REVIEW AND APPROVALS

MORRIS WETLAND MANAGEMENT DISTRICT

Morris, Minnesota

ANNUAL NARRATIVE REPORT

January 1, 2016 – December 31, 2016

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Wetland Manager Date

INTRODUCTION

The Morris Wetland Management District (WMD), originally established in 1964 as the Benson WMD, includes 248 waterfowl production areas (WPAs) totaling 52,906 acres in fee title ownership. In addition, the Morris office administers approximately 22,226 wetland acres of waterfowl management easement lands, 1,237 acres of FmHA easements, and 12,127 acres of wildlife habitat protection easements. The Morris WMD also administers fee and easement units of the Northern Tallgrass Prairie National Wildlife Refuge. We have now acquired 31 prairie easement tracts totaling 2,390 acres. All fee and easement areas are scattered throughout Big Stone, Chippewa, Lac qui Parle, Pope, Stevens, Swift, Traverse and Yellow Medicine Counties. The headquarters is located four miles east of Morris, Minnesota on the 861 acre Long Lake-Edwards WPA.

The topography of west-central Minnesota is diverse, ranging from the granite outcrops of the Minnesota River bottoms to the rolling hills of Pope County. The flat agricultural land of the Red River Valley of the north blends into the transition zone between the tallgrass prairie and eastern deciduous forest. Soils of the region are generally productive which contributed to the historically high concentrations of breeding waterfowl. With the advent of modern agriculture, approximately 90 percent of the original wetland basins in the district were drained and nearly 100 percent of the native grasslands were converted to cropland.

The primary objective of Morris WMD is to acquire, develop, and manage habitat for waterfowl production. Waterfowl species that commonly breed in this area include blue-winged teal, mallard, gadwall, wood duck, redhead, canvasback, ruddy duck, and Canada goose. The District also contains good populations of ring-necked pheasant and white-tailed deer, and an expanding wild turkey population. Another high priority objective is to provide habitat for native plants and animals. Private land habitat improvement for waterfowl and other wildlife is an important habitat restoration tool. Waterfowl production areas are open to public hunting and a variety of other wildlife oriented uses. The WPAs receive their highest public use on opening days of waterfowl, pheasant, and deer hunting seasons.

TABLE OF CONTENTS

HIGHLIGHTS 1

CLIMATIC CONDITIONS 2

MONITORING AND STUDIES 5

1a. Surveys and Censuses 5
1b. Studies and Investigations 9
1c. General Wildlife Observations 15

HABITAT RESTORATION 16

2a. Wetland Restorations (On/Off refuge) 16
2b. Upland Restorations (On/Off refuge) 18

HABITAT MANAGEMENT 25

3a. Wetland Management 25
3b. Haying 27
3c. Grazing 28
3d. Farming 31
3f. Fire Management 31
3g. Pest Plant Control 35

FISH AND WILDLIFE MANAGEMENT 54

4a. Bird Banding 54
4d. Nest Structures 54
4e. Pest/Exotic Control 54

COORDINATION ACTIVITIES 56

5a. Interagency Coordination 56
5c. Private Lands 58

RESOURCE PROTECTION 61

6a. Law Enforcement 61
6b. Permits/Economic Use 61
6c. Contaminants 61
6g. Land Acquisition Support 61

PUBLIC EDUCATION AND RECREATION 69

7a. Provide Visitor Services 69

7b. Outreach 72

7c. Friends of the Morris WMD 72

PLANNING AND ADMINISTRATION 74

8b. General Administration 74

ITEMS OF INTEREST 80

APPENDIX A 81

HIGHLIGHTS

1. **Concerns Grow Regarding Neonicotinoids**
   In cooperation with the R3 Division of Biological Resources, we initiated a baseline survey to assess how widespread neonicotinoid insecticides are in wetlands on Refuge System lands in Minnesota and Iowa. At Morris, we collected water samples from 23 wetlands on 16 WPAs in August (Section 1a).

2. **High Diversity Seedings are the New Normal**
   We planted 292 acres of native grasses and forbs on 22 WPAs and a Pheasants Forever tract slated for transfer. At the PF tract, which will be an addition to Stenerson Lake, we hired a contractor to broadcast three soil type appropriate mixes (dry, mesic and wet) for a combined total of 116 species (Section 2b).

3. **Morris WMD Continues a Strong Land Management Program**
   Over 10,250 acres of land was actively managed in 2016, including 3,338 acres grazed (Section 3c) and 6,912 acres burned (Section 3f).

4. **Land Acquisition Once Again Sets New Record for the Millennium**
   Morris WMD once again set a new station record for annual land protection this millennium, with a total of 2,286 acres protected, of which 712 acres were added to WPAs, 849 acres as habitat and wetland easements, and 725 acres as Northern Tallgrass Prairie easements. This new record broke last year's record setting protection acreage of 1,696 acres.

   The largest tract acquired was the Stadem Tract, an outstanding 354 addition to Hillman WPA in Big Stone County. This tract is approximately 1/3 wetlands, 1/3 native pasture, and 1/3 cropland which will be planted with a diverse native prairie seed mix. Hillman WPA is now 926 acres in size and harbors 348 acres of native prairie, much of which is very high quality (Section 6g).

CLIMATIC CONDITIONS

January
The month was warmer and drier than normal. Mid-month saw brutal arctic air accompanied by brisk winds. Snowfall totaled 4.4 inches; average is 8.1 inches. Winter (October-January) snow received was 15.9 inches, while the average is 26.3 inches. Effects of the strong El Nino were evident this season.

February
The month had a high frequency of cloudy days. The jet stream took a southward plunge during the second week of the month allowing colder weather conditions, followed by a significant warm up. Snowfall was below historical average and by mid-month to the month's end, there was no snow on the ground.

March
Temperature averaged 11 to 15 degrees above normal with record-breaking temperatures on 11th and 12th. Area lakes had very early ice-out dates during the middle of the month. Only a small amount of precipitation occurred this month.

April
The Drought Monitor put Big Stone and Traverse counties in the "Moderate" category while the rest of the district was "Abnormally Dry". Dust storms were seen and less than normal precipitation fell.

May
Average temperatures were the rule for May. Area crops were hurt by frost on the mornings of the 14th and 15th. The continued below average precipitation kept the district in abnormally dry conditions. The first tornado of the year was reported in Pope County on May 25th; little damage occurred.

June
Despite some rain, the area remained abnormally dry; half the days were very windy. Madison saw a high temperature of 100°F on the 13th. A scorching weekend of the 18th and 19th provided the right conditions for funnel clouds and a tornado at Lake Gilchrist (Pope County). Near the Milan-Watson area, severe thunderstorms with gusty winds and hail occurred. The Benson area saw rotation in a storm that produced heavy rainfall and nickel sized hail.

July
Extreme dryness ended with waves of rainfall on July 5th. Morris received a record breaking 4.51 inches and an observer just 0.7 miles to southeast reported 5.23 inches with an additional 0.83 inches from a later storm on that same day. This resulted in over six inches in a 24 hour period. A second round of storms produced a tornado near Appleton and a swath of one to two inch hail from there to Hutchinson.

The favorable wet year was a duck's best friend (DMO 6/30/2016).

August and September
Very pleasant weather occurred.

October
Milan recorded 80°F on the second day of the month. A wet first week ended with frost on the eighth, stopping the 2016 growing season.

November
Mostly mild, sunny and dry weather dominated the first half of the month. Winter started with blizzard "Argos" on the 18th, followed by unsettled weather. The month ended with a warm stretch, part of a warmer than normal pattern that had been in place since September 2015. There was little or no frost in the ground by month's end, and most water bodies were ice free.

December
On December 15 to 19 winter storm "Decima" swept in with an intense, short-lived blast of arctic air, followed by warmer temperatures. On Christmas Day storm "Europa" delivered a mix of snow and sleet, followed by rainy thunderstorms. The following day brought wind, rain, and periods mixed with snow. The month ended on the warm side.

2016 Weather Highlights
Overall, 2016 will be remembered as very warm, but not excessively hot; very wet, with multiple extreme rainfall events; and with a lack of cold weather (Tables 1 and 2). Other highlights from the Morris, MN weather station include:

- The annual mean temperature for 2016 was 45.2°F
- High temperature for the year was 93°F on June 20

- In 2016 there were five days of high temperatures exceeding 90°F
- Low temperature for the year was -29°F on December 19
- During 2016 there were 23 days with a minimum temperature of 0°F or lower
- Total precipitation was 27.7 inches
- Winter of 2015-2016, (October-March) had 24.8 inches of snow and 2016 (November-December) with 13.7 inches; average is 36.4 inches
- Records broken: February 28, 57°F (54°F in 1932); March 12, 68°F (66°F in 1934); March 13, 67°F (66°F in 1902); May 7, 91°F (89°F in 1934)
- Tied with 1963 as warmest autumn on record

Table 1 – Monthly Precipitation (inches) – Morris WMD – 2016

	Big Stone	**Chippewa**	**Lac qui Parle**	**Pope**	**Stevens**	**Swift**	**Traverse**	**Yellow Medicine**
	Artichoke Lake	**Milan**	**Madison**	**Glenwood**	**Morris**	**Benson**	**Wheaton**	**Canby**
Jan	0.29	0.09	0.15	0.32	0.29	0.29	0.21	0.51
Feb	0.64	0.45	0.37	0.30	0.66	0.45	0.81	0.46
Mar	0.55	1.17	0.83	1.56	0.61	1.65	0.34	1.21
Apr	2.24	2.41	2.04	1.53	1.85	1.78	1.91	1.80
May	1.45	1.34	1.45	2.03	1.99	3.20	1.23	1.66
Jun	0.99	0.93	1.78	1.82	1.89	1.92	1.82	2.55
Jul	7.71	6.25	8.48	8.03	9.88	8.59	7.07	3.62
Aug	4.07	10.20	8.37	5.85	2.79	4.25	3.17	6.11
Sept	2.83	3.20	3.91	1.72	1.68	3.14	1.72	4.13
Oct	3.45	3.10	3.50	3.34	3.94	3.25	3.68	2.28
Nov	1.86	2.12	1.94	1.29	1.34	2.22	1.94	1.96
Dec	1.27	1.34	1.44	0.96	0.85	1.46	1.10	2.02
Total	**27.35**	**32.61**	**34.26**	**28.75**	**27.77**	**32.20**	**25.00**	**28.31**

Table 2 – Monthly Temperature Information (°F) – Morris, MN – 2016

Month	**Mean Temp**	**Departure from Normal**	**High**	**Low**
January	12.7	+ 2.7	40	-19
Febuary	21.3	+ 8.1	57	-09
March	37.0	+ 9.2	68	09
April	43.4	- 0.1	83	15
May	57.7	+ 1.4	91	29
June	67.8	+ 1.2	93	46
July	69.6	- 1.3	90	46
August	69.0	- 0.8	89	47
September	61.2	+ 2.1	81	35
October	48.0	+ 1.2	77	27
November	40.0	+ 10.2	73	11
December	14.9	- 0.1	37	-29

MONITORING AND STUDIES

1a. Surveys and Censuses

Christmas Bird Count
There are two Christmas Bird Count (CBC) circles in Morris WMD. In 2016, the Morris CBC was on December 20, and the Lac qui Parle CBC was held on December 16. The Morris observers recorded 35 species, while the Lac qui Parle group recorded 41 species. Both counts recorded an unusually low number of Canada geese this year (three in Morris and 20 in Lac qui Parle). With our cold December weather, there was little open water in the area – a strong contrast to the previous two years when the December weather was much warmer than normal. Interestingly, the Lac qui Parle observers did have a higher than normal number of cackling geese (35). Morris recorded a high count for Eurasian collared doves (86). Other flagged species in Lac qui Parle were high counts for wild turkey (82) and horned larks (1147).

Breeding Bird Survey
Staff conducted two breeding bird survey routes this year. The breeding bird survey is coordinated by USGS and the Canadian Wildlife Service. It is a long-term, large-scale survey used to monitor status and trends of North American bird populations. There are several routes within the Morris WMD, many of which are conducted by staff from the Division of Migratory Birds and other volunteers. Biologist Vacek ran the Chokio route on July 1 (50 bird species observed) and the Appleton route on July 5 (57 bird species observed).

Four Square Mile Waterfowl Pair Count
The annual four square mile breeding waterfowl survey has taken place since 1987. Each year the Habitat and Population Evaluation Team uses data from this survey to compile wetland condition, breeding waterfowl population, and waterfowl production estimates for Morris WMD, as well as other districts, and the prairie pothole region of Minnesota and Iowa. At the time of this writing, we have not received 2016 results from HAPET.

Woodcock Survey
Biological Technician Oglesby assisted with the annual American woodcock singing-ground survey. There are two assigned survey routes in the district, one in Pope County and one in Stevens County. Routes are 3.6 miles long, with 10 listening stations where observers record the number of woodcock heard peenting. The route in Pope County is run annually. This year it was surveyed on May 2 with 4 birds observed. The Stevens County route is run every five years unless birds are observed, in which case it would be run annually (it was not run in 2016).

The Division of Migratory Bird Management uses the singing-ground survey data to calculate trends in woodcock heard during the singing ground survey. Like last year, the short term (2015-16) and 10-year (2006-16) trends were not significant in the Central Management Region, suggesting stationary populations. The region continued to experience a long-term (1968-2016) declining trend (-0.7 %/year). In Minnesota, the 2015-16 trend was not significant, but the state did show a small increase in both the 10-year (2.4 %/year) and long-term (0.8 %/year) trends.

Native Prairie Remnant Inventory
We continued the ongoing floristic quality assessments on remnant native prairie tracts managed by Morris WMD. Briefly, we list all plant species observed during a field visit to a prairie remnant. Using the coefficient of conservatism that has been assigned to each plant of the northern Great Plains, we are able to calculate a floristic quality index (FQI) that can be used to compare the relative quality of remnants. In addition to the FQI, we can analyze remnants based on other calculations such as the percent of native or nonnative species present.

We continued to focus this year on completing FQI assessments for the highest priority WPAs. This year surveys were completed on McIver WPA, and Prairie management unit 4, which includes Prairie WMA and habitat easements 278G and 336G.

Rocky Mountain blazing star (*Liatris ligulistylis*), a highly conservative prairie plant and a favorite of monarchs, was abundant during the prairie remnant inventory at McIver WPA in August (SCV 8/30/2016).

Wetland Resources Monitoring
In 2009, the regional hydrology staff established a long-term monitoring project to study surface and ground water within wetland complexes at Rothi and Nelson Lake WPAs. Hydrology data collected at the monitoring stations include precipitation, water quantity, and ground water levels.

Quantifying hydrology will allow us to better predict bounce, source water availability, groundwater recharge, hydrolic impacts of upstream land use, impacts of restored wetlands on flood abatement, and threats and needs of prairie wetlands under current climate change scenarios. The data we collect may also be used to refine climate change models for the region.

In 2016, the regional hydrology staff took care of downloading hydrology data from the monitoring stations at Rothi and Nelson Lake. We will be meeting with them early in 2017 to go over the data we have collected so far and discuss the future of the project.

Regional hydrology staff member Vince Capeder checks water levels at a monitoring site on Nelson Lake WPA (Jennifer Gruetzman 4/19/2016).

Bonanza Valley Water Monitoring

Minnesota DNR has designated the Bonanza Valley, which includes much of eastern Pope County, as a Groundwater Management Area (GWMA). The GWMA was established due to concerns about sustainable use of groundwater in this shallow aquifer. Groundwater usage has increased 30% in Minnesota in the last three decades, but has gone up over 175% in the Bonanza Valley during that time. As part of a public planning process, the DNR has established groundwater observation wells throughout the GWMA. Due to concerns about wetlands drying up when irrigators are running in late summer, the US Fish and Wildlife Service has partnered with DNR to monitor groundwater and surface water on four WPAs, including Bangor and Grove Lake in the Morris District. The regional hydrology staff have collected bathymetry data at each wetland, and have tied water stage to volume. Water levels do vary naturally in prairie wetlands, but we hope that this monitoring will help determine whether increased irrigation is impacting that natural cycle. Staff at Litchfield WMD are taking the lead on collecting data for this project.

North American Amphibian Monitoring Program/Minnesota Frog and Toad Calling Survey

We continued to participate in the North American Amphibian Monitoring Program this year. Routes were visited after sunset three times annually (early spring, late spring and summer). Observers identified the frog and toad species present at each stop based on breeding calls and estimated the abundance of each species using an index value.

The Minnesota DNR recruits volunteers for these routes, but has difficulty finding individuals to survey in our rural area. In 2016 Morris staff (Biological Technician Hughes and Biologist Vacek) assisted by surveying four of the nine routes in the district. We observed nine species of frogs and toads, with boreal chorus frog, wood frog and Canadian toad being the most frequent. Anecdotally, we seem to be observing American toads less often and tree frogs more often than in the past.

Phenology Monitoring (National Phenology Network)

We participated in the National Phenology Network monitoring program this year. We established four sites at Edwards WPA: one each in prairie, oak savanna, seasonal wetland and semi-permanent wetland habitats. Biotech Hughes and SCA Intern Morris visited the sites weekly from May through September. They determined phenophase of designated plant and animal species, which were entered into Nature's Notebook using a mobile app. This annual monitoring is a good experience for volunteers and student interns, and we plan to continue in the future.

Milkweed in Prairie Reconstructions

With the declining monarch population trends in recent years, there has been a large emphasis placed on creating monarch habitat by planting milkweeds. Morris WMD has been including various milkweed species in our high diversity prairie reconstructions for several years, and in 2016 we decided to start a comprehensive evaluation of how well that milkweed had established in our plantings. SCA Intern Morris sorted through seeding records since 2003 to determine where we have planted milkweed. She then visited 45 prairie reconstructions to look for milkweed species. Only 9 of the 24 sites that included at least one milkweed species in the seed mix had milkweed growing in the planted area. With so many sites to visit, a number of them were only viewed from the road so it is possible that non-flowering milkweed plants were overlooked. A more detailed, transect-based survey was tested at Westport WPA. The protocol was very time consuming and will not be practical across a large number of seedings. Interestingly, most sites where milkweed were not observed in the actual seeded area did have common milkweed growing in the road ditch or other portions of the WPA. We plan to continue to refine this protocol next field season.

Neonicotinoid Surveys

Neonicotinoids, a class of agricultural insecticides, are used widely in our region. Studies in recent years indicate that non-target effects may be occurring in both wetland and upland ecosystems. We are particularly concerned about reports from South Dakota and Canada that neonicotinoids are being detected in prairie wetlands. Aquatic invertebrates are a key food source for breeding waterfowl, so insecticide contamination in prairie pothole wetlands could have serious implications for our breeding waterfowl habitat goals.

Starting this year, we participated in a baseline survey to assess how widespread neonicotinoid chemicals are in wetlands on Refuge System lands in Minnesota and Iowa. Other stations

involved are Union Slough, Detroit Lakes, and Litchfield. At Morris, we collected water samples from 23 wetlands on 16 WPAs in August. The same wetlands were resampled in September, when we also added five additional wetlands.

This effort will continue in 2017 in conjunction with a graduate research project out of North Dakota State University.

Biologist Vacek collects a surface water sample at Edwards WPA. Water samples were sent to a lab at Mississippi State University to test for five different neonicotinoid pesticides (HM 8/26/2016).

1b. Studies and Investigations

Secretive Marshbird Research

Nina Hill, a graduate student at the University of Minnesota, is conducting research on secretive marshbirds in the Prairie Pothole Region of Minnesota. Overall, the research will examine the effects of vegetation management (particularly cattail control methods) on wetland use by secretive marshbirds. In the Morris WMD study area, we hope to learn how our overall WPA management (which is usually targeted to the upland plant community) affects the vegetation community and marshbird abundance in our shallow wetlands. The study wetlands are assigned into one of three management history categories: low (<3 burns and no grazing 2000-2014), medium (≥3 burns and no grazing 2000-2014), and high (≥3 burns and some grazing 2000-2014). Nina conducted 215 surveys in 2015 and 252 surveys in 2016. The most commonly detected marshbirds were sora, pied-billed grebe, American bittern, Virginia rail, and least bittern. Final analysis and results are pending.

Evaluation of Methods for Canada Thistle-Free Habitat Restoration
This study compares the effectiveness of various seeding techniques and seed mixes for suppressing Canada thistle establishment in new restorations. The hypothesis is that by increasing competition and decreasing the disturbance inherent in seeding, we can produce more weed-resistant restorations. Diane Larson (USGS-Northern Prairie Wildlife Research Center) is the principle investigator for this study, which is being conducted at Morris (Diekmann and Fahl WPAs), Fergus Falls and Litchfield WMDs and Neal Smith NWR. Each site has two to four study fields consisting of 108 plots that were seeded using one of three seeding techniques and three seed mixes (fully crossed for a total of nine treatments). The seeding techniques included dormant broadcast, spring broadcast, and spring drill. The seed mixes were of three diversity levels: 10, 20 and 34 species.

The study plots were surveyed in 2015, which marked 10 growing seasons since the fields were first planted. Cover by species was estimated in 2005-2007, 2010 and 2015. In 2015, cover of planted species, native non-planted species, and exotic species were similar to that recorded in 2010, suggesting that these aspects of the reconstructions had stabilized. Canada thistle (*Cirsium arvense*) cover had also declined without herbicide from a peak in 2007 to low stable levels from 2010 to 2015. Richness of planted forbs, on the other hand, was still increasing in many of the treatments. Two results in 2015 are reasons for concern: cover of planted species is only slightly over 50%, though with forbs still increasing, this may improve; and the cool-season exotic grasses Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*) are increasing.

Grassland Monitoring Team
We have participated with the Grassland Monitoring Team (GMT) since it started in 2007. This is a collaborative, adaptive management effort with the goal of managing remnant prairies to minimize invasive species (cool-season grasses and woody plants) and favor native species. Biologist Vacek is on the GMT coordination team, which also includes representatives from The Nature Conservancy, Minnesota Department of Natural Resources, and Chicago Botanic Garden.

Morris WMD has enrolled 15 management units at Welsh, Welker, Hamann, Glacial Lake, Prairie and Twin Lakes WPAs, as well as some state and private land within the Prairie WPA/WMA Complex. The sites are monitored every three years on a rotating schedule; Prairie 4, Victory A and B, and Twin Lakes B and C were all surveyed in 2016. Our basic protocol includes monitoring vegetation composition using a belt transect and checklists of indicator species (native and invasive), as well as structural information like litter depth and visual obstruction. The monitoring data are used to update predictive models, which then provide a site-specific, state-based management recommendation for the coming three-year cycle.

While we recognize that adaptive management is a long-term effort, the GMT models are starting to indicate that more intensive management is needed to improve degraded prairies, while less frequent defoliation is appropriate on high quality prairies. With nearly 10 years of data collected, the coordination team also decided to work with a statistician to analyze our data using traditional methods to compare with the adaptive management model results.

Native Prairie Adaptive Management Project
The Native Prairie Adaptive Management (NPAM) effort was developed by refuge biologists and managers from Regions 3 and 6, as well as USGS scientists from Northern Prairie and Patuxent

Wildlife Research Centers. The particular focus of this project is to learn how well we can reduce smooth brome and Kentucky bluegrass from remnant prairies on refuge lands. The project includes over 120 management units throughout the Prairie Pothole Region.
Morris WMD has nine management units in the project, located at Hillman, Florida Creek, and Freeland WPAs. Each year, our monitoring and management data, along with that collected at the other management units, is entered in an online database and used to generate management recommendations for the coming year. The recommendations are based on a model prediction of the best management decision given the current vegetation state and recent management history at the site. We started collecting vegetation data on our NPAM units in 2009, and the adaptive framework started providing management recommendations in 2011. Each year, Morris staff use the management recommendations provided through NPAM to guide our management plans at those sites.

