



Wetland Plant Community Responses to Sediment Removal in the Prairie Pothole Region

Shawn DeKeyser¹, Caitlin Smith², Cami Dixon³

¹North Dakota State University, Fargo, ND USA; ²U.S. Fish & Wildlife Service, New Richmond, WI USA; ³U.S. Fish & Wildlife Service, Woodworth, ND USA



ABSTRACT

We assessed effects of sediment removal as a restoration practice on plant communities in Prairie Pothole Region wetlands to determine if this management technique is providing desired results to create conditions for ideal vegetation communities in wetlands that will benefit wildlife. The desire is to move away from basins dominated by hybrid cattail (*Typha X glauca*) to basins supporting species and structure found in natural wetlands of the region. Three types of wetlands were surveyed; natural (reference), excavated (treatment), and converted cropland (cattail choked). Plant community surveys were completed in the shallow marsh and wet meadow zones of seasonal wetlands. Sites were sampled using a modified Daubenmire method. Aerial photos were assessed to determine the occurrence of drawdown cycles in wetland sites. Plant community data were analyzed using non-metric multidimensional scaling and multi-response permutation procedure to make comparisons between sites. The wet meadow zones and shallow marsh zones of the three types of wetlands were all significantly different ($p < 0.016$). In general, restored wetlands show vegetation trends that resemble natural wetlands, while those that have been allowed to recover without restoration tend to be cattail choked. When examining hybrid cattail specifically, visual obstruction scores were approximately four times greater in converted cropland sites versus treatment or reference sites. Vegetation composition indicates hydrologic conditions (fresh to brackish conditions) of specific sites and regional distribution are likely influential factors in wetland plant establishment.



