AIRR-094-11

Project Completion Report

"Preventing the Spread of Pioneer Populations of Reed Canarygrass (*Phalaris arundinacea* L.) and Hybrid Cattail (*Typha* X *glauca* Godr.) Within Wetlands of the Mounds View Grassland Complex, Iowa County"

(Project Duration: 2011 – 2014)

Funded through the DNR Aquatic Invasive Species Grants Program, with matching funds provided by The Prairie Enthusiasts, Inc.

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Description of Project Area:

A conservation goal for the 48,000-acre Military Ridge Prairie Heritage Area (MRPHA) is to establish and restore at least three core grassland/savanna areas with a minimum size of 2,000 acres each. Within one of these core areas is the 498-acre Mounds View Grassland Complex (Iowa County, Brigham Township, T6N R5E Sections 25& 26; 35 & 36), which is owned and managed by The Prairie Enthusiasts, Inc. (TPE). The Mounds View Grassland Complex is a mosaic of three land segments: Shea Prairie, Schurch-Thompson Prairie, and the A to Z property (refer to maps). Collectively, these sites support 31 at-risk species. Detailed management plans and species inventories are available and can be obtained via inquiry with The Prairie Enthusiasts Empire-Sauk Chapter. The Mounds View Grassland Complex is located within a larger complex of more than 1,480 acres of permanently-protected land, including The Nature Conservancy's Thompson and Barneveld Prairies, and the Underwood prairie remnant. Due to its wetland habitat acreage, the Mounds View Grassland Complex is a significant component of the MRPHA that provides both wetland habitat and a wetland-to-upland transitional coenocline to the generally dry MRPHA landscape. These wetlands also provide refugia to at-risk upland species such as regal fritillary butterflies (*Speyeria idalia*) during drought years. The Mounds View Grassland Complex is open to the general public for recreation, education, hiking, and fishing, but access is limited to foot travel only.

The 160-acre Schruch-Thompson segment consists of high quality dry/dry-mesic remnant prairie that supports eighteen at-risk species. The 276-acre A to Z segment consists of wetland and upland habitats and is bisected by a shallow valley with the permanent Williams-Barneveld Creek (a Class II trout stream) running from NE to SW at the valley bottom. Approximately 10 acres of the valley bottom supports a diverse community of remnant sedge meadow and wet meadow vegetation that is relatively free of invasive non-native plant species. From 2008 through 2010, AIS-sponsored project **TPE-AIRR-039-08** enabled scouting and removal of pioneer populations of reed canarygrass and watercress along the Williams-Barneveld Creek within the A to Z segment. Nineteen at-risk species inhabit the A to Z segment. The 62-acre Shea segment consists of two high-quality dry-mesic prairie remnants and a degraded but unplowed mesic prairie remnant, a 2-acre fen mound with peat soil, 11 acres of stream corridor/bottomland wet meadow, 0.6 linear miles of the Williams Branch of the Williams-Barneveld Creek with 1.2 linear miles of streambank wetland, and three small (< 1 acre) meander scar wetlands. The Shea segment supports a total of 13 at-risk species across all trophic levels. The total proposed project area consists of a total of 24 wetland acres, with targeted aquatic invasive species initially covering a combined total of slightly less than five acres.

Problem Addressed by this Project:

The Williams Branch of the Williams-Barneveld Creek was physically and hydrologically disconnected from the surrounding landscape. More than four feet of silty alluvium had been deposited atop pre-settlement hydric soils. The WDNR was awarded funding from a USFWS R3 Driftless Area Restoration NFHAP Grant to restore hydrology and functional integrity to the Williams Branch (a summary of the

proposed project, headed by Robert Hansis, was included with our original grant application packet). The stream restoration project consisted of excavating stream banks to their pre-settlement soil profile, excavating two buried meander scar wetland features, and re-sloping stream banks to a 6:1 grade. These activities reconnected the Williams Branch with the surrounding landscape and restored hydrology to both the streambank and meander scar wetlands. The stream restoration project was scheduled to begin in late summer 2011, although ground was not broken until June 2012.