Sediment Removal Adaptive Management
Morris WMD continues to participate in an adaptive management project focusing on the role of sediment removal in wetland restoration. The project is intended to guide decisions about if and when removing sediment is an appropriate component of wetland restorations. The project includes stations throughout Minnesota (Refuges and Private Lands Offices). We did not add any new basins this year, but did do annual vegetation and hydroperiod monitoring on six of the eleven wetlands that we have in the project. Wetlands are surveyed once a year before restoration, annually for the first four years, and in years six and eight. The model will be run in years four and eight to determine if sediment removal is producing more biologically diverse wetlands.

This wetland on Pope County 393X was previously restored but the structure had washed out. The partially drained wetland was choked by cattail and reed canarygrass. Six to twelve inches of sediment was removed from this basin when it was restored in 2012 (SCV 7/3/2013).

By 2016 you can see cattail and reed canarygrass reinvading the basin. This wetland will be surveyed again in 2018 and 2020 (KMM 7/13/2016).

Grazed Wetlands

Well-managed livestock grazing is a useful tool for managing native grasslands. Though most prescribed grazing is designed to meet upland prairie goals, the effects of livestock grazing in prairie wetlands are less understood and investigated. Grazing planned with upland prairies in mind can have unintended effects in the wetlands found at the site. For example, wetland soils are often more susceptible to change from the physical disturbance of cattle than wetland soils. These changes could lead to increased invasion by undesirable species. On the other hand, managers have observed that shallow wetlands in well-managed, private pastures often have less cover of invasive species than similar wetlands in grasslands that are predominantly managed by rest.

We worked with Fred Harris (a research scientist with the MN DNR) to establish a long-term monitoring project that will examine the effects of cattle grazing on native wet meadows. This year we established 15 pairs of survey plots at Hastad WPA. The plots were placed in the wet meadow zone of wetlands ranging from basins with high quality, native plant communities to basins with partial to full reed canarygrass invasion. We used temporary electric fence to exclude cattle from one plot in each wetland. Monitoring included recording plant frequency and cover, visual obstruction readings, and grazing utilization assessments. In 2017, we plan to set up monitoring at the Prairie WPA/WMA complex.

The YCC crew was very helpful for getting the grazed wetland survey plots measured and staked out (SCV 7/14/2016).

Each study wetland at Hastad WPA had a pair of survey plots – one grazed and one ungrazed. Temporary electric mesh fencing was used to exclude cattle from the ungrazed plots at Hastad WPA (KMM 8/10/2016).

Other Studies
Several other outside agencies or universities use Morris WMD lands for research sites. The research has value to us but we are not closely involved in the surveys or study design.

- **Population Structure and Trophic Role of Tiger Salamanders in Stevens County** – *Heather Waye* of the University of Minnesota (Morris) has a long-term study of tiger salamanders in Stevens County. She is monitoring population size, demographics, movement among populations, population genetics, and the trophic role of larval and adult salamanders. Her surveys are being done on Pepperton and JohnsonWPAs.
- **Carbon Dioxide and Methane Emissions from Wetlands** – *Leah Domine* of the University of St. Thomas is leading a research project to look into how shallow lakes function in terms of regional carbon cycling. The wetland on Kill WPA is being used as a study site for the project, which is permitted to continue through 2018.
- **Prairie Butterfly Survey** – *Robert Dana* with the Minnesota DNR is conducting a survey of prairie-dependent butterflies at the Prairie WPA and WMA complex. Regal Fritillaries were the only target species detected. A Northern Tallgrass Prairie NWR Easement (Pope County, 59G-14) was also surveyed, where Melissa blue, regal fritillary, prairie ringlet, and Pawnee skipper were detected. Interestingly, this was only one of two prairie complexes where Pawnee skipper were found.
- **Effects of Grazing vs. Fire for Prairie Management** – *Karen Oberhauser, Diane Larson and others* at the University of Minnesota (St. Paul) are investigating the relative effects of grazing and fire management on remnant prairies. There is little in the published literature about ecological effects of conservation grazing. The team will compare the plant and pollinator communities across 75 graze-only or burn-only prairies in western Minnesota, including 47 WPAs in Morris WMD.
- **Comparative Analysis of *Liatris* Nectar Composition** – *Karen Oberhauser and Karin Jokela* from the University of Minnesota (St. Paul) collected nectar samples from four *Liatris* species (blazing stars) at Florida Creek WPA in August. The nectar samples will be analyzed to compare volume, sugar content, fatty acids, amino acids and volatile organic compounds among species. In part, this project is meant to explore why monarchs seem to have a strong preference for *Liatris ligulistylis* even when other blazing stars are abundant.
- **Latitudinal Variation in Pollinator and Co-flowering Communities, and Reproductive Success in a Rewardless Orchid, *Cypripedium candidum*** – *Steven Anderson* of the University of Manitoba is researching various aspects of tallgrass prairie flowering plants and pollinators across a latitudinal gradient from southern Minnesota to southern Manitoba. His objective is to understand the mechanisms behind the latitudinal trend in fruiting success for small white lady's slipper (Cypripedium candidum). In 2016, he placed transects at Lundgren and Appleton WPAs.
- **Minnesota Wetland Condition Assessment** – Mark Gernes and Mike Bourdaghs with Minnesota Pollution Control Agency conducted the second cycle of a study to assess the status and trends of wetland conditions in Minnesota (the work occurs every 5 years). Vegetation and pesticide were sampled at Stegner WPA as part of this effort.

1c. General Wildlife Observations

With a warm and dry end to winter, our spring season got off to a bit of an early start in 2016. We observed the first pair of Canada goose at the headquarters on March 7. They didn't have to wait long, as ice-out occurred in most of the area by the middle of that month. The main part of the spring migration occurred in mid-March. Pasque flowers emerged the first week of April. The first goslings were observed on Stammer WPA on April 28, and the first mallard brood was seen at Horse Lake WPA on May 24.

The DNR pheasant index, based on their August Roadside Survey, was up 29% from 2015, but still 14% below the 10-year average and 48% below the long-term average. Pheasants benefitted from a second consecutive mild winter and good spring nesting conditions. Most importantly, however, has been the increase in habitat within the pheasant range (over 60,000 acres according to the DNR). The gray partridge index increased since 2015 and was similar to the 10-year average, but is still well below the long-term average. The mourning dove index decreased this year, and is now below both the short and long term averages.

This sandhill crane nest was seen in a Pope County wetland during Four Square Mile Surveys this spring. We regularly see breeding sandhill cranes and trumpeter swans in the eastern portions of the district (SCV 5/12/2016).

HABITAT RESTORATION

2a. Wetland Restorations (On/Off refuge)

Private Lands
Thirty-two wetlands were restored on private lands in 2016 (Table 3). This was the second year in a row with an increase in the number of completed wetland restorations due to a number of fee title acquisitions, in partnership with Pheasants Forever, Inc., and new easements that included substantial cropland acreages with drained wetlands.

These restorations included ditch fills, tile breaks, and sediment removal. A noteworthy private lands project was the Hamann habitat easement in Lac qui Parle County. A total of nine wetlands were restored on this property (five ditch plugs and four scrapes/sediment removals). Two semi-permanent wetlands were restored within the existing remnant prairie with the other seven restorations occurring within cropland. The entire site was seeded to a high diversity, local ecotype seed mix in 2016.

Overall, the number of wetland restorations on private lands continues to be lower than the long-term average as a result of a more diverse private lands program. The Partners Biologist now coordinates many more acres of upland habitat restoration than in the past. These projects include prairie reconstructions, cool-season grass conversion, and invasive tree removal. The result is a more efficient and strategic approach to conservation that focuses on putting the right habitat in the right places.

Waterfowl Production Areas
Two wetlands were restored by a contractor on Hillman WPA in Big Stone County with a North American Wetland Conservation Act (NAWCA) grant in 2016. The larger of the two wetlands was 19.7 acres and included a rocked primary spillway that will also provide access to the rest of the unit.

Sunset over a chain of restored wetlands on the Stenerson Lake WPA addition, Pope County, in early spring (ALG 4/2016).

Table 3 – Wetland Restorations – Morris WMD – 1987-2016

Year	Basins	Acres
1987	33	79
1988	208	673
1989	84	282
1990	82	278
1991	103	839
1992	85	228
1993	117	508
1994	78	556
1995	49	268
1996	42	177
1/1-9/30/97	34	423
FY 1998	91	311
FY 1999	51	345
FY 2000	73	387
FY 2001	38	120
FY 2002	35	313

Year	Basins	Acres
FY 2003	75	255
FY 2004	54	289
FY 2005	25	78
FY 2006	42	128
FY 2007	17	45
FY 2008	26	69
FY 2009	14	30.4
FY 2010	9	52.5
10/2010-11	14	52.9
2012	9	67
2013	1	11
2014	2	1.1
2015	21	22
2016	34	57.3
Total	**1,546**	**6,945.2**

2b. Upland Restorations (On/Off refuge)

Grasslands consist of native prairie, planted native species, introduced cool-season grass seedings, and legume plantings. We no longer plant the latter two, and now only seed native mixes with high forb and grass diversity (40 or more species). The term for these types of seedings is prairie reconstructions. Management practices include fire, grazing, haying, and herbicide application. Traditionally, new fee and easement acquisitions have provided the acreage for seeding each year. More recently we have made a concerted effort to convert low quality or weed infested grass stands. Restoration may involve farming for several years or straight conversion with tillage and herbicide. Restoration may also entail enhancement through inter-seeding into existing sod, whether a prairie remnant or a previously restored crop field.

Traditionally, newly acquired land was often cash rented and farmed with Round-up (glyphosate) Ready soybeans for a year if the existing crop was corn when it was acquired. This makes a good seedbed for native species and provides a means of controlling weeds. In the cases where we are converting grass stands with a historical weed problem, we will either hire a contractor to do tillage and fallow for a year with herbicide applications, or cash rent for several years in a soybean/ corn rotation with the final year being soybeans, or cash rent in a small grain and cover crop rotation with the option to fall graze. Recently, due to concerns with neonicotinoid treated seed and the common use of herbicides added to glyphosate that have carry-over up to 18 months, we have begun using cropping with small grains (mostly oats) as a seedbed prep.

In the last few years, some of our seeding efforts have aimed to address low diversity native plantings and low quality remnant prairie by inter-seeding forb rich seed mixes. These mixes have been local harvests augmented with local ecotype purchased seed, or vice-versa.

Weed control on young prairie reconstructions is often necessary to reduce shading and seed set of biennial and perennial non-planted species. In the last few years, post establishment management philosophy has evolved to have as light of a hand on the land as possible. Our observations have shown that with these high diversity mixes, if we exercise patience and let the site mature, the natives will establish and out-compete the undesirables. Weeds of greatest concern in a new seeding are perennials such as Canada thistle and biennials such as sweet clover, bull thistle, and plumeless thistle. Annuals like giant ragweed, wild sunflower, foxtail, and lamb's quarter may be cause for concern if very dense, but otherwise get a pass. In the first two or three years of establishment, if undesirable weed growth of the above mentioned species is found to be great enough to warrant management, we will clip the site no shorter than eight inches, spot mowing if feasible, or spot spray with a selective herbicide using backpacks and/or ATVs. By year four we often conduct a prescribed burn, either dormant in the spring or early enough in the growing season to minimize impacts to seeded cool-season native species. This stimulates the native warm season species, giving them a competitive edge.

Native Prairie

The original upland vegetation within the Morris District was tallgrass prairie. These remnant areas vary in size from less than one acre to 513 contiguous acres on Hastad WPA. The total native prairie acreage on WPAs within the District was approximately 7,225 in 2016. This total includes the addition to Stenerson Lake WPA, but does not include Finden or the addition to Hillman (Stadem) as initial habitat mapping has not been field verified and corrected. The Hastad addition did not have any remnant prairie. The Hoffman Northern Tallgrass Prairie tract will be

transferred in 2017 and once habitat mapping is complete, any native prairie will be added to the total in next year's report.

Over the past few years, active management consisting of prescribed burning, grazing, and haying has been applied to many of the larger remnants, with some even receiving inter-seeded forb and grass seed. Some of the smaller acreage remnants have not been actively managed because of size, terrain, location, and staff time.

A prescribed burn conducted in the remnant prairie at Svor WPA on May 20 promoted flowering in the blazingstars there, which drew many Monarch butterflies for the nectar (JBB 8/30/2016).

Native Seeding

Since 1973, the Morris WMD has planted roughly 13,123.5 acres of native vegetation. As identified in the Comprehensive Conservation Plan, upland restorations (also referred to as prairie reconstructions) "will replicate, to the extent possible, the structure, species composition, and processes of native ecological communities in the tallgrass prairie. Thus, where practical, reconstructions will use local ecotype seed containing eight or more grass species and 30 or more forb species." In the past 15 years, we have averaged just over 25 acres per year of seeding natives into expired food plots, alfalfa hayfields, crop fields of acquisitions, tree grove removal areas, or brome conversions. The primary limiting factor to converting more fields of marginal tame grass nesting cover to local ecotype natives is seed availability, expense, and the maintenance burden of shepherding a site through the weedy stage of establishment.

In recent years, reconstruction projects using grant funding have enabled us to do "Cadillac" seedings with more than 55-65 species of forbs, sedges, and grasses with a seeds per square foot forb to grass ratio of 1:2 or 1:1. Most years the mixes used in these projects were a combination of our own harvests and purchased seed. This year the projects done with contractors used mixes

composed entirely from purchased seed, except the re-seeding for the 2.5 acre Edwards Wet-Mesic site which contained some of our hand harvested species. For sites seeded with staff, we seeded 20 acres on six sites that contained a mixture of purchased seed and our harvests. All of the seed mixes used are found in Appendix A.

A May 1 prescribed burn stimulated the three year old seeding at Loen WPA resulting in a strong showing of Maximillian sunflower, false sunflower, and yellow coneflower (JBB 8/30/2016).

From approximately 2004 to 2012 when we were planning seed mixes for reconstructions in soils with a cropping history, or restoration/enhancement inter-seedings, we would try to include plenty of species in families displaying some degree of tolerance to the clopyralid and aminopyralid herbicides (trade names Transline, Pyramid, Milestone), such as the mint and carrot families. The strategy was meant to make broadcast herbicide application for thistles more feasible since there would be less non-target loss of costly forbs. Lately, we've been largely ignoring the tolerance aspect and just seeding as diverse a mix as we can find and/or afford; our approach has evolved to spot mow or spot spray thistles and other undesirable vegetation.

In the 2016 calendar year, 291.96 acres were seeded to native grasses and forbs on 22 WPAs and a Pheasants Forever (PF) tract slated for transfer (Table 4). The PF tract was an addition to Stenerson Lake WPA (P-42). It was still owned by PF at the time of seeding and thus coordinated by Partners Biologist Galt. A contractor from southern Minnesota (LeSueur River Seeding and Conservation) received the bid award. They broadcast three soil type appropriate mixes for a combined total of 116 species. The Karsky and Prairie reconstructions were seeded with a Truax drill by Habitat Forever through a CPL grant. Habitat Forever also re-seeded the 2.5 acre wet-mesic site at Edwards and a cool-season dominant mix in the 7.5 acre seeding at Big Slough, which was accidentally sprayed with Round-up by a Co-Op. An explanation for the

herbicide carryover at Edwards can be found in the 2015 annual narrative report. The Co-Op acknowledged their error and paid for the seed and seeding at Big Slough.

A contractor was hired using 6860 funding to plant seedlings and drill extra holes for the volunteer planting below the Kate Livingston Memorial at Edwards WPA. Unseasonably warm, dry weather in early June caused a delay in planting (JBB 6/15/2016).

The weather barely cooperated for the snow seeding at the Fettig tract addition to Stenerson Lake WPA (JBB 3/18/2016).

Table 4 – Prairie Reconstructions and Restorations* – Morris WMD – 2016

Unit Name	Unit ID	Date	Acres	Comments
Pepperton	SV-45	3/4	0.05	Hand broadcast plug repairs
Golden	SV-11	3/4	0.11	Hand broadcast plug repairs
Stenerson Lake	P-42	3/18	200.00	LeSueur River
Prairie	B-53	6/2	15.24	HF Drilled LE
Karsky	B-1	6/6	18.89	HF Drilled LE
Big Slough	SW-8	6/21	7.46	HF Drilled LE - due to overspray
Loen	SW-18	7/1	0.15	Hand broadcast
Glenwood	P-58	7/1	0.30	Hand broadcast
Weiler	SV-48	7/1	0.09	Hand broadcast
Edwards	SV-16	7/7	2.33	HF Drilled LE - re-seeded wet-mesic
Lake Simon	SW-26	7/14	12.41	Broadcast natives tree groves
Lake Simon	SW-26	7/14	4.01	Broadcast natives basins
Prairie	B-53	7/14	0.36	Hand broadcast LE
Bangor	P-27	7/18	2.40	Broadcast LE grove site
Stenerson Lake	P-42	7/18	4.20	Broadcast LE grove site
Lundgren	C-1	7/18	0.70	Broadcast LE tree piles
Beyer	L-19	7/20	4.18	Broadcast LE tree row removals
Spring Lake	SW-24	7/20	0.32	Broadcast LE tree piles
Hegland	L-13	7/20	9.43	Broadcast LE tree piles
Pepperton	SV-45	9/13	3.13	Broadcast LE sediment tailings
Lamprecht	SV-13	9/13	2.57	Broadcast LE sediment tailings
Schultz	SV-23	9/13	2.14	Broadcast LE sediment tailings
Sherstad Slough	SV-10	9/23	0.33	Broadcast LE tree pile
Lake Simon	SW-26	9/23	0.07	Broadcast LE ditch plug
Welsh	SW-4	9/23	0.18	Broadcast LE tree piles
Hegland	L-13	10/18	0.91	Broadcast LE grazing disturbance
Total			**291.96**	

*Seed mixes for these sites can be found in Appendix A.

Seed Harvest

The 2016 seed harvest was challenging due to a wet fall and site conditions that were too soft for our Gleaner combine. We persisted though and managed to combine 3,133 bulk pounds (588 pure live seed pounds) of seed from four sites (Table 5). Hand harvest totals were less than the haul from 2015, but were a reflection of losing the lead technician to another agency in September. As in past year's we tried to focus on more expensive or difficult to purchase species like phlox, Canada anemone, common boneset, narrow-leaved purple coneflower, veiny pea, silverleaf scurfpea, bottle gentian, prairie onion, blazingstars, lobelias, dwarf indigo bush, and leadplant. In addition to our annual Volunteer Seed Harvest Day held this year on October 1, we conducted another staff harvest.

The remnant prairie by the parking lot on Welsh WPA responded nicely after the prescribed burn and provided hand harvest opportunities for leadplant and narrow-leaved purple coneflower (JBB 7/26/2016).

A dense and abundant population of Canada anemone (*Anemone canadensis*) was discovered on a prairie remnant at Spring Lake WPA. Several trips with YCC and CCM were made and resulted in a record harvest of this species for us. The technicians also collected a record amount of dwarf bush indigo (*Amorpha nana*) at McIver, ground plum (*Astragulus crassicarpus*) at Glacial Lake, whorled milkweed (*Asclepias verticillata*) from Stenson Lake, Welsh and Florida Creek WPAs, and common boneset (*Eupatorium perfoliatum*) from Spring Lake.

Table 5 – Native Seed Harvested – Morris WMD – 2016

Site	Collection Date	Primary Species Collected	Method	Acres	Bulk Quantity	Comments
Bahr WPA	7/20	*Phlox pilosa*	Hand	0.45	~1.5 oz	
Hamann WPA-ditch	7/21	*Phlox pilosa*	Hand	0.2	~3.0 oz	
Jackson WPA	8/4	*Phlox pilosa*	Hand	0.64	~1.5 oz	
Glacial Lake WPA	8/5	*Astragalus crassicarpus, Lathyrus venosus*	Hand	4.76	32.0 oz	
Spring Lake WPA	8/10	*Anemone canadensis*	Hand	13.9	104 oz	
Hillman WPA	8/31	*Echinacea angustifolia*	Hand	2.91	16 oz	
Fitzgerald WPA	9/2	*Liatris ligulistylis*	Hand	3.5	~5 oz	
Hutchinson WPA	9/3	*Asclepias syriaca, A. incarnata*	Hand	0.44	10 oz	
Benson Lake WPA	9/7	*Asclepias incarnata*	Hand	0.02	*	
McIver WPA	9/9	*Asclepias incarnata*	Hand	0.67	*	
Krantz Lake WPA	9/14	*Liatris ligulistylis, L. pychnostachya*	Hand	10.68	32 oz	
Spring Lake WPA	9/21	*Asclepias syriaca*	Hand	7.93	32 oz	
McIver WPA	9/21	*Amorpha nana*	Hand	0.45	88 oz	
P-389G-1	9/21	*Liatris punctata*	Hand	3.67	184 oz	Staff Harvest
Hutchinson WPA	9/22	*Asclepias syriaca, A. incarnata*	Hand	2.79	*	
Edwards WPA	9/26	*Echinacea angustifolia*	Hand	3.44	80 oz	
Svor WPA	10/1	*Liatris ligulistylis, L. pychnostachya*	Hand	12.89	160 oz	Added to Krantz Lake
Welsh WPA	10/1	*Asclepias verticillata, Echinacea angustifolia*	Hand	15.43	96 oz	
P-389G-1	10/3	*Liatris aspera*	Hand	0.61	32 oz	Wulf Easement
Stenson Lake WPA	10/3	*Asclepias verticillata*	Hand	0.17	22 oz	
Rolling Forks WPA	10/14	*Liatris punctata*	Hand	0.15	*	
Kufrin WPA	10/3	Dry prairie species	Combine	5.8	477 lbs	Lot# B12-NP16
Lac qui Parle WMA	10/13-14	Dry prairie species	Combine	4	1015 lbs	Lot # WMA-NP16
Walden WPA	10/18-19	Local ecotype	Combine	9	1430 lbs	Lot# P19-LE16
Rustad WPA	11/1	Local ecotype	Combine	3.4	208 lbs	Lot# P25-LE16

*Hand harvest small quantity, not measured

HABITAT MANAGEMENT

3a. Wetland Management

Cattail Scrapes in Seasonal Wetlands
Invasive cattails are a significant threat in prairie wetlands, negatively impacting the native wetland plant community, hydrologic functioning, and waterbird use. Cattail plants spread by rhizomes and, if left unchecked, can quickly take over an entire seasonal wetland basin.

Managers have a suite of tools available to manage cattail, including herbicides, mechanical removal, burning and grazing. Herbicide control seems to work best in wetlands that have deeper, relatively permanent water; the dead plant material can sink and decompose in the water. In more seasonally-flooded basins, chemically-killed cattail plant material will not readily decompose and would need to be removed by fire or mechanical means to create desired, open water conditions. Research has shown that managing cattails with fire alone is only effective when the wetland substrate is dry enough for fire to consume the cattail rhizomes (i.e., dry for more than one growing season). This is a difficult situation to create, even with water level management capabilities.

Starting in 2015, we partnered with Pioneer Heritage Conservation Trust (PHCT) to try a new approach to cattail control. The group received Expedited Conservation Project (ECP) funding from the Minnesota DNR Conservation Partners Legacy (CPL) grant program to manage cattail-choked seasonal wetlands. We worked with PHCT in the past to chemically treat cattails in semi-permanent wetlands; with this new grant funding targeting seasonal wetlands, we decided to mechanically remove the cattail biomass, including the rhizome layer, out of the basin. We hope that this technique will “reset the clock” of cattail invasion, allowing us to maintain a more desirable plant community and habitat structure through regular burning and grazing.

