

Key Findings from the CEAP-Cropland Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Missouri River Basin

August 2012

These findings represent the baseline conservation condition, using conservation practices reported in the 2003–06 NRI-CEAP Survey. *Wind erosion is the most pervasive conservation concern in the region. Although only about 18 percent of the cultivated cropland in this region has a high or moderate need for conservation treatment, this represents more than 15 million cropped acres.*

Voluntary, Incentives-Based Conservation Approaches Are Achieving Results. Farmers have reduced sediment, nutrient, and pesticide losses from farm fields through conservation practice adoption throughout the Missouri River 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 41 percent of all cropped acres in the region, and structural practices for controlling wind erosion are in place on 10 percent. Ninety-three percent of the cropland acres meet criteria for no-till (46 percent) or mulch till (47 percent), and all but 3 percent have evidence of some kind of reduced tillage on at least one crop in the rotation. Ninety-eight percent have structural or tillage management practices, or both. Farmers meet criteria for high or moderately high levels of nitrogen or phosphorus management on more than 60 percent of the cropped acres. Application of these practices has reduced edge-of-field sediment and nutrient losses as well as loadings to rivers and streams and to the outlet of the Missouri River, as follows:

Reductions in edge-of-field losses of sediment and nutrients from cultivated cropland through conservation treatment in place during 2003–06, in percent, Missouri River Basin

Location	Sediment		Nitrogen			Phosphorus	
	Windborne	With runoff	Windborne	With runoff	Through leaching	Windborne	Soluble *
----- Percent reduction -----							
Eastern part of region	66	72	47	72	21	63	58
Western part of region	55	79	46	66	60	55	63
Entire region	58	73	46	58	45	58	59

* Soluble phosphorus includes not only phosphorus in runoff but also leaching to loss pathways, such as tile drains and natural seeps, that eventually return to surface water

Reductions in loadings of sediment and nutrients to rivers and streams and to the Missouri River outlet through conservation treatment in place during 2003–06, Missouri River Basin

Loadings to	Sediment	Nitrogen	Phosphorus
----- Percent reduction -----			
Rivers and streams from cultivated cropland	76	54	60
Missouri outlet from all sources	4	36	28

Opportunities Exist to Further Reduce Soil Erosion and Nutrient Losses from Cultivated Cropland. 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 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. *Some 1*

million acres—1 percent of the cultivated cropland in the region—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 14 million acres—17 percent of the cultivated cropland in the region—have a moderate level of need for additional conservation treatment.*
- **A low level of need** for conservation treatment exists where the existing level of conservation treatment is adequate compared to the level of inherent vulnerability. *Approximately 68 million acres—82 percent of the cultivated cropland in the region—have a low level of need for additional conservation treatment.*

The top table below shows potential reductions in edge-of-field losses sediment, nitrogen, and phosphorus through application of additional conservation treatment on high- and moderate-treatment need cropland. The bottom table shows reductions in delivery of sediment and nutrients to rivers and streams in the Missouri River Basin and reductions in delivery from all sources to the Mississippi River. Potential reductions from existing levels could be achieved through implementation of suites of conservation practices on cropped acres having high or moderate levels of treatment need.

Potential for further reductions in edge-of-field losses of sediment and nutrients from cultivated cropland through comprehensive conservation treatment of high- and moderate-treatment-need cropland, Missouri River Basin

Location	Sediment		Nitrogen loss—		Soluble phosphorus *
	Windborne	With runoff	With runoff	Through leaching	
----- Percent reduction -----					
Entire region	22	37	24	12	20

* Soluble phosphorus includes not only phosphorus in runoff but also leaching to loss pathways, such as tile drains and natural seeps, that eventually return to surface water

Potential for further reductions in loadings of sediment and nutrients to rivers and streams and to the Missouri River outlet through comprehensive conservation treatment of high- and moderate-treatment-need cropland, Missouri River Basin

Loadings to	Sediment	Nitrogen	Phosphorus
----- Percent reduction -----			
Rivers and streams from cultivated cropland	28	13	12
Missouri outlet from all sources	1	6	4

Comprehensive Conservation Planning and Implementation Are Essential. The resource concern with the most widespread need for additional conservation treatment related to cropland in the region is wind erosion, which accounts for most of the soil and nutrient losses from farm fields in this region. Despite reductions in wind erosion following conservation practice implementation, model simulations show that in at least some years annual wind erosion rates can exceed 4 tons per acre on 12 percent of the cultivated cropland, and can exceed 2 tons per acre on 20 percent. Suites of practices that include both soil erosion control and nutrient management—appropriate rate, form, timing, and method of application—are required to simultaneously address soil erosion and nutrient losses by wind, in runoff, and through leaching.

Targeting Enhances Effectiveness and Efficiency. Targeting critical acres significantly improves the effectiveness of conservation practice implementation. Use of additional conservation practices on acres that have a high need for additional treatment—acres most prone to runoff or leaching and with low levels of conservation practice use—can reduce per-acre sediment and nutrient losses by about twice as much on average as treatment of acres with a moderate level of need. Even greater efficiencies can be achieved when comparing treatment of high- or moderate-need acres to low-treatment need acres.