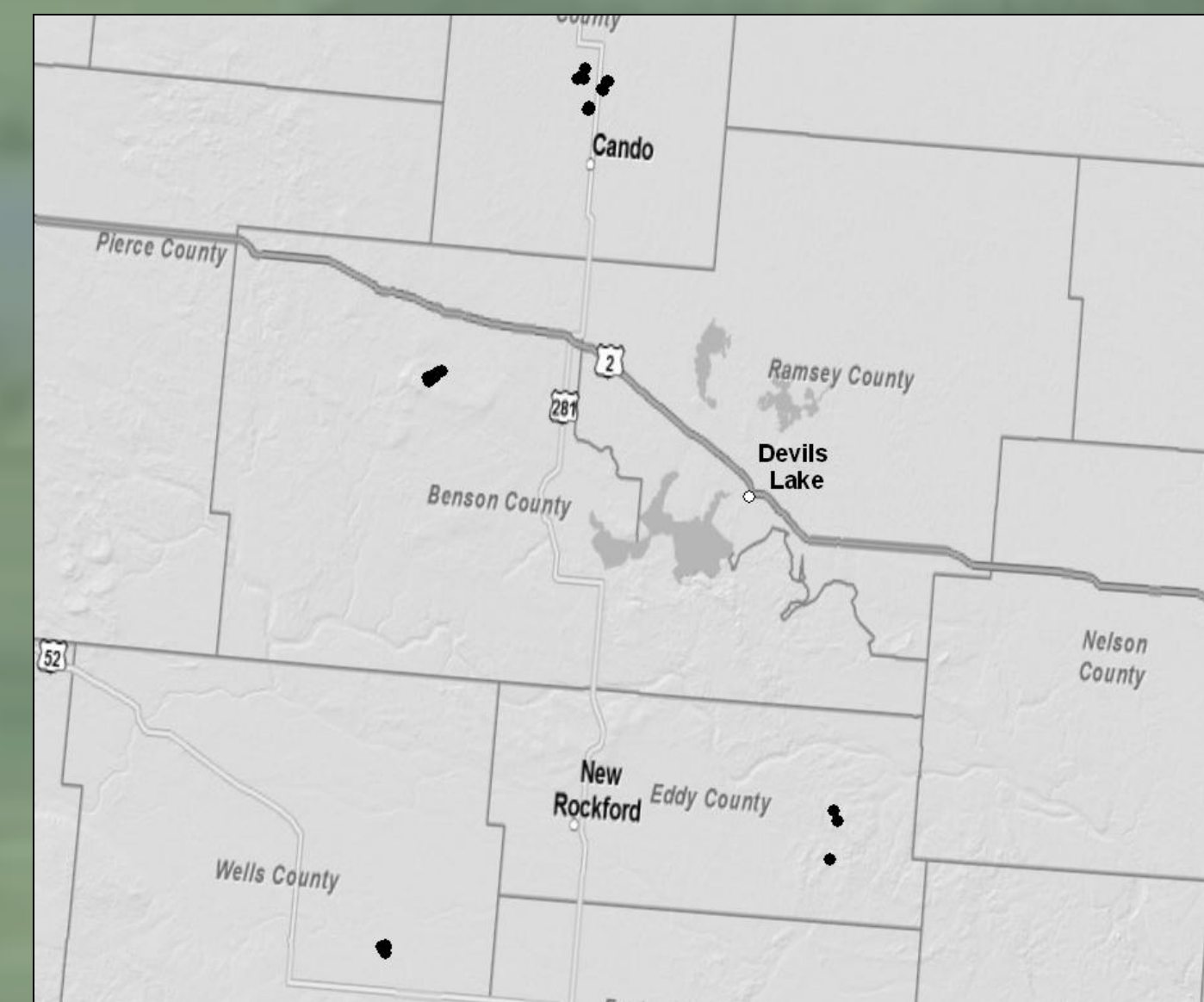
INTRODUCTION

The Prairie Pothole Region is known for its productive wetlands; however, there is a concern that these wetlands are increasingly being degraded and lost due to sedimentation caused by past and current management (Gleason and Euliss 1998, Fisher and Allbee 2011). The impacts of land-use and resultant sedimentation has caused major shifts in plant species composition and structure, often times producing monocultural stands of hybrid cattail. The removal of sediment to improve habitat and lengthen wetland lifespan is a newer management technique, with little follow-up research completed to track potential improvement.



MATERIALS AND METHODS

The study was completed during the field season of 2010 within central North Dakota.



Vegetation was surveyed for species composition via aerial cover and for structure by vegetation visual obstruction at varying heights in the wet meadow and shallow marsh communities of three wetland types. The wetland types included: 1) Reference (natural, never plowed native prairie), 2) Treatment (converted cropland and excavated of sediment), and 3) Control (converted cropland and unexcavated). Statistical analysis was completed utilizing multi-variate techniques.