In 2015, a contractor scraped cattail from seven wetlands on Lamprecht and Schultz WPAs. An additional basin on Schultz was scheduled to be treated in 2016 but could not be completed due to high water levels. PHCT had some remaining grant funds available, which allowed us to scrape an additional five wetlands on Pepperton WPA. We plan to follow the changes in these wetlands over the coming years to assess whether this intensive approach is worth the extra up-front expense. PHCT secured additional grant funding, which will allow us to scrape additional wetlands in 2017.

Water Level Management
Morris WMD has 32 wetlands with water control structures on 20 different WPAs. We use water level gauge readings, on-site habitat observations, and aerial photography to assess the effects of management. Most structures are visited monthly from April to October each field season for gauge readings and general maintenance. The annual water plan has details about management results and future plans for each basin.

Many of the water control structures in the district are aging, having been initially installed in the 1980s. When a structure fails, we use our water management and maintenance records to determine whether to continue managing water levels with a new structure or replace it with a fixed elevation dike. In 2016, Ducks Unlimited replaced the old Edwards H structure (which had

not been functional since at least 2007) with a sheetpile weir with stoplogs and concrete box culvert.

Some other highlights of the water management program in 2016:

- Artichoke WPA was reflooded after a full drawdown the previous year.
- Continued drawdown on Edwards I to facilitate the construction on the Edwards H structure.

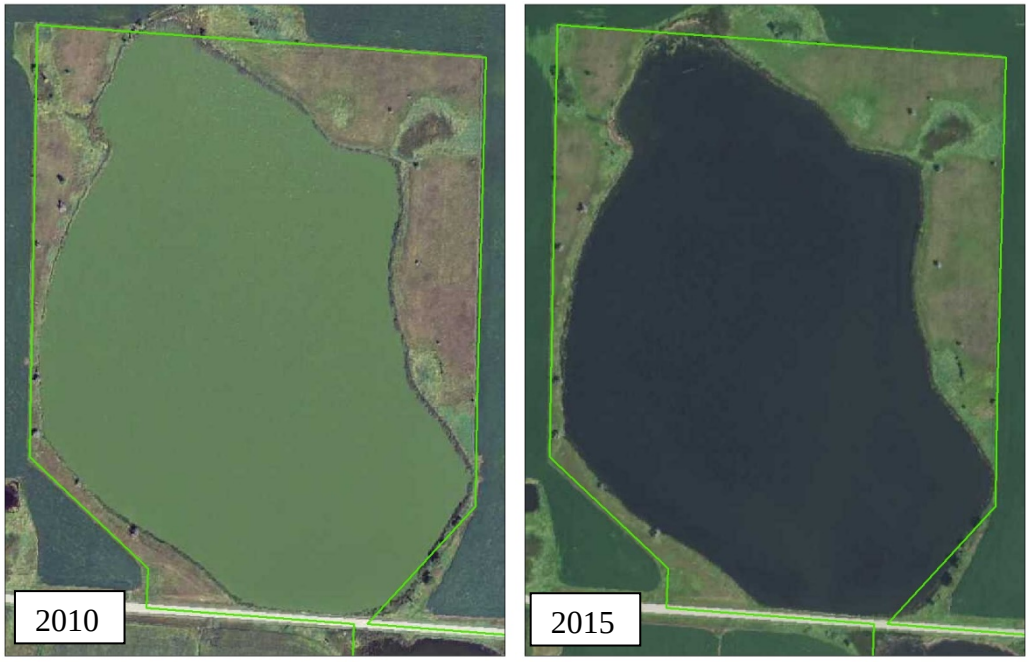
We worked with Ducks Unlimited to replace a failed water level management structure at Edwards WPA. The previous structure on the Edwards H basin was installed in 1988 (DMO 10/14/2016)

Walleye Stocking

Shallow lakes in our region often have artificially deep, stable water levels because of human-induced changes in the landscape, particularly agricultural drainage. This creates conditions that favor planktivorous fish such as fathead minnows. High fathead minnow populations can cause a shift in the food web within a wetland, resulting in a perpetual, turbid-water state. Ultimately, this results in poor habitat for waterfowl and other wetland-dependent birds. Over the years, managers have learned that controlling fish populations in a wetland can result in improved ecological conditions. Options for fish control include artificial drawdowns, reverse aeration, rotenone treatment, and introducing piscivorous fish.

We have worked for several years with Minnesota DNR Fisheries staff to use walleye fry to suppress fathead minnow populations and improve wetland habitat quality. In several instances this tool has successfully caused a basin to flip from a turbid- to a clear-water state. Through this partnership, the DNR gains much needed walleye rearing ponds and we get improved wetland conditions with little effort on our part. As part of the agreement, DNR Fisheries staff monitors

the fish populations and habitat conditions on the basins. In 2016, DNR stocked walleye fry at Lake Johanna, Froland, Schultz, Rothi, Nelson, Helgeson, Beck, and Karsky WPAs.



This basin on Krogsrud WPA was in poor condition for many years (note the turbid water state in the aerial photo on the left). After several years of walleye fry rearing and a little help from Mother Nature in the form of a winterkill, the basin flipped from a turbid state to a clear water state in 2011 and has maintained excellent conditions ever since (photo on the right).

3b. Haying

Historically, haying has been used for upland habitat management and noxious weed control on a limited basis on the Morris WMD, averaging 572 acres annually since 2004. It has some limitations as a tool on many sites due to density of scattered trees too big for hay equipment, roughness from gopher mounds, or damage to equipment from rocks. Also, early July haying, like a late May burn, can have negative impacts for nesting, so is used as a last resort in these instances. However, using cooperators to clip invasive weed problem areas and remove the litter as hay allows us to treat more acres than can be accomplished just mowing with district staff. On units where an abundance of thistle or sweet clover is triggering the management action, haying may take place earlier to prevent seed production and thus reduce a serious weed problem. In recent years tree control has also been an objective of haying.

Prior to 2015 our method of selecting cooperators for haying was based on a list of those who had expressed interest, and by local area. Since interest was low, this system seemed to work well, as we could scout sites for weed problems and issue permits in just a few days. We are now required to select cooperators through the bid or lottery draw. In 2016, no permits were issued due to staff and time limitations with this method. Weed issues were instead mowed by maintenance staff or contractors. Contractors were paid using 6860 funds.

3c. Grazing

Like prescribed fire, we use prescribed grazing as a grassland management tool. The overall goal of using grazing is to improve nesting habitat for migratory birds. Specific objectives of grazing depend on the site, but may include: reducing litter layer buildup, relieving competition from invading cool-season grasses, reducing seed production in biennials such as Queen Anne's lace and wild parsnip, promoting tillering and structural diversity, aiding inter-seeding, and stimulating native grasses. A high concentration of livestock (approximately one cow and calf pair per acre) is often used to remove a dense litter buildup and the new growth in roughly a 30-day period of time. We hope this will promote vigorous growth of desired native species and create quality nesting habitat.

In total 34 permits were issued to graze 29 WPAs and one easement, with 3,860 acres receiving treatment (Table 6). Of the 34 permits issued, sixteen of them were awarded through the bid or lottery process. The others were either multi-year permits written prior to implementation of the bid/lottery process, or we received approval from the Refuge Supervisor to use the negotiation method due to adjacent pastures or pastures under our easement program receiving management.

Early spring grazing has traditionally been the most frequently used time period. Most years grazing at this time starts around May 1, but varies depending on spring green-up and calving timing of the permittee. Due to the bidding process, permits are now issued with a grazing window of two to four weeks longer than the actual length of grazing. This gives flexibility to the permittees, while still meeting the habitat management objectives of the prescription. With the early spring most initiated grazing on schedule.

Recently, we have had more grazers interested in late summer and fall grazing. Objectives of grazing at this time can be reducing the litter layer, increasing plant density through tillering, promoting structural diversity, controlling wild parsnip or Queen Anne's lace, and targeting cool-season exotic grasses after most natives have entered dormancy. The late summer grazing period is a nice time of year to graze because it is after the nesting season, but the cattle typically come off in time for the grass to recover before freeze-up, thus allowing some residual nesting cover for the following spring. In 2016, seven WPAs were still being grazed in September, with removal on October 14 at Ann Lake, marking the latest grazing date.

Historically, a lack of border fence, declining cattle operations, and uninterested neighbors has limited our ability to utilize short duration grazing. From 2000 to 2010, we grazed an average of 1,111 acres and 13 units per year. In the past five years though, more and more grazers seem eager to utilize our grasslands for short term grazing and are more willing to do additional fencing now than in the past. From 2011 to 2015 an average of 4,127 acres, spread over 37 WPAs, were treated with grazing. One thing that has helped this is the use of temporary interior electric fence to subdivide the unit into cells for short duration targeted rotational grazing. This approach allows for fewer cattle and shorter durations within cells, but a longer duration for the permittee and for the entire WPA. This is a big deal, as there is a lot of hassle and expense with gathering up cattle and hauling them to and from a site; the longer cattle are in one location, the more appealing grazing WPAs becomes for cooperators.

New permanent boundary fence was built by Minnesota Pro Fence at Blue Mounds WPA, while Grassland Solutions built the boundary fence at Westhausen WPA. Additionally, the permittee at

Ann Lake WPA built a new fence this past year. He used Common Sense Fencing materials, and the fence is six strands to contain sheep for the wild parsnip grazing objectives. This was accomplished with Refuge Supervisor approval for a five year permit, the first of such length on the district. All of the contractor-built fences were entirely covered through the Prairie Recovery Project Grant (see Section 5a for more information about the Prairie Recovery Project).

This year, depending on when the permit was written, the grazing fees for negotiated permits were calculated using a base rate of between $25.75 and $27.50 per Animal Unit Month (AUM) with deductions for fence installation, fence repair, water hauling, etc. Because there is no report using AUM rental rates for Minnesota, the base rate was an average of USDA reported rates for South Dakota and North Dakota. Fees ranged from a low of "No Charge" for Ann Lake to a high of $11,027.25 for Hastad WPA (North Unit). This year there was only one permittee with a credit (Ann Lake). Credits can only be carried over to the following years of a multi-year special use permit. If at the end of the permit deductions exceed the fee, the credit is deleted from the books. We also utilized grass banking arrangements on six WPAs while working with permittees to improve their pastures that are under easement.

In November 2015, 11 WPAs were put up for bid to be grazed in 2016. On December 1, bids were opened and eight were awarded permits. Welker, Florida Creek, and Hawk Creek were the three WPAs that did not receive a bid. In the past we have negotiated agreements and completed permits primarily over the winter, but with the element of uncertainty that the bid/lottery method introduces to planning for cooperators, the fall deadline was used to give producers ample time to make alternate plans for the coming year should they not get drawn or win bids. Newspapers, radio stations, Facebook, email, and websites were all contacted and/or used to advertise the grazing opportunities. Although multiple inquiries were received for several units, four received only one bid. The awarded bids averaged out to $8.43 per AUM, which is $1.66 less than the average from 2014. The Refuge Supervisor granted permission to bypass the bid or lottery method for eight units, due to the justification provided. This process has resulted in several new cooperators in the past two years, mostly due to the advertising it requires.

Table 6 – Grazing Summary – Morris WMD – 2016

County	WPA	Grazed Dates		Fee	Acres	Stocking Rate (AUMs)	
		Planned	Actual			Planned	Actual
Big Stone	Easement 371G	5/01 - 6/30	5/15 - 7/19	$1,777.08	82	129.0	102.0
	Boehnke	5/18 - 8/02	6/01 - 8/02	$525.00*	88	75.0	75.0
	Henry	5/01 - 7/31	6/01 - 7/29	$364.00*	81	72.8	70.8
	Rothi – East central	5/14 - 9/10	5/05 - 9/03	$759.69	101	119.0	118.0
	Rothi – SW	5/01 - 8/30	5/07 - 9/02	$557.09	211	96.5	113.8
	Stegner	5/01 - 7/31	6/02 - 8/01	$480.00	125	120.0	120.0
	Twin Lakes – Interseed	4/21 - 7/10	4/24 - 5/26	$1,159.65	40	52.0	58.6
Lac qui Parle	Florida Creek	4/14 - 6/15	4/20 - 5/21	$166.50	40	39.0	38.2
	Freeland	5/01 - 6/15	5/06 - 6/01	GB	68	60.0	69.7
	Hastad – North	5/01 - 9/30	5/04 - 9/17	$11,027.25	511	510.9	499.0
	Hastad – South	5/01 - 6/19	5/08 - 6/19	$560.73	84	73.5	64.2
	Hastad – Extreme South	4/25 - 5/31	6/06 - 7/08	$287.00	10	12.5	20.4
	Hegland	5/01 - 8/31	6/04 - 8/31	$927.50	128	185.5	169.7
	Hegland – SW (Goats)	5/01 - 9/30	5/27 - 9/27	NC[2]	50	86.0	84.6
Pope	Ann Lake	5/08 - 10/16	5/28 - 10/14	NC[1]	69	148.8	124.3
	Avok Slough	5/01 - 7/01	6/02 - 6/30	$50.00	44	36.75	31.5
	Blue Mounds	7/15 - 9/15	8/19 - 9/19	GB	164	153.6	164.3
	Glenwood	5/15 - 7/31	5/21 - 7/26	$184.50	125	108.0	108.0
	Grove Lake	5/01 - 9/10	5/16 - 9/13	NC[1]	377	280.0	129.7
	Kolstad Lake	5/01 - 8/10	5/30 - 7/28	GB	194	168.0	165.1
	Lake Johanna	5/01 - 6/30	5/01 - 6/03	$1,253.30	107	87.5	74.8
	Larson – S½	6/19 - 7/30	6/24 - 8/04	GB	57	50.4	59.4
	McIver – NE	4/25 - 6/15	5/04 - 6/15	$212.00	107	87.5	74.8
	Overby – East	4/23 - 6/07	5/14 - 6/10	$208.76	67	54.0	66.5
	Rolling Forks – NE	5/01 - 6/09	5/07 - 6/03	$2,090.91	97	100.0	110.0
	Snetting	5/01 - 7/15	503 - 6/07	$139.00	40	35.0	33.6
	Stenerson Lake	6/01 - 7/18	5/24 - 7/05	GB	252	92.4	82.8
Stevens	Horton	5/15 - 7/15	5/28 - 6/25	$495.00	54	45.0	39.7
	Huebner	5/15 - 7/15	6/08 - 7/16	$408.10	37	38.5	42.7
	Lamprecht	5/15 - 8/31	5/21 - 8/03	$3,178.47	180	175.0	157.7
	Staples	7/01 - 8/31	7/04 - 8/04	$429.00	30	33.0	34.6
	Welfare	4/18 - 5/22	5/01 - 6/05	$488.00	58	56.0	53.2
Swift	Hamann	5/01 - 7/01	5/21 - 6/30	$151.20	74	75.6	71.3
	Loose	5/01 - 7/31	6/11 - 8/13	$1,316.20	68	61.25	68.4
Total				**$29,195.93**	**3,860**	**3,532.5**	**3,337.8**

* = fee applied to fence purchase, GB = grass banking, NC[1] = no charge, NC[2] = no charge (experimental)

3d. Farming

Due to a revision in Service policy, permanent food plots have been phased out. From now on, only cash rent farming will be used for converting undesirable nesting cover to desirable native species. Farming to prepare a seedbed for native reconstructions is limited to three years. Any longer than that requires approval from the Refuge Supervisor. In 2016, five WPAs had fields that were cash rented and farmed under special use permits for seedbed preparation. A 48 acre field at Bolson Slough was in its first year of farming under a permit that only allows oats, barley, soybeans or wheat and cover crops with grazing. Big Slough (30 acres) and Artichoke (54 acres) each had fields in their second year of a three year permit, while Hastad (69 acres) and Walden (20 acres) had fields in their third and final year.

Prairie coneflower, common milkweed, big bluestem, and Canada thistle are just a few of the "weeds" invading the oat/cover-crop planting at Big Slough WPA (JBB 8/1/2016).

3f. Fire Management

An average number of prescribed fire treatments and acres occurred on BNR (Morris WMD), while BGR (Big Stone NWR) experienced a below average number of treatments but an increase in acres. The season length was on par with previous years. The Hub experienced slightly above average wildfire activity in 2016 with three wildfires. No accidents or injuries involving personnel or equipment occurred during fire program activities.

Coverage area for the Hub includes the counties of: Big Stone, Chippewa, Lac qui Parle, Lincoln, Lyon, Pope, Stevens, Swift, Traverse, and Yellow Medicine, Minnesota.

Prescribed Fire

The first burn of the season (excluding winter piles) was on March 22, with the last for the spring season being on June 7. The first fall burn was on September 13 and the last was on November 17. The Hub staff burned 29 treatments for 4,339 acres on federally owned lands that were within the Morris District, and seven treatments for 3,120 acres on federally owned lands within the Big Stone NWR/WMD, totaling 36 treatments for 7,459 acres (Table 7). Broadcast burns were implemented in the spring and the fall. Piles were burned in the fall, winter, and with the broadcast burns. A total of 50 piles were burned.

Spring Lake WPA pile burn (PJM 4/13/2016).

Help for prescribed burning at the Hub came from the BNR/BGR staffs, neighboring FWS offices, ADs (a short duration hiring plan), and crews from other states (detailers). Local/neighboring help came from Fergus Falls WMD, Litchfield WMD, Agassiz NWR, regional personnel from the West Zone MN, and The Nature Conservancy (TNC). Detailers funded by the Minnesota Prairie Chicken Society Conservation Partners Legacy Grant (Prairie Chicken Grant) came from the Wichita Mountains NWR (Oklahoma), the Leopold/Horicon FWS Complex (WI), Carolina Sandhills NWR (SC), Marais Des Cygnes NWR (KS), Quivira NWR (KS), Flint Hills NWR (KS), and Port Louisa NWR (IA). The Hub hired one temporary (seasonal) firefighter, and also used funds to create Reimbursable Interagency Agreements in order to recruit a BLM detailer from Zortman, Montana. Hub personnel assisted with prescribed burns at the Fergus Falls WMD, Sherburne NWR, and Wichita Mountains NWR (OK).

Table 7 – Prescribed Burn Summary – Morris Hub – 2016

Burn Name	County	Unit Type/ Station	Burn Date	Acres
Stenerson, Piles	Pope	WPA/BNR	02/02/16	1
Appleton-South, Piles	Swift	WPA/BNR	02/17/16	3
Daly	Big Stone	WPA/BNR	03/22/16	35
Tolifson	Swift	WPA/BNR	03/28/16	135
Robin Hood	Traverse	WPA/BNR	04/11/17	362
Spring Lake	Swift	WPA/BNR	04/13/16	123
Westhausen-East	Swift	WPA/BNR	04/13/17	117
Piper	Big Stone	WPA/BNR	04/16/17	56
Hoff	Pope	WPA/BNR	04/20/17	1
Loen-Central	Swift	WPA/BNR	05/01/16	393
Appleton-North	Swift	WPA/BNR	05/02/16	301
Hillman-North	Big Stone	WPA/BNR	05/05/16	59
Seidl	Big Stone	WPA/BNR	05/06/16	166
Stenson Lake	Pope	WPA/BNR	05/15/16	305
Long Lake-North	Stevens	WPA/BNR	05/16/16	241
Geyer	Traverse	WPA/BNR	05/17/16	287
Froland-NW #1	Pope	WPA/BNR	05/17/16	47
Goodman	Lac qui Parle	WPA/BNR	05/17/16	139
Kufrin-East	Big Stone	WPA/BNR	05/17/16	42
Welsh	Swift	WPA/BNR	05/18/16	405
Nelson Lake-East	Pope	WPA/BNR	05/19/16	327
Svor-Central	Swift	WPA/BNR	05/20/16	253
Lynch Lake-North	Swift	WPA/BNR	05/21/16	346
Twin Lakes-East	Big Stone	WPA/BNR	05/24/16	9
Edwards, Islands	Stevens	WPA/BNR	05/26/16	3
Froland-NW #2	Pope	WPA/BNR	06/07/16	12
Spring Lake, Piles	Swift	WPA/BNR	11/06/16	5
Edwards-Central and North	Stevens	WPA/BNR	11/15/16	145
Edwards-SE	Stevens	WPA/BNR	11/17/16	21
Kragh Farms	Lincoln	WPA/BGR	04/04/16	236
Grand Mews	Lac qui Parle	WPA/BGR	04/17/16	991
Anderson	Lac qui Parle	WPA/BGR	04/22/16	1109
Peterson-North	Lyon	WPA/BGR	05/04/16	156
Coon Creek	Lincoln	WPA/BGR	05/04/16	155
Koch Meadows	Lac qui Parle	WPA/BGR	05/05/16	435
Mueller-West	Lac qui Parle	WPA/BGR	09/13/15	38
Total				**7,459**

Wildfire

Wildfire activity was slightly above average within the Hub for the calendar year, with three wildfires on Federal land for 146.2 acres (Table 8). A local landowner was burning his property when fire advanced onto Service land on May 8, 2016. The fire was suppressed by the local the local volunteer fire departments. A Big Stone County church burned down near the Kufrin WPA on May 25, and spread onto Service and State lands. This fire was also suppressed by local volunteer fire departments. A burned vehicle was discovered on a WPA in Traverse Co. on July 17, 2016. The Morris Hub found out about all of three fires after the fact, and the only actions taken were site visits, GPS documentation, and data entry for record-keeping purposes.

Wildfire activity in Minnesota peaked during the first two weeks in May. Morris Hub personnel assisted on wildfire activity for approximately a week during this time period. Helping our partners within the state during a time of need is important and worthwhile; however, the wildfire activity resulted in decreased prescribed burning.

Nationally, it was a moderate fire season. The National Preparedness Level (PL 1-5), which gauges national fire activity and resource needs throughout the country, peaked at a PL-4 in August and remained at that level for two to three weeks. Members of the Morris Hub assisted with interagency wildfire assignments in the states of Minnesota, Wyoming, Michigan, Idaho, and Montana.

Table 8 – Wildfire Burn Summary – Morris District – 2016

Fire Name	County	Date Burned	Acres Burned
Happy	Lac qui Parle	5/8/2016	146
Church	Big Stone	5/25/2016	0.1
Car	Traverse	7/17/2016	0.1
Total			**146.2**

Training, Development and Outreach

- Members of the District Fire Crew attended various fire trainings including S-430 (Operations Section Chief), S-212 (Chain Saws), S-290 (Intermediate Fire Behavior), and IWI (Incident Within an Incident).
- The Annual Fire Refresher was again put on at the Morris office by Fire Hub personnel, which is usually attended by 15-30 people.
- Phil Millette presented on the topic “Wildland Fire Management and Prevention” at the Hancock Public School during Fire Prevention Week in October.

Other

- Hub FMO Dan Angelo took a job with the Minnesota DNR in October, leaving the FMO position vacant.
- The Morris Hub purchased a new Ford F550 cab and chassis in 2016 that will replace an aging engine stationed at Morris. The new slip-on package is being built and installed in the winter of 2016/2017 and the engine will be operational for the 2017 season.
- A command vehicle within the Morris Hub was replaced in the fall of 2016, with another scheduled for replacement in 2017.

Detailers Erik Acker, Port Louisa NWR (blue helmet), Sean Sallman, Horicon NWR (red helmet); and Jake Saverynski (yellow helmet), working on the Nelson Lake-East prescribed burn (PJM 5/19/2016).

