United States Department of Agriculture

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

National Resources Conservation Service
Conservation Effects Assessment Project

June 2014

These findings represent the baseline conservation condition, using conservation practices reported in the 2003–06 NRI-CEAP Survey for the Pacific Northwest Basin.

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 Pacific Northwest 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 33 percent of all cropped acres in the region, including 40 percent of highly erodible land. Fifty-nine percent of cropped acres meet criteria for mulch till, and 21 percent meet criteria for no-till. Ninety-two 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 44 percent of the cropped acres and good phosphorus management on 43 percent.

Conservation practice adoption—whether through Federal or State programs or through landowners' initiative—has reduced edge-of-field sediment and nutrient losses and sediment and nutrient loads to rivers and streams and to the Pacific Ocean, as shown in the table below.

Reductions in edge-of-field sediment and nutrient loss from cropped acres, reductions in sediment and nutrient loadings delivered to rivers and streams *from cropland sources*, and reductions in sediment and nutrient instream loadings *from all sources* to the Pacific Ocean, Pacific Northwest Basin

Reduction	Sediment loss		Nitrogen loss			Total phosphorus loss
	Windborne	Waterborne	Windborne	With runoff	Through leaching	
	- Percent reduction -					
Edge-of-field	25	37	23	40	48	46*
To rivers and streams from cropland	53			57		60
To Pacific Ocean from all sources	5			16		8

*** Phosphorus lost to surface water, which includes sediment-attached and soluble phosphorus. Soluble phosphorus includes not only phosphorus in runoff but also leaching to loss pathways such as tile drains and natural seeps. Much of this lost phosphorus eventually returns to surface water.**

NOTE: Not all edge-of-field losses of sediment and nutrients reach rivers and streams. Some are captured by buffers, wetlands, or other nonagricultural lands. Reductions in loadings to the Pacific Ocean are smaller because conservation practices affect only the cultivated cropland share of total instream load.

Opportunities Exist to Further Reduce Soil Erosion and Nutrient Losses from Cultivated Cropland. Despite the obvious progress, further reductions are possible. 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. *Some 390,000 acres—only 3 percent of the cropped acres 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 8.2 million acres—70 percent of the cropped acres 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 soil vulnerability. *Approximately 3 million acres—27 percent of the cropped acres in the region—have a low level of need for additional conservation treatment.*

There is no single most critical conservation concern in this region. Most cultivated cropland needs additional treatment to reduce sediment *and* nutrient losses. The following table shows potential reductions from further conservation treatment.

Potential further reductions in edge-of-field sediment and nutrient loss from high- and moderate-treatment-need cropped acres, in sediment and nutrient loadings delivered to rivers and streams *from cropland sources*, and in sediment and nutrient instream loadings *from all sources* to the Pacific Ocean, Pacific Northwest Basin

Reduction	Sediment loss		Nitrogen loss			Total phosphorus loss
	Windborne	Waterborne	Windborne	With runoff	Through leaching	
	Percent reduction					
Edge-of-field	24	85	22	59	49	59*
To rivers and streams from cropland		73		47		41
To Pacific Ocean from all sources		2		5		3

*** Phosphorus lost to surface water, which includes sediment-attached and soluble phosphorus. Soluble phosphorus includes not only phosphorus in runoff but also leaching to loss pathways such as tile drains and natural seeps. Much of this lost phosphorus eventually returns to surface water.**

Comprehensive Conservation Planning is Needed, and Targeting Enhances Effectiveness and Efficiency

A comprehensive conservation planning process is required to identify the appropriate combinations of enhanced erosion-control practices and nutrient management techniques that will simultaneously address soil erosion and sedimentation as well as nutrient losses. This process will identify the specific soil vulnerability factors that determine the potential for sediment and nutrient losses through the dominant loss pathways.

The edge-of-field reductions in sediment and nutrient loss shown above represent average annual declines in sediment and nutrient loss resulting from conservation practices in use during the period 2003 to 2006, when compared to the no-practice scenario. As a share of potential savings (total tons saved) through full conservation treatment on all cropped acres, these reductions represent about 39 percent of potential reductions in waterborne sediment loss, 55 percent of potential reductions in wind erosion, 60 percent of potential reductions in nitrogen loss, and 58 percent of potential reductions in phosphorus loss. Significant additional per-acre reductions in sediment and nutrient losses could be achieved by focusing on the 8.6 million high- and moderate-treatment-need cropland acres. Use of additional erosion- and nutrient-control practices on acres that have a high or moderate need for additional treatment—acres most prone to runoff or leaching and with low levels of conservation practice use—can reduce most edge-of-field losses by about twice as much or more compared to treatment of acres with a low level of need. Treating the 27 percent of cropped acres that have a low level of need for additional conservation treatment would achieve little additional benefit.