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

Voluntary, Incentives-Based Conservation Approaches Are Achieving Results. Based on use of conservation practices reported in the 2003–06 NRI-CEAP Survey, farmers have reduced waterborne sediment, nutrient, and pesticide losses from farm fields through conservation practice adoption throughout the Texas Gulf 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 37 percent of all cropped acres in the region. Sixty-six percent of cropped acres have structural or tillage and residue management practices, or both. However, only 30 percent of cropped acres meet criteria for no-till, Reduced tillage methods are used less in this region than in other regions studied because cotton, a major crop in the Texas Gulf Basin, requires conventional tillage to control pests. Farmers meet criteria for good nitrogen management on about 22 percent of the cropped acres (an additional 17 percent had no nitrogen applications) and good phosphorus management on 10 percent (an additional 34 percent had no phosphorus applications).

Structural practices for controlling wind erosion, however, are in place on only 3 percent of the cropped acres. The chief conservation concern in the region is control of wind erosion. Water erosion is also a concern in the more humid eastern parts of the basin, and leaching of nutrients to groundwater is a concern in some parts of the basin.

The table below shows reductions in edge-of-field losses of sediment, nitrogen, and phosphorus through application of conservation treatment on cultivated cropland in the Texas Gulf Basin.

### Reductions in edge-of-field losses of sediment and nutrients from cultivated cropland through conservation treatment in place during 2003–06, Texas Gulf Basin

| Sediment | Nitrogen | Phosphorus *
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<thead>
<tr>
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<tbody>
<tr>
<td>Windborne</td>
<td>With runoff</td>
<td>Windborne</td>
</tr>
<tr>
<td>2</td>
<td>52</td>
<td>&lt;1</td>
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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 7.6 million acres—41 percent of the cultivated cropland in the region—have a high level of need for additional conservation treatment, nearly all for reduction of wind erosion. We estimate that use of erosion control practices could cut wind erosion losses on these acres by 45 percent.

- **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 10.3 million acres—56 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. Additional conservation treatment on these lands would provide little additional reduction in sediment and/or nutrient loss. Approximately 500,000 acres—3 percent of the cultivated cropland in the region—have a low level of need for additional conservation treatment.
Comprehensive Conservation Planning is Needed, and Targeting Enhances Effectiveness and Efficiency

The edge-of-field reductions in sediment and nutrient loss shown in the table on the previous page 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 through full conservation treatment on all cropped acres, these reductions represent 55 percent of potential savings in waterborne sediment loss, 50 percent of potential savings in total nitrogen loss, and 51 percent of potential savings in total phosphorus loss, but only 4 percent of potential savings in wind erosion losses (see figure below). The most pervasive conservation concern in the region is excessive rates of wind erosion during dry periods, including windborne losses of nitrogen and phosphorus. Model simulations show that the average annual rate of wind erosion is 8.55 tons per acre for cropped acres in the region—12.38 tons per acre per year for highly erodible land and 6.65 tons per acre for non-highly erodible land. About 54 percent of total phosphorus and 21 percent of total nitrogen lost from fields is with windborne sediment.

Targeting program funding and technical assistance for accelerated treatment of acres with the most critical need for additional treatment is the most efficient way to reduce agricultural sources of contaminants from farm fields in this region. Conservation treatment of the 7.6 million high-treatment need acres would reduce wind erosion by an average of 5.5 tons per acre per year on those acres. In comparison, additional treatment of the 10.3 million acres with a moderate need for treatment would reduce wind erosion by an average of about 3.0 tons per acre per year on those acres. Treatment of the remaining 0.5 million acres would reduce wind erosion by only about 0.5 ton per acre, on average.

Comparison of estimated wind erosion, waterborne sediment, nitrogen, and phosphorus savings (field-level) due to practices in use in the baseline conservation condition and potential savings with additional erosion control and nutrient management treatment of cropped acres, Texas Gulf Basin

The use of conservation practices in this region has reduced sediment, nitrogen, and phosphorus loads delivered from cropland to rivers and streams by 60, 41, and 55 percent, respectively, from conditions that would be expected without conservation practices. Application of additional conservation practices on the high- and moderate-treatment-need acres would further reduce delivery of sediment, nitrogen, and phosphorus loads to rivers and streams by 84, 32, and 63 percent, respectively.