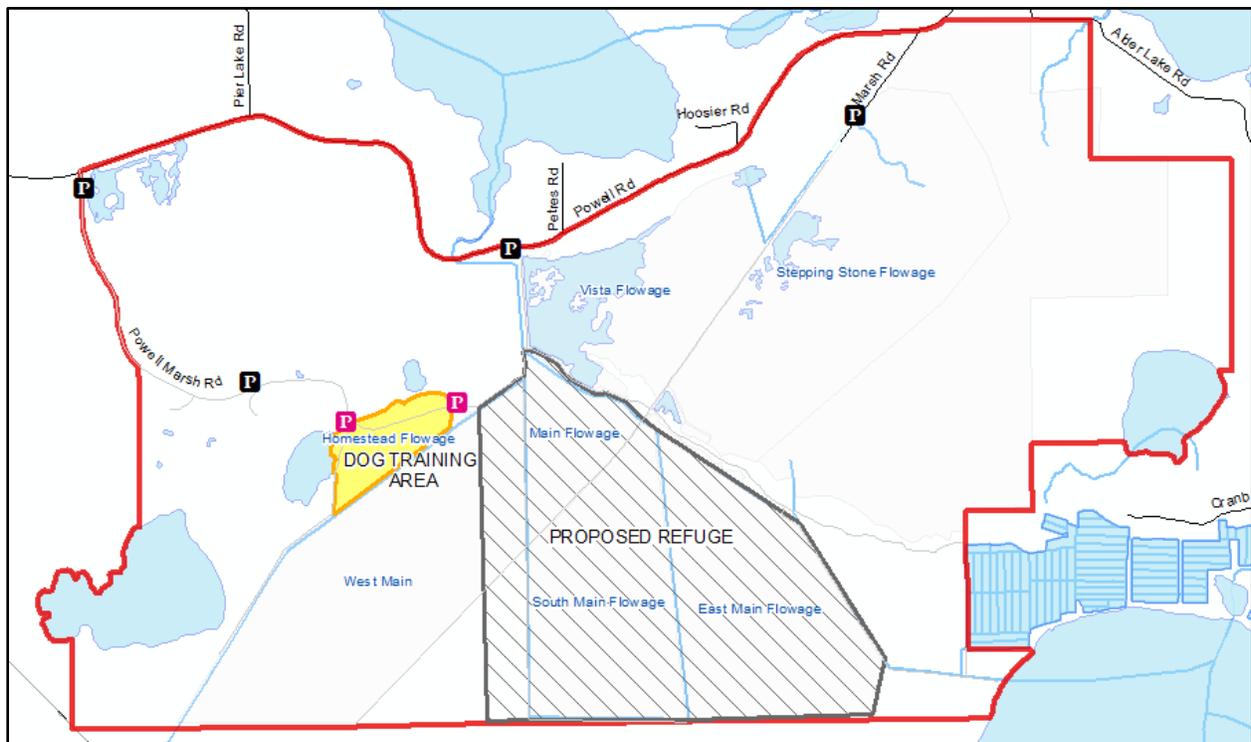


Figure 7: Potential location of a 60-acre dog training area.

## CHAPTER SIX: SUMMARY OF PUBLIC INVOLVEMENT

In accordance with Wisconsin Administrative Code, NR 44 – Master Planning for Department Properties – the Powell Marsh State Wildlife Area (PMSWA) includes an effort to involve the public in the process of developing a Master Plan. From its beginning, steps were taken to ensure opportunities for public involvement throughout the planning process.

The Wisconsin Department of Natural Resources (DNR) recognizes sound planning is a partnership effort with the people it serves and that the end product must be broadly supported by them as well as fit the capabilities of the property. The DNR encourages citizen input throughout the planning process. This document outlines the strategy for soliciting continued public review and input in the revision of the Powell Marsh Wildlife Area master plan. This planning process continues and builds upon the planning efforts that were begun in 1998-1999.

Master Plan development will be based on and be influenced by existing statutes, administrative codes, scientific data, management opportunities and resources capabilities, surveys, judgment of resource management experts and public opinion. The local and regional recreational supply and demand, economic and social needs also will be considered. Management alternatives for the property are influenced by these factors with the final master plan representing a balance of key benefits.

The DNR initiated the master planning process for the WA in 1999 in conjunction with conducting a revision of the Northern Highland American Legion State Forest master plan. At that time preliminary property vision and goals and a range of conceptual management alternatives were developed through a public design workshop. Soon after the workshop the planning effort for the wildlife area was put on hold to allow the DNR planning team to focus its efforts on state forest planning.

PMSWA property planning resumed again in July 2013 with the release for public review of the PMSWA Property and Regional Analysis document and preliminary property vision and goals and the conceptual management alternatives document (a slightly updated version of the work produced in the 1999 workshop). A public open house meeting was held to discuss the alternatives and receive comment in August 2013. An additional public listening session was held in October 2013 for the purpose of taking additional comments.

In May 2016 a week-long charrette design workshop was held to further refine management alternatives for the WA. This was an intensive, hands-on planning and design exercise where planners, property and business owners and other interested persons work together to discuss issues and potential solutions, create alternatives, and finally settle on a recommended plan for the future of the area.

## Summary of Comments Received on the Conceptual Alternatives-2013

As an initial step in the renewed master planning process for the Powell Marsh Wildlife Area in August 2013 the DNR released four conceptual Powell Marsh Wildlife Area management alternatives and preliminary vision and goals for public review and comment. These wide-ranging alternatives were offered as a tool to help frame discussions and ideas at the re-start of the wildlife area's plan revision process.

As is standard practice for department property planning, the purpose of this initial review is to gather the public's thoughts and ideas on the future management direction of the property and on what issues should be considered in the planning and environmental review process. This helps the department's planning team as they refine or develop new management and use options for the wildlife area, and then, develop a draft proposed plan.

We received a broad range of comments in a wide variety of ways and formats. Some people submitted comments at the public meeting while others did so by postal mail, email or online, and by phone. The following is a summary of the overall content (or themes) of what we learned from all comments received in the review process.

### **Uses of Powell Marsh WA**

Hunting and trapping are popular uses of Powell Marsh, but the property is used more for birding, viewing nature, and walking, hiking and skiing/snowshoeing.