3g. Pest Plant Control

Since 2009, in response to increasing threats from a growing number of undesirable plant species, two seasonal biological technicians have been annually hired to map and treat infestations on the district. In 2013, due to budget issues from sequestration, we were unable to hire a dedicated seasonal invasive species crew (ISC), and instead made do with what personnel resources we had when their workload allowed them to do weed control. As in the past two years, we were once again able to have a crew of seasonal employees this year that rotated between various duties, including weed control. This approach gives them the greatest breadth of experience and also reduces the odds of burnout. This year's crew was comprised of Melinda Hughes, Kevin Mortensen, Shaun McNally, Jenna Harlow (YCC Crew Leader), and Hanna Morris, a Student Conservation Association intern. Shaun and Jenna had other duties as major responsibilities, but did assist once in a while with weed control. Invasive species focused on by the ISC, YCC and

other staff, CCM, and contractors were: Canada thistle, plumeless thistle, yellow and white sweet clover, yellow toadflax, wild parsnip, Queen Anne's lace, crown vetch, bird's foot trefoil, purple loosestrife, leafy spurge, and trees.

Like last year, 6860 funds were used again to hire contractors to mow weedy prairie reconstructions for us. Bauer Ag mowed to control sweet clover and/or Canada thistle at Karsky (SE), Lawrence, Robin Hood, and Seidl, while Habitat Forever was hired to mow the inter-seeding at Twin Lakes for thistle control. Additionally, Habitat Forever also mowed several sites under contract as a part of the restoration process (Karsky (NW), Prairie (Burdick addition), and Stenerson Lake (Fettig addition). All other mowing was accomplished with maintenance staff and BST Kleinschmidt (Table 9).

After five years of rotational grazing to control wild parsnip at Rothi WPA, the site shifted to a goldenrod dominated plant community (JBB 9/21/2016).

The fluctuations in noxious weed control acres over the last seven field seasons (Table 10) has less to do with the relative abundance and occurrence of weeds (there's no shortage) and is more a byproduct of several factors: acres of new prairie reconstructions and tree grove removals, weather patterns, and staffing levels. The 2013 dip in acres treated, for example, was related to the lack of a dedicated invasive species crew. The advanced phenology and wet weather led to vigorous growing conditions, challenging our abilities to respond in time to keep undesirables from setting seed.

In Tables 9 and 10, the column for contracted acres reflects prairie reconstructions mowed by a contractor when the presence of thistle or other noxious weeds triggered the management. If a prairie reconstruction was mowed and the dominant vegetation was not a noxious weed (e.g., ragweed or lamb's quarter), then it was not included in the total. For instance, this year's

seedings at Prairie and Karsky WPAs were mowed by Habitat Forever for annual weeds and therefore were not counted in this total.

Table 9 – Broadleaf Noxious Weed Control – Morris WMD – 2016

County	Acres Treated			
	Mechanical	Spray	Contracted	Total
Big Stone	47.0	7.2	12.8	67.0
Chippewa	0.0	13.3	0.0	13.3
Lac qui Parle	0.0	32.4	0.0	33.4
Pope	231.5	16.3	85.5	333.3
Stevens	155.7	18.8	36.3	210.8
Swift	5.0	35.9	0.0	40.9
Traverse	0.0	0.0	27.9	27.9
Yellow Medicine	0.0	0.9	0.0	0.0
Total	**439.2**	**123.9**	**162.5**	**726.6**

Table 10 – Broadleaf Noxious Weed Control – Morris WMD – 2011-2016

Year	Acres Treated			
	Mechanical	Spray	Contracted	Total
2011	537.7	906.3	0	1,444.00
2012	480.4	495.6	0	976
2013	269.8	221.3	106.5	597.7
2014	433.1	299.8	90.3	823.2
2015	126.4	288	78.3	492.7
2016	439.2	123.9	162.5	726.6

Woody Vegetation Control

Besides encroachment of cool-season exotic grasses, our tracts of remnant prairie and re-established native grasses have also been invaded by trees. Siberian elm, box elder, cedar, cottonwood, buckthorn and willow are the most common. Efforts to control trees may involve mechanical cutting with either a tree shear or mulching attachment on the skid steer, mowing with our new rotary mowers, haying by cooperators, or hand cutting with chainsaws or circular bladed brush saws. We may also use chemical control methods in combination with mechanical methods, or alone with basal bark application of Garlon 4E/Pathfinder II type products. Fire and herbivory with cattle or goats may also be used effectively in certain situations.

When we first began tree removal 13 or more years ago, public sentiment to the activity was often negative. While we still get an occasional terse email, usually from an irate deer hunter, those attitudes seem to be much in the minority now. The faster a site can be converted from a grove to a nice stand of native grasses and flowers, the greater the likelihood of acceptance, especially from neighbors who may have had a fond attachment to the trees.

As in previous years, tree removal work was done through a combination of our staff time and equipment, and contractors (Table 11). Through the partnership with TNC's OHF-funded Prairie Recovery Project (PRP) (see Section 5a), a private contractor, Tony's Outdoor Services (Tony's) was hired to take out tree groves at the Hantho addition to Hastad WPA. Plotz Timber Harvest (Plotz) was hired to do tree removal on Edwards WPA though a CPL grant acquired in cooperation with the Stevens County Chapter of Pheasants Forever and at Pepperton WPA through PF's Enhanced Public Lands (EPL) grant. EPL funds were also used to hire Plotz and Backyard Reflections to take out trees on different portions of the Stadem addition to Hillman WPA, while Tony's was contracted at Rothi WPA to remove re-sprouts in the old groves and to disk them up, and to get the last remaining trees near the southwest boundary. The Conservation Corps of Minnesota (CCM) crews and TNC seasonal technicians were utilized heavily as well to basal bark spray scattered smaller trees, re-sprouts, and "baby" groves. A combined total of 510.8 acres were treated by these crews at the following WPAs: Artichoke Lake, Benson Lake, Hillman, Kufrin (Eids Lutheran), Lundgren, Prairie, and Redhead Marsh. Some tree work was accomplished with field staff at Blue Mounds, Centennial, Cyrus, Hastad (Hantho), Niemackl Slough, and Rothi.

The May 18 burn at Welsh WPA top-killed this cottonwood, but the tree responded with re-growth almost equal to its original height in only 105 days (JBB 8/30/2016).

Contracted tree removal on the district has fluctuated in quantity throughout the last 13 years depending on funding availability and workload. While cutting down and piling the trees can be the easy part, getting the piles burned and burying remaining debris is definitely the hard part. We've employed a strategy, with mixed success, of consuming the piles during prescribed burns of the surrounding grasslands (landscape burns). This strategy, when coupled with the recent upsurge in new piles due to the steady stream of PRP funds, has led to a backlog of unconsumed piles. This is complicated even more by the FWS policy of needing an RXB3 qualified person on site to oversee burning operations.

Our strategy for tree removal and pile consumption has now evolved to a three pronged approach of landscape burns, winter burns by staff, and contractor burns. Where appropriate, we've also started requiring contractors to neatly pile green ash and other species well suited for firewood in or near parking lots, so they can be utilized for personal use by the public. This also reduces the size and number of piles that need to be burned. This was done at Pepperton WPA this year. Through an arrangement with our RXB3 qualified fire staff, Plotz was also contracted to burn piles with our staff on site at Spring Lake. Due to the wet summer though, the piles never dried out enough for good consumption so fire operations were postponed until the dry fall weather presented an opportunity and burned by staff on November 6. Also burned in November by staff in a landscape burn, were the piles Plotz made in August on Edwards WPA.

The 10.5 acres of trees on the Hantho Addition to Hastad WPA were chipped for biomass removal thanks to the Prairie Recovery Project (JBB 5/26/2016).

Table 11 – Woody Vegetation Control – Morris WMD – 2015

WPA	Start Date	End Date	Method	Acres	Notes
Lundgren	3/31/2016	3/31/2016	Cut Stump	4.29	CCM/TNC
Beyer	4/4/2016	4/29/2016	Pulled	3.58	WMD
Hastad (Hantho)	4/11/2016	5/20/2016	Mechanical	10.3	Tony's
Prairie	4/29/2016	4/29/2016	Cut Stump	0.53	CCM
Artichoke Lake	5/12/2016	5/12/2016	Basal Spray	48.54	CCM
Redhead Marsh	5/16/2016	5/19/2016	Basal Spray	31.85	CCM
Artichoke Lake	6/2/2016	6/2/2016	Cut Stump	54.01	CCM
Rothi	6/9/2016	6/9/2016	Basal Spray	2.50	WMD
Benson Lake	6/11/2016	6/13/2016	Basal Spray	79.43	CCM
Lundgren	6/15/2016	6/27/2016	Cut Stump	70.94	TNC
Niemackl Slough	7/5/2016	7/5/2016	Mow	92.40	WMD
Centennial	7/15/2016	7/15/2016	Foliar Spray	1.72	WMD
Hastad	7/28/2016	7/28/2016	Foliar Spray	12.15	WMD
Pepperton	7/15/2016	7/29/2016	Mechanical	79.5	Plotz
Lundgren	8/10/2016	8/13/2016	Basal Spray	51.66	CCM
Kufrin	8/11/2016	8/12/2016	Basal Spray	42.07	CCM
Artichoke Lake	8/14/2016	8/14/2016	Basal Spray	21.52	CCM
Hillman	8/14/2016	8/14/2016	Basal Spray	10.06	CCM
Cyrus	8/16/2016	8/16/2016	Foliar Spray	0.42	WMD
Edwards	9/1/2016	10/3/2016	Mechanical	189.0	Plotz
Hastad	9/14/2016	9/14/2016	Foliar Spray	35.70	WMD
Blue Mounds	10/5/2016	10/13/2016	Spray	118.32	WMD
Hillman (Stadem South)	10/11/2016	11/10/2016	Mechanical	86.8	Backyard
Hillman (Stadem North)	10/19/2016	11/23/2016	Mechanical	44.3	Plotz
Rothi	11/3/2016	11/24/2016	Mechanical	16.4	Tony's
Svor (Partially Complete)	12/3/2016	12/31/2016	Mechanical	105.0	Plotz
Total				**798.0**	

Disturbed soil and tree fabric were all that remained after the maintenance staff was finished pulling cedars at Beyer WPA (JBB 6/22/2016).

Canada Thistle (*Cirsium arvense*)

Canada thistle control efforts are largely a byproduct of prairie reconstructions that are in their first five years of maturity. Our new strategy in "juvenile" reconstructions is to just let them mature and treat with mowing only if the undesirable weeds appear to be roughly 30 percent or greater of the vegetation cover. The majority of units in Table 12 that were mowed were done so because they met this threshold. Not included in this table are the units where the primary weed triggering the treatment was something other than Canada thistle, usually crown vetch, sweet clover or plumeless thistle.

The station received only one weed complaint in 2016. A neighbor to the new Simon Lake WPA called to complain about dandelion seed getting in his alfalfa! In discussions with him it became evident that his alfalfa field lay to the southwest (not in a prevailing wind direction), and didn't actually touch the boundary of the unit. To our knowledge it is the first time we have ever received a complaint about dandelions. Dandelions were indeed very thick in the new seeding, but they had already gone to seed by the time he called. Dandelion is not a noxious weed, so we wouldn't have had to respond on that account. After spot spraying the site for plumeless thistle a different fellow from the neighborhood also stopped to complain. After lengthy discussion, it became apparent the real issue was that he didn't appreciate us acquiring the land through PF (who acquired it from The Conservation Fund, who acquired it at an auction).

In its third season of growth, the 141 acre seeding at Niemackl Slough WPA had its greatest expression of Canada thistle yet, necessitating nearly 93 acres of mowing (JBB 6/23/2016).

We also received an inquiry from the Pope County weed inspector regarding our plans for weed control at Stenerson Lake WPA. He had gotten a call from the local state representative, who was contacted by several farmers in the neighborhood. A similar situation occurred when we received a visit from Don Opdahl of the Minnesota Department of Agriculture. He works with the county weed inspectors and wanted to visit with us about the chronic complainer at Dismal Swamp WPA and our plans for controlling thistle there. It is frustrating, inefficient, and ineffective when the public uses these indirect approaches rather than contacting us directly. The Pope County inspector was satisfied with the response he was given, but the Big Stone County inspector was not, resulting in the visit with Mr. Opdahl.

In past years, the complaint for Dismal Swamp has come through the county weed inspector and seems to be unrelated to the degree of actual infestation. It usually comes after seed-set, despite our response that it needs to come earlier so we don't spread seed while mowing. In 2015, we broadcast spot-sprayed with the UTV prior to any complaint. This year though, other than mowing the new seeding, no pre-emptive actions were taken on the remainder of the unit. Mr. Opdahl revealed that it is Terry Gillespie who has been complaining (his farmsite is across the street to the west from the southwest corner and he is a former food plot cooperator). Don acknowledged that the complaints are likely a product of Mr. Gillespie having a very low tolerance for Canada thistle, and possibly some deep resentment toward us from long ago. Overall, weed complaints across the district are far below historical levels.

Table 12 – Sites Treated for Canada Thistle – Morris WMD – 2016

Unit Name	End Date	Spray Acres	Mow Acres	Comment
Finden	6/23		16.73	2014 Seeding
Stenerson Lake	6/23		29.7	2016 Seeding
Edwards	6/23		36.3	2015 Seeding
Lundgren	6/27	9.6		Spot sprayed
Rothi	6/30		32.27	2014 Seeding
Stenerson Lake	6/30		41.6	2016 Seeding
Kufrin	7/1		3.31	Spot mowed 2007 seeding
Dismal Swamp	7/5		11.3	2013 Seeding
Fish Lake	7/5		9.83	2013 Seeding
Miller	7/5		8.42	2013 Seeding
Pepperton	7/5		14.46	2013 Seeding
Fults	7/5		12.78	2014 Seeding
Niemackl Slough	7/5		92.4	2014 Seeding
Pomme de Terre River	7/5		9.89	2014 Seeding
Mero	7/6		7.97	2013 Seeding
Stenerson Lake	7/7		133.3	2016 Seeding
Karsky	7/8		12.8	2013 Seeding
Total		**9.6**	**473.06**	

Wild Parsnip (*Pastinaca sativa*)

One of the more concerning new weeds to appear on the district is wild parsnip. This biennial readily invades remnant prairie, and doesn't appear to be triggered by any management activities, although burning has been documented to improve germination.

In 2008, we discovered huge wild parsnip infestations on Rothi and Westhausen WPAs, small ditch or roadside infestations on Rolling Forks and Helgeson WPAs, and scattered plants on easement BS-276G,1. In 2009, infestations on Ann Lake, Ben Wade, and Bredberg, as well as smaller patches on Gullickson (south), Jorgenson, and Stammer WPAs were mapped. In 2010, a new infestation on Schultz WPA in Stevens County was mapped as well. The northern tier of Pope County is probably the biggest problem area on the district, followed closely by the Otrey Lakes area in Big Stone County, the eastern third of Swift County, and near Westhausen WPA. This year a new infestation was discovered near the north parking lot on Krantz Lake WPA. It was too advanced for treatment however.

The infestation at Rothi WPA seemingly exploded from just a few plants in 2007 to huge patches and many scattered plants in 2008. Since then control efforts by staff have primarily been focused in and around the local ecotype seed production fields. Our approach is to first spray rosettes and then return within two weeks to treat new rosettes and pull or shovel flowering plants. Repeated visits throughout the spring and summer are ideal (wild parsnip produces rosettes throughout the entire growing season), but not always practical given our staff limitations and other priorities. Our efforts around the production fields at Rothi have been successful at reducing the level of infestation. Because headway is being made here, we have been able to expand hand control efforts to the larger infestations on other portions of Rothi.

The use of rotational grazing with livestock was employed at Rothi beginning in 2012, on a 100 acre portion of the WPA with the worst infestation. Anecdotal observations at the conclusion of grazing this year appear to reveal success at reducing the abundance of this species. Although only a quarter of the grazing area was canvassed, it looks promising as not one wild parsnip was found in the area that was covered.

Wild parsnip control efforts (Table 13) were up from last year (25.02 acres were treated in 2015, 100.59 acres in 2014, 21.48 acres in 2013, and 120.80 acres in 2012), but are far short of what is needed. We struggle to accomplish needed efforts because of advanced phenology and a lack of time and staff to get to all of the infestations before they mature. Like Rothi and Ann Lake, the plan for the infestation at Westhausen WPA is to rotationally graze livestock for five years or more to keep parsnip from producing seed.

Table 13 – Wild Parsnip Control – Morris WMD – 2016

WPA	Date	Treatment	Phenology	Acres
Rothi	6/8	Shovel/pull	Flowering	15.40
Rothi	6/9	Shovel/pull	Flowering	2.26
Rothi	6/13	Shovel/pull	Flowering	3.78
Rothi	6/17	Shovel/pull	Flowering	3.47
Rothi	6/20	Shovel/pull	Flowering	7.68
Berg	6/20	Shovel/pull	Flowering	0.20
Rothi	6/21	Shovel/pull	Flowering	15.60
Rothi	6/22	Shovel/pull	Flowering	2.58
Berg	6/24	Shovel/pull	Flowering	0.82
Rolling Forks	6/27	Shovel/pull	Post-Flowering	0.67
Berg	6/30	Shovel/pull	Post-Flowering	0.61
Berg	7/7	Shovel/pull	Post-Flowering	0.32
Rothi	7/25	Shovel/pull	Post-Flowering	9.42
Gilbertson	7/27	Shovel/pull	Post-Flowering	0.12
Total				**62.93**

It took several trips with hand crews to tackle this robust patch of wild parsnip near the boundary of Rothi WPA (JBB 6/8/2016).

Common Tansy (*Tanacetum vulgare*)
The first ever and only (known) infestation of common tansy on a WPA was discovered in 2008 on Anderson WPA in Big Stone County. Since then it has been sporadically treated depending on need and staff time. It was treated in 2015, but not in 2016. The patch that was discovered in 2015 near the new parking lot for Prairie WPA was re-visited on July 15 and a handful of pre-flowering plants were treated.

Spotted Knapweed *(Centaurea maculosa)*
We've had good success in controlling this species on the few units that have had infestations. For the fifth straight year, no plants have been found at Nordby WPA. One plant was found and sprayed at Pomme de Terre Lake WPA on August 16. No plants were found at Cyrus, but we didn't have time to get to Pieske. We will continue to re-visit these sites to ensure successful eradication.

Crown Vetch (*Coronilla varia*)
In 2016, 41.31 acres of crown vetch were sprayed on four WPAs (Table 14). This is a weed that, because of its slow rate of spread, is less of a priority but still gets some attention if we have time. There are more occurrences than we have documented, and more infestations than we can treat given our time and staff limitations. In 2012, we treated a total of 97.34 acres on the following WPAs: Edwards, Fehr, Florida Creek, Long Lake, Nordby, and Redhead Marsh. In 2013 we sprayed 11.31 acres of crown vetch at Florida Creek, Prairie, Artichoke, and Starbuck WPAs. In 2014 we only treated 3.53 acres on Centennial, Edwards, and Long Lake. In 2015, 55.9 acres were sprayed on four WPAs (Centennial, Edwards, Fahl, and Long Lake). Glenwood, Pearson, Wall, and Swede Home WPAs are sites we know have infestations, but have not treated or mapped due to staff and time limitations. This plant has a long-lived seed, so like most weeds,

control efforts with herbicide have to be for the long haul, with plans to return every year until it is no longer found.

Table 14 – Crown Vetch Control – Morris WMD – 2016

WPA	Date	Phenology	Acres
Edwards	6/21	Flowering	0.20
Edwards	6/22	Flowering	1.13
Edwards	6/23	Flowering	8.55
Edwards	6/30	Flowering	8.03
Edwards	7/1	Flowering	3.11
Long Lake	7/6	Flowering	0.79
Edwards	7/6	Flowering	2.07
Long Lake	7/7	Flowering	5.35
Centennial	7/15	Post-Flowering	1.72
Prairie	7/15	Flowering	0.18
Long Lake	7/15	Post-Flowering	9.04
Edwards	8/9	Flowering	0.22
Edwards	8/17	Flowering	0.92
Total			**41.31**

Queen Anne's lace *(Daucus carota)*
Another weed to appear on the district within the past ten years is Queen Anne's lace. Similar to wild parsnip, it is a biennial in the carrot/parsley family, which makes treatment with Milestone (aminopyralid) or Transline (clopyralid) ineffective due to its tolerance to these selective herbicides. With small infestations of approximately 100 plants or less, cutting or pulling second year plants to prevent seed production or herbicide application to rosettes are the main courses of action for control.

Due to concerns with grazing pressure effects to native prairie, the southeast arm of Hillman WPA was rested again in 2016. Other control methods were implemented on eight WPAs totaling 16.5 acres (Table 15). We now know of eight WPAs and one easement that have had one or more plants of this species.

Table 15 – Queen Anne's Lace Control – Morris WMD – 2016

WPA	Date	Phenology	Treatment	Acres
Rothi	7/25	Flowering	Shovel/pull	9.419
Brady	7/27	Post-flowering	Shovel/pull	0.178
Seidl	7/27	Post-flowering	Shovel/pull	*
Hillman	8/8	Post-flowering	Shovel/pull	0.530
Hillman	8/9	Post-flowering	Shovel/pull	0.321
Hillman	8/10	Post-flowering	Shovel/pull	0.360
Hillman	8/12	Post-flowering	Shovel/pull	0.520
Brady	8/15	Post-flowering	Shovel/pull	0.077
Hillman	8/16	Post-flowering	Shovel/pull	0.142
Glacial Lake	8/16	Flowering	Shovel/pull	*
Hillman	8/16	Post-flowering	Spray	0.590
Rothi	8/17	Post-flowering	Shovel/pull	0.060
Loose	8/17	Post-flowering	Spray	1.198
Seidl	8/17	Flowering	Spray	*
Schultz	8/17	Post-flowering	Spray	0.700
Geyer	8/17	Rosette	Spray	0.216
Loose	8/22	All stages	Spray	0.503
Loose	8/22	All stages	Shovel/pull	0.467
Loose	8/25	All stages	Spray	0.010
Hillman	8/31	Post-flowering	Shovel/pull	1.210
Total				**16.510**

*Single plants

Yellow Toadflax *(Linaria vulgaris)*

In 2010, yellow toadflax, also known as "butter and eggs," burst onto the scene in the form of large infestations on a couple of WPAs. Of greatest concern is the yellow toadflax infestation in the local ecotype restoration at Grove Lake WPA. The presence of this species threatens to undermine seed harvest goals for this site. In 2012, possibly due to the drought, there was very little flowering of this plant, so no control efforts were undertaken. The number of patches and acres of treatment at Grove Lake has varied over the years depending on environmental conditions affecting flowering, maturation of the native seeding and thus competition, and most importantly staff time/effort searching for and locating plants.

In 2013, Grove Lake and two new sites on Overby and Cyrus WPAs were treated with backpack sprayers. In 2014, the three known infestations on Grove Lake, Overby, and Cyrus WPAs were backpack sprayed and a new infestation was found and treated at Nelson Lake WPA. In 2015, two new infestations were discovered and treated. A small patch of a few plants along the road near the southwest corner of the new addition to Stenerson Lake was hand pulled/shoveled, while backpack sprayers were used to treat some of what was found at Scofield WPA. Cyrus and Overby WPAs were also re-visited and treated.

Overall acres of toadflax treated has varied from year to year. This is due as much to mapping accuracy, such as inclusion with other species being treated at the same time, as it is to an actual increase or decrease in patch size. In 2016, we were only able to get to Grove Lake (1.0 ac) and Pomme de Terre Lake (.05 ac).

