Environment and Climate Change Canada
Environnement et Changement climatique Canada

Tway National Wildlife Area Management Plan

Canada

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About Environment and Climate Change Canada's Protected Areas and Management Plans

What are Environment and Climate Change Canada protected areas?

Environment and Climate Change Canada establishes marine and terrestrial National Wildlife Areas for the purposes of conservation, research and interpretation. National Wildlife Areas are established to protect migratory birds, species at risk, and other wildlife and their habitats. National Wildlife Areas are established under the authority of the *Canada Wildlife Act* and are, first and foremost, places for wildlife. Migratory Bird Sanctuaries are established under the authority of the *Migratory Birds Convention Act, 1994* and provide a refuge for migratory birds in the marine and terrestrial environment.

What is the size of the Environment and Climate Change Canada Protected Areas Network?

The current Protected Areas Network consists of 54 National Wildlife Areas and 92 Migratory Bird Sanctuaries comprising more than 12 million hectares across Canada.

What is a management plan?

A management plan provides the framework in which management decisions are made. They are intended to be used by Environment and Climate Change Canada staff to guide decision making, notably with respect to permitting. Management is undertaken in order to maintain the ecological integrity of the protected area and to maintain the attributes for which the protected area was established. Environment and Climate Change Canada prepares a management plan for each protected area in consultation with First Nations and other stakeholders.

A management plan specifies activities that are allowed and identifies other activities that may be undertaken under the authority of a permit. It may also describe the necessary improvements needed in the habitat, and specify where and when these improvements should be made. A management plan identifies Aboriginal rights and allowable practices specified under land claims agreements. Further, measures carried out for the conservation of wildlife must not be inconsistent with any law respecting wildlife in the province in which the protected area is situated.

What is protected area management?

Management includes monitoring wildlife, maintaining and improving wildlife habitat, periodic inspections, enforcement of regulations, as well as the maintenance of facilities and infrastructure. Research is also an important activity in protected areas; hence, Environment and Climate Change Canada staff carries out or coordinates research in some sites.

The series

All of the National Wildlife Areas are to have a management plan. All of these management plans will be initially reviewed 5 years after the approval of the first plan, and every 10 years thereafter.

To learn more

To learn more about Environment and Climate Change Canada's protected areas, please visit the website at www.ec.gc.ca/ap-pa or contact the Canadian Wildlife Service.

Tway National Wildlife Area

Tway National Wildlife Area (NWA) was established in 1978 to facilitate operation of the Ducks Unlimited Canada (DUC) Tway Lakes Project by securing and improving 96 ha of protected wetlands and uplands for the benefit of waterfowl and other water birds. The DUC Tway Lakes Project was initiated in 1968 after it was noted that the lack of water level control in the Tway wetland complex had a negative effect on waterfowl productivity and that the lack of suitable upland nesting cover had resulted in the under-use of the wetlands for brood rearing. The establishment of Tway NWA secured adjacent upland habitat to meet the objectives of the project. Tway NWA supports high production of waterfowl, shorebirds and associated wetland species, and is particularly noted for the production of diving ducks.

Canada's Prairie Ecozone is among the most modified ecozones in Canada and provides some of the most important habitats for North American migratory waterfowl. Over half of North America's waterfowl and many other water birds breed on the Canadian Prairies and in adjacent states. Over the last 100 years, the majority of natural waterfowl habitat has been drastically altered by agriculture, with many wetlands drained and uplands plowed to produce annual crops. Droughts that cause small wetland basins to dry up exacerbate the negative consequences of land use change on waterfowl habitat. Waterfowl conservation efforts under way at Tway NWA strive to increase the availability of both reliable water and perennial nesting cover. Water levels in the wetland basins are manipulated by DUC staff using a connecting system of artificial ditches and dams along the Carrot River. This water supply from the river helps to maintain water levels and emergent vegetation in the marshes during seasonal or multi-year periods of drought that would otherwise leave the basins dry. The control structures used to manage water levels at Tway NWA have served their useful life and need to be rebuilt or decommissioned.

Habitats at Tway NWA include one managed wetland basin and a portion of a second, which occupy approximately 50% of the property, and a surrounding matrix of planted grasslands, small remnant Fescue grasslands and patches of Aspen forest. In 1971, approximately 20% of the 245-hectare property was agricultural land under cultivation for annual crops. In the 1980s and 1990s, Environment Canada planted the cropland to non-native perennial grass seed mixes to provide a greater area and variety of nesting cover for waterfowl. In the absence of disturbance, much of the remaining native grassland and wetland edges have become invaded by alien invasive species.

Tway NWA supports nearly 140 species of birds, including a significant concentration of breeding and staging migratory water birds such as diving ducks, Canada Geese, Lesser Snow Geese and White-fronted Geese.

Tway NWA was acquired principally because it is an example of high-quality prairie wetlands with upland habitat diversity and high waterfowl productivity potential and is located in an area that has been considerably modified by human activity and continues to be threatened by habitat loss and degradation. In the future, Tway NWA will continue to provide significant breeding habitat for migratory water birds through active management of the upland and wetland habitats. Public access for hunting and wildlife viewing on foot is permitted at Tway NWA.

For greater certainty, nothing in this management plan shall be construed so as to abrogate or derogate from the protection provided for existing Aboriginal or treaty rights of the Aboriginal peoples of Canada by the recognition and affirmation of those rights in section 35 of the *Constitution Act, 1982*.

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1 DESCRIPTION OF THE PROTECTED AREA

Tway National Wildlife Area (NWA) (Figure 1) provides important wildlife habitat and unique wildlife conservation attributes that include:

- Staging, nesting, brood-rearing or moulting habitat for approximately 140 bird species
- Access to water from the Carrot River system for moderation of water level fluctuations in wetland basins during dry periods (Figure 3)
- A network of ditches and water control structures built and operated by Ducks Unlimited Canada (DUC) that permit separate manipulations of the two wetland basins in the NWA and two additional basins outside the NWA
- Connection of the NWA within a larger DUC wetland project (Tway Lakes Project)

The Tway NWA region includes lands and waters managed by agencies such as DUC, Saskatchewan Wildlife Federation, Saskatchewan Ministry of Environment (Wildlife Habitat Protection Lands, Fish and Wildlife Development Lands) and Saskatchewan Ministry of Agriculture (Figure 4). When considered together, Tway NWA and surrounding lands and waters provide nationally significant habitat for migratory waterfowl and waterbirds, consistent with the Protected Areas Strategy (Environment Canada 2011).

Tway NWA and the surrounding DUC waterfowl habitat enhancement projects, such as the Tway Lakes Project, provide important waterfowl habitat in a landscape of intensive agricultural production and, as a result, attract a high number and variety of water birds. The network of wetlands has also prevented development of many road allowances in the vicinity, thereby maintaining relatively more intact habitat than the typical grid of cultivated lands separated by straight gravel roads. The Tway Lakes Project was initiated in 1968 and became fully operational in 1986. In assessing the Tway area for waterfowl production, DUC noted that the lack of water level control had a negative effect on productivity and that the lack of suitable upland nesting cover resulted in the under-use of wetlands for brood rearing. Thus, the primary objective of the Tway Lakes Project has been to maximize waterfowl production capability on the wetlands through water level management. The establishment of Tway NWA has contributed to this objective by securing adjacent upland habitat for management to improve the imbalance between the brood carrying capacity of the wetlands and the capability of surrounding uplands to produce enough broods. The wetland and upland habitat protected at

Tway NWA contributes directly to the conservation and management objectives of the North American Waterfowl Management Plan (http://nawmp.wetlandnetwork.ca/). The frequency of monitoring and manipulation of water levels by DUC staff also demonstrates a public-private partnership between Environment and Climate Change Canada and DUC that has continued for nearly 45 years at Tway NWA.

Since the first acquisition of lands in 1971, and following official designation as a NWA under the *Wildlife Area Regulations* in 1978 (Table 1), a number of new legislative and policy changes have influenced site management. Waterfowl were and are the primary wildlife group of concern, but other groups of migratory birds, species at risk, and rare or unique habitats are now part of the criteria for selecting and directing management of NWAs.

Table 1: Tway National Wildlife Area summary information

Protected Area Designation	National Wildlife Area
Province or Territory	Saskatchewan
Latitude and Longitude	52°45'N, 105°25'W
Size	245 ha
Protected Area Designation Criteria (Protected Areas Manual)	Historic: Area provides relatively undisturbed wetland and upland migratory bird habitat in an intensively cultivated region. Current: Criteria 1a) Migratory Birds – The area supports a group of species which is concentrated during the breeding and staging seasons
Protected Area Classification System	Category: A Conservation Value: High Management Goal: Species Habitat Conservation
International Union for Conservation of Nature (IUCN) Classification	Category IV – Habitat/Species Management Area
Order in Council Number	Order in Council P.C. 1978-1439 Amendment SOR/78-408
Directory of Federal Real Property (DFRP) Number	14441
Gazetted	1978
Additional Designations	None
Faunistic and Floristic Importance	Migratory Bird Concentration Site – S3 Provincial Rank
Invasive Species	Smooth Brome (*Bromus inermis*), Quackgrass (*Elymus repens*), Kentucky Bluegrass (*Poa pratensis*), Sweet Clover (*Melilotus* sp.), Alfalfa (*Medicago sativa*), Canada thistle (*Cirsium arvense*), Perennial Sow-thistle (*Sonchus arvensis*) and Dandelion (*Taraxacum officinale*)
Species at Risk	The National Wildlife Area supports four species at risk under the federal *Species at Risk Act*: Common Nighthawk (*Chordeiles minor*), Northern Leopard Frog (*Lithobates pipiens*), Short-eared Owl (*Asio flammeus*) and Yellow Rail (*Coturnicops noveboracensis*).
Management Agency	Canadian Wildlife Service; collaboration with DUC
Public Access and Use	No facilities on site. Access to the NWA is limited to two roads from the north. Hiking, canoeing and kayaking, hunting (by foot only), photography and wildlife viewing (by foot only), berry picking (non-commercial, by foot only), and night use (without spotlight) authorized by posted notice.