### **Favorite Characteristics of Powell Marsh**

The most favorite characteristics of Powell are its unique large, open landscape with diverse birds and wildlife and the viewing opportunities it affords.

### **Public Access**

People are generally happy with the current access, but nearly an equal number of commenters would like to see more hiking paths and with more loop trails, as well as more trails improved to provide better access to less mobile persons. Only a small number of people called for more vehicle access. Another common request was for easier carry-in boat access. Adding directional signage on access routes was also mentioned. There is a concern that providing additional or more improved access and other amenities could significantly alter the current user experience.

### **Refuge**

Just over one third of those who commented supported eliminating the refuge. An equal number of people want to keep a refuge, but they are not concerned about the location of its boundary, or they support changing the boundary to allow year round access across the area. The remaining group, about one quarter of commenters, feel the refuge should remain as it is currently.

**Favored Management Alternatives**

The comments reveal that some people strongly support enhanced and expanded recreational/access. Others want to habitat for waterfowl, shore birds and other “open habitat” birds maximized. A number of people favored full or partial “restoration” of the marsh (i.e removing all artificial flowages and dikes and ditches, primarily because they believe that is the best solution to the water quality concerns.

**Most Important Planning Issues**

The most important planning issue mentioned by far was addressing the water quality (iron floc) issue. That was followed by maintaining the existing open habitat and recreational uses.

**Information, Education and Viewing Opportunities**

*While this wasn't a specific question on the response form a significant number of comments specifically mention this topic.*

A number of actions to enhance information –education-viewing on the marsh were suggested. They include adding interpretation signs at key locations and developing nature trails (with signs). However, there was no specific mention of adding formal interpretive programs. A number of people desire having a boardwalk to gain access deeper into the marsh, no specific location was mentioned. Some would like to see benches positioned at popular viewing sites. Constructing a viewing platform near the center of the property was suggested by others.

**Preliminary Vision and Goals**

Only a few comments directly related to the preliminary vision and goals. Those either supported the goals or want to see a goal of “restoring” the marsh to its pre-developed condition added.

## Charrette Design Workshop-May 2016

A PMSWA management alternative was developed during the charrette process. The final report, *Powell Marsh State Wildlife Area (PMSWA) Charrette Alternative Management Plan*, is available for review in Appendix G and on the department's PMSWA master planning web page. The proposed PMSWA draft master plan contains much of what is proposed by the charrette alternative.

## Summary of Public Involvement and Comments on the Draft Master Plan and Environmental Analysis - September 2016

- The draft plan and Environmental Analysis was released for public review from August 18, 2016 through September 9, 2016.
- A public meeting was held on Monday, Aug. 29 at Manitowish Waters to review the plan and receive public comments.

Comments were received from a total of 29 persons, and government agency and local government officials. Twenty three people attended the public meeting, eight people offered formal oral testimony. Written comments were submitted at the public meeting and by postal mail, email and on the web site. Below is a summary of comments received.

### Recreation and public access

Overall, commenters indicate they want the existing character of the property to remain unchanged. They particularly like the quiet, vast open, unique landscape and the solitude it affords. Some refer to the PMSWA as having a wilderness-like atmosphere and do not want to see the area “degraded” by motorized access. A common theme heard was the outstanding opportunities on the property for birding and for providing habitat for rare birds. One commenter stated: “Powell could/should be a key recreational attraction in the Northwoods. It already is a significant stop for hundreds of birders and nature enthusiasts, hunters, trappers, berry pickers, skiers, birders, nature photographers.”

Strong support was given to all aspects of the recreation and public access of the draft plan, except for the proposed .9 mile public extension of public access on Powell Marsh Road and the construction of two new parking lots on that new open road segment.

Overwhelmingly commenters feel the road extension is not needed and that putting vehicles into the interior of the marsh would disrupt wildlife as well as visitors, destroying the remote character of the marsh. Over half of those who commented on the plan voiced strong opposition and only one was in support. Several references were also made to the charrette and the fact the participants did not want to increase motor vehicles in the interior of the property; the charrette did not recommend any changes in the current level of vehicle access. One other comment relating to road access was received; asked that the management road to a grassy hill near Sherman Lake opened to public vehicles.

In summary, of the 19 comments received on the 0.9-mile Powell Road public access extension and its new parking lots, one person supports the proposed extension, 17 are strongly opposed, and one supports a shorter extension (.4 mi.) as far as the Homestead Road intersection.

## Representative comments on recreation:

### *Character of the property*

- Preserve the property as undeveloped as possible. Keep the unique open habitat and wilderness-like atmosphere and solitude; focus on non-motorized use.

### *Trails and wildlife viewing enhancements*

- Many people voiced strong support for the designated trail loop. They stated it was a good addition that provides improved opportunities for birding and wildlife viewing as well as better ADA access. One person stated that bicycles should not be allowed on walking trails. The addition of an ADA viewing blind, a boardwalk to get visitors out into and close to the marsh, and resting benches along the trail were also supported. Adding an elevated viewing platform was also mentioned. One comment was received in opposition to trail development.

### *Refuge changes*

- All who commented on the refuge support the proposed changes, which will allow year round hiking around the Vista Flowage. Several people specifically mentioned they supported the proposed new refuge open/closed dates. No comments were in opposition to the refuge changes.

### *Information and education*

A number of people offered comments in support of a strong, expanded information and education program on the property; indicating it will expand visitor's enjoyment and appreciation for the property and its unique habitat.

Suggestions include:

- Provide brochures listing wildlife and plant species present and seasons for viewing.
- Install high quality interpretive information kiosk to tell the complete story (success and failures) of what happens when a wetland is manipulated.

## **Habitat and its management**

- A substantial number of comments received focused on maintaining the existing, expansive open wetland habitats by as proposed in the plan. Of paramount importance is maintaining the current open landscape and its wildlife and bird populations. One commenter offered a counter opinion, favoring abandonment of all the dikes, ditches and flowages to restore the marsh to an unmanaged, natural condition.

*Additional habitat management specifics offered:*

- A number of people want property managers to provide substantial mud flats during the spring and fall bird migrations.
- One person would like to see more areas of the marsh opened up using prescribed fire.
- One commented that non-native plants on the uplands should be removed and replaced with native species where possible.