Bird's-foot trefoil *(Lotus corniculatus)*

Much like crown vetch, bird's-foot trefoil, which is still commercially available, has been around for several years as a component of roadside plantings to control erosion. Initially, it wasn't too concerning as an invasive as it didn't seem to spread rapidly and invade grasslands. However on some sites, such as Bahr WPA, it has formed huge patches that displaced grass cover, thus one can assume it now represents a threat to waterfowl production goals. Like toadflax, it appears to fluctuate in expression from year to year. It was treated on three sites for the first time in 2016 (Table 16). The infestation discovered in the 2014 seeding at Beyer WPA was impressive and necessitated mowing to curb seed production. The few plants treated at Lundgren were present on a site being sprayed with glyphosate for seedbed prep. The plants sprayed at Hillman were encountered while spot treating Queen Anne's lace and Canada thistle. The same can be said for Edwards WPA where crown vetch was the primary target. A slow spreader, this species fits into a lower concern category, so when time and staff resources allow we will continue to monitor these sites and treat accordingly.

The 2011 seeding at Pieske WPA exploded in a sea of yellow bird's-foot trefoil blossoms this year. It was quite a shock as none had been observed here in prior years (JBB 6/23/2016).

Table 16 – Bird's-foot Trefoil Control – Morris WMD – 2016

WPA	Date	Phenology	Treatment	Acres
Beyer	6/28	Flowering	Mow	32.48
Lundgren	6/29	Flowering	Spray	16.74
Edwards	6/30	Flowering	Spray	8.03
Edwards	7/6	Flowering	Spray	2.07
Hillman	8/16	Flowering	Spray	0.59
Total				**59.91**

Biennial thistle

Plumeless thistle *(Carduus acanthoides)* started to show up within the district around 2005. It got a foothold on private lands, especially overgrazed pastures, but also smooth brome dominated CRP with coarse soils. Within about a five year period it has expanded and in some cases taken over fields and pastures. As of 2016, a minimum of 47 WPAs (up from 40 in 2015) are now known to have occurrences of plumeless thistle (Table 17). Twelve WPAs received treatment for plumeless thistle control this year (Table 18); seven were new sites (Finden, Fults, Mero, Niemackl Slough, Pepperton, Prairie, and Simon Lake). Most of the new occurrences and treatments are associated with prairie reconstruction efforts, probably as a result of soil disturbance and increased traffic on these sites, as well as an increased effort to micro-manage invasive weed expressions in these highly important projects. Since this species needs sunlight for seed germination, anecdotal observation seems to suggest that presence and abundance diminishes over time as the natives establish and vegetative cover increases.

Table 17 – Known Sites with Plumeless Thistle – Morris WMD – 2016

Big Stone County	Pope County		Swift County
Anderson	Benson Lake	Overby	Artichoke Lake
Bauman	Berg	Rolling Forks	Big Slough
Dismal Swamp	Blue Mounds	Rustad	Brady
Kufrin	Finden	Scofield	Fahl
Prairie	Froland	Stammer	Loen
Twin Lakes	Glacial Lake	Starbuck	Roderick
	Grove Lake	Stenerson Lake	Simon Lake
	Larson	Walden	Welsh
	Nelson Lake	Westport	
Chippewa County	**Stevens County**		**Traverse County**
Hawk Creek	Edwards	Pepperton	Geyer
	Fults	Pieske	Diekmann
	Long Lake	Pomme de Terre Lake	Robin Hood
	Mero	Pomme de Terre River	
	Niemackl Slough	Thorstad	
	Nordby		

Table 18 – Sites Treated for Plumeless Thistle – Morris WMD – 2016

WPA	Date	Method	Acres
Glacial Lake	6/2	Spray	6.07
Stenerson Lake	6/2	Spray	2.50
Stenerson Lake	6/21	Spray	4.30
Simon Lake	6/22	Spray	2.47
Stenerson Lake	6/22	Spray	3.50
Finden	6/23	Mow	16.73
Stenerson Lake	6/23	Mow	29.70
Glacial Lake	6/24	Shovel/pull	0.01
Stenerson Lake	6/30	Mow	41.60
Prairie	7/1	Spray	0.28
Pepperton	7/5	Mow	14.46
Fults	7/5	Mow	12.78
Niemackl Slough	7/5	Mow	92.40
Pomme de Terre River	7/5	Mow	9.89
Mero	7/6	Mow	7.97
Stenerson Lake	7/7	Mow	133.30
Prairie	7/14	Shovel/pull	0.23
Twin Lakes	7/15	Spray	4.79
Prairie	7/15	Spray	1.61
Loen	7/29	Spray	7.69
Glacial Lake	8/15	Shovel/pull	0.26
Stenerson Lake	8/17	Mow	85.60
Loen	9/1	Spray	9.00
Loen	9/8	Spray	7.00
Total			**494.14**

Sweet Clover *(Melilotis* spp.*)*

A weed we seem to spend more and more time and effort each year trying to control in first and second year prairie reconstructions is sweet clover, both yellow and white. Because this plant is a biennial we use mowing to reduce seed production in these restored areas, and grazing by cattle in remnant prairie areas. In 2016, we mowed 479.1 acres at 14 WPAs (Table 19). Some of the sites included in the table were mowed primarily for other target species that triggered the treatment, with sweet clover as a secondary target.

Table 19 – Sites Treated for Sweet Clover – Morris WMD – 2016

WPA	Date	Method	Acres
Stenerson Lake	6/23	Mow	29.7
Beyer	6/28	Mow	32.5
Rothi	6/30	Mow	32.3
Stenerson Lake	6/30	Mow	41.6
Lawrence	7/1	Mow	10.8
Robin Hood	7/1	Mow	19.1
Seidl	7/2	Mow	12.7
Dismal Swamp	7/5	Mow	11.3
Fish Lake	7/5	Mow	9.8
Miller	7/5	Mow	8.4
Pepperton	7/5	Mow	14.5
Fults	7/5	Mow	12.8
Niemackl Slough	7/5	Mow	92.4
Pomme de Terre River	7/5	Mow	9.9
Mero	7/6	Mow	8.0
Stenerson Lake	7/7	Mow	133.3
Total			**479.1**

Purple Loosestrife *(Lythrum salicaria)*
Controlling purple loosestrife in the district started in 1997 with the raising and release of its natural predator the loosestrife beetle *(Gallerucella* spp.). To date, 18 sites on eight WPAs have been treated with loosestrife beetles. If no clear signs of beetle activity are seen at newly reported infestations, other control methods are used. In 2016, 23 plants were pulled and two huge plants were sprayed with Garlon 3 on Centennial WPA; five plants were pulled and two plants sprayed on Aal WPA; and at Stammer WPA three plants were sprayed (just two *Gallerucella* beetles were seen on one of the three). A total of 0.0043 acres was treated in 2016. The loosestrife beetles are successfully keeping loosestrife in check at most known sites.

Leafy Spurge (*Euporbia esula*)
A major biological control program for leafy spurge was initiated in the late 1990s at Morris WMD. Three root-feeding flea beetles (*Aphthona lacertosa, A. nigriscutus*, and *A. czwalinae)* have established and reproduced. The very effective flea beetle larvae feed on the spurge root system, beetle populations increase rapidly after introduction, and the insects are easily captured (harvested) for redistribution (release) to additional locations.

In 2016 a total of 14,000 flea beetles were harvested from Rolling Forks, Loen, and Lynch Lake WPAs. The beetles were released at three sites on two WPAs and three sites on an easement (Table 20). Since 1997 the Morris WMD has released flea beetles at 232 release sites on 65 WPAs. YCC members collected and released 6,000 beetles for easement 59G-25 in Pope County. Beetles were applied to 0.19 acres on federal land and 0.0035 acres of private in 2016.

Table 20 – Leafy Spurge Beetles Released – Morris WMD – 2016

Location	No. Sites	No. Released
Blue Mounds WPA	2	5,000
Walden WPA	1	3,000
59G-25	3	6,000
Total	**6**	**14,000**

Two new release sites were established on Blue Mounds WPA where an estimated 1.75 acres of leafy spurge was discovered (DMO 6/30/2016).

Pope-Swift Cooperative Weed Management Area (CWMA)

The Pope County CWMA started in 2008 and expanded into Swift County in 2010 when funds were received through a grant from the Minnesota Board of Water and Soil Resources (BWSR). This cooperative effort is vital to adequately address the emergence of many new invasive weeds, which all carry serious implications if they get established. Wildlife Refuge Specialist Bright serves on the steering committee.

The Pope-Swift CWMA mission is to focus on education, training volunteer weed watchers for rapid response, infestation documentation, treatment, and monitoring. The project has mapped and/or treated the following weeds: common tansy, wild parsnip, spotted knapweed, plumeless thistle, leafy spurge, bouncing bet, and common toadflax. These were chosen because of their difficulty to control, their tendency to take over grassland cover, and the uncertainty in their distribution and abundance.

In 2016, the Pope County Soil and Water Conservation District hired Jessica Oldakowski as a permanent, full-time employee. She splits her time between the CWMA and Buffer Initiative. The website (www.weedwatchers.org) continues to be a year-round source of information for folks interested in invasive weeds, but it has not been updated since 2012 with current information, especially the weed distribution and treatment maps for Pope and Swift Counties. A synopsis of the CWMA activities is as follows:

This year the Pope-Swift Cooperative Weed Management Area program was focused on treatment of chronic areas, in particular, those that are infested with wild parsnip and plumeless thistle. Township road right-of-ways throughout Pope and Swift counties were targeted utilizing chemical treatments. These sites are part of a Treatment Plan created for a 2-3 year treatment regime. Other sites were chemically sprayed to treat leafy spurge and common tansy. One infestation of leafy spurge was treated biologically with the release of a small collection of leafy spurge beetles. Follow up monitoring will be required on this site. Many identified sites of noxious weeds in Pope and Swift counties have remained. However, there are a good number of sites that have decreased in weed population. It is the goal of the CWMA program to continue to treat chronic noxious weed sites and assist landowners with these issues in order to reduce the size of the infestations as well as the overall number of infestation sites.

Big Stone-Traverse CWMA

Based on the success of the Pope CWMA the Big Stone CWMA was formed in 2009. WRS Bright serves on the committee which also includes Big Stone NWR staff. In 2012, the CWMA expanded to include Traverse County. Also in 2012, the CWMA received a $50,000 Pulling Together Initiative Grant through the National Fish and Wildlife Foundation. This grant allowed for the purchase of a three-quarter ton pick-up and Gator UTV.

Ryan Hopkins was the intern hired for 2016 to continue mapping and treating target weeds. A synopsis of his report is included here:

One new site for wild parsnip was detected. It was in Section 11 of Otrey Township. Treatments primarily entailed chemical applications or hand-pulling, but three sites with larger infestations were mowed during the blooming stage. There were thirteen landowners billed for 31 hours of work completed and thirty other sites in right-of-way areas were sprayed.

FISH AND WILDLIFE MANAGEMENT

4a. Bird Banding

Morris WMD does not coordinate any bird banding locally, but does assist with banding projects conducted by the MN DNR. Our staff assisted the Appleton Area DNR wildlife staff with their annual goose banding effort. Locally breeding giant Canada geese are banded in Minnesota each year in an attempt to gather movement and harvest data for the population. We baited and set traps for mourning doves, but did not capture any to band.

4d. Nest Structures

We check and maintain nest structures over the winter because the ice provides easy access. Because of this, our results in the narrative run a year behind – the results here are from the 2015 nesting season.

Table 21 shows the structures that were available (in good enough condition for a duck to build a nest) and got used, did not get used, or unknown, as well as the structures that were not available (tipped, bent, poor condition, etc.). We are in the process of removing structures that have not been used in the last three years, that have become surrounded by dense cattail, or that are perpetual maintenance problems. Our hope is that these efforts will improve our use rates.

Table 21 – Nest Structure Checks – Morris WMD – 2015 Nesting Season

	Available			Not Available	Total
	Used	Not Used	Unknown		
Hen House	36	104	12	28	180
Wood Duck Box	10	2	5	0	17
Goose Tub	0	3	1	0	4

4e. Pest/Exotic Control

Goose Damage

Crop damage caused by resident Canada geese continues to be an issue throughout the district. Options available to private landowners to lessen damage caused by the birds include electric fencing and shooting permits. The early August goose season that had been implemented during the 2014 and 2015 hunting seasons to try to reduce the number of local Canada geese was dropped for 2016. The goose damage complaints in our district are handled primarily by the local DNR offices; however, we sometimes get involved if the complaint is adjacent to a WPA. Our office received no damage complaints in 2016.

Beaver

The number of beaver damage complaints were minimal in 2016. We received two complaints from landowners who believed that beaver were causing flooding problems on adjacent private land. Efforts were made to resolve those complaints by installing Clemson levelers to regulate the water level at those dams. Additionally, clean-out projects were done by staff on various WPAs to keep water control structures operational. It was not necessary to remove any beaver in 2016.

Installation of a Clemson leveler at Grove Lake WPA (MLK 04/2016).

COORDINATION ACTIVITIES

5a. Interagency Coordination

Pheasants Forever
Through a statewide partnership with the Service, Pheasants Forever (PF) has been actively purchasing tracts identified by the Service for acquisition and then donating them to the Service to be managed as waterfowl production areas. Most of the funding for these acquisitions, five to seven million dollars per year, has been from the state's Outdoor Heritage Fund with lesser amounts from North American Wetlands Conservation Act grants. Two fee title tracts were donated to the Service this year. The Hantho Farms tract was an addition to Hastad WPA (Lac qui Parle County), and the Fettig Tract was an addition to Stenerson WPA (Pope County).

In addition to land acquisition, PF also provides funding and labor to conduct rehabilitation and restoration projects on WPAs. Projects included fence construction, tree removal, and grassland seeding. PF has Habitat Specialists stationed throughout western Minnesota to conduct grassland restoration projects.

The Nature Conservancy
Another statewide partnership is in place with The Nature Conservancy (TNC) for acquiring lands for the Northern Tallgrass Prairie (NTP) NWR. This partnership differs from the partnership with PF in that not only fee title lands but also easements are purchased and then donated to the Service. All of the funding for these acquisitions (annually two to three million dollars in recent year) has been from the state's Outdoor Heritage Fund.

Seven NTP easement tracts were donated to the Service: three in Lac qui Parle County, three in Pope County, and one in Swift County. TNC also purchased a new fee tract, the 80 acre Hoffman Tract in Pope County, which will be donated to the Service in 2017. This will be the first new NTP fee tract acquired by the station since the single 22 acre Green Muhly Tract was acquired in Stevens County in 2007. In addition, a signed purchase option was obtained for another Fee Tract, Cramlet (65 acres), which is located along Hassel Creek in Pope County.

In addition to land acquisition, TNC provides funding and labor through the Prairie Recovery Project to conduct grassland rehabilitation and restoration projects on WPAs (Table 21). Most of the recent projects have been for tree removal on WPAs. Two Prairie Recovery Specialists, hired by TNC, conduct projects throughout the District. One specialist is stationed at the Litchfield WMD office and serves Pope and Swift Counties. The other specialist, Angie Miner, is stationed at our office and serves the western portion of Morris WMD.

Table 21 – Projects Completed by TNC on WPAs – Morris WMD – 2016

County	WPA	Acres	Project
Big Stone	Hillman	59	Prescribed burn assist
Big Stone	Hillman	14	Invasive control
Big Stone	Kufrin	45	Woody removal
Big Stone	Prairie	1	Woody removal
Big Stone	Redhead Marsh	160	Woody removal
Chippewa	Lundgren	27	Brome conversions
Chippewa	Lundgren	1	Brush pile chipping
Chippewa	Lundgren	115	Woody removal
Lac qui Parle	Beyer	287	Prescribed burn assist
Lac qui Parle	Hastad	1	Brush pile chipping
Lac qui Parle	Hastad	42	Tree removal
Lac qui Parle	Hegland	1	Chipping
Pope	Benson Lake	75	Woody removal
Pope	Blue Mounds	212	Fence installation
Pope	Blue Mounds	1	Seeding
Pope	Froland	47	Prescribed burn assist
Swift	Artichoke Lake	125	Woody removal
Swift	Spring Lake	123	Prescribed burn assist
Swift	Spring Lake	15	Seed collection
Swift	Welsh	1	Tree removal
Swift	Westhausen	90	Fence installation
Swift	Westhausen	117	Prescribed burn assist

Other Coordination

We work closely with the Natural Resources Conservation Service in their implementation of conservation programs including Wetland Reserve Program, Conservation Reserve Program, Conservation Reserve Enhancement Program, etc.

Staff members work with other agencies such as Soil and Water Conservation Districts, local water boards, and county highway departments on many issues. With the complex, scattered, and diverse land holdings of a wetland management district, issues arise each year related to roads, drainage, invasive species, and other topics requiring interagency coordination. Information about cooperative efforts and interagency coordination can be found in nearly every section of this narrative report.

5c. Private Lands

The Morris WMD had 1.0 FTE this year for the Partners for Fish and Wildlife Program (Partners Program). The Partners Biologist coordinates the habitat restoration work on private properties through the Partners Program and various conservation easement programs. The Partners Biologist also works closely with the District Habitat Team to develop and coordinate the habitat restoration work on new fee title acquisitions. We continue to have several noteworthy partnerships that contributed to the amount of leveraged funding and habitat restoration accomplishments in 2016. These partnerships will continue to be a major part of the habitat restoration work on public and private lands within the District.

As the number of completed projects grows and the farm economy changes, so does the number of project inquiries from private landowners. These inquiries are typically sent our way by neighbors and other partners. We continue to have 30-40 projects on our "wait list". The majority of these potential projects are small (<10 acres) and not located on Service easements.

FY2016 Completed PFW Program Accomplishments:

- 28 upland restoration/enhancements – 851.91 acres
- 36 wetland restoration/enhancements – 236.97 acres

  Total 1,088.88 acres
- Total USFWS contribution = $132,411
- Total partner contribution = $334,083

District staff continue to be involved with implementing the Minnesota Prairie Conservation Plan by being active on several Local Technical Teams (LTTs). These LTTs are based around prairie plan's Prairie Core Areas and are comprised of local conservation professionals who work closely with farmers, landowners, local officials, and citizens to promote grassland conservation and grass-based agriculture as outlined in the prairie plan. Local professionals are typically best suited to understand the lay of the land and the people who live there. With this knowledge base, the LTTs identify and help fund high priority grassland-related projects in their work areas. LTTs seek to concentrate their grassland conservation efforts in ways that get positive outcomes for the environment while adding value to the community and economy. They also serve as a resource to those interested in learning more about managing and conserving grasslands. We did not utilize Working Lands Initiative funding as much as in past years due to program changes that decreased flexibility. This resulted in a shift toward other funding sources that better fit our landowners' needs.

Pheasants Forever (PF) acquires several thousand acres of land in Minnesota every year. Within the Morris WMD, we work closely with PF staff and local chapters to acquire high priority properties in fee title. These properties are eventually donated to the Service. The Partners biologist provides technical assistance to PF to restore and enhance these properties prior to donation. Pheasants Forever utilizes a variety of grant programs to fund the restoration work including Outdoor Heritage Fund (OHF) and North American Wetland Conservation Act (NAWCA) grants. Much of the restoration work includes prairie reconstructions on marginal agricultural fields, wetland restorations, and invasive tree removal. In light of our management

limitations, our main goal is to restore these properties in such a way that we can maintain high quality wildlife habitat in the long run.

Pheasants Forever played an increasingly important role in our easement restoration efforts in 2016 by acquiring Small NAWCA grants for multiple restoration projects. In fall 2016, we ramped up our private lands restoration partnership by submitting grant applications that, if funded, will restore and enhance approximately 1,000 acres habitat on 10 properties. These grants will total almost $200,000.

The Nature Conservancy (TNC) is another major acquisition and restoration partner for the Morris WMD. With OHF funding, TNC has been acquiring land in fee title and permanent conservation easements within the Northern Tallgrass Prairie Habitat Preservation Area in western MN for addition to the Northern Tallgrass Prairie National Wildlife Refuge. The goal is to protect native prairie and associated wetland complexes. Service and TNC staff work together to review potential acquisitions in priority areas. The Partners biologist provides technical assistance to TNC to restore and enhance these acquisitions prior to donation. The Nature Conservancy covers the cost of restoration projects with OHF funding.

The tree removal project on the Colden NTGP Easement (Pope County) was completed in partnership with The Nature Conservancy using Outdoor Heritage Fund grants (ALG 1/20/2016).

A new partnership for us in 2016 was with the Minnesota Land Trust, in cooperation with the USFWS Minnesota Private Lands Office. Through this partnership, we acquired about $65,000 in Conservation Partners Legacy grant funding to be used for the habitat restoration work on the Carlson habitat easement in Pope County. Without these partnerships, it would be much more challenging to restore large tracts, like the 310-acre Carlson habitat easement. Restoration work should be completed on this property in 2017.

Our station was also allocated $38,000 in Monarch Initiative funding in 2016. This funding is restricted to on-the-ground habitat restoration and enhancement projects that benefit monarch butterflies. It was used on four Service habitat easements for purchasing high diversity, local ecotype seed mixes that provide the appropriate nectar plants and milkweed for monarchs, other pollinators, and breeding habitat for grassland birds.

A sweat bee visits the flower of a spiderwort in the pollinator garden outside our headquarters building. Pollinator health has become a conservation focus in recent years (ALG 6/13/2016).

RESOURCE PROTECTION

6a. Law Enforcement

In February, Officer Doug Briggs transferred to a new position as a Zone Officer in the eastern portion of Region 3, leaving the district without a full time law enforcement officer for most of the year. For that reason, we have nothing to report here for 2016.

6b. Permits/Economic Use

During 2017, we issued 69 Special Use Permits for activities on WPAs and easements. The permits were issued for conducting scientific studies, providing disabled hunter access, rearing walleye fry, cutting hay, grazing, cash rent farming, firewood cutting, fencing, tree removal, tile repair, and installing a power line.

6c. Contaminants

Neonicotinoids, a class of agricultural insecticides, are used widely in our region. Studies in recent years indicate that non-target effects may be occurring in both wetland and upland ecosystems. We are particularly concerned about reports from South Dakota and Canada that neonicotinoids are being detected in prairie wetlands. Aquatic invertebrates are a key food source for breeding waterfowl, so insecticide contamination in prairie pothole wetlands could have serious implications for our breeding waterfowl habitat goals. Starting this year, we participated in a baseline survey to assess how widespread neonicotinoid chemicals are in wetlands on Refuge System lands in Minnesota and Iowa. See Section 1a for more information about this survey.

6g. Land Acquisition Support

In recent years, the Service Realty branch has focused acquisition efforts on Small Wetlands Acquisition Program (SWAP) easements while Pheasants Forever (PF) became the primary organization purchasing land for WPAs using funds obtained through an Outdoor Heritage Fund (OHF) grant. This arrangement works well as PF prefers acquisition over easements as their constituents desire more public lands to hunt on rather than just habitat protection. Unfortunately, current SWAP funding levels are no longer enough to purchase all available easement opportunities. Funding for Minnesota, which was previously $5 million per year, was reduced to $2 million per year with the remaining funds directed to North and South Dakota. In addition, the price of land, and as a result the cost of easements, has doubled in recent years so our limited funds do not go as far. It is hoped that the 2014 approved price increase for Duck Stamps from $15.00 to $25.00 will result in Minnesota once again receiving $5 million, as in the recent past.