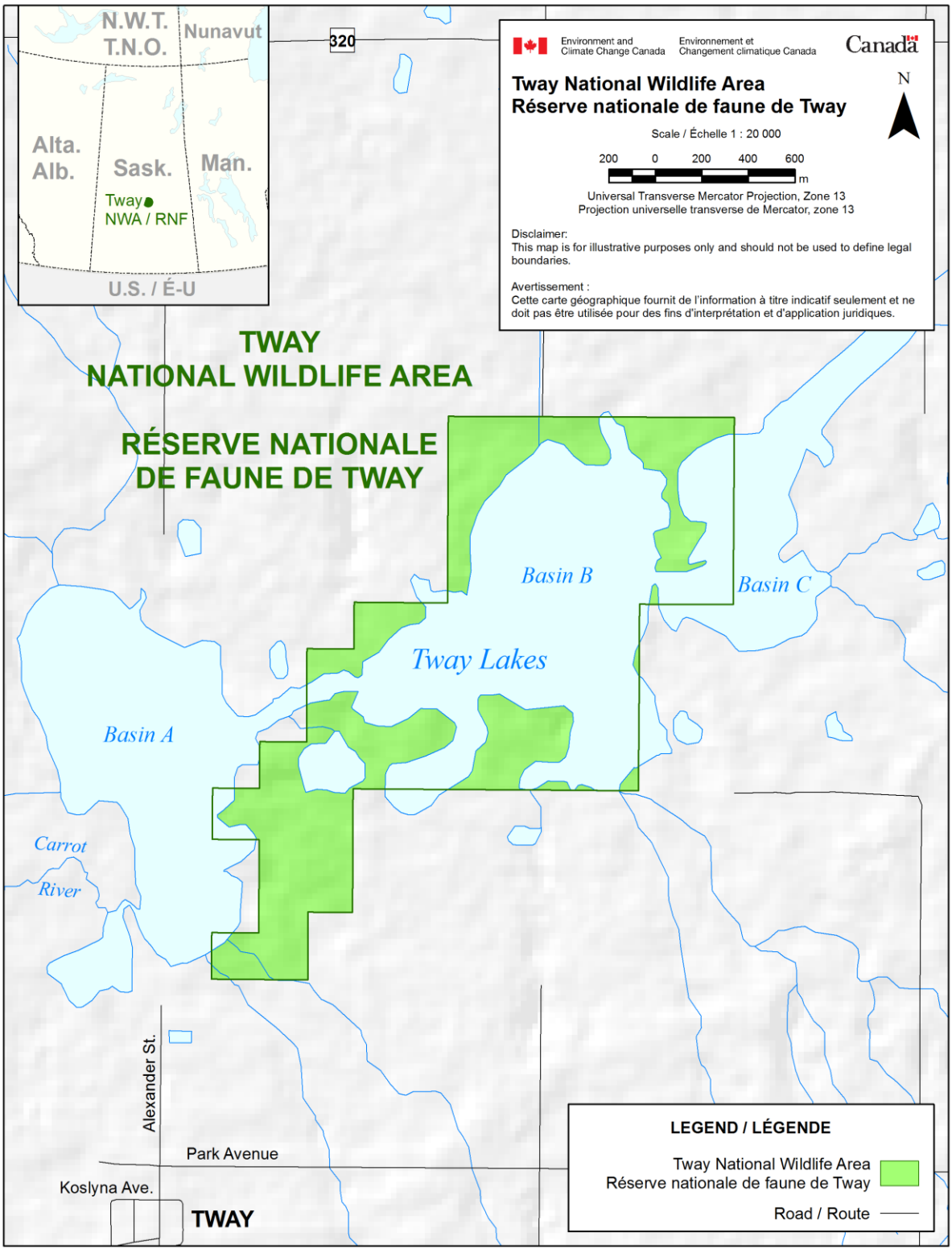

Figure 1: Tway National Wildlife Area

1.1 REGIONAL CONTEXT

Tway NWA is a 245-ha property located 125 km northeast of Saskatoon and less than 1 km north of the hamlet of Tway, Saskatchewan. It is located in the Rural Municipality of Invergordon #430 and near the boundaries of the municipalities of Three Lakes #400 to the south and Hoodoo #401 to the west. Tway NWA straddles the Aspen Parkland Ecoregion of the Prairie Ecozone and the Boreal Transition Ecoregion of the Boreal Plain Ecozone of Saskatchewan.

Tway NWA is bisected by the Cudworth Plain Ecodistrict (Aspen Parkland) to the south and the Tiger Hills Upland Ecodistrict (Boreal Transition) to the north side of the Carrot River. Both ecodistricts are characterized by a mosaic of hummocky or undulating glaciomoraine and glaciolacustrine deposits (Acton *et al.* 1998). The soils are predominately Black and Dark Gray Chernozemic loams soils, and elevations range from 530 m to 610 m above sea level. The landscape immediately surrounding Tway NWA is a gravel fluviolacustrine plain. Drainage is predominantly internal to closed-basin wetlands and lakes, or the Carrot River watershed. In 2001, it was estimated that this ecodistrict contained 9% native grassland, 5% trees and shrubs, and 9% water and wetlands (Hammermeister *et al.* 2001). Tway NWA lies in the Carrot River Valley, which, at one time, formed the Wakaw Spillway between Glacial Lake Saskatoon and Glacial Lake Melfort (Christiansen 1979). The marshes are a series of channel wetlands of the Carrot River that have been described as open water marshes (Millar 1976). The watershed is classified as Stressed due to reduced surface and ground water quality and rangeland and riparian health issues (Saskatchewan Watershed Authority 2012a).

The regional climate is cool and subhumid, with more precipitation falling as rain during the warm summer, and relatively less precipitation falling as snow during the cold winter. Climate normals for nearby Pilger (40 km southeast of Tway NWA) indicate mean annual precipitation of approximately 320 mm, while temperatures range from a mean July high of +24°C to a mean January low of –23.5°C (Environment Canada 2014).

Agricultural land use and private land ownership dominate the region, leading to frequent changes in land cover and land use driven by changes in global demand and commodity prices. As a result, many native species and natural processes that depend upon large and stable expanses of natural land cover (i.e., migratory bison herds or wildfire) are now missing from the ecosystem. Altering the landscape also alters local drainage and may have an impact on habitat on the NWA. Prior to cultivation, surrounding upland vegetation was Fescue Prairie intermixed

with Aspen Parkland communities (Coupland 1950, Coupland and Brayshaw 1953). Most of that vegetation and underlying Black Chernozemic soil was plowed and converted to cropland over the last century. Many wetlands were also drained or filled to further increase the area of arable cropland (Millar 1976, Bartzen *et al.* 2010).

The region is now fragmented by the grid road network that follows north-south and east-west road allowances every 1.6 to 3.2 km (McKercher and Wolfe 1978). This road network can interfere with wildlife and water movements, as well as facilitate movement of invasive alien species, pollutants, native predators and wildlife parasites (Forman *et al.* 2003). Surrounding agricultural activities include grain and oilseed annual crop production, perennial forage crop haying, and livestock grazing. Widespread use of pesticides and fertilizers and erosion of cultivated soils has affected local water and soil quality (Donald *et al.* 2007, Papiernik *et al.* 2005, Saskatchewan Watershed Authority 2012b).

Despite these regional changes in land cover, the wetland habitats of the Tway Lakes area continue to attract a diversity of wildlife. Two species at risk and nearly 140 species of migratory birds have been observed at Tway NWA or within its vicinity.

DUC has completed nearly 3000 habitat projects in Saskatchewan, protecting 725 000 ha of wetlands and associated habitat through restoration and retention projects. The Tway NWA is embedded within the Tway Lakes Project, an initiative led by DUC. The Canadian Wildlife Service (CWS) and DUC work together closely to enhance and protect waterbird habitat in the Tway NWA.

1.2 HISTORICAL BACKGROUND

Prior to European settlement, the surrounding region was occupied by First Nations of Plains Cree (Nahathaway), Assiniboine (Nakota) and Saulteaux (Anishnabe) background. Through most of the 1700s and 1800s, primary land uses were trapping for the fur trade or hunting and gathering for subsistence. During this period, the fur trade directly or indirectly caused great depletions in the populations of some wildlife, like Beaver (*Castor canadensis*), Muskrat (*Ondatra zibethicus*), Bison (*Bison bison*) and Elk (*Cervus canadensis*). By the end of the 1800s, settlers began to arrive in the surrounding region (Fung 1999).

European settlers started immigrating to this area in the late 1880s, including Ukrainian and Polish immigrants to the Tway region, and Hungarian and French immigrants in the surrounding area (Yellow Creek History Committee 1982). A Canadian Pacific rail line was built

between Lanigan and Prince Albert, Saskatchewan, in 1929 and abandoned in 1993. The village of Tway (currently a hamlet) was established along this rail line, providing grain elevators and other services to the local rural area. The current population of Tway is 22 people, with 12 private dwellings (Statistics Canada 2012a). In 2011, the surrounding Rural Municipality of Invergordon No. 430 had a population of 651 people in 319 private dwellings, with a median population age of 53.3 (Statistics Canada 2012b). This area has seen a large decline in population from the 1970s, but there was a 5.5% increase in population from 2006 to 2011.

From the early 1900s through to the 1970s, there was a rapid decline in natural land cover related to the increase in annual crop production. Wetlands in low relief landscapes were sometimes filled during droughts or drained to increase the area of cropland (Bartzen *et al.* 2010). Only where the soil was too stony, saline, sandy, saturated or steeply sloped did native grasslands and wetlands persist.

DUC initiated the Tway Lakes Project in 1968, after an initial survey of the area in 1966. The preliminary proposal involved the development of numerous wetland basins along the Carrot River, east of the outlet of Wakaw Lake. In 1970, the Tennessee Chapter of Ducks Unlimited Inc. sent a request to DUC to secure the Tway Lakes as a donor project. The request was processed, a cairn was erected on the site, and the project was named the Tennessee Tway Lakes Project. Construction of the first dyke, control structure and outlet ditch occurred in 1971, including the development of 37 artificial nesting islands.

During the 1960s and 1970s, DUC invested more in water engineering structures than in upland habitats, and thus encountered logistical challenges accessing structures across multiple private land holdings. In 1971, the CWS, under the NWA Program, purchased NW 3-44-24 W2 and the E½ NE 4-44-24 W2 to resolve this accessibility issue and increased the effectiveness of DUC's Tway Lakes Project. In 1979, DUC inspected the project, determined that the structures were inoperable and began an improvement program. From 1980 to 1982, water easement agreements were renegotiated, and new agreements were established so that objectives of the initial plan could be met (Whyte 1986). In 1983, CWS proposed to expand the NWA. The parcels of W½ and SW 3-44-24 W2, SE 4-44-24 W2, and a portion of SW 4-44-24 W2 were purchased in 1984. In 1985, NW 33-43-24 W2 was purchased (Table 2). The expansion plan included NE 32-43-24 W2, which was never secured (Whyte 1986). The most recent water control developments were completed in 1985.

