

Croplands—Conservation Effects Assessment Project (CEAP)



Who We Are

Our team based in Temple, TX is comprised of experts from the USDA Natural Resources Conservation Service (NRCS) Resources Assessment Division (RAD) Modeling Team, Texas A&M AgriLife Research, and the USDA Agricultural Research Service who provide modeling support to the National Resource Inventory, Soil and Water Conservation Act, and the Conservation Effects Assessment Project (CEAP).



Conservation Effects Assessment Project (CEAP –1)

Launched in 2003, CEAP is a multi-agency effort to organize and quantify national data on conservation practices and programs. CEAP-Croplands provides unprecedented insights into impacts of agricultural conservation practices and farm management, including impacts on water quantity and quality, crop yields, and soil health. CEAP guides conservation tool development, programs, and priorities from national to field scales.

These analyses include agricultural conservation funded by investments from federal, state, and local governments; NGOs; the private sector; and uniquely, the essential, voluntary contributions of American farmers. Roughly 19,000



CEAP-1 reports currently inform on-the-ground conservation planning, practice, program allocations, Congressional funding, and NRCS leadership decisions.

\$14.8 Billion dollars is invested in agricultural conservation every year

Annually voluntary conservation practice saves:

- ♦ 278 million tons of waterborne edge-of-field sediment losses;
- ♦ 4.2 billion pounds of Total Nitrogen losses;
- ♦ 722 million pounds of Total Phosphorus; and
- ♦ 309 million tons of wind erosion losses

94% of U.S. cultivated cropland has some form of conservation
48% would provide further benefits with additional conservation

Less than 25% of cropland acres are responsible for 73% of the sediment losses, 50% of the total nitrogen losses, and 62% of the total phosphorus losses.

CEAP–2 Underway

CEAP-2 national farmer surveys were completed in February 2017. CEAP-2 analyses are currently underway; release dates for products are anticipated to begin in Fall/Winter 2018/19 and continue regularly through 2022, at which time preparations for CEAP-3 will potentially begin. In the interim between CEAP-1 and -2, specific regions of the country have been resampled to obtain critical information in those areas. These "Special Studies" are often a result of initiatives directed from Congress or the President and include locations like the Chesapeake Bay Watershed, Western Lake Erie Basin, Sacramento Bay Delta, and other critical watersheds.

Variable Rate Technologies: a SMART – R Approach to Nutrient Management



Source

Nutrient source selection impacts nutrient availability to crops and vulnerability to losses. Sources rich in dissolved or plant available nutrients are also prone to leaching losses, while sources with lower plant available nutrients are more susceptible to water or wind erosion. The environmental concerns associated with nutrient loss need to be balanced with economic considerations of source selection, which include access to application implements and local availability of biosolids, manures, and commercial sources, etc. Nutrient source selection impacts nutrient application rate and method.



Method

On most cropland, nutrient application methods should include low-disturbance incorporation. Knifing, injection, and other emerging methods of low-disturbance incorporation get the nutrients into the rootzone, where the soil protects them from loss via wind and rain. With incorporation methods, farmers can apply just enough nutrients to meet their crop needs and be assured that the crop can access the nutrients. Keeping nutrients in the soil profile where plants can use them saves the farmer money, optimizes plant growth, and protects our nation's water quality.



Area

Considering application area takes a traditional 4Rs approach to nutrient management to the next step to maximize conservation benefits. GPS-based soil testing, soil mapping, and yield mapping help farmers better understand and manage variability in soils across their fields. With Variable Rate Technologies (VRT), farmers can adhere to the 4Rs on a soil-by-soil basis. By applying the right nutrients in the right amounts, with the right methods and right timing to feed the crops and accommodate individual soil needs, farmers save time and money, build soil health, and keep nutrients out of our waters.



Rate

Appropriate nutrient application rates are based on soil-testing, yield goals, crop rotations, cover crops, tillage intensity and application frequency. Application rates are often targeted as the solution to water quality goals, but appropriate rates are part of a comprehensive conservation plan. On high yielding soils cutting rates can lead to lower yields, increased soil exposure, decreased profits, and increased nutrient losses. On low-yielding soils application rates should be reduced to supply nutrients for realistic yields. In low-tillage or high residue systems insufficient application rates can lead to unhealthy soils.



Timing

Appropriate nutrient application timing is critical for managing nutrient losses to the environment and maximizing nutrient availability to crops. Weather patterns, soil nutrient tests, winter freezing, nutrient source, application method, and use of other conservation practices (e.g. cover crops) influence appropriate application timing for maximum nutrient use efficiency. Nitrogen and phosphorus timing events are often managed separately, though they should be coordinated to save farmers time and money in man-hours spent and diesel used applying nutrients.