**Water quality and water management**

A number of people commented that the water quality of DPL is getting worse every year and that something must be done about it. Commenters strongly support efforts to improve the quality of the water flowing off the PMSWA and improved water quality in Dead Pike Lake. Specifically, nearly all commenters support the flowage/water management actions proposed in plan, which was developed through the Charrette process.

*Additional water management points offered:*

- Support for attempting to improve the filtration capability of the marsh by managing to favor plants species that take-up more Phosphorus and iron.
- Independent scientific back-up review and monitoring of progress in improving water quality of Dead Pike Lake is needed.
- Conduct more research on the sources of phosphorus on the property.
- The marsh (PMSWA) should be fully restored to its original unaltered, natural functioning wetland condition for the health of the overall ecosystem as well as DPL.
- Supports increasing water flow [in the ditches] to help reduce the iron problem.
- A cranberry operator called for not removing the dam on the ditch at Little Trout Lake; unless it is restored to the existing shoreline elevations; concerned it will draw water from the lake, reducing lake levels..
- The plan must include specifics on how the “adaptive management” decisions will be made, as well as a timeline for implementing the water management changes.
- Full baseline data and clear scientific protocol is needed for a means of evaluation as well as for setting goals for improvement. The data and protocols need to be part of the master plan.

- The plan should specify a maximum limit for iron in water discharged to Dead Pike Lake; suggesting the iron limit used for the abandoned mine in Ladysmith be applied.
- Secchi disk monitoring of Dead Pike Lake should be included in the master plan to track in-lake changes.
- Ditches should be fully filled-in, not just plugged as ditch plugs will not curtail the amount of iron-rich ground water pushed into Main Ditch.
- A cost/benefit analysis of the long-term maintenance of the ditch/dike system should be developed comparing it to the cost/benefit of restoring the marsh to its original undeveloped condition.
- The plan should include a protocol for releasing water to Dead Pike Lake during excessive rain events.
- The Dead Pike Lake Association should be an active, on-going participant in the implementation phase of the master plan.

### Comments on the impact analysis

- Request the impact analysis include an analysis of the economic impacts on the property owners of Dead Pike Lake by the DNR's management of the marsh.

### Plan changes made in response to comments received

A number of minor editorial changes made for clarification purposes, and one substantive change was made to the draft plan related to the proposed extension of Powell Marsh Road.

*The proposed 0.9-mile extension of public vehicle access on Powell Marsh Road and the two new parking lots associated with it are no longer proposed in the plan. Public vehicle access will remain as currently exists.*

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## APPENDIX A: TYPES OF NORTHERN WISCONSIN WETLANDS

by Ron Eckstein, DNR Wildlife Biologist

A wetland is an area saturated by surface or ground water long enough to support vegetation adapted to life in saturated soil conditions. No two wetlands are exactly alike. We can, however, classify wetlands into some broad categories. In the field, it is often difficult to classify wetlands without a detailed look at the hydrology, vegetation, and types of soils.

### **Marshes**

A marsh is a wetland developed on mineral soil and characterized by emergent aquatic plants such as cattails, reeds and rushes that grow in shallow water. Marsh soils have a high mineral content and plant biomass productivity is high. Marshes are among the most productive of all wetlands for waterfowl and muskrats. There are few true marshes in northern Wisconsin.

### **Northern Sedge Meadows**

Northern sedge meadows are wet, “grassy” meadows. They have a moderate amount of mineral nutrients and are dominated by a low growth of various sedges and grasses.

### **Shrub Swamps**

Shrub swamps are rich in minerals and have understories of various grasses, sedges and ferns. There are two types of shrub swamps in Wisconsin. Alder thickets are dominated by speckled alder and occur primarily along streams. Shrub-carrs are dominated by species of willow and red-osier dogwood. They occur in areas with a supply of mineral ground or runoff water. Shrub-carrs are uncommon in northern Wisconsin.

### **Conifer and Hardwood Swamps**

Forested swamps are rich in minerals and highly productive. Examples of swamps include northern white cedar swamps and black ash swamps.

### **Peatlands**

Peatlands develop in cool, humid regions where water drainage is blocked. In northern Wisconsin, glaciers formed the landscape into shallow lakes and depressions conducive to the formation of peat. Peat is a soil made up of partially decomposed plant remains. It develops under water-soaked conditions, and has a low content of nutrient minerals. There are two distinct types of peatlands.

If the water flowing across the peatland surface originates on an adjacent upland, the vegetation can be quite distinctive. Such a peatland is called a fen. Fens are dominated by sedges and grasses, often with scattered shrubs such as bog birch and tamarack. Fens are fairly rich in minerals and moderately high in productivity. Rich fens have high mineral

nutrient content while poor fens have only moderate mineral nutrient availability. Most of the fens of northern Wisconsin are poor fens.

If the peatland surface is raised slightly above the level plain, the mineral-rich water will be diverted, and the peatland becomes a bog. Bogs accumulate water-soaked organic matter and are characterized by plants that can grow under water conditions of relatively high acidity and low nutrients.

### **Muskeg**

Over time, bogs can develop into muskeg. Muskeg is an acid peatland supporting black spruce and/or tamarack, an understory of shrubs, and a ground cover of sphagnum mosses. Without disturbance, muskeg can dominate peatlands for thousands of years.

## APPENDIX B: MAIN DITCH MAINTENANCE AND IMPROVEMENTS TO THE MAIN FLOWAGE DIKE

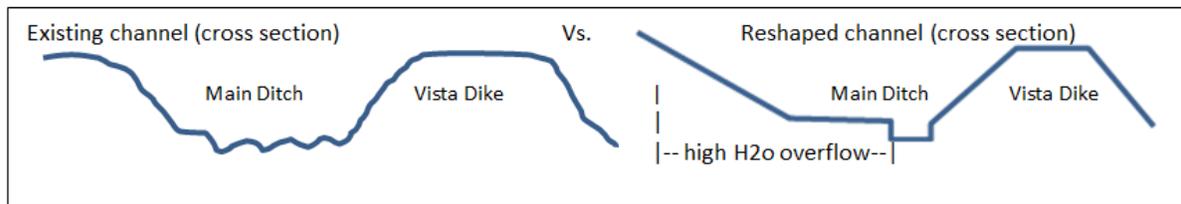
### 1. Reshape the Main Ditch Streambed

Over time the physical conditions in Main Ditch (along the west side of Vista Flowage) have changed dramatically. Vegetative growth, siltation, and beaver activity have altered the ditch's original depth, shape, and functionality. As Figure A below shows, today Main Ditch is characterized by multiple, shallow channels and slow water flow. Slow moving water or stagnant pools promote the formation of iron floc. Realigning (e.g. reshaping) the ditch back to its original single channel state would speed water flow, resulting in a reduced chance of iron floc to form in the ditch.