The Northern Tallgrass Prairie NWR land acquisition program received a much needed boost with a new partnership with The Nature Conservancy (TNC). Similar to the partnership with PF, TNC successfully acquires funding through OHF grants to purchase both fee and easement lands, then donates the tracts to the Service.

In recent years, the Morris district has primarily pursued acquisition of easements over fee title tracts as there are more landowners interested in selling easements, easements cost less per acre which thus allows us to protect more land, and management of easements requires fewer resources than do management of fee title lands. However, despite the obstacles to fee title acquisition we do pursue fee title tracts. We primarily target tracts adjacent to existing WPAs, which will make management more cost effective, and tracts that are located in areas with high potential for waterfowl production and/or that contain native prairie.

Fee Title

Tables 22 and 23 summarize our fee title ownership by county and over the last 15 years, respectively. This year, Pheasants Forever was successful in purchasing/donating two tracts of land to the district, totaling 358 acres. The Hantho Tract, is a 41 acre addition to Hastad WPA in Lac qui Parle County. The other tract, the Fettig Tract, is a 317 acre addition to Stenerson Lake WPA.

The Service also acquired the 354 acre Stadem Tract as an addition to Hillman WPA. This tract was acquired with Duck Stamp funds as portions of the tract had an easement on it which prevented the use of OHF (PF Partnership) funds. All tracts acquired with duck stamp funds require county board review. For this reason, a detailed letter was submitted previous to the board meeting to all of the commissioners which explained the values of the tract and requested their support. Fortunately, the board unanimously voted to certify purchase of the tract.

Table 22 – Waterfowl Production Area Realty Acreage – Morris WMD – 2016

County	Units	Realty Acres	Goal Acres	% of Goal Acquired
Big Stone	58	12,095.78	15,600	78
Chippewa	2	360.10	0	N/A
Lac qui Parle	19	4,374.07	6,600	63
Pope	66	13,752.88	21,000	64
Stevens	56	9,830.60	12,850	75
Swift	30	8,016.36	10,800	74
Traverse	12	4,105.20	6,720	61
Yellow Medicine	5	1,082.70	1,260	86
Total	**248**	**53,617.69**	**74,830**	**72**

Table 23 – Morris WMD – 15 Years of Fee Title Land Acquisition – 2002-2016

Year	Acres	Tract Name	WPA	County
2002	594	7 tracts	Centennial*	Big Stone
2003	2	Doherty	Long Lake	Stevens
2004	0			
2005	99	Knollheim	Haglund-Hastad	Lac qui Parle
	200	Wiik	Kufrin	Big Stone
2006	0			
2007	26	Faith Church	Moulton Lake	Big Stone
	22	Lubenow	Green Muhly NTP**	Stevens
2008	80	Schaeffer	Rustad	Pope
2009	156	Olsen	State Lake	Pope
2010	0			
2011	123	Snortum	Dakota	Yellow Medicine
2012	0			
2013	96	Nelson	Svor	Swift
	20	Burdick	Prairie	Big Stone
2014	202	Beyer	Beyer	Lac qui Parle
	36	Schmeig	Beyer	Lac qui Parle
	282	Gardner	Finden	Pope
	199	MN Farms	Niemackl Slough	Stevens
2015	5	Miller	Beyer	Lac qui Parle
	277	Gunewitz	Lake Simon	Swift
2016	41	Hantho Farm	Hastad	Lac qui Parle
	317	Fettig	Stenerson Lake	Pope
	354	Stadem	Hillman	Big Stone
Total	**3,131**			

* WRP Easements purchased to facilitate acquisition
** NTP = Northern Tallgrass Prairie NWR Tract
Red = OHF Funded Acquisition

The legislation authorizing purchase of WPAs requires that the Fish and Wildlife Service receive approval by the state involved. In Minnesota, the state makes its decision to approve or deny acquisition tract-by-tract through a decision by the Land Exchange Board. Land Exchange Board members are the Governor, Auditor, and Attorney General. Before going to the Land Exchange Board, we discuss the proposed acquisition with the board of commissioners of the county involved. The county does not approve or deny the acquisition but does express its opinion to the Land Exchange Board through a process that we call certification. With county certification, Land Exchange Board approval is almost automatic; without county certification, approval at the state level is less assured.

Tax loss remains an important issue related to land acquisition. A trust fund payment is made to the county government with each new fee purchase where revenue sharing is short. The interest

from the trust fund payment, when invested at the current one-year treasury bill interest rate, was intended to make up the difference between the revenue sharing payment and the taxes that would be paid on the land if it remained private property. However, in recent years interest rates have been so low that the payments do not make up for losses. The payments are only made in cases where the estimated revenue sharing payment for the land is less than the current taxes on the property. It is up to the counties to decide what to do with the money; they can spend it or invest it. Previously purchased land is not covered by the trust fund payments since they are made as part of the land purchase. The county commissioners appreciate this program but don't consider it the full answer to the revenue sharing problem.

Revenue sharing payments (so-called "in-lieu-of-tax payments") are important to our acquisition program (Table 24). Counties are understandably interested in the annual payment they receive and they are concerned about low payments. However, we do make many fewer demands on county resources than do owners of private land. Our drain on county resources for infrastructure, law enforcement, and human services is minimal or absent. Furthermore, in Minnesota, state school aid formulas tend to offset any loss of local property tax and prevent any loss of income to a school district when we purchase land. Still, while our net economic effect to most counties is almost certainly positive, it is difficult to get past the fact that we pay less than 100 percent of the authorized amount.

In 2015, counties received 25 percent of the amount prescribed by the revenue sharing formula (3/4 of one percent of fair market value).

Table 24 – Revenue Sharing Payments – Morris WMD – FY 2012-15*

County	FY 2012	FY 2013	FY 2014	FY 2015
Big Stone	$30,686	$36,151	$33,836	$35,575
Chippewa	995	805	1,094	793
Lac qui Parle	9,986	11,720	10,970	13,501
Pope	39,200	46,005	43,060	46,301
Stevens	27,370	32,122	30,065	33,585
Swift	18,233	21,398	20,028	21,483
Traverse	12,473	14,638	13,701	14,405
Yellow Medicine	3,774	4,429	4,145	4,358
Total	**$142,717**	**$167,268**	**$156,899**	**$170,001**

*Payments for 2016 will be paid in 2017

The long term success of fee acquisition is unknown. Our real estate capabilities, the farm economy, farm programs, revenue sharing, and many other issues combine to influence our land acquisition program. However, the establishment of the Minnesota's Outdoor Heritage Fund (OHF) in 2009 – one of four funds crated by the Clean Water, Land and Legacy Amendment – has provided a significant increase in funds available for land acquisition. With the continued degradation of habitat on private land, fee title acquisition remains a critical tool for habitat protection.

Wetland Easements
There was very little interest in wetland easements this year. Only one wetland easement was purchased, protecting a total of 66.06 acres of wetlands (Table 25).

Under the terms of a wetland easement, the Fish and Wildlife Service purchases the rights to drain, burn, level, or fill wetlands from a willing seller. The highest priority easement proposals are those which preserve wetlands located within one of 13 Focus Areas in the District.

The future of our easement program is directly related to funds, staff time, and the process by which we provide landowners an easement offer. Roughly half of all duck production in western Minnesota comes from temporary and seasonal wetlands which still have little or no protection under state and federal law. Each year sees more ephemeral wetlands drained in the district. Small shallow wetlands are usually not defined as wetlands by USDA and are specifically excluded from Minnesota's wetland protection legislation in typical agricultural situations. Our easement is the only protection available for many remaining wetlands.

Table 25 – Wetland Easement Program Status – Morris WMD – 2016

County	Number Easements	Wetland Acres	Total Tract Acres	Goal Acres
Big Stone	203	6,857.8	25,544.92	42,640
Chippewa	4	115.1	392.00	0
Lac qui Parle	44	1,529.1	5,410.55	23,540
Pope	268	9,127.9	35,502.50	44,180
Stevens	57	1,824.4	5,116.40	6,090
Swift	70	1,511.3	5,335.10	14,540
Traverse	35	1,146.0	3,871.51	8,440
Yellow Medicine	11	181.4	659.27	7,860
Total 2016	**692**	**22,293.0**	**81,832.25**	**147,290**
Total 2015	**691**	**22,226.9**	**81,701.01**	**147,290**
Total 2014	**689**	**22,174.3**	**81,540.60**	**147,290**
Total 2013	**689**	**22,174.3**	**81,540.60**	**147,290**
Total 2012	**686**	**22,099.7**	**81,335.90**	**147,290**

Habitat Easements
The Fish and Wildlife Service introduced the habitat easement in 1993. This easement protects grassland habitat adjacent to wetlands in addition to the wetlands. While native prairie tracts receive the highest priority, we pursue easements on other grassland habitat as well, as long as the block provides significant waterfowl value.

Four types of easement are available. However, we no longer pursue fully restrictive easements as they require a full appraisal which takes three to six months to complete and the purchase price is often very similar to the cost of a fee purchase. The three remaining types of easement options allow varying opportunities for grazing and limited haying but prohibit drainage and tillage. The

landowner is required to pay taxes and control noxious weeds. Currently, a realty process called Assessed Land Value is available for minimally restrictive easements and allows quick and efficient offers. We have been purchasing many easements in recent years on grasslands containing or adjoining wetlands. With the landowner still able to graze the sites, it is both attractive to the landowner and beneficial to migratory birds to permanently protect these grasslands.

Starting in 2009, we increased our efforts to expand the habitat easement program and have been successful in protecting some excellent habitat. Unfortunately, Duck Stamp funding was reduced from $5 million per year to $2 million in Minnesota, as the funds were transferred to North and South Dakota because the Director saw these states as a higher priority. Despite reduced funding, eleven habitat easements were purchased in 2016 protecting a total of 783.4 acres of grasslands and wetlands (Table 26). In comparison, nine habitat easements were purchased in 2015, protecting 886 acres. Habitat easements must have commissioner review and Land Exchange Board approval in the same manner as wetland easements.

Table 26 – Habitat Easement Program Status – Morris WMD – 2016

County	Easements	Acres
Big Stone	54	5,414.31
Chippewa	0	0.00
Lac qui Parle	16	1,249.00
Pope	36	3,864.95
Stevens	2	57.87
Swift	16	935.62
Traverse	2	296.16
Yellow Medicine	10	1092.37
2016 Total	**136**	**12,910.28**
2015 Total	**125**	**12,126.87**
2014 Total	**116**	**11,240.07**
2013 Total	**113**	**10,922.60**
2012 Total	**108**	**9,864.88**

Farmers Home Administration Easements

The former Farmers Home Administration (FmHA) is now part of the Farm Service Agency (FSA). For consistency, we continue to call easements related to their programs FmHA easements. We inspect each easement for compliance each year and manage the units in a manner similar to our fully restrictive habitat easements, using prescribed fire, haying, grazing, or no management action as appropriate. Changes in USDA rules and policies have eliminated opportunities to acquire additional FmHA easements. Table 27 summarizes the FmHA easements managed by Morris WMD.

Table 27 – FmHA Easements – Morris WMD – 2016

County	Easements	Easement Tracts*	Acres
Big Stone	1	1	4.82
Chippewa	1	1	63.20
Lac qui Parle	2	2	114.93
Pope	5	11	220.13
Stevens	1	2	73.55
Swift	10	17	418.12
Traverse	0	0	0.00
Yellow Medicine	3	9	342.48
Total	**23**	**43**	**1,237.23**

*Some easements contain more than one tract.

Northern Tallgrass Prairie National Wildlife Refuge

The Fish and Wildlife Service received approval in 2000 to proceed with development of this refuge. Funding for acquisition has come through the Land and Water Conservation Fund, a state conservation corridors grant, and, more recently, OHF grants. The refuge concept is modeled after the small wetlands (WPA) program and aims to protect 77,000 acres of remaining native tallgrass prairie in scattered tracts in western Minnesota and northwest Iowa. Prairie protection is accomplished through a combination of fee title and easement acquisition. Overall refuge coordination is provided by the manager of the Big Stone NWR. Various refuges and wetland management districts are responsible for coordinating acquisition and management of individual refuge units in designated counties. The Morris WMD is responsible for those units that fall within our eight county district (Table 28).

Seven new Northern Tallgrass Prairie NWR easement tracts were acquired this year through a partnership with The Nature Conservancy (TNC). The Service identifies fee and easement tracts for protection and TNC acquires the tracts using funds received from an OHF grant, then donates the tracts to the Service. In 2016, a total of 725 Northern Tallgrass Prairie easement acres were acquired. Three of the tracts are located in southern Pope County, another three in western Lac qui Parle County, and one in western Yellow Medicine County. The largest of the tracts is the Martin Grabow Easement (59G16), 300 acres, which is located along the South Dakota border in Yellow Medicine County. This tract contains native prairie, oak savannah, and a spring fed stream and is part of a larger prairie complex which harbors a sharp-tailed grouse population.

Table 28 – Northern Tallgrass Prairie NWR Units – Morris WMD – 2016

County	Fee Tracts	Fee Acres	Easement Tracts	Easement Acres	Total Tracts	Total Acres
Big Stone	0	0	5	349.81	5	349.81
Chippewa	0	0	0	0.00	0	0.00
Lac qui Parle	0	0	4	292.80	4	292.80
Pope	0	0	11	1,240.05	11	1,240.05
Stevens	1	21	0	0.00	1	21.00
Swift	0	0	2	110.00	2	110.00
Traverse	0	0	2	45.70	2	45.70
Yellow Medicine	0	0	13	1,055.56	13	1,055.56
Total	**1**	**21**	**37**	**3,093.92**	**38**	**3,114.92**

PUBLIC EDUCATION AND RECREATION

7a. Provide Visitor Services

Morris WMD hosts approximately 69,000 visitors during the year. Most district visitors partake in recreational opportunities such as trapping, hunting, fishing, wildlife observation, interpretation and environmental education. The largest economic impact provided to local communities comes from hunters who are the most frequent users of our WPAs.

The district headquarters, located at Edwards WPA (Stevens County), offers a visitor center where general information about Morris WMD, activities, and programs is available. A short paved trail loops through native prairie and is accessible to people with physical disabilities. A scenic, 2.5 mile gravel wildlife drive is open for vehicle traffic during spring, summer, and early fall, and is always open for foot or bicycle travel. The route provides wildlife viewing opportunities. We also maintain a 1.2 mile long hiking trail that winds through native prairie, woodlands, and around a wetland. A second self-guided nature trail is located at Froland WPA, Pope County.

Prairie Pioneer Days
Once again the District was the host of the Prairie Extravaganza event. The event is collaboration between the district and the Friends of the Morris Wetland Management District, and is held in conjunction with the city of Morris' Prairie Pioneer Days festival on the weekend after July 4th. The musical act this year was Total Bluegrass. The usual horse drawn wagon rides were absent due to an injury of one of the horses. Other events included bird house building, selling native plants (Morning Sky Greenery), and live raptors (from the Audubon Center for the North Woods). In addition, the district staff gave interpretive nature hikes with an emphasis on native pollinators and the plants that they depend on.

Fourth Grade Conservation Day
Fourth Grade Conservation Day is an environmental education program for fourth graders that includes three sections:

- Catching and identifying insects in early fall
- Snowshoeing and winter ecology in winter
- Watershed mapping in spring

This year, only Glacial Hills Elementary school participated in Fourth Grade Conservation Day.

Students exploring the prairie during Fourth Grade Conservation Day (Kaley Poegel 5/25/2016).

Youth Hunt
The mentored youth hunt is a way to introduce youth to the sport and tradition of hunting in a way that is safe, and ensures that conservation values are passed on to the next generation of sports men and women.

Unfortunately, the mentored youth duck hunt was not held this year because we were unable to find a Ducks Unlimited partner to team with.

Hunting
Hunting continues to be a major part of many people's lives, especially in rural areas. The primary game species in our area are deer, pheasant, and waterfowl. Even if hunters don't fill their limit, they are out enjoying the great outdoors. The diversity of WPAs in Morris WMD offers many options for the hunter.

<u>Waterfowl</u>
There was no August early goose season option this year. Unfortunately, this was a year when wheat was harvested early and thus, there might have been good hunting opportunity in August. There was ample opportunity to hunt geese in September, and for most hunters it was probably one of the better years in the last 6 years.

Duck opening weekend was good, but not as good as last year. There was some decent hunting up to mid-October, but was really pretty poor the second half. The peak huntable migration days (where birds actually dropped in and stayed momentarily versus flying straight over) was November 5th-9th. Overall, the season started great and we had some decent days in the middle. By the end of the season the hunting opportunities were poor.

Pheasant

Hunting pressure was noticeably lighter this year. In the days prior to the season, most field reports agreed the numbers were probably better than advertised. Crop harvest was delayed by moisture in many areas. While most crops were out by mid-season, some were still standing at the end of the season; providing bonus food plots and cover. Bird numbers are still not where they were in 2005-07, but probably the highest we've had since then.

Big Game

There was nice weather at the front end of the archery season, but lots of mosquitoes to contend with. There was no shortage of deer; and one gentleman put adds in the local papers wanting bow hunters to come harvest does on his property (Lac qui Parle County). Crops were a little slow to be harvested due to the wet conditions, but most were out by the end of October. Snow and colder weather in December concentrated deer and made for some good late season opportunities, even on public lands. Harvest was nearly identical to last year, and hasn't changed much in the last several years.

During the firearm deer season, crop harvest was at 95 percent for beans and 85 percent for corn, with some crops still standing in the low areas. Hunting pressure was similar to recent years. Opening weekend harvest numbers indicated a 16 percent decline over 2015 opening weekend. There seemed to be more deer across the landscape this year, so the decline in harvest was probably a function of nice weather and uninspired efforts. Slug harvest ended up being down 8 percent from 2015, with buck harvest down 17 percent.

The muzzleloader harvest was up 35 percent, with buck kill up 30 percent. Hunting pressure was noticeably heavier on public lands this year.

Turkey

Hunting traffic was moderate for the first couple days, but lightened up soon after. Reports from around the area suggest good numbers of birds along the river valley, up Big Stone Lake, and in western Lac qui Parle County. There seemed to be slightly more pressure at the end of the season with the new law changes allowing a "second chance hunt" for those who didn't tag a bird in their early season. There were many optimistic reports from staff and public that there was a healthy hatch of turkeys in the spring/summer. There was predominately good turkey hunting weather for most of the season.

Small Game

In addition to pheasant hunting, huntable small game in Morris WMD include cottontail rabbit, jack rabbit, gray/fox squirrels, gray partridge, ring-necked pheasant, crow, woodcock, rail, snipe, and mourning doves. Dove hunting pressure was low and success poor this year; mosquitoes were terrible and dove numbers were down.

7b. Outreach

The Morris WMD web page is: https://www.fws.gov/refuge/morris_wmd/

The WPA mapper, a website featuring maps and aerial photography of WPAs, is also an important tool for the public to locate and learn about their waterfowl production areas: http://gis.fws.gov/wpa_mapper

We are currently producing three to four posts per week on our Facebook page, and now have 12,776 "likes" nearly doubling since last year.

A handicapped accessible hunting/photo blind was delivered by Capable Partners, a handicapped sportsman's group. We plan to erect it in the summer of 2017.

This year the district again hosted several high school and college classes for field trips including Freshwater Ecology, Environmental Studies, and Graphic Arts.

In an effort to increase public awareness and education outreach, the Morris staff represented the Service at the following events throughout the year:

- Judge Morris High School Science Fair
- Volunteer Thank You Supper
- Morris Fifth Grade Science Fair Judging
- University of MN Morris Welcome Picnic and Expo
- Service Learning Class, University of Minnesota, Morris
- Monarch Tagging
- SWELL
- Morris Elementary School Outdoor Learning Environment planning meeting
- Library summer reading program in Benson, Appleton and Kerkhoven

7c. Friends of the Morris WMD

The Friends of the Morris Wetland Management District, a non-profit advocacy and support group, was established in 2001. Their mission is to help the community develop a deeper appreciation and understanding of the Morris WMD.

The Friends provide support for district management, particularly activities relating to community relations. Besides numerous other small events and activities, the Friends helped organize, staff, and fund our participation in Prairie Pioneer Days, a local community festival we use to promote awareness of grasslands and wetlands.

The friends celebrated Earth Day with a screening of "The Power of One Voice", a documentary film about the life and work of Rachel Carson. This was done in partnership with the Morris Movie Theater Cooperative.

The Friends group cleaned up litter from a stretch of road outside of the district headquarters, which the friends have adopted as part of the" Adopt a Highway" program.
The Friends and District staff maintained a booth at Horticultural Night at the USDA Horticultural Garden.

Progress was made on the Kate Livingston memorial located along the wildlife drive on Edwards WPA. Morris WMD staff, Friends group members, boy scouts and other volunteers gathered to plant plugs in the prairie reconstruction around Kate's memorial bench area.

WRS Bright gave planting instructions to volunteers who gathered to plant plugs for the prairie reconstruction near the Kate Livingston memorial at Edwards WPA (SAB 6/18/2016).

PLANNING AND ADMINISTRATION

8b. General Administration

12 5 4 13 11 2 14

1 6 10

9 7 8 3

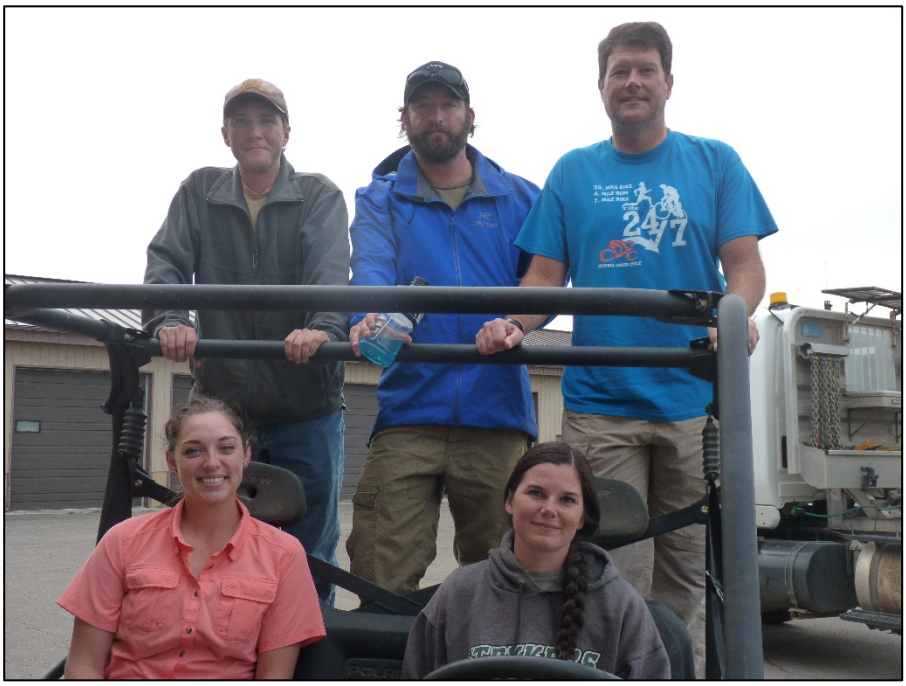
1. Bruce Freske, Wetland Manager, GS-13, PFT
2. Mead Klavetter, Wildlife Refuge Specialist, GS-12, PFT
3. Sara Vacek, Wildlife Biologist, GS-11, PFT
4. J. B. Bright, Wildlife Refuge Specialist, GS-11, PFT
5. Alexander Galt, Wildlife Biologist, GS-11, PFT
6. Karen Stettner, Administrative Officer, GS-9, PFT
7. Styron Bell, Wildlife Refuge Specialist, GS-9, PFT
8. Daniel Angelo, Prescribed Fire Specialist, GS-9, PFT
9. Phil Millette, Supervisory Range Technician, GS-7, PFT
10. Donna Oglesby, Biological Technician, GS-7, PFT
11. Joshua Pittman, Engineering Equipment Operator, WG-9, PFT
12. Jacob Saverynski, Maintenance Worker, WG-7, PFT
13. Adam Kleinschmidt, Biological Science Technician, GS-5, Term
14. Angela Miner, The Nature Conservancy

The following permanent personnel actions took place in 2016:

- Law Enforcement Officer Raymond Briggs went to Detroit River International Wildlife Refuge as a Zone Officer. His last day at Morris was February 6.
- Prescribed Fire Specialist Dan Angelo resigned from the Service on September 30. Dan took a position with the Minnesota Department of Natural Resources.

