

# Impacts of Conservation Adoption on Cultivated Acres of Cropland in the Chesapeake Bay Region, 2003-06 to 2011

## Key Findings

*The voluntary, incentives-based conservation approach continues to be effective.* Historic levels of conservation implementation are achieving unprecedented results in the Chesapeake Bay region. Farmers, ranchers, and forestland owners voluntarily install or adopt conservation practices on their lands as part of a conservation plan, in partnership with USDA's Natural Resources Conservation Service (NRCS), soil and water conservation districts, state agencies, and private organizations. These voluntary and collaborative investments help support agricultural producers and rural economies, protect wildlife habitat, and improve water quality in the Chesapeake Bay region.

The first national Conservation Effects Assessment Project (CEAP) farmer surveys documented the conservation and production practices in place from 2003-06 and informed the original Chesapeake Bay region CEAP report, the "Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Region" (USDA NRCS 2011). This report demonstrated that during the time period 2003-06, most cropland acres in the Chesapeake Bay region were treated with structural or residue management conservation practices, or both, with the goal of controlling erosion, reducing nutrient losses, and improving soil and water quality. In order to provide more up-to-date information and assess the benefits of more recent conservation investments in the Chesapeake Bay region, NRCS performed a second CEAP survey in the region during the fall of 2011 and covered the conservation and production practices in use from 2009 to 2011.

This new report, "Impacts of Conservation Adoption on Cultivated Acres of Cropland in the Chesapeake Bay Region, 2003-06 to 2011," using the data collected in 2003-06 and 2011, demonstrates that during the time between the two surveys, agricultural producers have significantly increased their use of an array of conservation measures to improve and protect water and soil quality in the Chesapeake Bay region. These conservation practices are generating substantial natural resource benefits for producers and the communities of the Chesapeake Bay region.

These additional conservation measures have resulted in reductions in rill erosion rates by 57 percent and edge-of-field sediment losses by 62 percent since 2006. In addition, the average annual rate of soil carbon loss was reduced by 50 percent. The 2011 survey results indicate that edge-of-field nitrogen losses in surface runoff were reduced by 38 percent, nitrogen losses in subsurface flows were reduced by 12 percent, and phosphorus losses were reduced by 45 percent compared to 2003-06 loss rates. The edge-of-field conservation achievements on the Chesapeake Bay watershed's cropped acres ultimately helped the Chesapeake Bay itself by reducing the total cumulative instream delivery from all sources (urban, rural, point, and non-point). In fact, achievements in agricultural conservation adopted between 2003-06 and 2011 reduced the cumulative instream loads delivered to the Chesapeake Bay by 8 percent for sediment, 6 percent for nitrogen, and 5 percent for phosphorus. These percentage reductions equate to annual reductions of 15.1 million tons of sediment and 48.6 million pounds and 7.1 million pounds of nitrogen and phosphorous, respectively.

Structural practices, including buffers or terraces, play important controlling and trapping functions in the "Avoid, Control, Trap" (ACT) conservation system approach for reducing losses of sediment and nutrients from cropland acres. Structural practices were in use on 52 percent of cropped acres in 2003-06. By 2011, structural practices were adopted on 66 percent of cropped acres, or a 27 percent increase between the survey periods.

Annual practices such as cover crops and conservation tillage serve all three important avoiding, controlling, and trapping functions in the ACT conservation system approach. Conservation tillage adoption on one or more crops in rotation increased from occurring on 74 percent of cropped acres in 2003-06 to 90 percent of cropped acres in 2011. As for cover crop use, farmers substantially expanded their use of this core ACT practice. In the 2003-06 survey, only 5 percent of cropped acres in the Chesapeake Bay region used cover crops every year and 88 percent of cropped acres were never planted to cover crops; in the 2011 survey, however, the number of cropped acres that farmers planted to cover crops every year more than tripled (to 18 percent of cropped acres) and more than half of all cultivated acres in the region (52 percent) had cover crops applied at least one out of every four years.

Livestock and poultry producers have improved their manure management practices in recent years, leading to manure being spread on more acres in the region in 2011 than it was in 2003-06. The number of acres receiving manure increased almost 30 percent (growing from 37 percent to 48 percent of cropped acres receiving manure between the 2003-06 and 2011 surveys). Likewise, as an indicator of enhanced nutrient management, there was nearly a 147 percent increase in soil testing on manured acres prior to applying more manure (increasing from 15 percent to 37 percent of cropped acres between the surveys). There are also indications of a growing manure market in the region. Manured acres applied with purchased, rather than manure produced-on-farm, nearly quadrupled, increasing from 57,000 acres in 2003-06 to 203,000 acres in 2011.

***Progress has been made toward addressing conservation needs, and opportunities exist to increase conservation on cropped acres in the Chesapeake Bay region.*** The conservation efforts of the region's farmers on their own and with support from local, state, and Federal programs, especially focused programs like the Chesapeake Bay Watershed Initiative (CBWI), have generated significant progress in addressing conservation concerns on cropland acres with a high potential benefit for protecting and improving water quality. Acres with high potential benefits are those that could respond well to additional conservation treatments and have the greatest potential for losses of sediment and nutrients. Conservation measures adopted between 2003-06 and 2011 reduced the number of cropped acres with high potential benefits by 80 percent, dropping from the 2003-06 level of 813,000 acres (19 percent of all cropped acres) to 157,000 acres (4 percent of all cropped acres) in 2011. As of 2011, more than half the acres in the region were classified as having low needs for additional conservation treatment. Compared to 2003-06 conditions, the additional conservation practices in place in 2011 increased the number of acres with low conservation needs by almost 32 percent (or increasing from 41 percent of cropped acres in 2003-06 to 54 percent in 2011).

Although significant gains were made in the controlling and trapping components of the ACT conservation system approach, opportunities remain for progress in avoiding nutrient losses through improved nutrient application management. Specifically, avoidance could be better achieved through better incorporation of the 4Rs (the *right* rate, the *right* timing, the *right* method, and the *right* form) into nutrient management plans. Improvement in 4R implementation would be particularly beneficial on acres on which manure application occurs because manure requires different application strategies than do commercial fertilizers.

***Comprehensive conservation planning that incorporates targeting is essential for effectiveness and efficiency.*** Prioritizing one or more conservation goals, identifying acres with the highest potential for conservation gains per conservation dollar investment, and identifying the appropriate suites of treatments for each acre significantly improves the effectiveness of conservation practice implementation and increases the value of the conservation dollar. Suites of practices that comprehensively address all three components of the ACT strategy are required to adequately address soil erosion, nutrient losses in runoff, *and* nitrogen losses through leaching. This study shows that the increased use of additional conservation practices on acres with high potential benefits significantly reduced losses due to runoff. The increased use of cover crops and winter annuals decreased leaching losses. Additional gains will depend on continued use of current practices and continuing improvement in the application rate, timing, method, *and* form of nutrients.