Grazing management has been a desired management activity within Tway NWA, but fencing has been insufficient to contain livestock. In 2002, CWS conducted a boundary survey, and a new fence was constructed around most of the property perimeter. Grazing began thereafter for a few years until the shortcomings of the fence (incomplete perimeter, broken gates, etc.) caused permit holders to decline grazing opportunities.

1.3 LAND OWNERSHIP

Lands were acquired for the creation of the Tway NWA in 1971, 1984 and 1985 (Table 2). Surface title to Tway NWA belongs to the federal government. Subsurface rights are retained by the provincial government. Road allowances are owned by the provincial government but are managed by the local Rural Municipality of Invergordon No. 430. DUC has easements placed on three nearby land parcels for their water control projects.

Table 2: Summary of land holdings at Tway NWA

Legal Land Location	Title in Name Of	Exceptions	Interest Registered By	Date of Title Transfer
NW3-44-24 W2	Her Majesty the Queen in the Right of Canada	N/A	Ducks Unlimited Canada	April 1971
Easterly 1320 feet in perpendicular width throughout NE 4-44-24 W2	Her Majesty the Queen in the Right of Canada	Except most northerly 66 feet in perpendicular throughout	Her Majesty the Queen (Sask) as rep. by the Minister of Highways and Transportation	August 1971
LSD 4 and 5 of 3-44-24 W2	Her Majesty the Queen in the Right of Canada	N/A	N/A	May 1984
SE4-44-24 W2	Her Majesty the Queen in the Right of Canada		Ducks Unlimited Canada	August 1984
NE¼ and S½ of LSD 3 and SE¼ of LSD 6 of 4-44-24 W2	Her Majesty the Queen in the Right of Canada	N/A	Ducks Unlimited Canada	August 1984
LSD 11 and 14 and SE¼ of LSD 12 and NE¼ of LSD 13 of 33-43-24 W2	Her Majesty the Queen (Canada)	All that portion of Legal Subdivision 11 on Plan 85PA12179	Ducks Unlimited Canada	November 1985

All surrounding lands are either provincial Crown lands or are privately held by livestock and annual crop producers, many with DUC water projects on them (Figure 4).

No utility rights-of-way occur on the land base or on legal land titles.

1.4 FACILITIES AND INFRASTRUCTURE

No facilities are present on site. Signs and fences are maintained by CWS through periodic field inspections along the NWA boundaries. The wood post and barbed wire perimeter fence around the NWA is 3.7 miles (7.5 km) in length and was completed in 2002 (Figure 2). Perimeter fencing is in fair to good condition, with 400 metres of fence missing on the north boundary and the west side, where the boundary goes through water and wet areas. Cross-fences on the NWA are dilapidated and require removal.

The water control infrastructure was built in 1971, repaired in the mid-1980s, and has always been operated by DUC (Figure 3). Infrastructure includes ditches, dams and culverts that DUC operates and maintains through a long-term agreement signed with CWS in 1986 (Table 3). There are no official trails on the area, but DUC staff drives on the dyke to the water control structure on the east side of the property via two-track trails extending from the north fence across the earthen dams.

From 1985 to 2015, the water control structures served their useful life. The control structure at the drainage of Tway Lake has breached, and the dyke around it has been severely eroded. Beaver activity also interferes with the function of the structures.

A concrete cairn with a brass plaque depicting and explaining the Tway Lakes Tennessee Project is maintained by DUC.

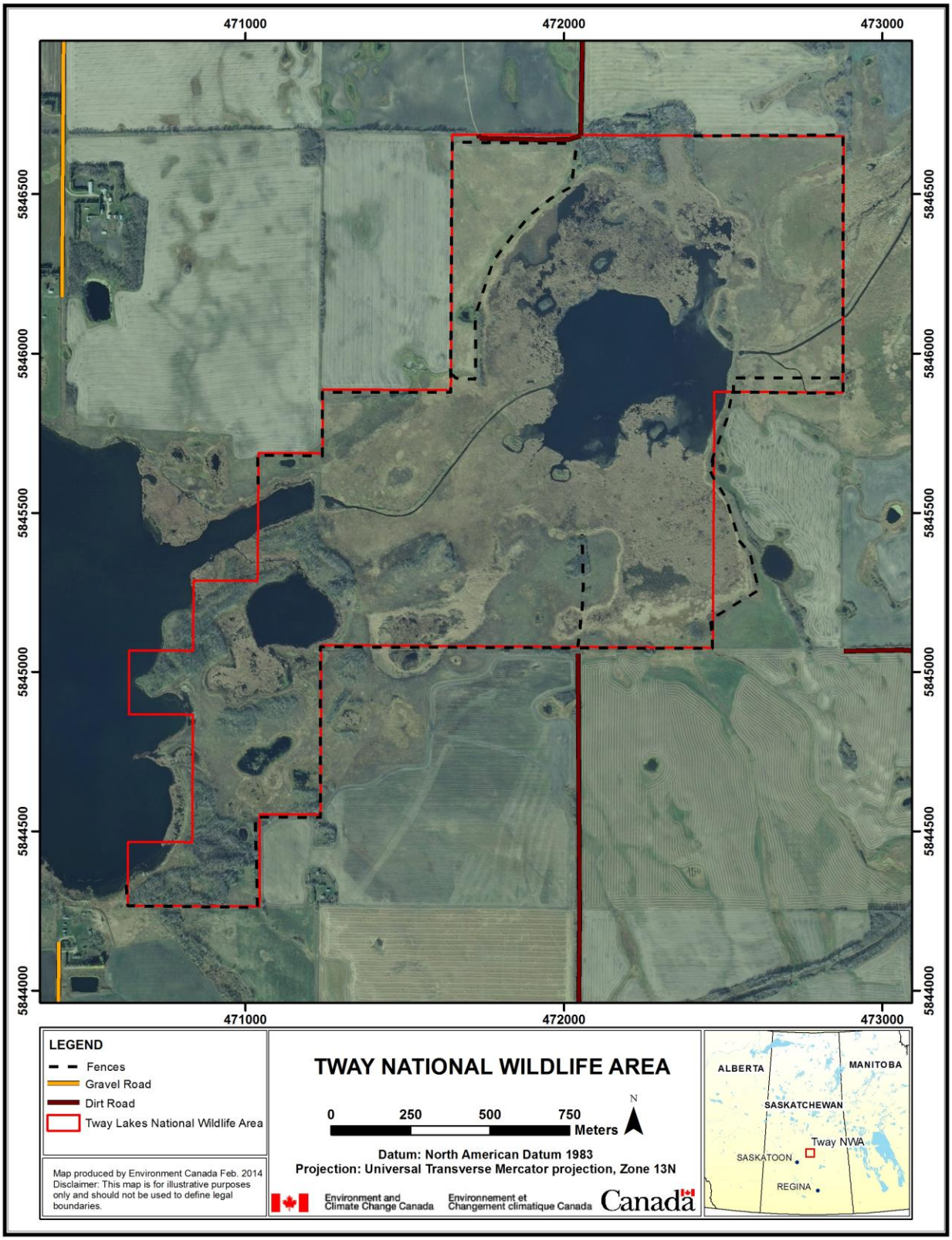

Figure 2: Location of the perimeter fencing at Tway NWA

Table 3: Facilities and infrastructure in Tway National Wildlife Area

Type of Infrastructure	Number	Condition	Approximate Size	Responsibility (Holder or Owner)
Artificial Nesting Islands	5 (remaining)	Poor to Fair	0.4 ha	DUC
Boundary Signs	50	Fair to Good	N/A	CWS
Ditch	1	Fair	549 m	DUC
Drop Culvert	1	Poor to Fair	4.5 m^2	DUC
DUC Cairn	1	Fair	N/A	DUC
Dyke and Culvert	1	Poor to Fair	0.56 m x 0.92 m	
Earthen Dam	1	Fair	639 m^2	DUC
Entrance Sign	1	Poor	N/A	CWS
Information Sign	1	Excellent	N/A	CWS
Wire Gates	6	Fair to Good	N/A	CWS
Wire Fence with Wood Posts	N/A	Fair to Good	7500 m	CWS
Wire Fence with Wood Posts	N/A	Dilapidated	1700 m	CWS
Wire Fence with Wood Posts	N/A	Non-existent	400 m	CWS

