

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

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These findings represent the baseline conservation condition, using conservation practices reported in the 2003–06 NRI-CEAP Survey and other sources. *The loss of nutrients, especially nitrogen through leaching, is the most pervasive conservation concern in the region.*

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 Upper Mississippi 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 45 percent of all cropped acres in the region. Ninety-one percent of the cropland acres meet criteria for no-till (28 percent) or mulch till (63 percent), and all but 5 percent have evidence of some kind of reduced tillage on at least one crop in the rotation. Ninety-six percent have structural or tillage management practices, or both. 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 2003–06, in percent, Upper Mississippi River Basin

Wind erosion	Sediment losses with runoff	Nitrogen losses		Total phosphorus losses
		With runoff	Through leaching	
----- Percent reduction -----				
64	61	45	9	44

Reductions in instream loads of sediment and nutrients from cultivated cropland through conservation treatment in 2003–06, in percent, Upper Mississippi River Basin

Loadings to	Sediment losses with runoff	Total nitrogen losses	Total phosphorus losses
----- Percent reduction -----			
Rivers and streams from cultivated cropland	65	26	41
Lower Mississippi River Basin (instream loads, all sources)	14	19	26

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 9 million acres—15 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 26 million acres—45 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 23 million acres—40 percent of the cultivated cropland in the region—have a low level of need for additional conservation treatment.*

The principal agricultural conservation concern in the region is the loss of nutrients from cropland, especially the loss of nitrogen through leaching. The top table below shows potential reductions in edge-of-field losses of 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 from cultivated cropland to rivers and streams in the Upper Mississippi River Basin and reductions in delivery from all sources to the Lower Mississippi River Basin. 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 conservation treatment on high- and moderate-treatment-need cropland, in percent, Upper Mississippi River Basin

Sediment losses with runoff	Nitrogen losses		Total phosphorus losses
	With runoff	Through leaching	
----- Percent reduction -----			
76	58	48	45

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

Loadings to	Sediment	Nitrogen	Phosphorus
----- Percent reduction -----			
Rivers and streams	74	49	41
Lower Mississippi River Basin (instream loads, all sources)	8	33	26

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 the loss of nutrients, especially nitrogen through leaching. Treatment of erosion alone can exacerbate the nitrogen leaching problem by re-routing surface runoff to subsurface flow pathways. Soil erosion control practices are effective in reducing the loss of nitrogen in surface runoff, but for some acres the re-routing of surface water runoff to subsurface flow along with incomplete nutrient management results in a small net increase in total nitrogen loss from the field.

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. Although most cropland has some evidence of nutrient management, only about 13 percent of cropped acres meet nutrient management criteria for nitrogen and phosphorus application for all crops in all years of the rotation.

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.