

Report as of FY2006 for 2005ND78B: "The Impact of Wetlands and Wetland Easements on North Dakota Land Values"

Publications

Project 2005ND78B has resulted in no reported publications as of FY2006.

Report Follows

THE IMPACT OF WETLANDS AND WETLAND EASEMENTS ON NORTH DAKOTA LAND VALUES

DESCRIPTION OF THE STATE/REGIONAL WATER PROBLEM BEING INVESTIGATED

Wetlands are ubiquitous across the Prairie Pothole region of North and South Dakota and Minnesota and numerous federal, state, and non-governmental agencies are actively involved in purchasing wetland conservation easements from private landowners. Common examples are the Small Wetland Acquisition Program of the United States Fish and Wildlife Service (USFWS), the Wetlands Reserve Program (WRP), and the Natural Resource Conservation Service (NRCS). To ensure that such programs are effective in encouraging landowners to place wetlands under easement while minimizing the expenditure of public funds, it is necessary that the impact of both wetlands and wetland easements on land values be fully understood.

KEY LITERATURE AND RESEARCH

My advisor (S. Shultz) along with a colleague at the University of Minnesota (S. Taff) recently completed a preliminary (test phase) of this research in three counties in southeastern North Dakota. The results published in the article: ‘**Implicit Prices of Wetland Easements in Areas of Production Agriculture**’ in the journal Land Economics, 80 (4), 2004, are summarized in the following abstract:

Impacts of Fish and Wildlife Service wetland easements on agricultural land values in North Dakota were estimated by regressing sale process on physical and institutional characteristics of sold parcels. While easements on temporary wetlands did not influence prices, each additional acre of permanent wetland under easement decreased average prices by \$321 (-79%). Because non-eased permanent wetlands were shown to reduce land prices by \$161/ac., we can estimate the implicit price of a wetland easement per se to be 160\$/acre – 6% below historical easement payment levels in the study area. Alternative model specifications further demonstrate the importance of separating eased and non-eased wetlands and of accounting for their hydrologic condition.

SCOPE AND OBJECTIVES OF THE PROPOSED RESEARCH

I have expanded Dr. Shultz’s previous research to include all 39 North Dakota counties west of the Missouri River, since these counties contain almost all of easements statewide. I am currently quantifying the impact of temporary and semi-permanent wetlands and wetland easements on land values within these counties during the 2000-2004 time period. Since there has recently been an increasing trend in the sale of land for outdoor recreation purposes, I have begun to study the impact of land parcels sold for hunting/recreation purposes on the value of surrounding agricultural land sales because

this was not done in Dr. Shultz's earlier research. All 53 counties will be considered in this portion of the project.

METHODS AND PROCEDURES

1) Data have been collected associated with all nonconfidential agricultural land sales across all 53 counties comprising the State of North Dakota. More than 200 of these sales have been identified as potential (buyer out of state or resident of larger North Dakota city) recreational land sales. The SSURGO digital soils database has been used to quantify soil productivity within the sold parcels. Data have been collected for the years from 2000 to 2004. Collected sales data include a legal description of the property, sale price, date, and buyer/seller name. Three types of sales have been excluded: 1) all sales that are less than 40 acres in size. 2) arms-length transactions (between family members), and 3) sales which include buildings and other non-land assets.

2) The boundaries of all sale tracts have been digitized into a GIS database by identifying and selecting field boundaries in the common land unit (CLU) database of the NRCS based on legal descriptions of the sale tract. In cases where CLU boundaries do not directly correspond to sales, particular quarter section polygons of the public land survey (PLS) GIS coverage will be selected and digitized.

3) Land uses (acres of cropland versus pastureland) within individual sales tracts have been estimated through spatial overlays of the 2003 or 2005 CDL coverages. In addition, land uses specifically adjacent to wetlands and easements have been quantified using GIS buffering techniques.

4) The relative productivity of the sale tracts has been represented by spring wheat yields (bushels per acre) for cropland, and range productivity (pounds of forage per acre) for pastureland. These soil productivity measures have been calculated through spatial overlays of tracts and the SSURGO soils database, and by weighting SSURGO yields based on acreage within all unique SSURGO soil polygons within tracts.

5) The acreage of temporary and semi-permanent wetlands within sale tracts has been quantified through spatial overlays of the NWI Basin (Reynolds et al., 1996). Temporary wetlands hold water in the early spring but are usually dry by mid-summer. Semi-permanent wetlands hold water throughout the growing season during most years.