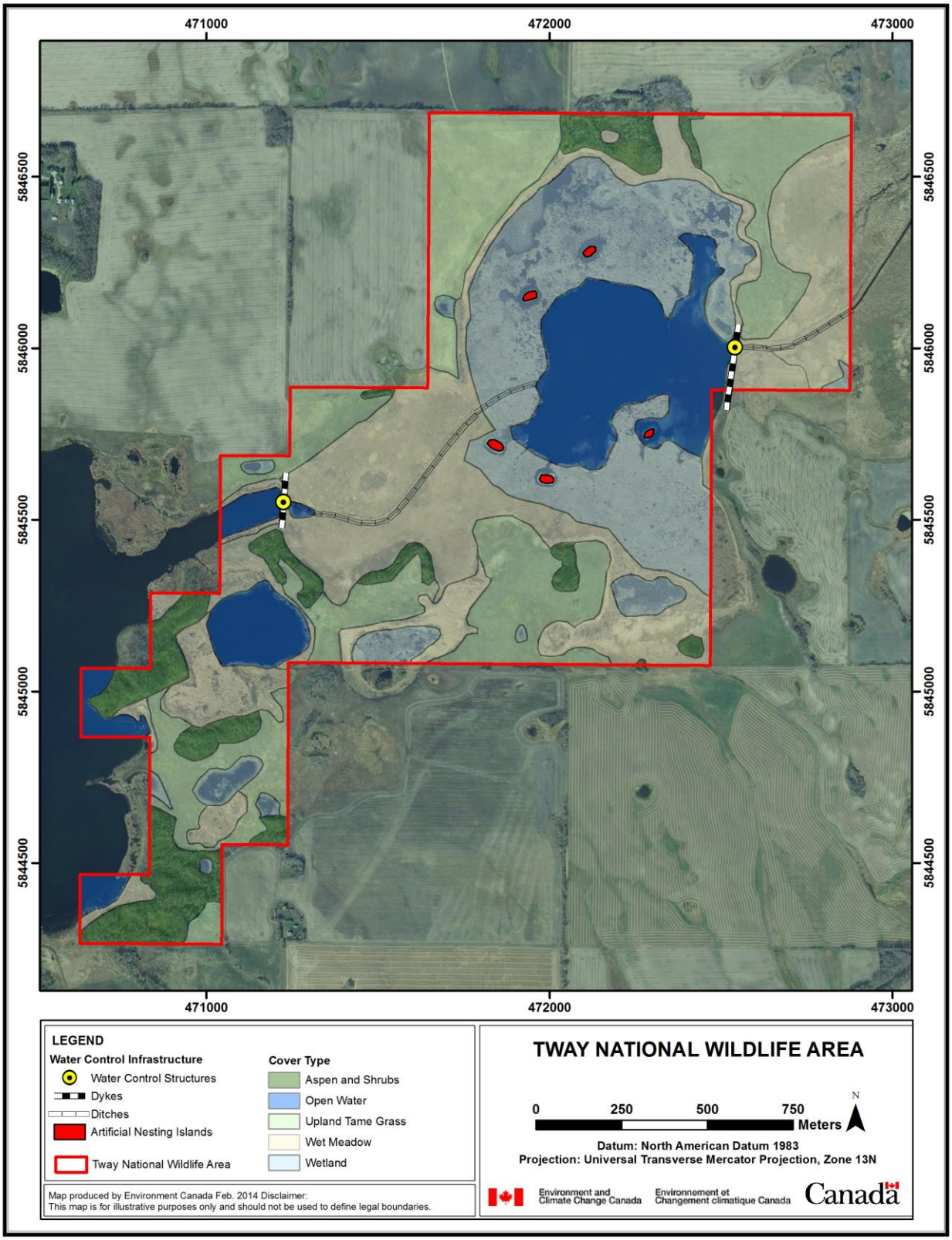

Figure 3: Location of habitat types and water control infrastructure at Tway NWA

2 ECOLOGICAL RESOURCES

2.1 TERRESTRIAL AND AQUATIC HABITATS

Tway NWA straddles the Aspen Parkland Ecoregion of the Prairie Ecozone and the Boreal Transition Ecoregion of the Boreal Ecozone of Saskatchewan. Upland ecosites occupy 71 ha (23%) of the Tway NWA (Table 4). The Saskatchewan Soil Survey (1989) reports the uplands at Tway NWA are Black Chernozomic soils with an average slope of 2–3%. Upland soil textures range from sandy loams on gravely fluvial materials (Whitesand series) to more silty lacustrine materials (Hoey series).

Table 4: Dominant vegetation community types at Tway NWA

Community Type	Approximate Hectares	% of NWA
Aspen and Shrubs	24	9.8
Open Water	34	13.9
Upland Tame Grass	57	23.4
Wet Meadow	76	31.1
Wetland	53	21.7
Artificial Nesting Islands	0.4	0.1

Originally, upland ecosites would have been dominated by grasslands of Plains Rough Fescue–Northern Wheatgrass–Western Porcupine Grass (*Festuca hallii–Elymus lanceolatus–Hesperostipa curtiseta*) on loamy sites (Thorpe 2007a) and Western Porcupine Grass (*Hesperostipa curtiseta*) on sandy loam sites (Thorpe 2007b).

Upland ecosites have been modified by deliberate and unintended human activity over the last century. Historically, the majority of uplands were plowed for agricultural crop production. All cultivated areas were subsequently either sown to dense nesting cover (a mixture of Sweet Clover [*Melilotus* spp.], Alfalfa [*Medicago saliva*], Intermediate Wheatgrass [*Thinopyrum intermedium*] and Tall Wheatgrass [*Thinopyrum ponticum*]) or reverted to native upland through natural succession. Most of that land is now dominated by perennial forages of European origin, mostly Smooth Brome (*Bromus inermis*) and Kentucky Bluegrass (*Poa pratensis*).

Due to active fire suppression to protect infrastructure and forage supplies, many native grassland habitats within Tway NWA now support expanding patches of trees and shrublands, which may include Trembling Aspen (*Populus tremuloides*), Willow (*Salix* spp.), Western Snowberry (*Symphoricarpos occidentalis*), Saskatoon (*Amelanchier alnifolia*), Beaked Hazelnut

(*Corylus cornuta*) and Red-osier Dogwood (*Cornus stolonifera*). Long-term exclusion of fire, grazing or haying at Tway NWA has resulted in unfettered seed production and wind dispersal of Smooth Brome, Canada Thistle (*Cirsium arvense*), Perennial Sow Thistle (*Sonchus arvensis*), Dandelion (*Taraxacum officinale*) and Yellow Sweet Clover (*Melilotus officinalis*), which have invaded and now dominate the once-remnant native grasslands and the wet meadows.

No vegetation inventories have been completed on the NWA nor have there been any ecological health assessments of the upland and lentic riparian communities.

Lowland ecosites with open water, wetlands and wet meadows that range from fresh to saline occupy 163 ha (77%) of Tway NWA (Table 4). The dominant soils are Humic Gleysolic that underly shallow open water and poorly drained soils found in marginal areas (Saskatchewan Soil Survey 1989). The emergent vegetation around the large wetland basin is dominated by Great Bulrush (*Scirpus acutus*) and Common Cattail (*Typha latifolia*), with Creeping Spike Rush (*Eleocharis palustris*) and Sedges (*Carex* sp.). The submergent vegetation includes Sago Pondweed (*Potamogeton pectinatus*), Hornwort (*Ceratophyllum demersum*), Water-milfoil (*Myriophyllum exalbescens*), Common Duckweed (*Lemna minor*) and Muskgrass (*Chara vulgaris*) (Whyte 1986). Wet meadow communities have not been inventoried.

In general, the flowing surface waters in the Tway region are intermittent. Local creeks and streams are largely dependent on spring runoff, and they show seasonal and annual fluctuations in salinity. The area covered by water at Tway NWA changes drastically among seasons and years. In some years, water is virtually absent from the NWA except for Tway Lake. The Carrot River, which supplies Tway NWA, is intermittent and typically has a no-flow period between November and February. In dry years, the no-flow period can extend from July to March. Flows generally peak in May and rapidly decline in October.

2.2 WILDLIFE SPECIES

Nearly 140 species of birds have been observed at Tway NWA (unpublished data: Saskatoon Nature Society 1991). Major species groups of migratory birds that currently use the NWA include wetland species such as waterfowl, grebes and shorebirds, and grassland and forest species such as woodpeckers, warblers and sparrows. The large wetland basin created by the water control structure is noted for production of diving ducks, especially for use during

moulting (Whyte 1986). Waterfowl that are known to breed in Tway NWA are Canada Goose (*Branta canadensis*), Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Blue-winged Teal (*Anas discors*), Green-winged Teal (*Anas crecca*), American Wigeon (*Anas clypeata*), Canvasback (*Aythya valisineria*), Redhead (*Aythya americana*), Lesser Scaup (*Aythya affinis*) and Ruddy Duck (*Oxyura jamaicensis*).

No inventories have been completed for plants, bryophytes, mammals, reptiles or amphibians in Tway NWA. Large ungulates such as White-tailed Deer (*Odocoileus virginianus*), Mule Deer (*Odocoileus hemionus*), Elk (*Cervus canadensis*) and Moose (*Alces alces*) are common in the area and are likely present in the NWA during certain times of the year. Beaver (*Castor canadensis*) and Muskrat (*Ondatra zibethicus*) inhabit Tway NWA and pose management challenges by plugging the water control structures with branches, reeds and mud, and burrowing in the dykes and dams. Mounds created by Northern Pocket Gophers (*Thomomys talpoides*) are widespread in the seeded upland grasslands.

The 1986 Management Plan provides a list of potential species that may occur on the NWA or the vicinity (Whyte 1986).

2.3 SPECIES AT RISK

Two species at risk, Common Nighthawk (*Chordeiles minor*) and Yellow Rail (*Coturnicops noveboracensis*), which are listed as threatened and special concern under Schedule 1 of the *Species at Risk Act*, respectively, are known to breed in Tway NWA (Table 5). Also recorded at Tway NWA are Baird's Sparrow (*Ammodramus bairdii*), Horned Grebe (*Podiceps auritus*), Barn Swallow (*Hirundo rustica*) and Bobolink (*Dolichonyx oryzivorus*), which have been recommended for listing under the *Species at Risk Act* (Table 5). Short-eared Owl (*Asio flammeus*), which is listed as special concern under Schedule 1 of the *Species at Risk Act*, inhabits the area surrounding Tway NWA and may frequent the property.

The following species have been observed in Tway NWA and are on the provincial Saskatchewan Conservation Data Centre tracking list: American White Pelican (*Pelecanus erythrorhynchos*), Cooper's Hawk (*Accipiter cooperii*), Forster's Tern (*Sterna forsteri*), Great Blue-heron (*Ardea herodias*), Short-billed Dowitcher (*Limnodromus griseus*), Turkey Vulture (*Cathartes aura*) and Western Grebe (*Aechmophorus occidentalis*) (Saskatchewan Conservation Data Centre 2012). One tracked mammal species, the Olive-backed Pocket

Mouse (*Perognathus fasciatus*), has been historically recorded in the vicinity (Saskatchewan Conservation Data Centre Wildlife Application 2014) (Table 5).

Potential habitat for the Northern Leopard Frog (*Lithobates pipiens*), considered special concern under Schedule 1 of the *Species at Risk Act*, is present in Tway NWA (Table 5) (Gerry and Pepper 2000).