Temporary Personnel

Michael T. Rose	Range Technician, (fire), TFT	03/20/2016 – 08/22/2016
Melinda A. Hughes	Biological Science Tech, TFT	04/17/2016 – 10/01/2016
Jenna L. Harlow	Social Services Aid, TFT	05/15/2016 – 08/06/2016
Hanna Morris	Student Conservation Association Intern	05/25/2016 – 08/12/2016
Shaun J. McNally	Biological Science Tech, TFT	06/12/2016 – 08/20/2016
Kevin M. Mortensen	Biological Science Tech, TFT	06/12/2016 – 12/10/2016
Adam J. Kleinschmidt	Biological Science Tech, Term	06/14/2015 – Present



Kevin Mike Shaun
Hanna Melinda

Youth Conservation Corps

Jenna L. Harlow	Social Services Aid (Leader)	5/15/2016 – 8/06/2016
Carrie Wilts	YCC Crew Member	6/05/2016 – 7/29/2016
Tristan L. Anderson	YCC Crew Member	6/05/2016 – 7/29/2016
Clayton C. Beck	YCC Crew Member	6/05/2016 – 7/29/2016
Scott L. Iverson	YCC Crew Member	6/05/2016 – 7/29/2016

Jenna Carrie Scott Clayton Tristan

Table 29 – Staff Size – Morris WMD – 2012-2016

	Permanent			Temporary	Other
	Full Time	**Seasonal**	**Part Time**	**GS & WG**	**Programs***
2016	13	0	0	6	4
2015	13	0	0	6	4
2014	13	0	0	7	4
2013	13	0	0	5**	0
2012	14	0	0	8	3

*Includes YCC
**Includes Pathways employees

Volunteers
Our volunteers continue to be an asset to Morris WMD. Most of our regular volunteers are members of our Friends group or students from the University of Minnesota, Morris. In 2016, 50 volunteers contributed 321 hours of work. The bulk of our volunteer hours came from activities such as seed collecting and cleaning, visitor services and outreach, and building nest boxes.

Volunteers from the organization called Minnesota Public Interest Research Group, helping to improve a seeding site by removing large debris (SAB 10/23/2016).

Safety
The station had one reportable accident in 2016; one injury occurred while performing maintenance on a water control structure. In accordance with DOI and FWS procedures, the district conducted a self-safety assessment. As in most safety assessments there were a few issues that were observed and corrected. Overall, the District was in good shape with regards to following safety standards.

Funding
We received our final budget figures March 11. Our budgets over the last five years are summarized in Table 30.

Table 30 – Morris WMD Funding Levels (Dollars in Thousands) – 2012-2016

Fiscal Year	1260	Fire 9100/9200	Special*	6860*	1121	Total Budget
2016	1,280.3			12.30	168.5	1,448.8
2015	1,225.4	300.1		8.291	140.7	1,666.2
2014	1,200.6	221.7	175.2**	6.943	118.8	1,541.1
2013	1,086.0	199.8			5.0+	1,290.8
2012	1,312.7	245.3			149.1	1,707.1

*Funds are not included in Total Budget figure
**Funds to purchase a John Deere Skid Steer and two Law Enforcement pickups
+The Private Lands position was vacant in 2013

The budget amounts for 1260 and 9100/9200 are somewhat deceiving because they often include "project specific" funds. In FY 2016, 1260 budget included $24,927 to purchase a pickup.

We have received Refuge Revenue Sharing (6860) funds since 2014. The money we receive is based on the amount of revenue we generate from grazing and haying activities on Service land for the previous year. This money is to be used for "direct support of activities required to continue activities supporting the revenue collections." The $12,300 that we received in 2016 was spent to purchase seed, purchase and apply chemical for weed control, and mow seedings (Sections 2b and 3g).

Region 3 implemented a Fire Zone program in 2016. The region was split into three fire zones, each with a supervisor and an administrative officer. Our zone, the West Zone, is located in Detroit Lakes. The Zone received all the fire money and administered it. Morris WMD was given $8,800 of fire "Support" dollars.

General Maintenance

The annual inspection of boundary posting continued in 2016. Some of this work was done opportunistically by staff or when specific issues came up that needed our attention, but most of it was accomplished by Biological Technician McNally. This year we concentrated on Pope and Stevens counties.

A contract was issued to install or rebuild 29,998 feet of perimeter fence on Robin Hood WPA. This fencing infrastructure will facilitate grazing as a management tool on one of the district's highest priority WPAs.

Several repair and maintenance projects associated with ditches, dikes, access, and water control structures were completed by Engineering Equipment Operator Pittman, Maintenance Worker Saverynski, other staff, and YCC:

- Removal of beaver debris on Edwards water control structure E
- Burying tree and rock piles
- Parking lot maintenance

The headquarters buildings required little maintenance this year, but instead equipment seemed to need constant attention. Most notably:

- Replaced shop water heater
- General building maintenance and inspections included: garage door opener repairs, fire alarm inspection, yard light repairs, and heating system maintenance
- A Harley rake was rented to do some maintenance on the auto tour
- General fleet of passenger vehicles: transmission, oil changes, air conditioning, battery replacement, tires, brakes, F350 rear air shocks, radio installation and removal
- Department of Transportation inspections, repairs and certifications
- A number of staff continued to work on and resolve issues related to field equipment break downs

The following equipment was purchased, replaced/upgraded or sold in 2016:

- Purchased Micron iPad
- Replaced/upgraded four computers
- Replaced/upgraded Trimble GPS Controller
- Purchased a John Deer UTV – traded in 2 worn out UTVs
- Purchased a Honda Rubicon ATV – traded in 3 worn out ATVs
- Replaced one fleet vehicle – a Chevy 1500HD with a Dodge 1500
- Sold on GSA Sales a Ford F550 with fire package
- Initiated contract to outfit the new Ford F550 cab and chassis with a fire pump and storage package (purchased in 2015). This should be completed in the early months of 2017 (Section 3f).

ITEMS OF INTEREST

Partners Biologist Alex Galt was presented the Wildlife Professional of the Year Award by Minnesota Pheasants Forever at their annual convention in Willmar. He is pictured here with Sheldon Myerchin, Minnesota State Coordinator for the Partners for Fish and Wildlife Program (Matt Christensen 1/29/2016).

APPENDIX A

Table A-1 – Prairie and Karsky Reconstruction Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Big bluestem	0.48	1.800	4.57%
Indian grass	0.60	2.400	6.10%
Little bluestem	0.20	1.200	3.05%
Sideoats grama	0.80	3.500	8.89%
Switchgrass	0.20	1.800	4.57%
Canada wildrye	0.24	0.600	1.52%
Prairie dropseed	0.40	2.400	6.10%
Prairie brome	0.40	1.200	3.05%
Bluejoint grass	0.02	1.800	4.57%
Prairie cordgrass	0.28	1.100	2.79%
Brown fox sedge	0.04	1.377	3.50%
Wool grass	0.00	1.171	2.97%
Fowl bluegrass	0.10	0.268	0.68%
Whitetop grass	0.08	0.854	2.17%
American sloughgrass	0.04	0.689	1.75%
Graminoid Total (15 species)		**22.159**	**56.29%**
Forb	**OZ/Acre Seeded**	**Seeds/Sq Ft**	**Seeded % of Mix***
Common yarrow	0.08	0.556	1.41%
Anise hyssop	0.36	0.752	1.91%
Prairie onion	0.56	0.141	0.36%
Lead plant	0.84	0.309	0.78%
Canada anemone	0.20	0.037	0.09%
Swamp milkweed	0.14	0.015	0.04%
Common milkweed	1.82	0.167	0.42%
Whorled milkweed	0.28	0.071	0.18%
Heath aster	0.08	0.386	0.98%
Smooth aster	0.36	0.460	1.17%
New England aster	0.42	0.636	1.62%
Canada milkvetch	0.98	0.382	0.97%
Showy tick trefoil	1.26	0.159	0.40%
Joe Pye weed	0.28	0.611	1.55%
Northern bedstraw	0.08	0.135	0.34%
Maximilian's sunflower	1.40	0.418	1.06%
Stiff sunflower	0.42	0.039	0.10%
Common ox-eye	1.12	0.162	0.41%
Blue flag iris	0.90	0.027	0.07%
Rough blazing star	0.50	0.185	0.47%
Meadow blazing star	0.81	0.186	0.47%
Tall blazing star	0.84	0.212	0.54%
Great blue lobelia	0.06	0.643	1.63%
Wild bergamot	0.70	1.125	2.86%
White prairie clover	1.26	0.550	1.40%
Purple prairie clover	2.24	0.926	2.35%
Prairie cinquefoil	0.06	0.297	0.75%

Forb (cont.)	OZ/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Mountain mint	0.03	0.141	0.36%
Prairie coneflower	1.01	0.972	2.47%
Prairie rose	0.28	0.017	0.04%
Black-eyed Susan	0.84	1.774	4.51%
Cup plant	0.98	0.031	0.08%
Stiff goldenrod	0.84	0.791	2.01%
Showy goldenrod	0.28	0.611	1.55%
Purple meadow rue	0.84	0.212	0.54%
Prairie spiderwort	0.84	0.193	0.49%
Blue vervain	0.28	0.598	1.52%
Ironweed	1.12	0.617	1.57%
Culver's root	0.06	1.028	2.61%
Golden Alexanders	2.52	0.636	1.62%
Forb Total (40 species)		**17.208**	**43.71%**
Seed Mix Total (55 species)		**39.37**	

* % by seed count

Table A-2 – Big Slough Cool-Season Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Prairie brome	0.72	2.116	8.77%
Bluejoint grass	0.01	0.910	3.77%
Canada wildrye	0.35	0.908	3.76%
Bearded slender wheatgrass	0.30	1.109	4.60%
Prairie Junegrass	0.01	0.531	2.20%
American sloughgrass	0.02	0.275	1.14%
Plains oval sedge	0.05	0.449	1.86%
Brown fox sedge	0.02	0.447	1.85%
Fowl mannagrass	0.01	0.165	0.68%
Fowl bluegrass	0.02	0.716	2.97%
Wool grass	0.01	4.959	20.55%
Total Grass (11 species)		12.585	52.15%
Forb	**OZ/Acre Seeded**	**Seeds/Sq Ft**	**Seeded % of Mix***
Common yarrow	0.05	0.207	0.86%
Anise hyssop	0.40	0.826	3.42%
Prairie onion	0.16	0.040	0.17%
Lead plant	0.32	0.118	0.49%
Common milkweed	0.48	0.044	0.18%
Canada milkvetch	1.68	0.656	2.72%
White prairie clover	1.44	0.628	2.60%
Purple prairie clover	1.28	0.529	2.19%
Prairie larkspur	0.10	0.138	0.57%
Showy tick trefoil	0.80	0.101	0.42%
Narrow-leaved purple coneflower	1.00	0.161	0.67%
Maximilian's sunflower	0.08	0.024	0.10%
Common ox-eye	1.60	0.231	0.96%
Wild bergamot	1.01	1.623	6.73%
Common evening primrose	0.48	0.992	4.11%
Large-flowered penstemon	0.10	0.032	0.13%
Prairie cinquefoil	0.16	0.848	3.51%
Mountain mint	0.08	0.404	1.67%
Prairie coneflower	0.56	0.540	2.24%
Prairie rose	0.16	0.009	0.04%
Black-eyed Susan	0.72	1.521	6.30%
Purple meadow rue	0.24	0.061	0.25%
Prairie spiderwort	0.08	0.018	0.07%
Hoary vervain	0.80	0.514	2.13%
Ironweed	0.20	0.110	0.46%
Culver's root	0.05	0.918	3.80%
Golden Alexanders	1.00	0.253	1.05%
Total Forb (27 species)		**11.546**	**47.85%**
Seed Mix Total (38 species)		**24.13**	

* % by seed count

Table A-3 – Lake Simon Ditch Plug Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/ Sq Ft	Season*	Soils** W	M	D	Seeded % of Mix+
Big bluestem	0.40	1.520	W	X	X	X	3.96%
Little bluestem	0.60	3.600	W		X	X	9.37%
Sideoats grama	0.60	2.640	W		X	X	6.87%
Blue grama	0.12	2.100	W			X	5.47%
Prairie brome	0.20	0.590	C			X	1.54%
Canada wildrye	0.48	1.250	C		X		3.25%
Bearded slender wheatgrass	0.40	1.480	C		X	X	3.85%
Prairie Junegrass	0.02	1.060	C			X	2.76%
Green needlegrass	0.36	1.440	C		X	X	3.75%
Switchgrass	0.12	1.080	W	X	X		2.81%
Indian grass	0.44	1.760	W	X	X		4.58%
Rough dropseed	0.12	1.340	W		X	X	3.49%
Sand dropseed	0.02	0.090	W			X	0.23%
Prairie dropseed	0.12	0.720	W		X	X	1.87%
Plains oval sedge	0.09	0.859	C		X	X	2.24%
Brown fox sedge	0.06	1.787	C	X	X		4.65%
Path rush	0.01	1.837	C		X	X	4.78%
Graminoid Total (17 species)		**25.153**					**65.48%**
Forb	**OZ/Acre Seeded**	**Seeds/ Sq Ft**	**Bloom Time++**	**Soils W**	**M**	**D**	**Seeded % of Mix**
Common yarrow	0.04	0.165	E/M		X	X	0.43%
Anise hyssop	0.48	0.992	M/L		X	X	2.58%
Prairie onion	0.24	0.061	M		X	X	0.16%
Lead plant	0.96	0.353	M		X	X	0.92%
Common milkweed	1.32	0.121	M	X	X	X	0.31%
Sky blue aster	0.24	0.441	L		X	X	1.15%
Heath aster	0.02	0.092	L		X	X	0.24%
Smooth aster	0.36	0.455	L		X	X	1.18%
New England aster	0.24	0.364	L	X	X		0.95%
Canada milkvetch	2.40	0.937	M		X		2.44%
Ground plum	0.24	0.458	E			X	1.19%
Wild white indigo	0.70	0.010	M				0.03%
White prairie clover	2.16	0.942	M/L		X	X	2.45%
Purple prairie clover	2.40	0.992	M/L		X	X	2.58%
Showy tick trefoil	1.68	0.212	M		X		0.55%
Maximilian's sunflower	1.32	0.394	M/L		X		1.03%
Stiff sunflower	0.48	0.044	M/L			X	0.11%
Common ox-eye	1.68	0.243	E/M		X		0.63%
Rough blazing star	0.60	0.220	M/L		X	X	0.57%
Wild bergamot	0.72	1.157	M/L		X	X	3.01%
Common evening primrose	0.05	0.103	M/L		X	X	0.27%
Large-flowered penstemon	0.84	0.270	E			X	0.70%
Prairie phlox	0.07	0.031	E/M		X	X	0.08%
Prairie cinquefoil	0.02	0.106	M/L			X	0.28%
Mountain mint	0.06	0.303	E/M	X	X		0.79%
Prairie coneflower	0.96	0.926	E/M		X	X	2.41%

Forb (cont.)	OZ/Acre Seeded	Seeds/ Sq Ft	Bloom Time++	Soils			Seeded % of Mix
				W	M	D	
Prairie rose	0.24	0.014	M		X	X	0.04%
Black-eyed Susan	0.72	1.521	M/L		X	X	3.96%
Stiff goldenrod	0.24	0.226	M/L		X	X	0.59%
Showy goldenrod	0.24	0.523	M/L		X	X	1.36%
Purple meadow rue	0.12	0.030	M	X	X		0.08%
Prairie spiderwort	0.48	0.110	E/M		X	X	0.29%
Heart-leaved golden Alexanders	0.96	0.264	E		X	X	0.69%
Golden Alexanders	0.72	0.182	E	X	X		0.47%
Forb Total (34 species)		**13.262**					**34.52%**
Seed Mix Total (51 species)		**38.415**					

* C=Cool Season, W=Warm Season
** W=Wet, M=Mesic, D=Dry
+ % by seed count
++ E=Early, M=Mid, L=Late

26.82%	Cool Season Graminoids
38.66%	Warm Season Graminoids
3.06%	Early Bloom Forbs
4.63%	Early/Mid Bloom Forbs
4.52%	Mid Bloom Forbs
18.79%	Mid/Late Bloom Forbs
3.52%	Late Bloom Forbs

Table A-4 – Lake Simon Basins (Wet) Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/ Sq Ft	Season*	Soils** W	Soils** M	Soils** D	Seeded % of Mix+
Virginia wildrye	0.500	1.100	C	X	X		2.00%
Switchgrass	0.300	2.700	W	X	X		4.90%
Indian grass	0.607	2.420	W	X	X		4.39%
Prairie cordgrass	0.500	1.900	W	X	X		3.45%
Prairie wedgegrass	0.036	1.880	C	X	X		3.41%
American sloughgrass	0.100	1.837	C	X			3.33%
Porcupine sedge	0.100	1.102	C	X	X		2.00%
Common fox sedge	0.150	1.873	C	X			3.40%
Bristly sedge	0.100	1.102	C	X			2.00%
Brown fox sedge	0.100	2.978	C	X	X		5.41%
American mannagrass	0.100	2.571	C	X			4.67%
Bebb's Oval Sedge	0.100	1.249	C	X	X		2.27%
Whitetop grass	0.500	3.489	C	X			6.33%
Graminoid Total (14 species)		**29.480**					**53.51%**
Forb	**OZ/Acre Seeded**	**Seeds/ Sq Ft**	**Bloom Time++**	**Soils W**	**Soils M**	**Soils D**	**Seeded % of Mix**
Sweet flag	0.70	0.106	E	X			0.19%
Purple giant hyssop	0.10	0.213	L	X			0.39%
Mud plantain	0.10	0.138	M/L	X			0.25%
Swamp milkweed	1.00	0.110	M	X	X		0.20%
Common milkweed	2.29	0.210	M	X	X	X	0.38%
New England aster	0.70	1.061	L	X	X		1.93%
Joe Pye weed	0.50	1.090	E/M	X			1.98%
Common boneset	0.10	0.367	M	X			0.67%
Tall blazing star	0.60	0.152	M/L	X	X		0.28%
Blazing star mix	12.50	3.157	M/L	X	X		5.73%
Great blue lobelia	0.88	10.044	L	X			18.23%
Monkey flower	0.01	0.528	M/L	X			0.96%
Giant bur-reed	1.02	0.012	M	X			0.02%
Purple meadow rue	1.49	0.376	M	X	X		0.68%
Blue vervain	0.48	1.025	M/L	X	X		1.86%
Ironweed	3.40	1.873	M/L	X	X		3.40%
Culver's root	0.25	4.591	M	X	X		8.33%
Wet Prairie Mix	2.20	0.556	E	X	X		1.01%
Forb Total (18 species)		**25.610**					**46.49%**
Seed Mix Total (32 species)		**55.090**					

* C=Cool Season, W=Warm Season
** W=Wet, M=Mesic, D=Dry
+ % by seed count
++ E=Early, M=Mid, L=Late

Note: some wet areas also seeded with P61LE15

40.77%	Cool Season Graminoids
12.74%	Warm Season Graminoids
1.20%	Early Bloom Forbs
1.98%	Early/Mid Bloom Forbs
10.28%	Mid Bloom Forbs
12.48%	Mid/Late Bloom Forbs
20.54%	Late Bloom Forbs

Table A-5 – Mesic Seed Mix (Lake Simon Groves, Lundgren Piles, Hegland Piles, Bangor Grove, and Stenerson Lake Grove) – 2016

Graminoid	Source*	LB/Acre Seeded	Seeds/ Sq Ft	Season**	Seeded % of Mix+
Big bluestem	P61SW21-2015 L10NP15 FVNP2015	0.642	2.439	W	5.73%
Little bluestem	L10NP15 FVNP2015	0.192	1.152	W	2.70%
Sideoats grama	Millborn	0.295	1.300	W	3.05%
Blue grama	P61SW21-2015	0.031	0.542	W	1.27%
Prairie brome	Millborn	0.300	0.882	C	2.07%
Bluejoint grass	Millborn	0.004	0.364	C	0.85%
Prairie sandreed	Millborn	0.019	0.125	W	0.29%
Canada wildrye	P61SW21-2015	0.112	0.291	C	0.68%
Bearded slender wheatgrass	Millborn	0.200	0.739	C	1.74%
Prairie Junegrass	Millborn	0.010	0.531	C	1.25%
Muhlenbergia	Millborn	0.005	0.147	W	0.35%
Switchgrass	P61SW21-2015 L10NP15 FVNP2015	0.031	0.279	W	0.66%
Indian grass	P61SW21-2015 L10NP15 FVNP2015	0.417	1.666	W	3.91%
Prairie cordgrass	L10NP15	0.180	0.669	W	1.57%
Rough dropseed	Millborn	0.019	0.213	W	0.50%
Tall dropseed	P61SW21-2015 L10NP15	0.020	0.224	W	0.53%
Sand dropseed	Millborn	0.002	0.009	W	0.02%
Prairie dropseed	L10NP15	0.271	1.624	W	3.81%
Copper shouldered oval sedge	Millborn	0.040	0.250	C	0.59%
Plains oval sedge	Millborn	0.030	0.300	C	0.70%
Field oval sedge	Millborn	0.030	0.275	C	0.65%
Broom sedge	Millborn	0.010	0.309	C	0.73%
Brown fox sedge	Millborn	0.010	0.298	C	0.70%
Silky wildrye	Millborn	0.200	0.404	C	0.95%
Fowl mannagrass	Millborn	0.010	0.331	C	0.78%
Path rush	Millborn	0.001	0.367	C	0.86%
Graminoid Total (26 species)			**15.730**		**36.93%**
Forb	**Source**	**OZ/Acre Seeded**	**Seeds/ Sq Ft**	**Bloom Time++**	**Seeded % of Mix**
Common yarrow	Millborn	0.100	0.413	E/M	0.97%
Anise hyssop	Millborn	0.400	0.826	M/L	1.94%
Prairie onion	P61SW21-2015 L10NP15 Rothi, Berg, Kolstad Lk HH	1.296	0.327	M	0.77%
Lead plant	PrairieResto P61SW21-2015 L10NP15 R. Forks, Hegland HH	2.640	0.97	M	2.28%
Fragrant false indigo	L10NP15	0.400	0.092	E/M	0.22%
Thimbleweed	Millborn	0.280	0.167	M	0.39%
Pasque flower	Millborn	0.250	0.103	E	0.24%
Swamp milkweed	Millborn	0.400	0.044	M	0.10%
Common milkweed	Millborn	2.344	0.215	M	0.50%