Figure A: Multiple Channels in Main Ditch (current condition)



Figure B: Diagram of current and proposed ditch channel reshaping.



*\*Efforts would be made to make the ditch appear more natural than the depicted diagram*

## 2. Replace the Main Water Control Structure:

The existing Main Ditch water control structure (located at the south end of Main Ditch) is original and outdated. PMWA staff currently use handmade wooden spacers between stop logs in order to meet minimum flow requirements. A new structure would allow better control of flow.

## 3. Increase the Elevation of the Dike Along the West Side of Main Flowage:

Upgrading the dike, including raising its height, along the western side of the Main Flowage would allow more water to be stored in Main Flowage to ensure the minimum water flow can be maintained throughout the year.

## APPENDIX C: THOUGHTS ON PHOSPHORUS AND IRON LOADING TO DEAD PIKE LAKE, VILAS COUNTY

Paul Garrison, Fisheries and Aquatic Sciences Research Section, DNR  
23 April 2012

*This work is a comparative analysis of the data in the USGS study (Krohelski, James T., Rose, William J., and Hunt, Randall J. 2002) and the Barr Engineering study (Barr Engineering Company and Dead Pike Lake Association. 2011).*

I worked through the [water quality study] files in the CD that were provided by Barr Engineering through the Dead Pike Lake Association. I concentrated on the data for phosphorus and iron loading for the lake. The information mostly includes flow and concentrations for the stream entering the lake from Powell Marsh. I also used the data from the 2002 USGS study report.

I estimated P and Fe loading to the lake using the hydrologic budgets determined by Barr and the USGS. These two methods result in very different conclusions concerning how much water enters the lake through groundwater and how much enters through surface water. The Barr estimate is that the largest source of water is the stream draining Powell Marsh while the USGS estimates that most of the water entering the lake is from groundwater. To estimate Fe and P loading I used data from both studies and calculated annual loads based on the Barr model and the USGS model.

### Method

- Barr measured flows in the stream in 2008 from May 1 through Oct 31. I assumed their flows were correct and made estimates from these flows for the rest of the year to obtain annual loads. Generally I assumed the average flow Aug 1 through Oct 31 was base flow and used these flows for November and December. For the winter months January and February I reduced this flow by ½ assuming flows would be reduced because of ice cover. I used flows measured in May to simulate spring runoff and applied these flows for the period March and April.
- Barr estimated groundwater input as the difference between what their model predicts for lake level and measured stream flow. This results in average surface inflow of 2.9 cfs and groundwater of 0.5 cfs for total annual average flow of **3.1 cfs**.
- The USGS did not measure continuous stream flows but only a few times. They applied an existing groundwater flow model and used lake level as the controlling end point against which to calibrate their model. Their results were that the annual average input from the stream was 1.0 cfs and groundwater contributed 3.3 cfs for a total average flow of **4.3 cfs**. Given that these models were constructed using measurements from different years, I think the average flows are similar. They are very different in concluding which component contributes most of the water.
- Because the USGS has extensive experience with hydrologic modeling I assumed their estimate of average flow for the system was more correct than the Barr estimate. Because I assumed that Barr's estimate of surface flow was correct (since it is actual measurements), I increased the groundwater input in the Barr hydrologic budget to 1.4 cfs.

Table 1. Percentage of hydrologic budget with the two models

	<b>BARR</b>	<b>USGS</b>
Surface water	67	23
Ground water	33	77

- *Phosphorus*: Barr measured P concentrations 5 times in 2008 during the period May 27 through October 7 in the stream. I used these values and weighted them for the measured flows to compute loads from the stream. I used the average weighted P concentration for the rest of the year and the flows discussed above to compute the load from the surface water. Dale Robertson gave me an estimate of the P concentration in ground water of  $17 \mu\text{g L}^{-1}$  which I used to compute the load from the groundwater.
- *Iron*: Barr measured Fe concentrations 12 times during the period May 27 through September 20 in the stream. I used these values and weighted them for the measured flows to compute loads from the stream. For the rest of the year I estimated Fe concentrations from measured values in the stream and the flows discussed above to compute the load from the surface water. I used lower Fe concentrations ( $4 \text{ mg L}^{-1}$ ) during base flow and a higher concentration ( $10 \text{ mg L}^{-1}$ ) during spring runoff. During the USGS study they measured dissolved Fe at various depths in the ground water. I chose the value I thought that was most reasonable ( $25 \text{ mg L}^{-1}$ ) and applied it towards the ground water flow to compute the Fe load from ground water.
- With both models the highest source of P is from the stream draining the marsh (Table 2). I estimate between 80 and 93% of the P load is from this source. Phosphorus deposition in the sediment core reflects increased P loading after the marsh was ditched so the importance of the stream for P loading seems reasonable.
- The stream seems less important for the Fe loading. The Barr model estimates 43% from the stream while the USGS model estimates 17%. I don't have as much confidence in the Fe loading estimate because I was not sure what concentration to use for the ground water. As with P, the sediment core indicates increased Fe loading after the marsh was ditched and managed.

Table 2. Percentage of loading of P and Fe from water sources using the two models.

		<b>BARR</b>	<b>USGS</b>
Phosphorus	Surface Water	93	80
	Ground Water	7	20
Iron	Surface Water	43	17
	Ground Water	57	83

- *What happens if the marsh is returned to its natural state?* I think it is likely that less P will enter the lake. I also think it is reasonable that some (much) of the P that enters the lake now is not biologically available because it is sequestered with the iron. I think this is likely because, the in-lake P concentration is less than I would expect given the estimated P load. This means I think P loading will decline but I am not sure how the in-lake P concentration will be reduced. I am less confident on the outcome of Fe loading. It is likely that less Fe will enter the lake given the history of Fe deposition in the core. I think it is reasonable that since the Fe in the groundwater will not enter the surface water in marsh (in the absence of the ditches and ponds) but much of this will go somewhere and it likely will be, in part, Dead Pike Lake. Other lakes in the region experience iron floc in the near shore waters and I think we can expect this in Dead Pike Lake.
- I think we should concentrate on the P loading scenario more than iron. There is no evidence that the iron concentrations in the lake are adversely affecting the lake ecosystem but we know that elevated P levels lead to algal blooms and other problems.