Reference



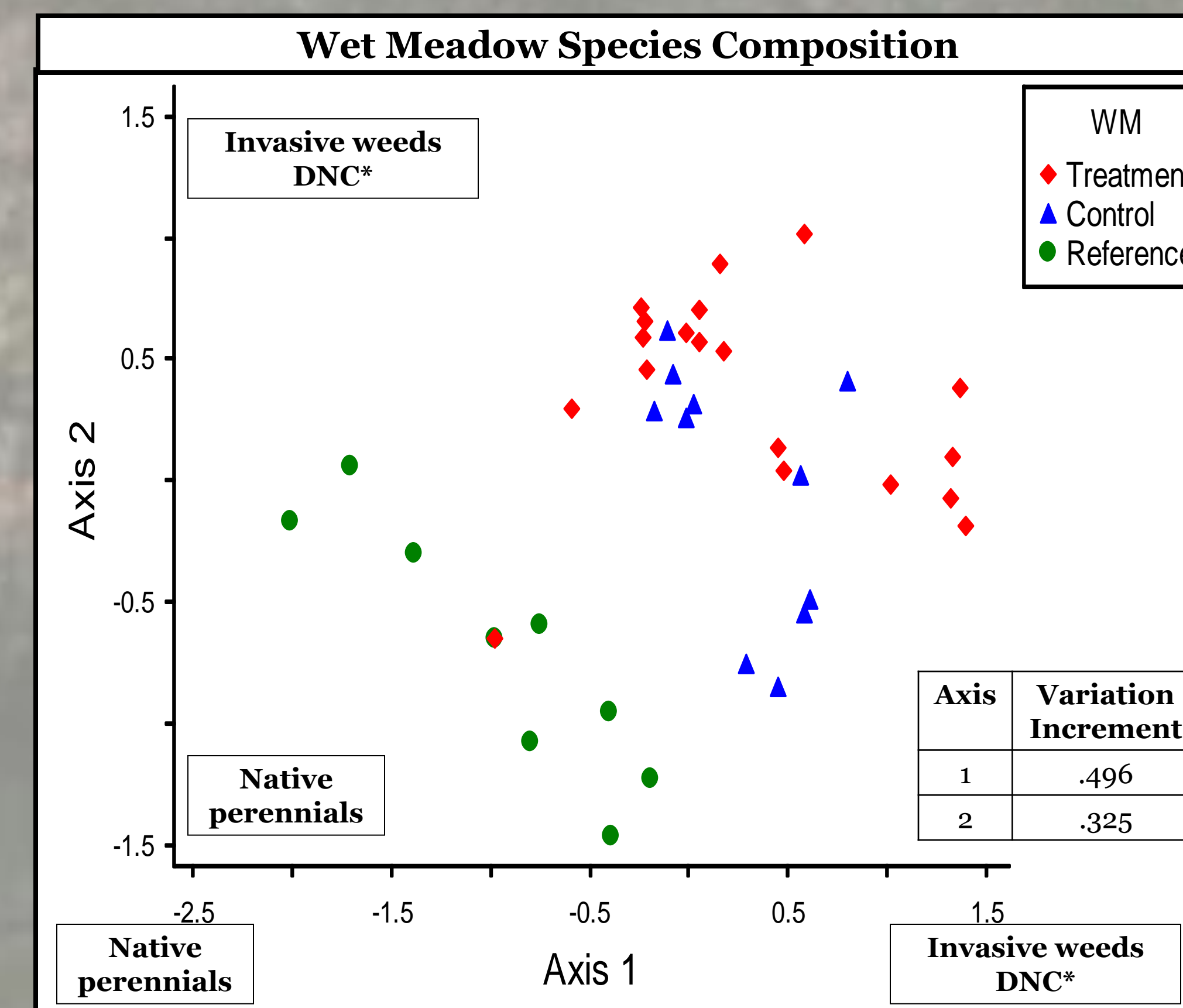
Treatment



Control

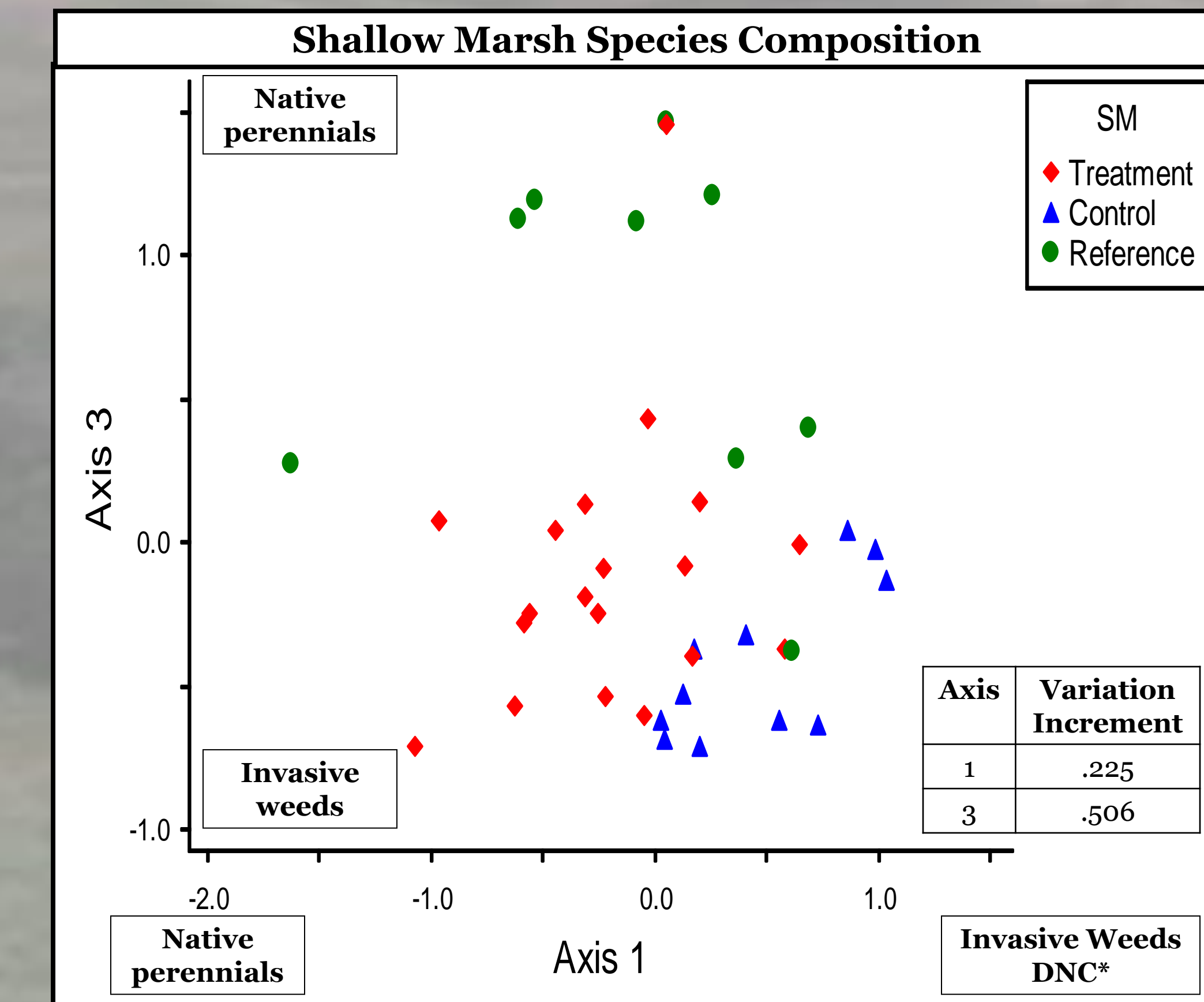
RESULTS

Species driving Axis 1:	
+ r-values	- r-values
<i>Sonchus arvensis</i>	<i>Carex laeviconica</i>
<i>Cirsium arvense</i>	<i>Eleocharis macrostachya</i>
<i>Chenopodium album</i>	<i>Juncus interior</i>
<i>Pascopyrum smithii</i>	<i>Lysimachia ciliata</i>
Species driving Axis 2:	
+ r-values	- r-values
<i>Pascopyrum smithii</i>	<i>Argentina anserina</i>
<i>Andropogon gerardii</i>	<i>Carex sartwellii</i>
<i>Melilotus officinalis</i>	<i>Muhlenbergia richardsonis</i>
<i>Rumex crispus</i>	<i>Juncus balticus</i>



* DNC = Dense Nesting Cover (Planted cool season grasses and legumes)

Species driving Axis 1:	
+ r-values	- r-values
<i>Typha x glauca</i>	<i>Carex laeviconica</i>
<i>Cirsium arvense</i>	<i>Eleocharis macrostachya</i>
<i>Scolochloa festucacea</i>	<i>Glyceria grandis</i>
<i>Sonchus arvensis</i>	<i>Lysimachia hybrida</i>
Species driving Axis 3:	
+ r-values	- r-values
<i>Sparganium eurycarpum</i>	<i>Rumex crispus</i>
<i>Carex atherodes</i>	<i>Polygonum amphibum</i>
<i>Lemna turionifera</i>	<i>Typha x glauca</i>
<i>Sium suave</i>	



* DNC = Dense Nesting Cover (Planted cool season grasses and legumes)

Shallow Marsh Visual Obstruction	
Wetland Type	Average Obstruction Score Values*
Treatment	1.12 ^A
Control	2.24 ^B
Reference	1.58 ^A

* Treatments with different letters were significantly different ($P < 0.05$)

Wetland Percent Cover of Typha	
Wetland Type	Average Percent Typha spp. Cover*
Treatment	5.94 ^A
Control	19.34 ^B
