

# **Report for 2005ND75B: Evaluating and Validating the Index of Plant Community Integrity for the Assessment of Temporary, Seasonal, and Semi-permanent Wetlands in the Prairie Pothole Region**

## Publications

- Dissertations:
  - Hargiss, Christina Louise Melaas, 2005. Evaluation of an Index of Plant Community Integrity for Assessing Wetland Plant Communities in the Prairie Pothole Region, M.S thesis, Department of Animal and Range Sciences; School of Natural Resources Management; College of Agriculture, Food Systems, and Natural Resources; North Dakota State University, Fargo, North Dakota.
- Conference Proceedings:
  - Hargiss, C.L.M., E.S. DeKeyser, D. Kirby. 2006. Development and Evaluation of an Index of Plant Community Integrity for Assessing Wetland Plant Communities. 2006 Annual Society of Range Management Meeting, Vancouver, BC.
  - Hargiss, C.L.M., E.S. DeKeyser, D. Kirby. 2005. Evaluation of an Index of Plant Community Integrity for Assessing Wetland Plant Communities. 2005 Annual Society of Range Management Meeting, Fort Worth, TX.

## Report Follows

# **EVALUATION OF AN INDEX OF PLANT COMMUNITY INTEGRITY FOR ASSESSING WETLAND PLANT COMMUNITIES IN THE PRAIRIE POTHOLE REGION**

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## **WATER PROBLEM**

Since the implementation of the Clean Water Act in 1972 (Public Law 92-500) there has been increased effort to restore and maintain our nation's wetlands. Legislation since this Act, accompanied with a wide range of land uses within the Prairie Pothole Region (PPR), has resulted in the EPA and other government agencies trying to answer the question of how to assess the health of a wetland. Efforts were made by the Natural Resources Conservation Service (NRCS) and the US Army Corps of Engineers (COE) to answer this question when they created the Hydrogeomorphic (HGM) Model for wetland functional assessment. Another attempt to answer this question was through the creation of the Index of Biological Integrity (IBI) for biological assessment. This was a joint venture of the EPA and several state agencies.

DeKeyser et al. developed an IBI for seasonal wetlands in the PPR that they termed the Index of Plant Community Integrity (IPCI). An IPCI has also been developed to quantitatively assess the condition of temporary and semi-permanent wetlands of the Northwestern Glaciated Plains (NWGP) ecoregion. The NWGP ecoregion is within the mixed grass prairie of North Dakota. Wetland assessment was based on disturbance level and multiple vegetative composition measurements. This classification allows for other temporary, seasonal, and semi-permanent wetlands in the NWGP to be classified and placed into quality classes for mitigation and ecological purposes. However, it is not known whether it is applicable to other ecoregions of the PPR, and whether it is reliable through major climatic disturbances such as droughts. In the current study, the research area was extended to include more of the PPR, specifically the entire NWGP and Northern Glaciated Plains (NGP) of South Dakota, the NGP of North Dakota, and the NWGP of Montana (Omernik 1987). In addition to ecoregion assessment, wetlands were chosen based on the level of disturbance in the wetland and surrounding area, and under a wider range of disturbances including drought. These measurements will help to evaluate the IPCI's effectiveness over a larger geographic area, and over a larger disturbance gradient.

## **OBJECTIVES**

The specific objectives of this study include:

1. Evaluate the IPCI assessment technique over a larger spatial area within the PPR.
2. Evaluate the IPCI assessment method based on a wider variety of disturbances.

3. Validate the metrics, quality classes, and assessment methods used in the IPCI.
4. Determine if/how the HGM Model can be incorporated into the IPCI to evaluate wetland condition.

## **RESULTS**

An evaluation of the Index of Plant Community Integrity (IPCI) was conducted for assessing wetland plant communities in the Prairie Pothole Region. The IPCI evaluates the condition of temporary, seasonal, and semi-permanent wetland plant communities based on disturbance level and multiple community attributes. During 2003 and 2004, vegetative composition was measured for temporary, seasonal, and semi-permanent wetlands located in South Dakota, North Dakota, and Montana concentrated in the Northern Glaciated Plains and Northwestern Glaciated Plains Ecoregions. Wetlands were selected based on classification and type of disturbance ranging from little disturbance (native rangeland) to heavily disturbed (cropland). Wetland data was analyzed using vegetation metrics and further analyzed using nonmetric multidimensional scaling and cluster analyses. All metrics tested were significant in indicating disturbance level in wetlands. Three classes were determined (Good, Fair, and Poor) for temporary and semi-permanent wetlands. Five classes were determined (Very Good, Good, Fair, Poor, and Very Poor) for seasonal wetlands. Based on these classes, score ranges were assigned to the metrics that better defined the ranges designated in the original IPCI. Using the modified IPCI, wetlands in the Northern and Northwestern Glaciated Plains of South Dakota, North Dakota, and Montana can be placed into disturbance classes for ecological purposes and mitigation needs.

Analyses of data showed that the IPCI proved to be an effective tool for evaluating the health of wetland plant communities in the NGP and NWGP of North Dakota, South Dakota, and Montana. Specific metric ranges were changed to better suite a larger data set when compared to the original IPCI. The HGM Model was not able to evaluate wetlands consistently with the IPCI.

## **SIGNIFICANCE**

The IPCI can be used by private landowners, agencies, and land managers for providing baseline data by identifying and assessing wetland plant communities. Also, the IPCI can be used in restoration efforts to monitor change year to year. The IPCI can also be used in reclaimed areas and for mitigation purposes.