Hydrological disturbances such as sedimentation and altered hydrology (high velocity/high discharge events and flashy hydroperiods) can predispose wetlands to species invasions. Prior to implementation of **AIS Project TPE-AIRR-094-11**, Small pioneer populations of reed canarygrass (*Phalaris arundinacea* L.) had been observed along the Williams Branch and adjacent surrounding areas. Most of the reed canarygrass occurred as small clones less than 10-meters in diameter interspersed throughout the existing margins of the stream. The unburied meander scar wetland was slightly more infested, with a large clone approximately one acre in size that was displacing existing native wet meadow vegetation (which consisted primarily of *Silphium perfoliatum, Carex trichocarpa,* and *Calamagrostis canadensis*). Stream restoration ameliorated the underlying chronic hydrological disturbances that were contributing to this invasion, yet reed canarygrass is notorious for rapidly establishing in bareground areas created by restoration and recontouring activities. Early detection and rapid response to reed canarygrass in the early stages of colonization and establishment presented an opportunity for management intervention with a high probability for successful long-term suppression. These efforts were carried out to help ensure the long-term success of the stream restoration project. A letter of support from Robert Hansis, stream restoration project leader, was included in our application packet.

In addition to reed canarygrass, a small population of hybrid cattail (*Typha* x *glauca*) had been observed near the Williams-Barneveld Creek at the A to Z segment of the Mounds View Grassland Complex. The population was initially discovered by Pat Trochel (WDNR and TPE) in 2008 and had been rapidly expanding in diameter prior to implementation of suppression efforts. Hybrid cattail is capable of rapid expansion, and this clone merited immediate management action before it increased in severity to the detriment of the remnant wetlands present at A to Z.

Watercress (*Nasturtium officinale*) is an aggressive invader of springs, seeps, drainage channels, and streams. This species can adversely impact water flowage and discharge in small streams. While watercress had not been detected in the Williams Branch of the Williams-Barneveld Creek, this invasive species was known to be distributed within the local area, warranting annual scouting so that pioneer populations could be quickly eradicated before they had the opportunity to spread. Annual scouting for other aquatic invasive species that might colonize the stream restoration project was also carried out concurrently with watercress scouting.

Overall Project Goal:

To protect the biological integrity of the wetlands of the Mounds View Grassland Complex and the at-risk species they directly and indirectly support by preventing pioneer populations of reed canarygrass and hybrid cattail from reproducing and/or expanding within the complex.

Specific Project Objectives:

1. To prevent rapid establishment, spread, and eventual dominance of reed canarygrass and hybrid cattail following streambank restoration and creation of bareground space at the Shea segment of the Mounds View Grassland Complex.
2. To reduce the abundance or eliminate pioneer populations of reed canarygrass within the Shea remnant prairie segment of the Mounds View Grassland Complex.
3. To reduce the abundance or eliminate populations of hybrid cattail within the Mounds View Grassland Complex.
4. To scout for the presence of pioneer populations of aquatic invasive species within the Williams Branch of the Williams-Barneveld Creek.

Methodology:

Reed Canarygrass

To protect water quality integrity, herbicides were not applied to reed canarygrass plants that were rooted within the stream bank. Reed canarygrass clones rooted within the streambank were mowed at anthesis by TPE staff, interns, and volunteers. Reed canarygrass clones occurring within 10 (ten) meters of the streambank, but not within the channel itself, were spot treated with a 0.25% (a.i.) mixture of imazapyr (Habitat®, a broad-spectrum herbicide registered for use in aquatic systems) and 0.375% (v/v) Induce pH® (Helena Chemical Company), a non-ionic surfactant/sticking agent/pH stabilizer (also approved for use in aquatic systems). Reed canarygrass clones occurring more than ten meters from the Williams Branch of the Williams-Barneveld Creek were treated with the grass-selective herbicide clethodim (Intensity®) to prevent collateral damage to non-target species and secondary weed outbreaks that can accompany broad-spectrum herbicide application. The empirically determined minimum effective concentration of this herbicide (0.5% active ingredient by volume) was used when spot-treating reed canarygrass clones. A water-conditioning additive and spreading agent are required for sethoxydim to perform effectively. Water conditioner (ReQuest®, Helena Chemical Company) was added to tank mixtures at a rate of 0.25% (v/v) and Induce pH was added to herbicide mixtures at a rate of 0.375% (v/v). Induce pH® was chosen over MSO/NIS additives because the sticking agent it contains minimizes herbicide drift and leaf wash off/rewetting that could have potentially transported the active ingredient clethodim into the Williams Branch of the Williams-Barneveld Creek. Treatments were administered for three growing seasons to dampen reed canarygrass reestablishment and resurgence. Seeds of native species were collected on-site and frost-interseeded to encourage revegetation of treated areas. In accordance with WDATCP and APM permit requirements, all entrances and access points to areas treated with herbicide were posted during the restricted entry interval (REI) period.

