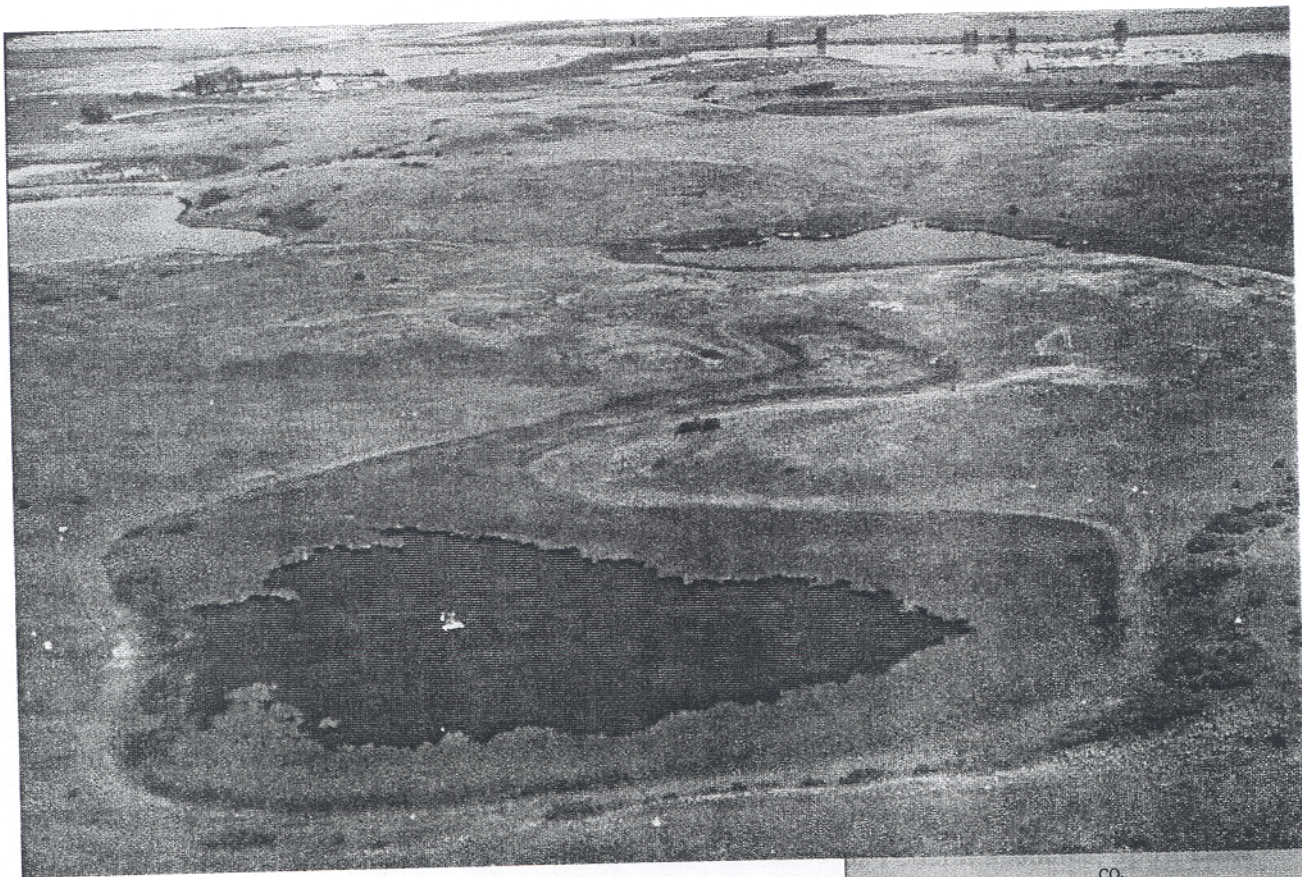


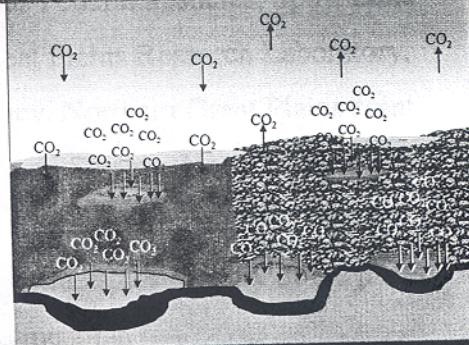
# Prairie Wetland Carbon Research Meeting



Northern Prairie Wildlife  
Research Center

Jamestown, North Dakota

May 15-16, 2002



 **USGS**  
science for a changing world

# Carbon and Nitrogen Sequestration in Northern Native and Restored Prairie Wetlands

Alan Olness<sup>\*1</sup>, N. H. Euliss, JR.<sup>2</sup>, and R. A. Gleason<sup>2</sup>.

---

<sup>1</sup>USDA-Agricultural Research Service, North Central Soil Conservation Research Laboratory, Box 903, Iowa Avenue, Morris, MN 56267-1065 USA. <sup>2</sup>U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, ND 58401-7317 USA.

Wetlands, an important landscape feature in the prairie pothole region (PPR) of the Northern Great Plains, are potential sinks for carbon and nitrogen. Soil samples were collected at 205 wetland sites within a five-state area. Seasonal and semipermanent wetlands sampled included native, cultivated (drained and non-drained), and restored sites. Soil cores were sampled to a depth of 60-cm increments. Samples within each of three vegetation zones, deep marsh, shallow marsh and wet meadow were composited, dried, ground to pass a 150  $\mu$  sieve and soil organic carbon, inorganic carbon, and total nitrogen contents were determined.

Native seasonal and semipermanent wetlands contained 4.1 to 5% organic carbon in the 0- to 15-cm depth zones. Soils in native wetlands contained up to 1.0 to 1.5% more organic carbon and 0.08 to 0.12 % more nitrogen than soils from wetlands that had a cultivated history and which included drained, non-drained and wetlands restored less than 5 years. Carbon and nitrogen concentrations decreased with depth and no effect of cultivation was observed at depths greater than 30-cm except for carbonate-carbon in semipermanent wetlands. Carbon and nitrogen concentrations increased with age of restoration in restored semipermanent wetlands and appear to reach pre-tillage levels within 20 years; we did not detect a measurable increase in concentration of carbon or nitrogen in seasonal wetlands. Soil carbonate levels in the 0 to 30 cm depths in seasonal wetlands however appear unaffected by drainage or tillage. About 12,000 kg of carbonate  $\text{ha}^{-1}$  were lost from the surface 60-cm of semipermanent wetlands, presumably due to drainage or tillage. Carbonate levels recovered slower than carbon or nitrogen in semipermanent wetlands. Organic C:N ratios varied from about 9.8 to 10.8 within the wetland soils, were greater in seasonal wetlands, and decreased very slightly with depth. Restoring semipermanent wetlands appears an easy method of sequestering large amounts of carbon within a rather short period of time. Sequestration of organic carbon proceeds rapidly and the total amount of sequestration depends on the amount of carbon initially present.