Table 5: Species at risk detected either in Tway National Wildlife Area or in the surrounding landscape

Common and Scientific Names of Species	Status			Presence or Potential of Presence[4]
	Canada		Saskatchewan	
	SARA[1]	COSEWIC[2]	Provincial Ranking[3]	
Amphibians				
Northern Leopard Frog (*Lithobates pipiens*)	Special Concern	Special Concern	S3	Potential
Birds				
American White Pelican (*Pelecanus erythrorhynchos*)	No Status	Not at Risk	S3B	Confirmed
Baird's Sparrow (*Ammodramus bairdii*)	No Status	Special Concern	S4B	Confirmed
Barn Swallow (*Hirundo rustica*)	No Status	Threatened	S5B, S5M	Confirmed
Bobolink (*Dolichonyx oryzivorus*)	No Status	Threatened	S5B	Confirmed
Common Nighthawk (*Chordeiles minor*)	Threatened	Threatened	S4S5B, S4S5M	Confirmed
Cooper's Hawk (*Accipiter cooperii*)	No Status	Not at Risk	S4B, S2M, S2N	Confirmed
Forster's Tern (*Sterna forsteri*)	No Status	Data Deficient	S4B	Confirmed
Great Blue-heron (*Ardea herodias*)	No Status	Not at Risk	S3B	Confirmed
Horned Grebe (*Podiceps auritus*)	No Status	Special Concern	S5B	Confirmed
Short-billed Dowitcher (*Limnodromus griseus*)	No Status	Not Assessed	S1B, S4M	Confirmed
Short-eared Owl (*Asio flammeus*)	Special Concern	Special Concern	S3B, S2N	Potential

Common and Scientific Names of Species	Status			Presence or Potential of Presence[4]
	Canada		Saskatchewan	
	SARA[1]	COSEWIC[2]	Provincial Ranking[3]	
Turkey Vulture (*Cathartes aura*)	No Status	Not Assessed	S2S3B, S2M, S2N	Confirmed
Western Grebe (*Aechmophorus occidentalis*)	No Status	Not Assessed	S5B	Confirmed
Yellow Rail (*Coturnicops noveboracensis*)	Special Concern	Special Concern	S3B, S2M	Confirmed
Mammals				
Olive-backed Pocket Mouse (*Perognathus fasciatus*)	No Status	No Status	S3	Potential

1 *Species at Risk Act*: Extinct, extirpated, endangered, threatened, special concern, not at risk (assessed and deemed not at risk of extinction) or no status (not rated)
2 Committee on the Status of Endangered Wildlife in Canada: the same status names as the SARA status
3 Saskatchewan Conservation Data Centre Provincial Rank: http://www.biodiversity.sk.ca/Docs/SKCDCRankDefs.pdf
4 List as "confirmed," "probable" or "potential"

The Saskatchewan Conservation Data Centre (2011) has listed 13 element occurrences of rare and endangered species found in the Rural Municipality of Invergordon surrounding Tway NWA, many of which are historic occurrences, and the species' current range no longer extends into this area (e.g., Burrowing Owl [*Athene cunicularia*]).

2.4 INVASIVE SPECIES

The tame grass upland community is dominated by Smooth Brome (*Bromus inermis*), Quackgrass (*Elymus repens*), Kentucky Bluegrass (*Poa pratensis*), Sweet Clover (*Melilotus* sp.) and Alfalfa (*Medicago sativa*). Canada thistle (*Cirsium arvense*), Perennial Sow-thistle (*Sonchus arvensis*) and Dandelion (*Taraxacum officinale*) are common throughout.

Common Tansy (*Tanacetum vulgare*), a provincially listed noxious weed, is a major invasive alien plant species of concern in the Rural Municipalities of Invergordon and Three Lakes. It has been observed on the NWA and vicinity in road ditches, hayfields and pastures. Wild Caraway (*Carum carvi*) is another invasive alien plant species found in the vicinity along road ditches.

Wild Boar (*Sus scrofa*), an agricultural livestock species in Saskatchewan, is feral in the Rural Municipality of Invergordon and surrounding areas.

3 MANAGEMENT CHALLENGES AND THREATS

There are six management challenges and threats affecting the future ecological condition of Tway NWA.

3.1 ALIEN INVASIVE SPECIES

The majority of the upland grassland vegetation in the NWA is comprised of three invasive alien grasses (Smooth Brome, Quackgrass, Kentucky Bluegrass). Three invasive noxious weeds (Perennial Sow-thistle, Canada Thistle, Common Tansy) and a non-native legume (Sweet Clover) are widespread. These species have invaded the remnant native grassland communities, reduced plant community diversity, altered the structure of nesting habitats, and changed forage supplies for livestock and wild ungulates. Eradication of alien invasive plants is not feasible. Management efforts should focus on controlling invasive species to the extent that wildlife habitat values are maintained or enhanced.

The management decision to reseed cropland to tame forage grasses and legumes in the 1970s, and then to allow much of that vegetation to go unmanaged for years, has been the greatest source of seed for the widespread invasion of alien invasive species in Tway NWA. Habitat and landscape requirements for waterfowl are not always suitable for other bird species, particularly endemic grassland songbirds, many of which are species at risk. Perennial cover is still important to grassland songbirds (McMaster and Davis 2001), but responses to the structure of that cover and the surrounding landscape differ between songbirds and ducks (McMaster *et al*. 2005). For example, some songbird species depend upon grazed native grasslands with shorter cover and may avoid shrubland habitats or wetland margins (Koper and Schmiegelow 2006, 2007; Skinner and Clark 2008).

Feral Wild Boars are an emerging issue in the surrounding region, and this species may pose a threat to native biodiversity (Brook 2014).

3.2 ARTIFICIAL WATER CONTROL STRUCTURES

The natural course of the Carrot River was altered for the Tway Lakes Project. Two water control structures exist in Tway NWA (Figure 3), and several other water control structures that are managed by other agencies occur upstream and downstream of Tway NWA on the Carrot River. Water control structures tend to exacerbate floods in wet cycles and often interfere with fish passage. Flooding wetlands may raise groundwater tables in gravelly–sandy soils, leading to increased salinity and greater abundance of invasive alien species.

Historically, infrastructure on Tway NWA has required heavy equipment access, excavation and dumping of soil and subsoil, and installation of metal and cement structures. Operation of this infrastructure requires vehicle access several times each year between April and October to monitor water levels and make decisions regarding placement or removal of stoplogs. In this region, natural closed-basin wetlands fill early in the year with spring runoff from snowmelt and lose water from evaporation or seepage thereafter (Stewart and Kantrud 1971). However, several wetland basins on Tway NWA have artificial inlet and outlet connections that support an unnatural flow of fresh river water for several days or weeks in late spring each year to help fill downstream basins. Occasionally, Beavers and Muskrat must be trapped, trees and shrubs cut, grassland mowed, and ditch bottoms dredged in order to keep the engineered structures operating. This type of intensive management is not in keeping with DUC's current preference to minimize ecological management and avoid intensive project operations such as removing stoplogs to manage drawdowns (Uhrich, pers. comm.).

The DUC water control structures in Tway NWA have served their useful life and now need to be rebuilt or decommissioned. Continuing degradation of the structures may lead to safety hazards. Rebuilding the infrastructure at the Tway Lakes would involve installing fixed crest steel sheet pile weirs designed for a 50-year project life. Such control structures would have mild slope rock spillways to provide improved passage for fish (e.g., Northern Pike [*Esox lucius*] and Walleye [*Sander vitreus*]) and reduce vulnerability to beaver damage. DUC is looking for partners to fund reconstruction of the Tway Lakes Project and provide for long-term management.

Decommissioning the Tway Lakes Project would involve removing controls and modifying works to return the wetlands to a naturalized water level. The naturalized water levels would be lower, with reduced depth on Tway Lake and only remnant shallow wetlands remaining on the downstream basins (Uhrich, pers. comm.).

Either option, redevelopment or removal, will require time to make resources and personnel available. The activities necessary to rebuild or remove the water control structures in Tway NWA are prohibited activities described in section 3 of the *Wildlife Area Regulations*. The primary mitigating factor to allow these activities on Tway NWA is the potential positive outcome for wetland habitats, water bird populations and human safety.

If decommissioning were to occur, reductions in size of the wetlands would potentially require active vegetation restoration activities to avoid colonization of former wetlands areas by invasive species.

3.3 FIRE AND FIRE SUPPRESSION

Fire suppression in the region has allowed many woody species to proliferate and invasive alien species to spread. Both of these changes reduce vegetation diversity. Historic air photos show an increase in Aspen stands from the 1970s to the present. In Fescue Prairie, spatial heterogeneity and species composition increase after a single burn, which results in patchier plant communities (Gross and Romo 2010). Fire return intervals of 10 to 11 years should be considered for Fescue Prairie (Pylypec and Romo 2003). This would benefit many wildlife species that use the habitat within Tway NWA, including grassland birds, which exhibit declines in abundance and nest densities as woody cover increases (Grant *et al*. 2004, Davis 2005).

3.4 LIVESTOCK GRAZING

Grazing has the potential to create spatial and temporal heterogeneity in grassland vegetation structure, which can have beneficial effects on native grassland as habitat for wildlife (Fuhlendorf *et al.* 2012). Deferred grazing with cattle has been used at Tway NWA to create heterogeneity in nesting habitat and remove litter build-up to reduce potential fire intensities.

Lack of active management of seeded grassland for several decades while deferring grazing to late summer and fall has resulted in seed production and widespread invasion by various perennial and biennial alien plant species. While this vegetation community serves as nesting cover for ducks and preferred habitat for Northern Pocket Gophers and mice, it is unsuitable habitat for most other upland migratory bird species or species at risk.

Grazing has been absent from Tway NWA since 2008, resulting in increased invasion of tame forages into native grasslands and the expansion of Aspen communities. The number of livestock producers in the Tway region may have declined, creating a possible challenge to find a permit holder willing to carry out the specific grazing prescriptions designed to benefit wildlife in the NWA.

3.5 GRAVEL EXTRACTION

Several gravel pits are located in the vicinity of Tway NWA, and gravel is hauled to Saskatoon via Highway 41. Gravel pit operations are noisy and may directly disturb wildlife in

the immediate vicinity, or indirectly modify wildlife habitat by altering local water tables and drainage patterns and introducing new alien invasive species. There will be increasing pressure on adjacent lands as existing gravel pits are depleted. Every year, there are requests for permits to develop gravel resources on other NWAs in Saskatchewan, and a future request to do so on Tway is likely.

3.6 AGRICULTURAL EFFLUENTS

The Carrot River Watershed is classified as Stressed due to reduced surface and groundwater quality and rangeland and riparian health issues (Saskatchewan Watershed Authority 2012b).