Forb (cont.)	Source	OZ/Acre Seeded	Seeds/ Sq Ft	Bloom Time++	Seeded % of Mix
Sky blue aster	Millborn	0.200	0.367	L	0.86%
Lindley's aster	Millborn	0.070	0.145	M/L	0.34%
Heath aster	Millborn	0.050	0.230	L	0.54%
Smooth aster	Millborn	0.300	0.379	L	0.89%
Calico aster	Millborn	0.070	0.402	M/L	0.94%
New England aster	Millborn	0.100	0.152	L	0.36%
Panicled aster	Millborn	0.070	0.251	L	0.59%
Canada milkvetch	Millborn	1.000	0.390	M	0.92%
Birdsfoot coreopsis	Glacial Lake HH	0.240	0.055	M	0.13%
White prairie clover	L10NP15	1.062	0.463	M/L	1.09%
Purple prairie clover	P61SW21-2015 L10NP15	1.071	0.443	M/L	1.04%
Showy tick trefoil	Millborn	3.000	0.379	M	0.89%
Narrow-leaved purple coneflower	Millborn	0.862	0.139	M	0.33%
Joe Pye weed	Millborn	0.100	0.218	E/M	0.51%
Common boneset	Millborn	0.050	0.184	M	0.43%
Bottle gentian	Fitzgerald HH	0.180	2.324	L	5.46%
Sneezeweed	Millborn	0.100	0.298	L	0.70%
Maximilian's sunflower	L10NP15 FVNP2015	1.899	0.567	M/L	1.33%
Stiff sunflower	Millborn	1.000	0.092	M/L	0.22%
Common ox-eye	Millborn	1.000	0.145	E/M	0.34%
Veiny pea	Edwards HH	0.118	0.002	E/M	<0.01%
Rough blazing star	Rothi NPR HH	0.275	0.101	M/L	0.24%
Meadow blazing star	Hamann HH	4.000	0.918	L	2.16%
Tall blazing star	Millborn	0.800	0.202	M/L	0.47%
Bugleweed	L10NP15	0.074	1.529	E/M	3.59%
Wild bergamot	P61SW21-2015 L10NP15	0.900	1.446	M/L	3.40%
Common evening primrose	L10NP15 Hamann HH	0.600	1.240	M/L	2.91%
False gromwell	Millborn	0.827	0.028	M	0.07%
Wood betony	Millborn	0.080	0.061	E	0.14%
Prairie turnip	Millborn	0.100	0.003	E	0.01%
Prairie cinquefoil	L10NP15 Hegland HH	0.087	0.461	M/L	1.08%
Rattlesnake root	L10NP15	0.059	0.027	M/L	0.06%
Mountain mint	PrairieResto Hamann HH	0.732	3.697	E/M	8.68%
Prairie coneflower	Millborn	0.800	0.771	E/M	1.81%
Prairie rose	Millborn	0.500	0.029	M	0.07%
Black-eyed Susan	L10NP15	0.798	1.685	M/L	3.96%
Cup plant	Millborn	0.500	0.016	M/L	0.04%
Purple meadow rue	Millborn	0.400	0.101	M	0.24%
Prairie spiderwort	Millborn	0.300	0.069	E/M	0.16%
Blue vervain	Millborn	0.050	0.107	M/L	0.25%
Hoary vervain	L10NP15	0.044	0.028	M/L	0.07%
Ironweed	Millborn	0.100	0.055	M/L	0.13%
Culver's root	Millborn	0.008	0.147	M	0.35%
Heart-leaved golden Alexanders	Millborn	0.200	0.055	E	0.13%
Golden Alexanders	Redhead Marsh HH	0.231	0.058	E	0.14%
Solidago spp.	P61SW21-2015	0.178	0.245		0.58%
Goldenrods & asters	L10NP15 FVNP2015	1.628	2.242		5.26%

Forb (cont.)	Source	OZ/Acre Seeded	Seeds/ Sq Ft	Bloom Time++	Seeded % of Mix
Mixed prairie spp.	SV34/Esmt, Glacial Lk, Prairie HH	2.048	0.756		1.78%
	P61SW21-2015				
	L10NP15				
	FVNP2015				
Forb Total (55+ species)			**26.859**		**63.07%**
Seed Mix Total (81+ species)			**42.589**		

* Seed source (e.g., lot number, vendor, hand harvest location)
** C=Cool Season, W=Warm Season
+ % by seed count
++ E=Early, M=Mid, L=Late

12.54%	Cool Season Graminoids
24.39%	Warm Season Graminoids
0.66%	Early Bloom Forbs
16.29%	Early/Mid Bloom Forbs
7.45%	Mid Bloom Forbs
19.50%	Mid/Late Bloom Forbs
11.55%	Late Bloom Forbs

Table A-6 – Edwards Wet Seed Mixes – 2016

Graminoid	Source*	LB/Acre Seeded	Seeds/ Sq Ft	Season**	Seeded % of Mix+
Bluejoint grass	Millborn Wet	0.036	3.280	C	4.96%
Virginia wildrye	Millborn Wet	0.500	1.100	C	1.67%
Switchgrass	Millborn Wet	0.300	2.700	W	4.09%
Indian grass	Millborn Wet	0.607	2.420	W	3.66%
Prairie cordgrass	Millborn Wet	0.500	1.900	W	2.88%
Prairie wedgegrass	Millborn Wet	0.036	1.880	C	2.85%
American sloughgrass	Millborn Wet	0.100	1.837	C	2.78%
Porcupine sedge	Millborn Wet	0.100	1.102	C	1.67%
Common fox sedge	Millborn Wet	0.150	1.873	C	2.84%
Bristly sedge	Millborn Wet	0.100	1.102	C	1.67%
Brown fox sedge	Millborn Wet	0.100	2.978	C	4.51%
American mannagrass	Millborn Wet	0.100	2.571	C	3.89%
Bebb's Oval Sedge	Millborn Wet	0.100	1.249	C	1.89%
Whitetop grass	Millborn Wet	0.500	3.489	C	5.28%
Graminoid Total (14 species)			**29.481**		**44.62%**
Forbs	**Source**	**OZ/Acre Seeded**	**Seeds/ Sq Ft**	**Bloom Time++**	**Seeded % of Mix**
Sweet flag	Millborn Wet	0.70	0.106	E	0.16%
Purple giant hyssop	Millborn Wet	0.10	0.213	L	0.32%
Mud plantain	Millborn Wet	0.10	0.138	M/L	0.21%
Swamp milkweed	Millborn Wet Shooting Star Wet	1.66	0.183	M	0.28%
Common milkweed	Millborn Wet Moen WPA	3.35	0.308	M	0.47%
New England aster	Millborn Wet Shooting Star Wet	0.92	1.394	L	2.11%
Joe Pye weed	Millborn Wet	0.50	1.090	E/M	1.65%
Common boneset	Millborn Wet	0.10	0.367	M	0.56%
Tall blazing star	Millborn Wet Shooting Star Wet	0.93	0.235	M/L	0.36%
Blazing star mix	Svor WPA (100oz/6.25#)	12.50	3.157	M/L	4.78%
Great blue lobelia	Private (7.3 oz) Shooting Star Wet	0.66	7.518	L	11.38%
Monkey flower	Millborn Wet	0.01	0.528	M/L	0.80%
Giant bur-reed	Millborn Wet	1.02	0.012	M	0.02%
Purple meadow rue	Millborn Wet Shooting Star Wet	1.82	0.460	M	0.70%
Blue vervain	Millborn Wet Shooting Star Wet	1.14	2.434	M/L	3.68%
Ironweed	Shooting Star Wet Fahl WPA (1.7#)	4.61	2.540	M/L	3.84%
Culver's root	Millborn Wet Shooting Star Wet	0.29	5.326	M	8.06%
Common yarrow	Shooting Star Wet	0.08	0.331	E/M	0.50%
Prairie onion	Shooting Star Wet	0.22	0.056	M	0.08%
Lead plant	Shooting Star Wet	0.44	0.162	M	0.25%

Forbs (cont.)	Source	OZ/Acre Seeded	Seeds/ Sq Ft	Bloom Time++	Seeded % of Mix
Canada anemone	Shooting Star Wet	0.10	0.018	E	0.03%
Heath aster	Shooting Star Wet	0.04	0.184	L	0.28%
Smooth aster	Shooting Star Wet	0.04	0.051	L	0.08%
Canada milk vetch	Shooting Star Wet	1.47	0.574	M	0.87%
Showy tick trefoil	Shooting Star Wet	1.10	0.139	M	0.21%
Sneezeweed	Shooting Star Wet	0.33	0.985	L	1.49%
Maximilian's sunflower	Shooting Star Wet	0.55	0.164	M/L	0.25%
Common ox-eye	Shooting Star Wet	2.20	0.318	E/M	0.48%
Blue flag iris	Shooting Star Wet	0.44	0.013	E/M	0.02%
Rough blazing star	Shooting Star Wet	0.11	0.040	M/L	0.06%
Meadow blazing star	Shooting Star Wet	0.22	0.051	L	0.08%
Wild bergamot	Shooting Star Wet	1.39	2.234	M/L	3.38%
Large-flowered penstemon	Shooting Star Wet	0.13	0.042	E	0.06%
White prairie clover	Shooting Star Wet	1.10	0.480	M/L	0.73%
Purple prairie clover	Shooting Star Wet	1.87	0.773	M/L	1.17%
Prairie cinquefoil	Shooting Star Wet	0.04	0.212	M/L	0.32%
Mountain mint	Shooting Star Wet	0.11	0.556	E/M	0.84%
Prairie coneflower	Shooting Star Wet	0.77	0.742	E/M	1.12%
Prairie rose	Shooting Star Wet	0.22	0.013	M	0.02%
Black-eyed Susan	Shooting Star Wet	0.66	1.394	M/L	2.11%
Cup plant	Shooting Star Wet	1.32	0.042	M/L	0.06%
Stiff goldenrod	Shooting Star Wet	0.22	0.207	M/L	0.31%
Showy goldenrod	Shooting Star Wet	0.04	0.087	M/L	0.13%
Prairie spiderwort	Shooting Star Wet	0.11	0.025	E/M	0.04%
Hoary vervain	Shooting Star Wet	0.54	0.347	M/L	0.53%
Golden Alexanders	Shooting Star Wet	1.33	0.336	E	0.51%
Forb Total (45+ species)			**36.585**		**55.38%**
Seed Mix Total (59+ species)			**66.066**		

* Seed source (e.g., lot number, vendor, hand harvest location)
** C=Cool Season, W=Warm Season
+ % by seed count
++ E=Early, M=Mid, L=Late

34.00%	Cool Season Graminoids
10.63%	Warm Season Graminoids
0.76%	Early Bloom Forbs
4.65%	Early/Mid Bloom Forbs
11.50%	Mid Bloom Forbs
22.72%	Mid/Late Bloom Forbs
15.74%	Late Bloom Forbs

Table A-7 – SV34-2015 Seed Mix* – 2016

Species	PLS LB/Acre Seeded	% PLS	Seeds/Sq Ft
Little bluestem	2.70	27.0	15.93
Prairie species:	1.69	16.9	~10.14
Indiangrass			
Big bluestem			
Tall dropseed			
Sideoats grama			
Switchgrass			
Purple prairie clover			
White prairie clover			
Black-eyed Susan			
Stiff goldenrod			
Elymus sp.			
Blue grama			
Showy ticktrefoil			
Wild bergamot			
Vervain sp.			
Kalm's brome			
Leadplant			
Asters sp.			
Goldenrods sp.			
Seed Mix Total (19+ species)_			**~26.07**

*seed was harvested at Pomme de Terre Lake WPA (SV-34) and used at the following sites:

Niemackl Slough WPA (0.5 ac)
Welsh WPA-piles (0.25 ac)
Sherstad Slough WPA-pile (0.005)
Pepperton WPA (10.7 ac)
Lamprecht WPA (3.8 ac)
Beyer WPA (2.85 ac)
Schultz WPA (3 ac)
Loen WPA (0.1 ac)
Glenwood WPA (0.1 ac)
Weiler WPA (0.1 ac)
Lake Simon WPA (0.05 ac)

Table A-8 – Stenerson Lake Dry Reconstruction Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Big bluestem	0.400	1.520	4.11%
Sideoats grama	0.350	1.540	4.16%
Blue grama	0.100	1.750	4.73%
Prairie brome	0.500	1.470	3.98%
Canada wildrye	1.000	2.590	7.00%
Slender wheatgrass	0.400	1.480	4.00%
Prairie Junegrass	0.020	1.060	2.87%
Switchgrass	0.100	0.900	2.43%
Little bluestem	0.400	2.400	6.49%
Indian grass	0.250	1.000	2.70%
Rough dropseed	0.080	0.900	2.43%
Sand dropseed	0.010	0.050	0.14%
Prairie dropseed	0.070	0.420	1.14%
Bicknell's sedge	0.044	0.275	0.74%
Plains oval sedge	0.012	0.120	0.32%
Dudley's Rush	0.002	2.351	6.36%
Field oval sedge	0.050	0.459	1.24%
Brown fox sedge	0.019	0.566	1.53%
Path rush	0.001	0.367	0.99%
Graminoid Total (19 species)		**21.218**	**57.38%**
Forb	**OZ/Acre Seeded**	**Seeds/Sq Ft**	**Seeded % of Mix**
Common yarrow	0.08	0.331	0.90%
Anise hyssop	0.20	0.413	1.12%
Prairie onion	0.80	0.202	0.55%
Lead plant	0.80	0.294	0.80%
Thimbleweed	0.10	0.060	0.16%
Pasque flower	0.03	0.012	0.03%
Common milkweed	1.00	0.092	0.25%
Whorled milkweed	0.39	0.098	0.27%
Sky blue aster	0.10	0.184	0.50%
Heath aster	0.10	0.459	1.24%
Smooth aster	0.10	0.126	0.34%
Lindley's aster	0.06	0.129	0.35%
Canada milkvetch	0.50	0.195	0.53%
Ground plum	0.05	0.096	0.26%
Purple giant hyssop	0.27	0.558	1.51%
Prairie coreopsis	1.00	0.230	0.62%
White prairie clover	2.50	1.090	2.95%
Purple prairie clover	2.19	0.905	2.45%
Prairie spiderwort	0.60	0.138	0.37%
Showy ticktrefoil	0.50	0.063	0.17%
Narrow-leaved purple coneflower	1.50	0.241	0.65%
Early figwort	0.05	0.212	0.57%
Early meadow rue	0.12	0.020	0.05%
Maximilian's sunflower	1.00	0.298	0.81%
Showy sunflower	1.00	0.092	0.25%
Common ox-eye	1.00	0.145	0.39%

Forb (cont.)	OZ/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix
Wild garlic	0.70	0.009	0.02%
False boneset	0.02	0.015	0.04%
Wild licorice	0.06	0.005	0.01%
Button blazing star	0.96	0.353	0.95%
Calico aster	0.15	0.861	2.33%
Grass-leaved goldenrod	0.09	0.723	1.96%
Wild bergamot	0.30	0.482	1.30%
Fragrant false indigo	0.31	0.071	0.19%
Large-flowered beardtongue	0.60	0.193	0.52%
Prairie cinquefoil	0.10	0.530	1.43%
Mountain mint	0.20	1.010	2.73%
Prairie coneflower	1.20	1.157	3.13%
Prairie rose	0.20	0.011	0.03%
Black-eyed Susan	0.80	1.690	4.57%
Prairie blue-eyed grass	0.24	0.248	0.67%
Gray goldenrod	0.20	0.289	0.78%
Stiff goldenrod	0.30	0.282	0.76%
Showy goldenrod	0.15	0.327	0.88%
Hoary vervain	0.80	0.514	1.39%
American vetch	0.16	0.008	0.02%
White camas	0.05	0.048	0.13%
Heart-leaved golden Alexanders	0.90	0.248	0.67%
Forb Total (48 species)		**15.757**	**42.62%**
Seed Mix Total (67 species)		**36.975**	

* % by seed count

Table A-9 – Stenerson Lake Mesic Reconstruction Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Big bluestem	0.530	2.01	5.60%
Sideoats grama	0.700	3.09	8.61%
Blue grama	0.080	1.18	3.29%
Prairie brome	0.300	0.88	2.45%
Bluejoint grass	0.010	0.91	2.54%
Canada wildrye	0.180	0.47	1.31%
Slender wheatgrass	0.210	0.78	2.17%
Switchgrass	0.110	0.99	2.76%
Little bluestem	0.350	2.10	5.85%
Indian grass	0.530	2.12	5.91%
Prairie cordgrass	0.180	0.68	1.90%
Prairie dropseed	0.180	1.08	3.01%
Bicknell's sedge	0.100	0.62	1.73%
Plains oval sedge	0.067	0.67	1.87%
Field oval sedge	0.050	0.46	1.28%
Brown fox sedge	0.023	0.68	1.90%
Path rush	0.002	0.73	2.03%
Graminoid Total (17 species)		**19.45**	**54.22%**
Forb	**OZ/Acre Seeded**	**Seeds/Sq Ft**	**Seeded % of Mix**
Western yarrow	0.13	0.537	1.50%
Anise hyssop	0.50	1.033	2.88%
Prairie onion	0.30	0.076	0.21%
Lead plant	1.00	0.367	1.02%
Fragrant false indigo	0.50	0.115	0.32%
Canada anemone	0.05	0.009	0.03%
Common milkweed	1.00	0.092	0.26%
Whorled milkweed	0.10	0.025	0.07%
Sky blue aster	0.10	0.184	0.51%
Heath aster	0.10	0.459	1.28%
Smooth blue aster	0.24	0.303	0.84%
New England aster	0.32	0.485	1.35%
Canada milkvetch	1.00	0.390	1.09%
Prairie coreopsis	0.40	0.092	0.26%
White prairie clover	0.80	0.349	0.97%
Purple prairie clover	1.12	0.463	1.29%
Showy tick trefoil	2.12	0.268	0.75%
Narrow-leaved purple coneflower	1.00	0.161	0.45%
Early figwort	0.05	0.212	0.59%
Wild licorice	0.20	0.015	0.04%
Sneezeweed	0.10	0.298	0.83%
Maximilian's sunflower	1.00	0.298	0.83%
Showy sunflower	1.00	0.092	0.26%
Common ox-eye	1.00	0.145	0.40%
Wild garlic	0.20	0.003	0.01%
Rough blazing star	0.16	0.059	0.16%
Meadow blazing star	0.54	0.124	0.35%
Prairie blazing star	0.48	0.121	0.34%

Great blue lobelia	0.01	0.115	0.32%
Wild mint	0.01	0.069	0.19%
Wild bergamot	0.80	1.286	3.58%
Grass-leaved goldenrod	0.01	0.080	0.22%
Wood betony	0.02	0.015	0.04%
Purple giant hyssop	0.06	0.128	0.36%
Prairie cinquefoil	0.08	0.424	1.18%
Lindley's aster	0.07	0.151	0.42%
Mountain mint	0.24	1.212	3.38%
Prairie coneflower	0.48	0.463	1.29%
Prairie rose	0.24	0.014	0.04%
Black-eyed Susan	0.96	2.028	5.65%
Cup plant	0.80	0.026	0.07%
Stiff goldenrod	0.24	0.226	0.63%
Showy goldenrod	0.32	0.698	1.95%
Purple meadow rue	0.24	0.061	0.17%
Prairie spiderwort	0.16	0.037	0.10%
Blue vervain	0.32	0.683	1.90%
Ironweed	0.64	0.353	0.98%
Culver's root	0.06	1.102	3.07%
American vetch	1.00	0.047	0.13%
Heart-leaved golden Alexanders	0.24	0.066	0.18%
Golden Alexanders	1.44	0.364	1.01%
Forb Total (51 species)		**16.423**	**45.78%**
Seed Mix Total (68 species)		**35.873**	

* % by seed count

Table A-10 – Stenerson Lake Wet Reconstruction Seed Mix – 2016

Graminoid	LB/Acre Seeded	Seeds/Sq Ft	Seeded % of Mix*
Big bluestem	0.400	1.520	3.42%
Bluejoint grass	0.060	5.460	12.27%
Virginia wildrye	0.140	0.220	0.49%
Canada wildrye	0.660	1.710	3.84%
Green bulrush	0.000	0.170	0.38%
Switchgrass	0.180	1.620	3.64%
Woolgrass	0.000	1.870	4.20%
Prairie wedgegrass	0.010	0.030	0.07%
Indian grass	0.400	1.600	3.60%
Prairie cordgrass	0.600	2.280	5.12%
American sloughgrass	0.060	1.102	2.48%
Bicknells sedge	0.150	0.937	2.11%
Porcupine sedge	0.040	0.441	0.99%
Common fox sedge	0.070	0.874	1.96%
Tussock sedge	0.010	0.195	0.44%
Brown fox sedge	0.010	0.298	0.67%
American mannagrass	0.040	1.028	2.31%
Fowl mannagrass	0.030	0.992	2.23%
Torrey's rush	0.001	0.588	1.32%
River bulrush	0.090	0.142	0.32%
Fowl bluegrass	0.020	0.955	2.15%
Chairmakers rush	0.030	0.132	0.30%
Whitetop grass	0.038	0.265	0.60%
Graminoid Total (23 species)		**24.429**	**54.91%**
Forb	**OZ/Acre Seeded**	**Seeds/Sq Ft**	**Seeded % of Mix**
Sweet flag	0.40	0.061	0.14%
Anise hyssop	0.30	0.620	1.39%
Mud plantain	0.50	0.689	1.55%
Purple giant hyssop	0.30	0.640	1.44%
Swamp milkweed	2.00	0.220	0.49%
Common milkweed	2.00	0.184	0.41%
Panicled aster	0.10	0.358	0.80%
New England aster	0.40	0.606	1.36%
Swamp aster	0.20	0.367	0.82%
Canada anemone	1.00	0.184	0.41%
Showy ticktrefoil	1.60	0.202	0.45%
Joe Pye weed	0.30	0.654	1.47%
Common boneset	0.18	0.661	1.49%
Beggars tick	0.10	0.011	0.02%
False aster	0.05	0.184	0.41%
Flat-topped aster	0.20	0.308	0.69%
Wild licorice	0.80	0.060	0.13%
Sneezeweed	0.20	0.597	1.34%
Sawtooth sunflower	1.00	0.344	0.77%
Maximilian's sunflower	0.50	0.149	0.33%
Common ox-eye	1.80	0.260	0.58%
Blue flag iris	0.80	0.024	0.05%

Meadow blazing star	1.00	0.230	0.52%
Tall blazing star	1.00	0.253	0.57%
Great blue lobelia	0.05	0.574	1.29%
Wild mint	0.06	0.413	0.93%
Monkey flower	0.01	0.528	1.19%
Calico Aster	0.04	0.230	0.52%
Nodding bur marigold	0.20	0.096	0.22%
Early figwort	0.70	2.973	6.68%
Obedient plant	0.60	0.152	0.34%
Mountain mint	0.10	0.505	1.14%
Great blue lobelia	0.05	0.574	1.29%
Prairie blazing star	1.00	0.253	0.57%
Cup plant	2.90	0.093	0.21%
Grass-leaved goldenrod	0.08	0.643	1.45%
Mad dog skullcap	0.10	0.143	0.32%
Stiff goldenrod	0.30	0.282	0.63%
Lindley's aster	0.06	0.138	0.31%
Giant bur-reed	5.00	0.057	0.13%
Purple meadow rue	1.00	0.253	0.57%
Blue vervain	0.40	0.854	1.92%
Ironweed	1.98	1.091	2.45%
Culver's root	0.10	1.837	4.13%
Golden Alexanders	2.00	0.505	1.14%
Forb Total (45 species)		**20.060**	**45.09%**
Seed Mix Total (68 species)		**44.489**	

* % by seed count