One of the issues with the Barr report was lack of recommendations for how changes to the lake inflow hydrology will affect water levels. Both the Barr and USGS reports conclude that removing the ditches and ponds will not change the overall water input to the lake. The Barr data indicates the timing of the inflow would change but the annual inflow of water will remain similar.

## APPENDIX D: DIFFERENCES IN WATER CHEMISTRY OF THE POWELL MARSH DITCH SYSTEM AS IT RELATES TO HOLDING OR PASSING WATER FROM THE WILDLIFE IMPOUNDMENTS.

Jim Kreitlow, DNR Water Program. 2007

### Abstract

This study evaluated differences in water chemistry variables in the Powell Marsh ditch system as it relates to holding or passing surface water from the wildlife impoundments. Can we reduce the formation of iron hydroxide (iron floc) and improve the aesthetic quality of water in the ditch system by passing water?

Formation of iron floc is a problem that occurs in the Powell Marsh ditches. This orange colored water discharges to Dead Pike Lake producing objectionable plumes. The problem occurs during periods of low flow (or when water is held back or stored in wildlife impoundments). The primary source of water entering the ditches at this time is groundwater naturally high in dissolved iron. When groundwater comes in contact with oxygen the dissolved iron precipitates and forms iron hydroxide (orange or rust color).

It is important to try to improve the aesthetic quality of the water before it enters Dead Pike Lake. The goal is to reduce the iron precipitate in the ditch system. The theory is that by drawing water from one or more of the wildlife impoundments (or another source) we can change the water chemistry and improve the aesthetic quality of water in the ditches. The water in the ditch would be surface water dominated (lower in total and dissolved iron), and would reduce the retention time (time water remains in the ditches and is exposed to oxygen from atmosphere). It may also reduce the amount of groundwater entering the ditches (hydraulic head).

Pre and post monitoring was conducted (before and after passing water) to see if there are positive water quality changes in the ditch system. Sampling locations included both the impounded areas and the ditch system. Seven sampling events took place over a one year period (August 2005- August 2006). Five of the sampling events could be considered pre monitoring and two post monitoring. Water chemistry data was collected using two methods. First, multi-probe monitoring meters (sondes) were deployed. These meters collected data continuously over a selected monitoring period. Second, grab water samples were collected just beneath the surface at the selected locations during each monitoring event. Flow gauging was conducted to determine flow velocities being passed through the ditch system (both pre and post monitoring). The amount of water being released from a control structure (post monitoring) was determined using an equation for a sharp crested weir.

The results show there is a difference in water quality between the impounded pools and the ditches. Passing water improves the water quality in the ditch system. Total iron, dissolved iron, manganese and suspended solids concentrations are reduced. Water clarity (turbidity) and aesthetic quality is improved (photo documentation). Retention time also plays a role in floc formation. The less residence time the better. The amount of water stored in the wildlife impoundments (elevation) reduces iron floc formation in the ditches (i.e. Main Ditch) that are located within impounded areas (hydraulic head). Stored water in wildlife impoundments can also force more groundwater into ditches below a control structure (i.e. South Ditch), or ditches that lie adjacent (i.e. Ditch #3) increasing the probability of floc formation during low flow conditions.

Based on this study, passing water does have a positive impact and could reduce the frequency of slug discharges of aesthetically displeasing water entering Dead Pike Lake.

For a discussion on methods and the data collected see the full document, *Differences in Water Chemistry of the Powell Marsh Ditch System as it Relates to Holding or Passing Water from the Wildlife Impoundments*. Jim Kreitlow, DNR Water Program. 2007.

## APPENDIX E: ASSESSEMENT OF WILDLIFE HAZARD RISKS AT THE MANITOWISH WATERS AIRPORT

### Introduction

Wildlife threats to aircraft in the U.S. are well documented and can have severe impacts as illustrated by Flight 1549 landing on the Hudson River in 2009 after ingesting Canada geese in both engines. That incident brought renewed attention to the conflict of aircraft and wildlife interaction. Wildlife have been struck by aircraft since the advent of flight however there are an increasing number of strikes reported and those can be attributed to several circumstances:

1. Many populations of large bird and mammal species commonly involved in strikes have increased markedly in the last few decades and adapted to living in urban environments, including airports.
2. Commercial air traffic in the U.S. increased and is predicted to grow at a rate of about 1.5 percent per year.
3. Aircraft with more efficient and quieter engines.

As a result of these factors the risk of wildlife-aircraft conflict will continue to be a challenge for airport staff to manage into the future.