Hybrid Cattail

Hybrid cattail suppression methods were slightly modified from the technique presented in the *Project Scope Description* for this AIS grant. This modification was based upon preliminary results of research presently being conducted by Integrated Restorations, LLC staff (Budyak et al., unpublished data). Hybrid cattail was treated by mowing all hybrid cattail stems to a two-inch stubble height with a STIHL FS 250 clearing saw (Fig. 1) followed by directed cut surface spray application of a 3.85% (active ingredient by volume, equivalent to 5 fluid ounces/gallon) mixture of imazapyr (Habitat®) and 5% (v/v) Induce pH® sticking agent (6.25 fluid ounces/ gallon) with a small capacity compression sprayer fitted with a cone nozzle. Sticking additive was added at a higher concentration when treating hybrid cattail to minimize collateral damage to non-target species by herbicide wash-off and overspray. To further prevent overspray, sprayer nozzles were fitted with a polypropylene cone-shaped drip/drift guard attachment adjusted to the mean diameter of *Typha* shoots (Fig. 2). Herbicide was applied to hybrid cattail at flowering (late June through the end of July), as this is a period in this species life cycle when its rhizome carbohydrate reserves (and etiolated regrowth/re-sprouting capacity) are at a minimum. The water-soluble herbicide imazapyr reportedly displays rapid and extensive translocation ability within plants; therefore, contractors only treated one in four of the mowed *Typha* stems. Post-treatment monitoring conducted throughout the duration of this project qualitatively showed that treating one in four stumps was effective; all mowed stems displayed signs of chlorosis and necrosis.

Figure 1: Freshly cut *Typha* stems

Figure 2: Modified compression sprayer

2011 Management Activities:

APM Permit Number: 2011 PERMIT #10-11 (issued 6 April 2011)
(APM Herbicide Treatment Record Submitted 7 July 2011)
Interim Report Submitted 19 December 2011

2011 management activities consisted of 1) treatment of the existing hybrid cattail population, and 2) scouting for additional hybrid cattail plants and watercress along the length of the Williams Branch of the Williams-Barneveld Creek. Reed canarygrass suppression treatments were not initiated in 2011, since the stream restoration project is not scheduled to begin until June 2012.

Summary of Hybrid Cattail Suppression Activities in 2011

Hybrid cattail suppression was conducted from 6 – 8 July 2011.

Summary of Watercress Scouting Activities in 2011

Watercress and hybrid cattail scouting was conducted along the Williams Branch of the Williams-Barneveld Creek bordering the Shay Prairie Remnant on 22 September 2011. Neither species was observed in 2011. Additional scouting will take place in 2012 and 2013, after stream restoration (when this site will be most vulnerable to invasions).

2012 Management Activities:

APM Permit Number: SCR-12-55-535 (issued 7 May 2012)
(APM Herbicide Treatment Record Submitted 8 August 2012)
Interim Report Submitted 30 December 2012

2012 management activities consisted of 1) suppression of a portion of the existing hybrid cattail population, 2) suppression of the existing reed canarygrass population, and 3) scouting for additional hybrid cattail plants and watercress along the length of the Williams Branch of the Williams-Barneveld Creek. In addition, the Williams-Barneveld stream restoration project was initiated in late June 2012 and was completed by early September 2012.

Summary of Reed Canarygrass Suppression Activities in 2012

Reed canarygrass clones growing outside of the banks of the Williams-Barneveld Creek were treated with a 0.5% (a.i.) solution of clethodim and 1% (v/v) methylated seed oil-nonionic surfactant emulsified in an aqueous solution containing 0.25% (v/v) water conditioning agent in May 2012. Additional treatment effort will be required in the spring of 2013 given the amount of bareground created by stream restoration, a situation highly conducive to reed canarygrass invasion and expansion.

Summary of Hybrid Cattail Suppression Activities in 2012

Post-treatment monitoring of 2011 treatments during the 2012 field season revealed that the treatment protocol that was developed for hybrid cattail suppression was highly effective (Fig. 3). In addition, the protocol was also highly selective for cattail, with minimal collateral damage inflicted upon non-target sedges and forbs (Fig. 4). Hybrid cattail suppression efforts were limited to a single day of treatment in 2012 by drought conditions at the treatment site. The treatment protocol for suppression (detailed in the project scope description for this grant) specifies herbicide treatment at flowering (late June through the end of July), as this is a period when this species' rhizome carbohydrate reserves (and etiolated regrowth and re-sprouting capacity) are at a minimum. However, during this time period in 2012, much of the hybrid cattail appeared wilted and quasi-senescent from prolonged water deficit combined with excessive daytime temperatures. Uptake rates of water-soluble herbicides (for practical purposes, imazapyr is infinitely soluble in water) are curtailed by osmotic stress imposed by drought conditions (Larcher 1995; Nobel 2009). Moreover, and more importantly, herbicide translocation is severely hampered by quasi-dormancy, since the pressure-flow mechanism of phloem loading and translocation is dependent upon active photosynthesis (Geiger and Bestman 1990). Post-treatment monitoring in spring and early summer 2013 will determine the extent to which the 2012 drought affected treatment efficacy. Additional follow-up treatments are scheduled for the summer of 2013.