The surrounding watershed is several hundred square kilometers and includes lands subject to drainage. The runoff from that drainage contains unused fertilizers and pesticides, which can cause nutrient loading of wetlands along the Carrot River and contamination of wetlands with residual herbicides, fungicides and insecticides or their breakdown products. Fertilizer application (nitrogen and phosphorous) and pesticide application are rated as high intensity in the watershed. The severity of these effects over the long term is uncertain. Livestock effluents were rated as a moderate intensity in the watershed but may have more local impacts (Saskatchewan Watershed Authority 2012b).

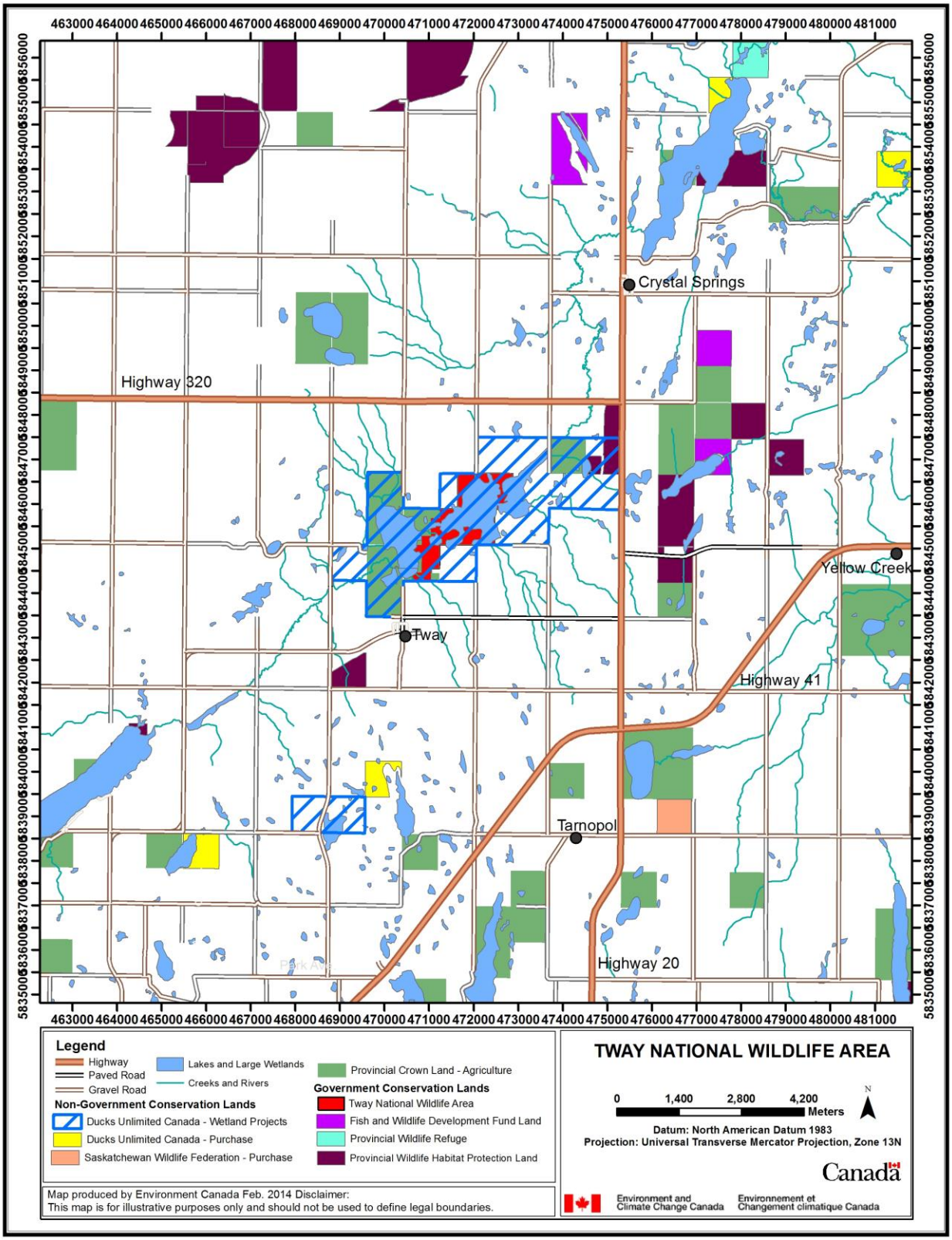

Figure 4: Conservation lands within the vicinity of Tway NWA

4 GOALS AND OBJECTIVES

4.1 VISION

The long-term vision for Tway NWA is wildlife conservation: the NWA provides relatively undisturbed wetland and upland migratory bird habitat in an intensively cultivated region and supports more than 140 bird species at some point during the year.

4.2 GOALS AND OBJECTIVES

The dual goals of this management plan reflect the need to concurrently manage both upland and wetland habitats in Tway NWA. CWS will maintain and improve upland wildlife habitat through a variety of management activities such as grazing, invasive species management and prescribed burning. CWS will collaborate with DUC to determine future management of water levels and wetland habitats.

Goal 1: Maintain and enhance upland grassland vegetation at Tway NWA as nesting habitat for migratory birds.

Objectives:

1.1 Increase the structural and compositional heterogeneity of grasslands with natural disturbance tools such as fire and grazing (by 2020).

1.2 Reduce the distribution and abundance of alien invasive plants and noxious weeds (ongoing).

1.3 Reduce the distribution and abundance of native woody vegetation with natural disturbance tools such as fire and grazing (by 2020).

Goal 2: Maintain wetland habitats at Tway NWA to provide habitat for migratory birds and manage wetlands in a manner compatible with DUC's future directions for the Tway Lakes Project.

Objectives:

2.1 Wetlands within the NWA will be managed to provide habitat for migratory birds including waterfowl, shorebirds and other migratory species in ways that adapt to future changes in moisture regimes and infrastructure (ongoing).

2.2 Beaver and muskrat burrowing activities that interfere with operational water control structures will not increase over time (ongoing).

4.3 EVALUATION

Annual monitoring will be performed within the limits imposed by the availability of financial and human resources. The management plan will be reviewed 5 years after its initial approval, and reviewed and updated every 10 years thereafter. The evaluation will take the form of an annual review of monitoring data obtained from the monitoring and research projects outlined below. This monitoring will be used to establish priorities for action and to allocate resources.

5 MANAGEMENT APPROACHES

This section and the following Table 6 contain a description of the possible approaches that could be used in the management of Tway NWA. However, management actions will be determined during the annual work planning process and will be implemented as human and financial resources allow.

Table 6: Management approaches for Tway NWA

Management Challenge or Threat	Goal and Objectives	Management Approaches and Level of Priority[1]
Alien invasive species	**Goal 1: Maintain and enhance upland grassland vegetation at Tway NWA as nesting habitat for migratory birds.** **Objective 1.b:** Reduce the distribution and abundance of alien invasive plants and noxious weeds (ongoing).	• Invasive Species Management **(1)** • Livestock Grazing **(1)** • Prescribed Burning **(2)**
Artificial water control structures	**Goal 2: Maintain wetland habitats at Tway NWA to provide habitat for migratory birds and manage wetlands in a manner compatible with DUC's future directions for the Tway Lakes Project.** **Objective 2.a:** Wetlands within the NWA will be managed to provide habitat for migratory birds including waterfowl, shorebirds and other migratory species in ways that adapt to future changes in moisture regimes and infrastructure (ongoing). **Objective 2.b:** Beaver and muskrat burrowing activities that interfere with operational water control structures will not increase over time (ongoing)	• Wetland Habitat Management **(1)** • Wildlife Management **(1)**

Management Challenge or Threat	Goal and Objectives	Management Approaches and Level of Priority[1]
Fire and Fire Suppression	**Goal 1: Maintain and enhance upland grassland vegetation at Tway NWA as nesting habitat for migratory birds.** **Objective 1.a:** Increase the structural and compositional heterogeneity of grasslands with natural disturbance tools such as fire and grazing (by 2020). **Objective 1.b:** Reduce the distribution and abundance of alien invasive plants and noxious weeds (ongoing). **Objective 1.c:** Reduce the distribution and abundance of native woody vegetation with natural disturbance tools such as fire and grazing (by 2020).	●Prescribed Burning **(2)**
Livestock Grazing	**Goal 1: Maintain and enhance upland grassland vegetation at Tway NWA as nesting habitat for migratory birds.** **Objective 1.a:** Increase the structural and compositional heterogeneity of grasslands with natural disturbance tools such as fire and grazing (by 2020). **Objective 1.b:** Reduce the distribution and abundance of alien invasive plants and noxious weeds (ongoing). **Objective 1.c:** Reduce the distribution and abundance of native woody vegetation with natural disturbance tools such as fire and grazing (by 2020).	• Livestock Grazing **(1)**

Management Challenge or Threat	Goal and Objectives	Management Approaches and Level of Priority[1]
Gravel Extraction	**Goal 1: Maintain and enhance upland grassland vegetation at Tway NWA as nesting habitat for migratory birds.** **Objective 1.a:** Increase the structural and compositional heterogeneity of grasslands with natural disturbance tools such as fire and grazing (by 2020). **Objective 1.b:** Reduce the distribution and abundance of alien invasive plants and noxious weeds (ongoing).	• Invasive Species Management **(1)**
Agricultural Effluent	**Goal 2: Maintain wetland habitats at Tway NWA to provide habitat for migratory birds and manage wetlands in a manner compatible with DUC's future directions for the Tway Lakes Project.** **Objective 2.a:** Wetlands within the NWA will be managed to provide habitat for migratory birds including waterfowl, shorebirds and other migratory species in ways that adapt to future changes in moisture regimes and infrastructure (ongoing).	• Livestock Grazing **(1)**

[1] Level of Priority: 1 (from 0 to 3 years); 2 (from 4 to 6 years); 3 (from 7 to 10 years)

5.1 HABITAT MANAGEMENT

5.1.1 Upland Habitat Management

Grazing and fire will be used to create diversity in structure and composition of the plant community in Tway NWA, thereby improving the wildlife habitat. Greater variety in the structure and composition of perennial upland cover is known to support a greater diversity of species relative to a monoculture or uniform harvest system (Askins *et al.* 2007, Rotenberry and Wiens 1980). For example, waterfowl nest density and success appear to increase on landscapes with many small wetlands and a patchwork of idled and managed perennial hay and annual cropland

(Arnold *et al.* 2007). Some species, like Northern Pintail, may benefit from haying or otherwise managing perennial cover (McMaster *et al.* 2005). Management interventions, such as prescribed burning, grazing and haying, could be used to achieve the goal of improving wildlife habitats.

