United States Department of Agriculture

Key Findings from the CEAP-Cropland Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Souris-Red-Rainy Basin

National Resources Conservation Service
Conservation Effects Assessment Project

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These findings represent the baseline conservation condition, using conservation practices reported in the 2003–06 NRI-CEAP Survey for the Souris-Red-Rainy Basin. The Souris, Red, and Rainy Rivers drain eastern North Dakota, western and northern Minnesota, and a small part of northeastern South Dakota before flowing north into Canada where they discharge ultimately into Hudson Bay. In the center of the region, the Red River forms most of the boundary between North Dakota and Minnesota; to the east, the Rainy River is part of the U.S.-Canada boundary. The Souris-Red-Rainy Basin drains about 38 million acres in the United States, including some 20 million acres of cultivated cropland.

Voluntary, incentives-based conservation approaches are achieving results. Farmers have reduced sediment and nutrient losses from cultivated cropland through conservation practice adoption throughout the Souris-Red-Rainy Basin, compared to losses that would be expected if no conservation practices were in use. Structural practices for controlling water erosion are in place on 18 percent of all cropped acres in the region, including 23 percent of highly erodible land. Fifty-five percent of cropped acres meet criteria for mulch till, and 17 percent meet criteria for no-till. Eighty-nine percent of cropped acres have structural or tillage and residue management practices, or both. Farmers meet criteria for good nitrogen management—appropriate rate, timing, *and* method of application—on more than 38 percent of the cropped acres and good phosphorus management on 43 percent.

Conservation practice adoption on cropped acres—whether through Federal or State programs or through landowners' initiative—has reduced wind erosion by 52 percent, edge-of-field waterborne sediment losses by 43 percent, nitrogen loss with windborne sediment by 45 percent, nitrogen loss with runoff by 67 percent, nitrogen loss through leaching by 71 percent, and total phosphorus loss by 57 percent.

The need for additional conservation treatment in the region was determined by imbalances between the level of conservation practice use and the level of inherent soil vulnerability. Three levels of treatment need were estimated:

- **A high level of need** for conservation treatment exists where the loss of sediment and/or nutrients is greatest and where additional conservation treatment can provide the greatest reduction in agricultural pollutant loadings. *Although some cropland in the region needs additional treatment for loss of sediment or nutrients, these needs are not widespread enough to be considered to have a high-level of need for additional conservation treatment.*
- **A moderate level of need** for conservation treatment exists where the loss of sediment and/or nutrients is not as great and where additional conservation treatment has less potential for reducing agricultural pollutant loadings. *Approximately 4.3 million acres—25 percent of the cropped acres in the region—have a moderate level of need for additional conservation treatment, all for wind erosion.*
- **A low level of need** for conservation treatment exists where the existing level of conservation treatment is adequate compared to the level of inherent soil vulnerability. *Approximately 13.2 million acres—75 percent of the cropped acres in the region—have a low level of need for additional conservation treatment.*

Water quality concerns associated with crop production the Souris-Red-Rainy Basin are not pronounced because of the low levels of precipitation, the short growing season, the preponderance of close-grown crops, the widespread use of conservation practices on cropland, and the high percentage of cropped acres that have low potential for runoff or leaching. The most significant conservation need in the region—control of wind erosion—exists mainly in the Red River subregion. Only about 2 percent of cropped acres have annual nitrogen leaching losses higher than 25 pounds per acre per year, but because these acres were widely distributed across the region we did not consider them to have a significant need

for conservation treatment. Although additional conservation practices could be applied on the low-treatment-need cropland, further reductions in sediment and nutrient loss would be minimal. The greatest gains would come through treatment to reduce wind erosion.

Conservation Practice Effects on Water Quality

Cultivated cropland makes up about 68 percent of the land base of the Souris and Red River subregions but contributes 77 percent of the loadings of sediment, 83 percent of the nitrogen, and 57 percent of the phosphorus to rivers and streams in the region. (The Rainy River subregion has too little cropland to support reliable estimates of sediment and nutrient loss.) Urban point and nonpoint sources, which make up only about 5 percent of the land base, account for the bulk of the remaining sediment and nutrient loads.

Model simulations suggest that conservation practices in use on cultivated cropland in the period 2003-06 have reduced loads *from cultivated cropland* delivered to rivers and streams from the combined Souris and Red River subregions by—

- 50 percent for sediment,
- 75 percent for nitrogen, and
- 52 percent for phosphorus.

Some of the sediment and nutrients that reach rivers and streams are removed, trapped, or deposited before the rivers reach Canada. The proportion of instream loads attributed to cropland sources that are exported to Canada from the Souris River subregion are estimated to be—

- 33 percent of the sediment,
- 91 percent of total nitrogen, and
- 66 percent of total phosphorus.

The proportion of instream loads attributed to cropland sources that are exported to Canada from the Red River subregion are estimated to be—

- 13 percent of the sediment,
- 86 percent of the nitrogen, and
- 52 percent of the phosphorus.

In the Souris River subregion, conservation practices have reduced instream loads *from all sources* of—

- sediment by 20 percent,
- nitrogen by 83 percent, and
- phosphorus by 33 percent.

In the Red River subregion, conservation practices have reduced instream loads *from all sources* of—

- sediment by 5 percent,
- nitrogen by 75 percent, and
- phosphorus by 38 percent.