Summary of Watercress Scouting Activities in 2012

Watercress and hybrid cattail scouting was conducted along the Williams Branch of the Williams-Barneveld Creek bordering the Shay Prairie Remnant on 20 April 2012 (watercress) and 18 July 2012 (hybrid cattail). Neither species was observed in 2012. Additional scouting is scheduled for 2013, after stream restoration (when this site will be most vulnerable to invasions).

Figure 3: Hybrid cattails treated in summer 2011 (foreground), as seen in spring 2012. Compare to untreated area in background.

Figure 4: Selectivity of 2011 hybrid cattail suppression treatments. Sedges and forbs are growing adjacent to treated cattail stems.

2013 Management Activities:

APM Permit Number: SCR-13-25-296 (issued 3 May 2013)
(APM Herbicide Treatment Record Submitted 31 July 2013)
Interim Report Submitted 21 February 2014
Grant Time Period Extension Requested 3 February 2013
Grant Time Period Extension Approved 4 February 2013

2013 management activities consisted of 1) suppression of the existing reed canarygrass population at the Shea prairie section of the project area, 2) suppression of a portion of the existing hybrid cattail population at the A to Z farm section of the project area, and 3) scouting for additional hybrid cattail plants and watercress along the length of the Williams Branch of the Williams-Barneveld Creek. In addition, bareground space along the margins of the Williams-Barneveld stream restoration was seeded with native species by Prairie Enthusiasts volunteers in autumn 2012, with additional sedge and grass plugs planted in spring 2013. As a result of the delay in completion of the stream restoration project and the severe drought in 2012, an extension of the AIS grant was requested and granted. The revised project end date is 31 December 2014.

Summary of Reed Canarygrass Suppression Activities in 2013

Reed canarygrass clones growing outside of the banks of the Williams-Barneveld Creek and within the surrounding floodplain were spot-treated with a 0.5% (a.i.) solution of clethodim and 1% (v/v) methylated seed oil-nonionic surfactant emulsified in an aqueous solution containing 0.25% (v/v) water conditioning agent from 3 – 7 June 2013. TPE interns mowed reed canarygrass clones rooted within the Williams-Barneveld Creek in mid-June 2013 (prior to seed maturation) to prevent the downstream spread of reed canarygrass propagules. This treatment window was suggested by Integrated Restorations, LLC staff, because there is some evidence from the literature that mowing reed canarygrass at this time might eradicate some reed canarygrass genotypes (because their rhizome carbohydrate reserves are at a minimum between the onset of anthesis and seed maturation). This approach was also suggested in order to eliminate the need for imazapyr applications to the waters of this newly restored trout stream. Although imazapyr is approved for use in aquatic systems, and this project was permitted to conduct such applications within the Williams-Barneveld Creek, there was concern that imazapyr could destabilize the stream bank and increase the potential for erosion if it inflicted collateral damage to other species rooted within the stream bed and along its banks (imazapyr is a broad-spectrum herbicide). There was additional concern that imazapyr application could result in fish kills due to reduced dissolved oxygen from increased biochemical oxygen demand from decomposition of treated reed canarygrass plant material. Whether or not this mowing approach was effective at eliminating or reducing reed canarygrass rooted within the stream bed remains to be seen during subsequent growing seasons.

Notwithstanding the 2012 drought, seeding efforts by TPE volunteers were largely effective, and seeded species had become established over approximately 75% of the bareground space that resulted from stream restoration. However, 25% of the bareground area still lacks vegetation cover and remains vulnerable to erosion and reed canarygrass establishment (Fig. 5). Additional reed canarygrass suppression efforts will be required during the 2014 growing season.

Figure 5: Some bareground area is still present within the stream restoration corridor and surrounding floodplain; this will require additional management to prevent reed canarygrass and hybrid cattail establishment.

Summary of Hybrid Cattail Suppression Activities in 2013

Hybrid cattail suppression was conducted between 31 July and 2 August 2013. Although no clones were discovered by scouting efforts along the newly-restored Williams Branch of the Williams-Barneveld Creek, the clone invading the wet meadow at the A to Z site was still present. Encouragingly, the area of this clone that had been treated during the summer of 2011 continued to be suppressed, with several desired endpoint wet meadow species becoming established in its place (Fig. 6). We anticipate completing eradication of this clone during the summer of 2014.