Prescribed Burning

Prescribed burning may be undertaken in any year to reduce the cover of invasive native shrubs, alien perennial grasses or litter build-up that are otherwise considered a fire hazard. A cumulative total of 36 hectares (50% of the uplands) will be burned in each 5-year period, such that the average fire return interval on the upland grasslands is 10 years; this return interval is consistent with natural fire regimes in this region (Wright and Bailey 1982, Pylepec and Romo 2003). Fire can be reintroduced in Fescue Prairie as a management tool that creates temporal and spatial variation in composition, structure and function (Romo 2003). For conservation purposes, prescribed burning should be considered only at times when it can be conducted safely (Romo 2003). To minimize short-term negative effects on migratory birds, burning will be restricted to early April before the nesting season begins, or to September and October after the nesting season has ended.

Prescribed burns will aim to restore remnant native grasslands in association with livestock grazing. Boundaries of burn units will include constructed features like trails and ditches, or open water bodies, and mowed fireguards that follow property edges or ridgetops. These boundary features either offer discontinuities in fuels, ease of equipment access, or are otherwise effective lines for ignition of backfires that will travel slowly downslope. Backfires from these boundary features will be the primary form of ignition, with stripfires or headfires used only where a black line or water body 10–15 metres in width occurs downwind and around the flanks. Burns will not occur where wind speeds exceed 25 km hr^{-1}, to reduce the risk of long-distance ember transport from woody fuels or the risk of fires jumping fire guards (Cheney and Sullivan 2008). Individual burn units will be designed to safely manage each fire with existing numbers of appropriately trained staff. Finally, burns will not occur during periods of fire bans dictated by surrounding municipal or provincial governments.

Other procedures, including occupational health and safety training requirements, pre-burn checklists, incident command system, post-fire mop-up, and cooperation with surrounding landowners and municipal fire departments, will be outlined in individual burn plans.

Livestock Grazing

Grazing by domestic livestock can diversify the structure of perennial cover at Tway NWA and limit weeds and woody plant invasions. Thus, grazing will be an important tool to maintain ecological integrity of Tway NWA and provide more heterogeneity in nesting cover for a greater diversity of birds. Two components of implementing livestock grazing include design of the grazing regime most appropriate for the ecosystem, and constructing the infrastructure needed to support that grazing regime. Grazing regimes are described by timing, duration, frequency and stocking density. Grazing rotations involve the movement of animals from one pasture to another, deferment involves delaying grazing in a pasture until most plants have completed seed production or nesting is completed, and rest involves not grazing a pasture for at least one year (Heitschmidt and Stuth 1991).

Tway NWA will be managed with grazing deferred to summer and fall (after July 15) at a moderate stocking density to maintain productivity and density of the grass cover for nesting waterfowl. Burns in patches of remnant native grasslands may help target grazing of Smooth Brome there in July. The estimated maximum stocking rate for Tway NWA is 137 Animal Unit Months (AUMs) north of the Carrot River and 156 AUMs on the south side for a total of 293 AUMs. North side of Carrot River is a sandy–loam and wet meadow range ecosites with approximately 32 and 20 ha, respectively for each range site, with an estimated 50% tame forage component. South side of the Carrot River is a 40-ha clay loam range and a 40 ha wet meadow range ecosites with no estimation of tame forage component. These estimates are based upon stocking rate recommendations outlined by Thorpe (2007). To limit potential nutrient inputs into wetlands, grazing intensity will be conservative. Effects of grazing on riparian health will be monitored, and adaptations to reduce grazing impacts will be made if unhealthy riparian areas become common.

Haying and grazing permits for Tway NWA have been provided sporadically from 1986 to 2007 on various portions of the NWA. If efforts to achieve grazing objectives are unsuccessful, haying might be appropriate as an alternative approach to create more diversity in wildlife habitats.

Invasive Species Management

Control of invasive alien species or weeds identified as noxious under Saskatchewan's *The Weed Control Act*, 2010, will employ chemical formulations and application timing prescribed by licensed pesticide applicators. Control will be done up to 30 metres inside the

NWA boundaries to promote compliance with the Act above. All application methods will involve hand-held or ATV-mounted equipment to minimize disturbance to surrounding vegetation. Spot-spray applications of broad-leaf herbicides with limited residual effects will be used to target patches of the major problem species, like Canada Thistle or Common Tansy. In all cases, no follow-up revegetation actions should be necessary, only monitoring the success of actions, and re-application where first efforts failed.

Wild Boars may become a problem on the NWA, resulting in habitat disturbance and vegetation destruction. Humane removal methods of the animals as well as instituting follow-up prevention methods will follow the direction of a provincial conservation officer and any applicable provincial legislation.

5.1.2 Wetland Habitat Management

Wetland habitats naturally fluctuate with changes in water level. Temporary ponds are frequently dry by mid-summer or remain completely dry throughout some dry years. Changes in water levels for natural wetlands are driven by two primary factors: climate and land cover. Land managers have little influence over climate but can influence land cover. The grazing and burning proposed in Section 5.1.1 may marginally influence wetland water levels by increasing runoff.

The previous focus of the wetland management program at Tway NWA was to increase the NWA's potential for waterfowl production by raising maximum water levels, adding nesting islands and managing drawdowns. Manipulations of wetlands in the Tway Lakes Project with water control infrastructure was intended to benefit waterfowl, particularly broods in mid-summer, when natural water supplies may be limiting to brood survival. However, this approach required intensive management activities, and objectives were not consistently achieved.

As a federally protected area, conservation of wildlife and conservation of wetland function are policy expectations. Tway NWA was originally created to protect the water control infrastructure, and CWS will continue to work with DUC to identify and evaluate options for rebuilding or decommissioning this infrastructure, and implementing a selected option as funding becomes available. In the meantime, ongoing maintenance may include frequent inspection and operational visits by DUC staff and occasional equipment access for minor repairs. These activities are consistent with the Federal Policy on Wetland Conservation and are not likely to result in significant adverse environmental effects under the *Canadian*

Environmental Assessment Act, 2012 (CEAA), but major changes to existing water control could fall under section 67 of CEAA, which would mean an environmental assessment and species at risk analysis would be required.

Regulatory matters regarding water removals are under the control of the Saskatchewan Water Security Agency, which issues permits to DUC for this purpose.

5.2 WILDLIFE MANAGEMENT

Hunting is allowed on Tway NWA by a notice posted at the entry to the property. It was waterfowl hunters who financially supported the DUC Tway Lakes Project, with the intent that waterfowl hunting would be allowed in the area. All federal and provincial wildlife hunting regulations apply on Tway NWA.

Occasional removal of Beavers or Muskrats will be permitted where those animals are responsible for plugging water control structures, or back-flooding municipal roadways. Humane removal methods of the animal, lodges and any dams, as well as instituting follow-up prevention methods, will follow the direction of a provincial conservation officer and any applicable provincial legislation.

No other active wildlife population management is anticipated for 2015–2019.

5.3 MONITORING

Effective and efficient monitoring requires careful planning and a coordinated approach. Monitoring will also be carried out in a manner that contributes to meeting species at risk recovery strategy or action plan objectives. Ongoing monitoring needs are as follows:

1. Distribution and abundance of waterfowl, songbird species and species at risk (Goal 1.1–1.3, 2.1).
2. Upland habitat suitability for grassland songbirds and prairie ducks, particularly Sprague's Pipit and Northern Pintail, using vertical obstruction and foliar cover measures for comparison to published habitat needs (Goal 1.1–1.3).
3. Distribution and abundance of native plant species (Goal 1.1–1.3).
4. Distribution and abundance of alien invasive species (Goal 1.3).
5. Range and riparian health assessments where lands are grazed by livestock, including before and after measurements with associated control and impact sites (Goal 1.1–1.3, 2.1).

6. Woody vegetation reductions in response to burning treatments, using height and density measures, including before and after measurements with associated control and impact sites (Goal 1.1, 1.3).
7. Noxious weed reductions following control methods employed, using cover, area or density measures appropriate to the target weed, in the year controls were applied and the year following (Goal 1.2).
8. Aquatic habitat quality for waterfowl, using submergent vegetation and macro-invertebrate abundance as indicators of water quality at control and impact sites (Goal 2.1).
9. Adherence of permittee(s) and DUC to prohibited activities and permit conditions (Goal 1.1–1.3, 2.1–2.1).
10. Condition of infrastructure for consideration of repair, replacement or decommissioning on an annual basis (Goal 1.1–1.3, 2.1–2.2).

Results of the above monitoring activities will be considered in annual and ongoing management planning for Tway NWA. Changes to monitoring activities may be made following the five-year review of the management plan and management goals.

5.4 RESEARCH

Research activities will be considered for permitting when the results obtained through research have the potential for the following:

1. Addressing one or more of the management goals/objectives;
2. Will not interfere with the conservation of wildlife; and
3. Will not likely cause significant adverse environmental effects.

To obtain a permit to conduct research in Tway NWA and to receive instructions concerning guidelines for a research proposal, please contact:

Protected Areas Ecologist
c/o Environment and Climate Change Canada
Canadian Wildlife Service
Prairie and Northern Region
Perimeter Road
Saskatoon SK S7N 0X4

5.5 PUBLIC INFORMATION AND OUTREACH

Few people visit Tway NWA for wildlife viewing or waterfowl hunting, and a substantial program for public information and outreach is not warranted. For national and international audiences, summary information is made widely available through the Environment and Climate Change Canada Internet site on Protected Areas (www.ec.gc.ca/ap-pa). For local audiences, boundary and information signs are vital for maintaining awareness of the site. Local audiences and outcomes to consider when preparing any communications materials or events include:

- Permitted agricultural users, hunters or maintenance contractors who comply with all permit conditions or posted notices; and
- Adjacent neighbours who can promptly report suspected contraventions of prohibited activities to CWS.

Since local users are most likely to impact Tway NWA, it is important to build local support for NWA management goals and objectives. It is reasonable to expect continued levels of local support and compliance with the *Wildlife Area Regulations*, given that management will include regulated hunting, permits for the occasional removal of problematic Beavers, and permits for cattle grazing.