Reference	4.63 ^A

* Treatments with different letters were significantly different ($P < 0.05$)

CONCLUSIONS

- Plant species composition of the wet meadow as well as the shallow marsh were significantly different between the Reference, Treatment, and Control.
- Wet meadow vegetation in the Reference wetlands were dominated by native perennial species and the Treatment and Control wetlands were dominated by planted dense nesting cover and invasive weeds.
- Shallow marsh vegetation in the Reference wetlands were dominated by native perennial species, Control wetlands were dominated by cattails and dense nesting cover, and Treatment wetlands trended toward native perennial species and invasive weeds.
- Vegetation structure was significantly taller in Control wetlands than either the Treatment or Reference wetlands.
- There was significantly more cover of Typha spp. in Control wetlands than either the Treatment or Reference wetlands.

LITERATURE CITED

- Gleason, R.A. and N.H. Euliss, Jr. 1998. Sedimentation of prairie wetlands. Great Plains Research 8, 97-112.
- Fisher, M. and T. Allbee. 2011. Removing sedimentation as a technique for restoring palustrine seasonal and temporary wetlands in the northeast drift prairie of North Dakota – final report. SWG Federal Aid No. T-27-HM.

Acknowledgements

Funding was provided by the U.S Fish and Wildlife Service and Ducks Unlimited. We would also like to thank the North Dakota Lands Department and the North Dakota National Guard for land access; and the Devils Lake Wetland Management District staff for guidance.