### Location and Setting

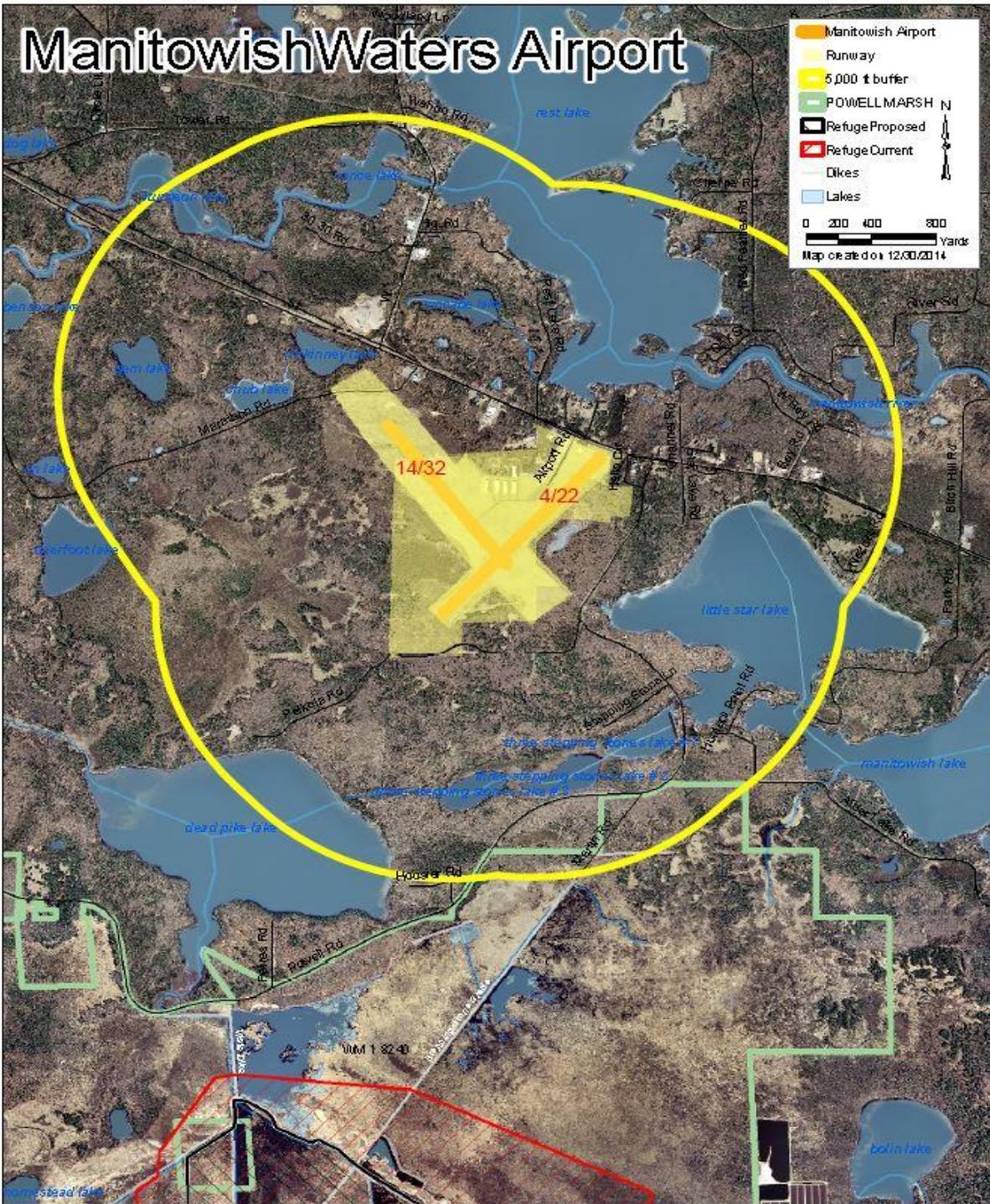
Manitowish Waters Airport is located in Vilas County in north central Wisconsin. The area is known for the abundance of natural resources and attracts seasonal tourists who participate in various outdoor-related pursuits. The 439-acre airport is designated as a General Aviation (GA) airport (non-commercial service) with 11 single engine aircraft based on the field. It is operated by the Town of Manitowish Waters for public use. It has two runways, 14/22 which is 3,498 feet long by 60 feet wide, is paved and has edge lighting and, 4/22 which is 3,094 feet long and 120 feet wide, is turf marked with cones and is closed in winter.

### Wildlife Attractants within the Separation Distance

The FAA recommends in Advisory Circular 150/5200-33B that: *Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's Aircraft Operation Area (AOA) and the hazardous wildlife*

*attractant*. Manitowish Waters Airport does not advertise Jet-A as an available fuel and would be included in the listed separation distance. Please see **Figure 1** for a map of the separation distance.

As stated previously the area is known for the natural resources and the area within 5,000 feet of Manitowish Waters Airport is nearly all wildlife habitat, with human development limited to residential housing primarily along lake shores and minimal commercial development. Wildlife habitat includes numerous lakes, rivers, wetlands, forests and grassland. Many of these features are on airport property or within several hundred feet of the AOA and are likely to contribute to the risk of wildlife strikes.



**Figure 1. Manitowish Waters Airport with the FAA recommended 5,000 foot separation distance.**

Seventy-four percent of bird strikes that involve GA aircraft occur at or below 500 feet above ground level (AGL). This statistic provided by the FAA indicates that the area near the airport is the best return on

investment to address wildlife conflicts. In most cases an aircraft is well within the 5,000 foot separation distance when it is at or below 500 feet.

**Wildlife Strikes at Manitowish Waters Airport**

Birds account for 97 percent of the reported strikes in the U.S., and mammals for the remaining three percent. A review of the FAA’s Wildlife Strike Database indicates that two strikes (**Figure 2**) have been reported in the last 24 years; both were 17 years ago and involved a deer and an unknown terrestrial mammal.

**Federal Aviation Administration**

Wildlife Strike Database and Reporting System

**Search the FAA Wildlife Strike Database**

Start your search by selecting a "State", "Airport", or "Airline". You may limit your search to a specific date range and / or optional search criteria. Click the "Submit" button to view your results in a table.

The table may be sorted by any column, by clicking on the column name. Click once to sort ascending, and again for descending. Results can be exported to Microsoft Excel using the "Export to Excel" button beneath the table.

**View Strike Reports by:**

State  OR  Airport  OR Airport Code   
 Airline

**Date Range:**  
 From:  To:

**Optional Search Criteria:**  
 Aircraft Type:  Engine Type:   
 List of Damage:  Species:

Results: 2 Records to display per page:

Date	State	Airport	Airline	Aircraft	Engine	Species	Damage
08/29/1997	WI	MANITOWISH WATERS	BUSINESS	C-560	D	White-tailed deer	M
08/29/1997	WI	MANITOWISH WATERS	BUSINESS	C-560	D	Unknown terrestrial mammal	M

Note: This table includes only 8 out of a total of 94 fields of data. To view all 94 fields use the "Export to Excel" button to download a Microsoft Excel spreadsheet with your data.

**Key**

Engine Type	
A	Reciprocating
B	Turbojet
C	Turboprop
D	Turbofan
E	None (glider)
F	Turboshaft (helicopter)

Damage (Civil)	
N	None
M	Minor
M?	Uncertain
S	Substantial
D	Destroyed

Damage (Military)	
Class A	Over \$2,000,000
Class B	\$500,000 - \$2,000,000
Class C	\$50,000 - Less than \$500,000
Class N / Class E	No damage or damage less than \$50,000

Figure 2. FAA record of wildlife strikes associated with the Manitowish Waters Airport.

Both strikes resulted in minor damage to the aircraft and no injuries to the occupants of the aircraft were reported. No strikes with birds have been reported.

