United States Department of Agriculture
Natural Resources Conservation Service
Resources Inventory and Assessment Division

June 2010

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

The Upper Mississippi River Basin (UMRB) cropland study was designed to (1) quantify the effects of conservation practices commonly used on cultivated cropland in the region, (2) evaluate the need for additional conservation treatment, and (3) estimate the potential gains that could be attained with additional conservation treatment. The study is part of the Conservation Effects Assessment Project (CEAP), a multi-agency USDA effort to quantify the environmental effects of conservation practices.

The results of the study lead to the following conclusions for the UMRB:

- *Computer modeling simulations indicate that conservation practice use in the UMRB has made good progress toward reducing sediment, nutrient, and pesticide losses from farm fields. However, significant conservation treatment is still needed to reduce nonpoint agricultural sources of pollution to acceptable levels.*
  - *Use of soil erosion control practices is widespread, but the most vulnerable acres require additional conservation practices.*
  - *Complete and consistent use of nutrient management practices is generally lacking; 62 percent of the acres require additional treatment to reduce the loss of nitrogen or phosphorus from farm fields.*
  - *The most critical conservation concern is the loss of nitrogen through leaching on half of the cropped acres.*
  - *Treatment of erosion alone can exacerbate the nitrogen leaching problem by re-routing surface water to subsurface flow pathways.*
  - *Nitrogen leaching loss is controlled by pairing erosion-control practices with nutrient management practices for rate, form, timing, and method of application.*
  - *Conservation practices have the greatest effect on the more vulnerable acres.*

- About 38 percent of the acres are adequately treated for sediment, nitrogen, and phosphorus loss. Conversely, about 62 percent of the acres still require additional conservation treatment to reduce sediment and/or nutrient losses to acceptable levels.

- Model simulations suggest that adequate treatment for all resource concerns is rarely achieved with single practice solutions. Full treatment of the most vulnerable acres will require a *suite* of conservation practices designed to—
  - *avoid* or limit the potential for loss by consistently using nutrient management practices (appropriate rate, timing, *and* method) on *all* crops in the rotation;
  - *control* overland flow and concentrated flow; and
  - *trap* materials leaving the field using appropriate edge-of-field mitigation.

- Nutrient management is especially important for acres with erosion control treatment because some of the surface water that carries nitrogen and phosphorus in solution is re-routed to subsurface loss pathways, where it is more difficult to treat. A significant portion of the nutrients in subsurface flows is eventually delivered to lakes, streams, and rivers through seepage, artificial drainage systems, and groundwater return flow.

- Simulation of additional conservation treatment suggests that, by augmenting conservation practices already in use with needed improvements in nutrient management on under-treated acres in the region, nitrogen savings could be more than doubled.

- Even when fully treated, however, some of the most vulnerable acres will have unacceptable losses, especially during years with extreme weather events. For these acres, a change in the cropping system, land-use change, or establishment of long-term conserving cover may be necessary to reduce water quality impacts.