6 AUTHORIZATIONS AND PROHIBITIONS

In the interest of wildlife and their environment, human activities are minimized and controlled in NWAs through the implementation of the *Wildlife Area Regulations*. These regulations set out activities that are prohibited (subsection 3[1]) in the wildlife area and provide mechanisms for the Minister of the Environment to authorize certain activities to take place in NWAs that are otherwise considered prohibited. The regulations also provide the authority for the Minister to prohibit entry into NWAs.

Activities within an NWA are authorized where notices have been posted at the entrance to or along the boundaries of the NWA or when notices have been published in local newspapers. All activities in an NWA are prohibited unless a notice has been posted or published authorizing the activity to take place. However, in addition to notices, certain activities may be authorized by obtaining a permit from the Minister of the Environment.

6.1 PROHIBITION OF ENTRY

Under the *Wildlife Area Regulations*, the Minister may publish a notice in a local newspaper or post notices at the entrance of any wildlife area or on the boundary of any part thereof prohibiting entry to any wildlife area or part thereof. These notices can be posted when the Minister is of the opinion that entry is a public health and safety concern or when entry may disturb wildlife and their habitat.

For Tway NWA, entry is not prohibited. Authorized activities and those activities that will be considered for permitting are described below.

6.2 AUTHORIZED ACTIVITIES

For Tway NWA, notices authorizing the following activities will be available through the provincial hunting and trapping synopsis via local newspapers, or on information signs located along the area boundary.

Authorized activities without special restrictions:

1. Hiking
2. Canoeing and kayaking

Authorized activities with special restrictions:

1. Photography and wildlife viewing (on foot only)
2. Hunting of waterfowl, big game and upland game birds (on foot, see Government of Saskatchewan Hunters' and Trappers' Guide for specifications on species, season dates, times of day and bag limits)
3. Berry picking (for non-commercial purposes only)
4. Night use (without spotlight)

Note: If there is a discrepancy between the information presented in this document and the notice, the notice prevails, as it is the legal instrument authorizing the activity.

6.3 AUTHORIZATIONS

Permits and notices authorizing an activity may be issued only if the Minister is of the opinion that the activity is scientific research relating to wildlife or habitat conservation, or the activity benefits wildlife and their habitats or will contribute to wildlife conservation, or the activity is not inconsistent with the purpose for which the NWA was established and is consistent with the most recent management plan.

The Minister may also add terms and conditions to permits in order to minimize the impact of an activity on wildlife and wildlife habitat.

All requests for permits or authorizations must be made in writing to the following address:

Protected Areas Ecologist
c/o Environment and Climate Change Canada
Canadian Wildlife Service
115 Perimeter Road
Saskatoon SK S7N 0X4

For further information, please consult the Policy when Considering Permitting or Authorizing Prohibited Activities in Protected Areas Designated under the *Canada Wildlife Act* and *Migratory Birds Convention Act, 1994* (December 2011). This Environment and Climate Change Canada policy document is available on the Protected Areas website (www.ec.gc.ca/ap-pa).

6.4 EXCEPTIONS

The following activities will be exempt from the requirements for permitting and authorizations:

- Activities related to public safety, health or national security, that are authorized by or under another Act of Parliament or activities that are authorized under the *Health of Animals Act* and the *Plant Protection Act* to protect the health of animals and plants;
- Activities related to routine maintenance of NWAs, to the implementation of management plans, and enforcement activities conducted by an officer or employee of Environment and Climate Change Canada.

6.5 OTHER FEDERAL AND PROVINCIAL AUTHORIZATIONS

Depending on the type of activity, other federal or provincial permits or authorizations may be required to undertake an activity in this NWA.

Contact your regional federal and provincial permitting office for more information:

Protected Areas Ecologist
c/o Environment and Climate Change Canada
Canadian Wildlife Service
115 Perimeter Road
Saskatoon SK S7N 0X4

Province of Saskatchewan
Ministry of Environment
3211 Albert Street
Regina SK S4S 5W6

7 HEALTH AND SAFETY

There are currently health and safety issues related to the DUC water control structures associated with undercut dams resulting in ground collapse, dangerous water flows during peak flow periods resulting in risk of drowning, and potential falls from height on the control structure. DUC has done a good job of keeping a guard rail around the control structure to reduce the risk of falling; however, the other problems are not managed at present. Undercut dams need to be fixed, and warning signs that indicate the potential hazards and risk of falls and drownings need to be erected.

Currently, there are no other known health or safety issues for Tway NWA. No environmental hazards have been identified (Franz Environmental, Inc. 2006). However, non-emergency issues related to security or health and safety issues for Tway NWA should be reported to:

National Wildlife Area Program
Environment and Climate Change Canada
Canadian Wildlife Service
115 Perimeter Road
Saskatoon SK S7N 0X4
Telephone: 306-975-4087

In the case of environmental emergencies, contact will be made with the Canadian Environmental Emergencies Notification System at:

Saskatchewan Ministry of Environment
1-800-667-7525

All reasonable efforts will be made to protect the health and safety of the public, including adequately informing visitors of any known or anticipated hazards or risks. Further, Environment and Climate Change Canada staff will take all reasonable and necessary precautions to protect their own health and assure safety as well as that of their co-workers. However, visitors (including researchers and contractors) must make all reasonable efforts to inform themselves of risks and hazards, and they must be prepared and self-sufficient. Natural areas contain some inherent dangers, and proper precautions must be taken by visitors, recognizing that Environment and Climate Change Canada staff neither regularly patrol nor offer services for visitor safety in NWAs.

Incidents or emergencies can be reported to the numbers listed in Table 7 below.

Table 7: Emergency contacts for Tway National Wildlife Area

Emergency Contacts for Tway NWA, SK (52°45'N, 105°25'W)	
Any life-threatening emergency	911
Police/Fire/Ambulance	911
Royal Canadian Mounted Police (RCMP), Wakaw Detachment	306-233-5810
Environment and Climate Change Canada – Wildlife Enforcement Division, Saskatoon	306-975-4087
Saskatchewan Ministry of the Environment	1-800-667-TIPS
Saskatchewan Ministry of the Environment – Melfort Conservation Officer	306-752-6214
Rural Municipality of Invergordon #430, Crystal Springs, SK	306-749-2852

8 ENFORCEMENT

No cooperative agreements for enforcement and surveillance have been developed with other competent authorities, such as other government departments and agencies (Royal Canadian Mountain Police, National Defence, etc.), provinces and territories, or any local or municipal authorities.

Informally, Environment and Climate Change Canada enforcement officers in Saskatoon have been given a list of properties where permits have been issued for agricultural or research activities each year. This list helps them plan their work with responses to complaints or regular inspections of properties.

The management of NWAs is based on three Acts and the regulations thereunder:

- *Migratory Birds Convention Act, 1994,* and *Migratory Birds Regulations*
- *Canada Wildlife Act* and *Wildlife Area Regulations*
- *Species at Risk Act*

9 PLAN IMPLEMENTATION

The management plan will be implemented over a 10-year period. Annual work plans will be developed in accordance with priorities and budgets. The details of management plan implementation will be determined through Environment and Climate Change Canada's annual work planning process. An adaptive management approach will be favoured for the implementation of the management plan. The implementation of the plan will be evaluated 5 years after its publication, on the basis of the actions identified in Table 8.

The framework by which Tway NWA is managed is clearly delineated by the *Canada Wildlife Act*. Close liaison between government agencies and non-government wildlife organizations is essential for effective long-term management of the NWA and its surrounding environment. Topics of mutual interest to the federal and provincial governments include management of game and non-game wildlife, rare and endangered species, recreation, and production of special publications relevant to the NWA.

For Tway NWA, a minimum of one meeting per year should be held by DUC and CWS staff to review the previous year's events, and to discuss and coordinate plans for the upcoming season.

The following items will be considered for action during the first 10 years following approval of the management plan for Tway NWA. New initiatives will be prioritized and added to the list as required.

Table 8: Implementation strategy timeline for Tway National Wildlife Area

Activity	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
First Priority										
Completion of fencing requirements along north boundary	x	x								
Inspect the property boundary annually to maintain necessary signage and fencing to protect the property from prohibited activities, facilitate livestock grazing, and detect and control undesired vegetation with herbicides	x	x	x	x	x	x	x	x	x	x
Meet annually with DUC staff responsible for water control structure operation and maintenance to discuss workplans and identify challenges to address	x	x	x	x	x	x	x	x	x	x
Process permits annually for grazing to manage upland vegetation		x	x	x	x	x	x	x	x	x
Manage invasive species including use of herbicides for the removal of noxious weeds and the removal of wild boar (if present)	x	x	x	x	x	x	x	x	x	x
Second Priority										
Implement prescribed burns on 25% of the property			x					x		
Monitor the combined impacts of water regulation, grazing and prescribed burning on ecological conditions			x					x		

9.1 MANAGEMENT AUTHORITIES AND MANDATES

CWS: Ecological monitoring, habitat and land use management, permits and licensing, public information and outreach, enforcement, site maintenance (e.g., fences), boundary and information signs.

DUC: Tway Lakes Project and associated wetlands water level manipulations, construction and maintenance of water control structures (dykes and ditches).

9.2 MANAGEMENT PLAN REVIEW

Management plans will be reviewed 5 years after initial acceptance and every 10 years after that. Although CWS is solely responsible for management of Tway NWA, given that the Tway Lakes Project includes wetlands within the boundaries of the NWA, it is recommended that DUC be involved in the review of the management plan. Joint public consultation with DUC, other special interest groups and concerned individuals will be held, where possible, on topics

related to conservation of habitat and wildlife on Tway NWA. Submissions for plan revision will be invited at that time.

10 COLLABORATORS

Collaboration with local agencies and sector organizations to contribute to the protection and conservation of wildlife species and their habitats in the NWA will be favoured.

For instance, collaborations could be developed or pursued with universities and research centres to fill scientific knowledge gaps, with the province to implement species at risk recovery measures, particularly for species under provincial jurisdiction, with non-governmental organizations and municipal authorities to increase public awareness of the objectives of the NWA. The main organizations likely to collaborate or to have a stake in the management of Tway NWA include:

- DUC
- Saskatchewan Ministry of Agriculture
- Saskatchewan Ministry of Environment
- Local fish and wildlife clubs (Basin Lake Fish and Game League [St. Benedict], Struthers Lake Wildlife Federation [Yellow Creek/Crystal Springs])

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