6) Estimation of conservation easement acreage within sale tracts has been accomplished by overlaying USFWS (SWAP) easement boundaries with sale tract and NWI wetland coverages.

7) The hydrologic (wetness) condition of all wetlands and easements has been determined through GIS-based spatial overlays of water classifications of the NASS-CDL, and visual inspections of overlaid NAIP color aerial photography. Overlays were specific to the year of sale and imagery. The goal has been to confirm the water coverage assumed with NWI classifications which was necessary because the surface water acreage of wetlands

can vary dramatically due to changing precipitation conditions across the state. These results will be compared to those obtained by Royle (Royle et. al., 2002) which were determined by statistical methods.

8) The following hedonic (price-attribute) multiple regression model will be estimated:

$$P_L = f(Z_s, Z_p, Z_w, Z_f),$$

where the dependent variable P_L is the sale price (\$/acre); Z_s are sale characteristics including size and possible locational details; Z_p represents relative productivity measures of crop and pasture land; Z_w represents wetland characteristics (NWI classifications with water coverage estimates, as well as land uses immediately surrounding wetlands); and Z_f represents wetland easement restrictions.

9) Alternative model specifications will be evaluated including varying the Basin classification categories of NWI wetlands, utilizing alternative buffer sizes to account for land uses adjacent to wetlands, and by using alternative functional form (linear, log-linear, and semi-log relationships).

10) Marginal implicit prices will be calculated for each of the explanatory variables. These measure the expected change in the average sale price per acre associated with a 1-unit change in the quantity of an explanatory variable while holding all other explanatory variables constant at their mean levels. Finally, the marginal implicit prices of both wetlands and wetland easements for agricultural and recreational land sales will be mapped across all 53 counties comprising the State of North Dakota.

ANTICIPATED RESULTS (DELIVERABLES) & BENEFITS

A Departmental Report for lay audiences and a journal article for academics will be prepared that contain estimates of the impact of different types of wetlands and wetland easement on both agricultural and hunting/recreation land values across all 53 counties of North Dakota. Presentations summarizing research results will also be made to local and national groups (farmer groups, state and national agencies, and academic conferences). These estimates are expected to be used by the USFWS, the USDA-NRCS, rural appraisers, land owners, and land buyers/sellers to evaluate fair market prices for wetland easements, and land purchases with and without different types of wetlands.

PROGRESS TO DATE

4,332 agricultural land sales from the years 2000 to 2004 have been collected from county courthouse public records in all 53 North Dakota counties. 775 of the 4,332 total land sales were found to contain wetland easements. The boundaries of all sales tracts have been digitized into a GIS database by identifying and selecting field boundaries in the common land unit (CLU) database of the NRCS based on the legal descriptions of the database. Land uses (acres of cropland vs. pastureland) have been calculated through spatial overlay of the year 2003 or 2004 NASS CDL coverages. The relative productivity

of the sale parcels is represented by spring wheat yields for cropland, and pounds of forage per acre for pastureland. These soil productivity measures were calculated through spatial overlays of tracts and the SSURGO soils database. The type of wetlands found within the sale tracts has been quantified using spatial overlays of the NWI Basin. Conservation easement acres within sale tracts were determined by overlaying USFWS easement boundaries with the sale tract and NWI wetland coverages. The hydrologic (wetness) condition of all wetlands and easements has been determined using spatial overlays of water classifications of the NASS CDL, and visual inspections of overlaid NAIP color aerial photography.

In addition, 210 land purchasers that reside either in one of the larger North Dakota cities or outside the state were identified as potential recreational land buyers. Survey information about the nature of the sale was obtained from 152 of the 210.

REFERENCES

Reynolds, Ronald E., Danny R. Cohan, and Michael A. Johnson. 1996. Using landscape information approaches to increase duck recruitment in the Prairie Pothole Region. *Transactions of the North American Wildlife and Natural Resource Conference* 61:86-93. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/birds/incduck/incduk.htm>

Royle, J. Andrew, Mark D. Koneff, and Ron E Reynolds. 2002. "Spatial Modeling of Wetland Condition in the U.S. Prairie Pothole Region". *Biometrics* 58, 270-279.

Shultz, S. and S. Taff. 2004. "Implicit prices of wetland easements in areas of production agriculture". *Land Economics* 80(4):501-512.