As shown, terrestrial mammals can create risks for aircraft. Deer are ranked as one, the highest relative hazard to aircraft by the FAA. The best prevention is the installation of a deer-proof fence that completely surrounds the airfield. The department can assist in obtaining a state issued nuisance deer shooting permit if deer are creating a risk to aircraft.

Reports of Canada geese and Sandhill cranes on the airport are a significant risk to aircraft and efforts to abate their presence should be implemented. Canada geese are ranked third and Sandhill cranes are ranked five by the FAA with one being the most hazardous. Non-lethal techniques that involve harassment can be performed without a permit and if species become acclimated to those techniques the department can assist in obtaining a Federal Depredation Permit from the USFWS that allows for lethal removal.

#### **Area Habitat and Land Use**

Area land use can have a significant effect on the risk of wildlife conflicts at airports. The separation distance recommended by the FAA (5,000 feet) is the most critical for aircraft safety and as previously mentioned this area consists primarily of wildlife habitat at the Manitowish Waters Airport. However, it is also in the best interest of the airfield safety to be aware of development of features that attract wildlife such as landfills, agricultural production, storm water basins and wetlands in the greater area.

Powell Marsh Wildlife Area is a 4,300-acre property managed by the Wisconsin Department of Natural Resources for wildlife-based recreation. It is located approximately 1 mile south of the Manitowish Waters Airport. The property is currently conducting a Master Plan effort and throughout the process local input is requested to assist with direction.

The property's initial goal in the 1950s was management to enhance Canada geese production and to encourage use by migrants. To accomplish that, managers used prescribed fire to stimulate new growth for fall waterfowl migrations, similar to conditions that resulted from historic wildfires. A system of ditches and dikes was constructed to provide water level control, enable prescribed burning and allow limited farming. A portion of the property was designated as a refuge to encourage continued waterfowl use. Some of these practices have since stopped and Canada goose production is no longer the property's sole goal.

The proposed practices for the property are not likely to congregate Canada geese or Sandhill cranes at concentrations higher than the surrounding habitat currently supports.

- Agricultural production is not being proposed. The seed, plant, grain and residue produced during row crop production as well as the increase viewing opportunity that geese and Sandhill cranes prefer (to watch for approaching predators) will not occur.
- Mowing will be limited. As stated above, grass maintained at heights less than 8-10 inches encourages both cranes and geese. Mowing will only occur in narrow bands to facilitate dike maintenance.
- Native landscapes to include prairie grasses and forbs will be encouraged. These types of plants are known to reach heights that block the view of Canada geese and makes them unsecure in their ability to detect a potential approaching predator. Sandhill cranes have difficulty navigating in tall stands of native plantings and are less likely to enter. In fact some airports are currently using similar plantings on their properties to make formally mowed areas unattractive. <http://www.pbs.org/wgbh/nova/next/space/airport-prairies-make-flying-safer/>
- Expanses of open water will not be manipulated or maintained on DNR property within the 5,000 foot separation distance of the Manitowish Waters Airport (see **Figure 1**).
- The current size of the refuge will be reduced. This reduction will permit more recreational hunting opportunity in the Vista Flowage. Additional hunting opportunity will mean less congregating waterfowl in areas that are under the approach for Runway 4 (see **Figure 3**).

### **Conclusion**

The area within 5,000 feet of the Manitowish Waters Airport has rich wildlife habitat and supports a variety of resident and migrant birds and mammals. If wildlife risks are observed to aircraft it is more likely that they developed from areas closer to the airport than Powell Marsh. The practices proposed for Powell Marsh during the Master Plan effort are not likely to enhance the property for Canada geese or Sandhill cranes; in fact they may displace populations to more preferable locations.

### ***Prepared by Dan Hirschert, Wildlife Biologist, Bureau of Wildlife Management, DNR***

*Dan Hirschert is a wildlife damage biologist with the DNR in Madison, Wisconsin. He holds the accreditation as a FAA Qualified Biologist and has held that since 2002. He has conducted, supervised and written dozens of documents regarding Wildlife Hazard Site Visits, Wildlife Hazard Assessments and Wildlife Hazard Management Plans in nine states that have been approved by the FAA and state aviation agencies.*



## APPENDIX F: BIRD USE AT PMSWA.

The following list is a compilation of documented bird sightings from Powell Marsh (updated in 2014).