Figure 6: Native wet meadow species emerging from a treated section of the hybrid cattail clone at the A to Z section of the Mounds View Grassland Complex project area.

Summary of Watercress and Hybrid Cattail Scouting Activities in 2013

Watercress and hybrid cattail scouting was conducted along the Williams Branch of the Williams-Barneveld Creek bordering the Shay Prairie Remnant on 24 June 2013 (watercress) and 1 August 2013 (hybrid cattail). Neither species was observed in 2013. Additional scouting is scheduled for 2014.

2014 Management Activities:

APM Permit Number: SCR-13-25-21 (issued 24 April 2014)
(APM Herbicide Treatment Record Submitted 17 July 2014)
Project Completion Report Submitted 19 December 2014

2014 management activities consisted of 1) suppression of the existing reed canarygrass population at the Shea prairie section of the project area, 2) suppression of the remainder of the hybrid cattail population at the A to Z farm section of the project area, and 3) scouting for additional aquatic invasive species along the length of the Williams Branch of the Williams-Barneveld Creek.

Summary of Reed Canarygrass Suppression Activities in 2014

Reed canarygrass clones growing outside of the banks of the Williams-Barneveld Creek and within the surrounding floodplain were spot-treated with a 0.5% (a.i.) solution of clethodim and 1% (v/v) methylated seed oil-nonionic surfactant emulsified in an aqueous solution containing 0.25% (v/v) water conditioning agent from 9 – 27 June 2014. As in previous years, TPE interns mowed reed canarygrass clones rooted within the Williams-Barneveld Creek in mid-July 2014 (prior to seed maturation) to prevent the downstream spread of reed canarygrass propagules. To date, this approach has not lessened the number of reed canarygrass clones rooted within the stream bank, but it has prevented increases in the diameter of individual clones. A follow-up application on resurging reed canarygrass was conducted on 11 August 2014.

Summary of Hybrid Cattail Suppression Activities in 2014

Hybrid cattail suppression was completed between 14 July and 5 August 2014. In 2014, several scattered clones of both hybrid and narrow-leaved cattail (*T. angustifolia* L.) were discovered along the newly-restored Williams Branch of the Williams-Barneveld Creek by TPE scouting efforts. These clones were randomly distributed throughout the project area and were small in diameter, consisting of approximately 2 – 15 culms per clone. The hybrid cattail clone invading the wet meadow at the A to Z site was still present, but had been reduced to approximately 30% of its original area following three consecutive years of suppression effort. Contractors completed eradication of the actively growing portions of this clone during the summer of 2014.

Summary of Aquatic Invasive Species Scouting Activities in 2014

Aquatic invasive species scouting was conducted along the Williams Branch of the Williams-Barneveld Creek and adjacent Shay Prairie Remnant on 11 August 2014. Contractors did not observe any watercress, remaining hybrid or narrow-leaved cattail culms, giant manna grass (*Glyceria maxima* (Hartm.) Holmb.), or purple loosestrife (*Lythrum salicaria* L.) present within the project area in 2014. Subsequent scouting for aquatic invasive species beyond 2014 will be carried out by TPE staff, interns, and volunteers.

Overall Project Assessment

Annual interventions from 2011 through 2014 have accomplished the overall project goal of preventing pioneer populations of reed canarygrass and hybrid cattail from invading and dominating bareground area created by stream bank re-contouring and floodplain restoration long enough to provide planted and relic native species propagules the unhampered opportunity to become established. The project area was thoroughly and repeatedly scouted for the presence of additional aquatic invasive species so that immediate action could be taken to prevent them from becoming established. Nevertheless, these aggressive species are continually attempting to establish themselves within the Mounds View Grassland Complex via propagule influx from the adjacent surrounding landscape, from existing on-site propagule banks, and from propagules brought to the site lodged in fur and feathers of wildlife and waterfowl. Follow-up treatment and monitoring efforts, combined with active reseeding of local genotype seed and concurrent management activities on site (e.g. periodic prescribed burns) will be required to preserve and protect this unique habitat for the long-term benefit of both the public and the at-risk species that this site supports, and also the MRPHA as a whole. On a high note, one immediate outcome of this project was the much-publicized presence of a pair of Endangered Whooping Cranes (Fig. 7) at the Shea site during the summer of 2012.

Figure 7: Whooping Cranes utilizing the newly restored Shea wetland mosaic

References Cited

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