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Long Term, Annual Nutrient and Sediment Losses from Agricultural Basins in West Central Wisconsin

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Abstract Text:

The unglaciated region in the upper Midwest is an area consisting of broad, upland areas underlain by limestone bedrock with steep slopes and narrow valleys. Headwater streams on paired basins have been monitored for six years. The north basin consists of 430 acres with 150 acres cropland, 250 acres woodland, and 30 acres pasture. The south basin consists of 215 acres with 39 acres cropland and pasture, 107 acres woodland, and 69 acres in CRP/CREP. Slopes in the cropped fields range from 6 – 33%, while the woodland and pasture are significantly steeper. Perennial streams emerge from the base of the limestone slopes and run through both basins. The farm has adopted a strip tillage system for corn and no-till for both soybeans and alfalfa. Six years of data show annual sediment losses of 440 pounds per acre in the north basin and 110 pounds in the south basin which has little agriculture. Storms account for 97% of all sediment losses; major summer storms in June of 2002 and 2004 accounted for 70-75% of the total sediment loss for those years. Average annual total nitrogen losses ranged from 4-8 pounds per acre per year in the north and 1-3 pounds in the south basin. Approximately 53% of the total nitrogen losses occurred during storm flow; the same storms in June of 2002 and 2004 accounted for 30-35% of those losses. Average annual total phosphorus losses ranged from 0.3-0.9 pounds per acre in the north and 0.3-0.4 pounds per acre in the south with the June storms contributing 70% of the total phosphorus losses. These nutrient and sediment loadings are below most anticipated thresholds for water quality protection; this farm is economically and environmentally viable.

Impact Statement:

The losses from this operation are significantly lower than expected or estimated from any of the current water quality models used in Wisconsin. Data from this farm are being used to calibrate and improve water quality models. The information generated from this farm has been developed into education and training programs that demonstrate that producers can adopt farming systems that protect water quality in environmentally sensitive areas. This farm has also provided critical information on nutrient loading from woodland and grasslands which is educating producers, agency personnel and environmental organizations on the natural contributions of phosphorus from non-farmed areas.