Common Name	NHI Status	Priority Plan	Type of Use	Cover Type
American Bittern	SC/M (Rare)	SGCN, WBIRD	Nesting	Unforested Wetland
American Black Duck	SC/M (Watch)	SGCN, WFWL	Nesting/migratory	Unforested Wetland
American Coot	SC/M (Watch)		Migratory	Unforested Wetland
American Golden Plover	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
American White Pelican	SC/M (Rare)		Migratory	Open Water
American Woodcock	SC/M (Watch)	SGCN, SBIRD	Nesting	Upland Forest Fringe
Bald Eagle	SC/P (Rare)	SGCN	Foraging	Open Water
Bank Swallow		PIF	Foraging	Open Water/ Unforested Wetland
Barn Swallow		PIF	Foraging	Open Water/ Unforested Wetland
Belted Kingfisher		PIF	Nesting	Open Water
Black Tern	END (Rare)	SGCN, WBIRD	Nesting/migratory	Unforested Wetland
Black-billed Cuckoo	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe
Black-crowned Night-Heron	SC/M (Rare)		Observed	Unforested Wetland
Blackburnian Warbler		PIF	Nesting	Forest (Coniferous Forests)
Black-throated Green Warbler		PIF	Nesting	Upland Forest
Blue-winged Teal	SC/M (Watch)	SGCN	Nesting	Unforested Wetland
Bobolink	SC/M (Watch)	SGCN, PIF	Nesting	Unforested Wetland /Grassy Upland
Boreal Chickadee	SC/M (Rare)	SGCN	Nesting/resident	Forested Wetland
Broad-winged Hawk		PIF	Nesting	Upland Forest
Brown Thrasher	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe/ Grasslands
Buff-breasted Sandpiper	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Canada Goose		WFWL	Nesting	Open Water/ Unforested Wetland
Canada Warbler	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe
Canvasback	SC/M (Watch)	SGCN	Migratory	Open Water/ Unforested Wetland
Cape May Warbler	SC/M (Watch)		Migratory	Forest (Coniferous Forests)
Common Goldeneye	SC/M (Rare)		Migratory	Open Water/ Unforested Wetland
Chestnut-sided Warbler		PIF	Nesting	Upland Forest Fringe
Clay-colored Sparrow		PIF	Nesting	Open habitat
Common Loon	SC/M (Watch)		Nesting	Open Water
Common Yellowthroat		PIF	Nesting	Unforested Wetland
Dunlin	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Eastern Meadowlark	SC/M (Watch)	SGCN, PIF	Migratory	Grassy Upland
Evening Grosbeak	SC/M (Watch)		Nesting	Upland Forest
Golden-winged Warbler	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe
Gray Jay	SC/M (Watch)		Nesting	Forested Wetland
Great Blue Heron	SC/M (Watch)		Foraging	Unforested Wetland
Greater Yellowlegs		SBIRD	Migratory	Unforested Wetland
Henslow's Sparrow	THR (Rare)	SGCN, PIF	Observed	Unforested Wetland
Hooded Merganser		WFWL	Nesting	Unforested Wetland
Horned Grebe	SC/M (Watch)	SGCN	Migratory	Unforested Wetland
Le Conte's Sparrow	SC/M (Rare)	SGCN	Nesting	Unforested Wetland
Least Bittern	SC/M (Rare)	WBIRD	Observed	Unforested Wetland
Least Flycatcher	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe
Lesser Scaup	SC/M (Watch)	SGCN, WFWL	Migratory	Open Water
Long-eared Owl	SC/M (Rare)		Observed	Open habitat
Mallard		WFWL	Nesting	Unforested Wetland
Marbled Godwit	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Marsh Wren		PIF	Nesting	Unforested Wetland
Merlin	SC/M (Watch)		Nesting	Upland Forest Fringe
Mourning Warbler		PIF	Nesting	Upland Forest Fringe
Nashville Warbler		PIF	Nesting	Forested Wetland
Nelson's Sparrow	SC/M (Rare)	SGCN	Observed	Sedge Meadows /Grassy Uplands

**Appendix – F**

Northern Flicker		PIF	Nesting	Upland Forest Fringe
Northern Harrier	SC/M (Watch)	SGCN, PIF	Nesting	Sedge Meadows /Grassy Uplands
Northern Pintail	SC/M (Watch)	WFWL	Migratory	Unforested Wetland
Northern Rough-winged Swallow		PIF	Foraging	Unforested Wetland
Olive-sided Flycatcher	SC/M (Rare)	SGCN, PIF	Migratory	Forested Wetland
Osprey	SC/M (Watch)	SGCN	Foraging	Open Water
Peregrine Falcon	END (Rare)	SGCN	Migratory	Open Water/ Unforested Wetland
Pied-billed Grebe		WBIRD	Nesting	Unforested Wetland
Purple Finch		PIF	Nesting	Forest (Coniferous Forests)
Redhead	SC/M (Rare)	SGCN	Migratory	Open Water
Red-necked Grebe	END (Rare)	SGCN, WBIRD	Migratory	Open Water/ Unforested Wetland
Rose-breasted Grosbeak		PIF	Nesting	Upland Forest Fringe
Ruffed Grouse		PIF	Nesting	Upland Forest Fringe
Ruby-crowned Kinglet	SC/M (Rare)		Migratory	Upland Forest Fringe
Rusty Blackbird	SC/M (Watch)	SGCN, PIF	Migratory	Unforested Wetland
Sedge Wren		PIF	Nesting	Unforested Wetland
Sharp-tailed Grouse	SC/H (Rare)	SGCN	Likely no longer present here	
Short-billed Dowitcher	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Short-eared Owl	SC/M (Rare)	SGCN, PIF	Migratory	Unforested Wetland
Solitary Sandpiper	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Sora		WBIRD	Nesting	Unforested Wetland
Swamp Sparrow		PIF	Nesting	Shrub Wetland
Trumpeter Swan	SC/M (Rare)	SGCN	Nesting	Open Water
Tundra Swan		WFWL	Migratory	Open Water/ Unforested Wetland
Veery	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest
Vesper Sparrow	SC/M (Watch)	SGCN, PIF	Migratory	Upland Forest Fringe
Warbling Vireo		PIF	Nesting	Upland Forest
Whimbrel	SC/M (Watch)	SGCN, SBIRD	Migratory	Unforested Wetland
Whip-poor-will	SC/M (Watch)	SGCN, PIF	Nesting	Upland Forest Fringe
White-throated Sparrow		PIF	Nesting	Upland Forest Fringe
Whooping Crane	SC/FL (Watch)	SGCN	Observed	*LDF side of Powell
Wilson's Phalarope	SC/M (Rare)	SGCN, SBIRD	Migratory	Unforested Wetland
Wilson's Warbler	SC/M (Watch)		Migratory	Shrub Wetland
Yellow Rail	THR (Rare)	SGCN, WBIRD	Nesting	Unforested Wetland
Yellow-bellied Flycatcher	SC/M (Watch)		Nesting	Forested Wetland
Yellow-bellied Sapsucker		PIF	Nesting	Upland Forest
Yellow-throated Vireo		PIF	Nesting	Upland Forest
<i>Snowy Owl</i>			Winter Migrant	Open habitat
Sandhill Crane			Nesting	Unforested Wetland

Blue= Listed in original PMSWA RPA bird list

Key to Priority Plans

- PIF [Partners in Flight priorities](#) from Bird Conservation Regions 12 and 23 and Continental Watch List species. Regional priorities included Tier I and II species.
- SGCN Species of Greatest Conservation Need for [Wisconsin's Wildlife Action Plan](#). This includes all [state-listed species](#).
- WBIRD Upper Mississippi River/Great Lakes [Waterbird Conservation Plan](#). Bird species rated as high concern were included from BCRs 12 and 23.
- WFWL Regional priorities from WCR 12 and 23 from the [North American Waterfowl Management Plan](#). This included all species of high priority during breeding or non-breeding seasons.
- SBIRD Regional/continental priorities from the [Upper Miss/Great Lakes Joint Venture](#) Shorebird Plan. This includes all species with a total risk score (regional or continental) of 4 or 5.

## **APPENDIX G: PMSWA CHARRETTE ALTERNATIVE MANAGEMENT PLAN**