FEATURE

Nitrogen Trading Tool to facilitate water quality credit trading

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Markets for water quality and other ecosystem services are rapidly emerging across the country. One of the basic requirements that link buyers and sellers of ecosystem services is an agreed upon unit of trade and a way to measure it. The new Nitrogen Trading Tool (NTT) prototype provides a reliable, easy-to-use method of calculating nitrogen credits for water quality.

The USDA Natural Resources Conservation Service (NRCS) developed the NTT in close cooperation with the USDA Agricultural Research Service's Soil Plant Nutrient Research Unit and the US Environmental Protection Agency (USEPA), with input from states, land grant universities, environmental brokers, and NRCS Conservation Innovation Grant recipients.

In addition, regulators that oversee and certify point to nonpoint water quality trades have helped to guide the content of the NTT output reports. Thus, the USEPA knows how the nitrogen credits are calculated and is cognizant of the conservation measures that generate the credits.

Quantifying the loss mechanisms of nutrients such as nitrogen is difficult (Delgado 2002). The NTT couples the scientifically rigorous Nitrogen Loss and Environmental Assessment Package (NLEAP) model (Shaffer and Delgado 2001; Shaffer et al. 2008) with a user-friendly, Web-based interface to allow the producer to easily calculate nitrogen savings from varying agricultural practices and approaches. These credits may then be bought or sold in emerging water quality markets across the country.

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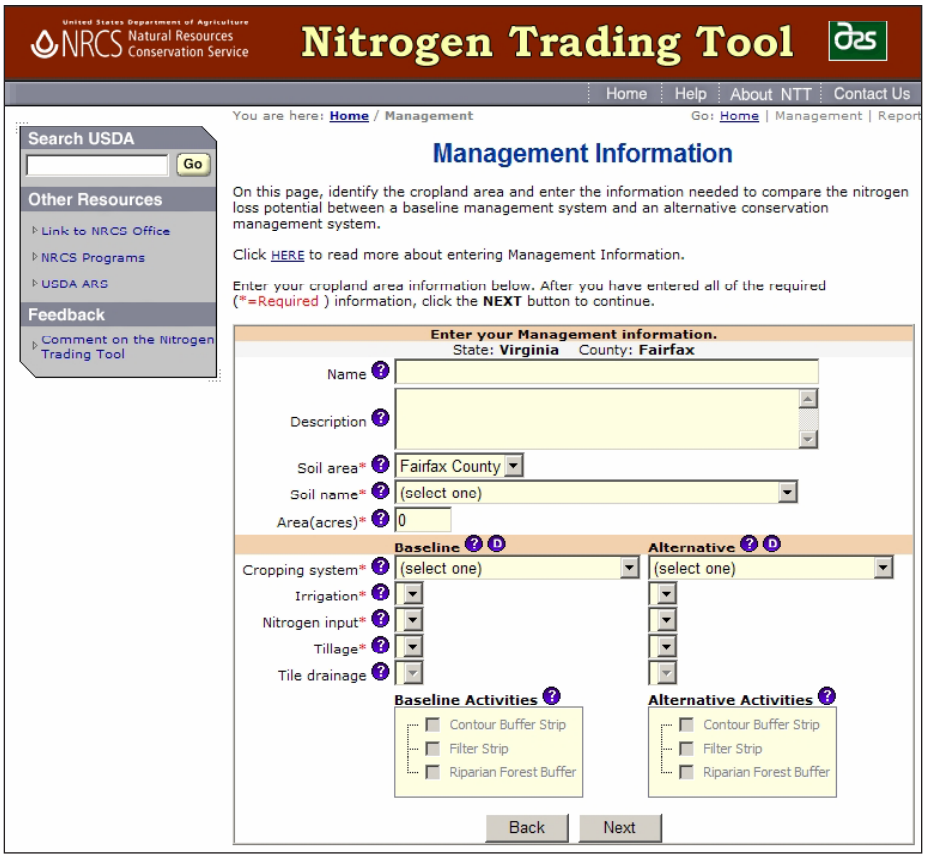


Web-based Nitrogen Trading Tool user interface.

The NTT provides easy-to-follow requests for information from the user. The tool delivers a comprehensive output report displaying nitrogen constituent changes from the baseline scenario to an alternative future management scenario.

If there is a net savings of nitrogen, it may be available for "sale" or for "banking" in water quality markets. The development of water quality trading measurement tools such as this provides the first step to linking buyers and sellers.

To calculate changes in nitrogen, NLEAP simulations are run on a daily basis for 24 continuous years (Delgado et al. 2007). The first 12 years of the simulations are used to stabilize the system, and the last 12 years are used for analyzing the effects of different management scenarios.

The nitrogen differences that occur through processes such as volatilization, leaching, runoff, and atmospheric emission are presented both for the baseline and alternative scenarios. A positive difference between the base and alternative scenarios represents nitrogen not delivered to the environment by adopting the alternative management practice(s). This difference may be translated into nitrogen credits and could potentially be traded in the water quality market. The actual units of tradable credits from this reduction will depend upon the local rules and regulations and trading ratios adopted by the particular trading program.

In addition to the biologically active nitrogen associated with water quality (sum of nitrogen leached, volatilized, and lost to runoff), the NTT also displays the savings in the nitrogen emitted in the form of N_2O that can be traded in the air quality market. According to the USEPA (2002), one unit of N_2O is equivalent to approximately 310 units of CO_2.

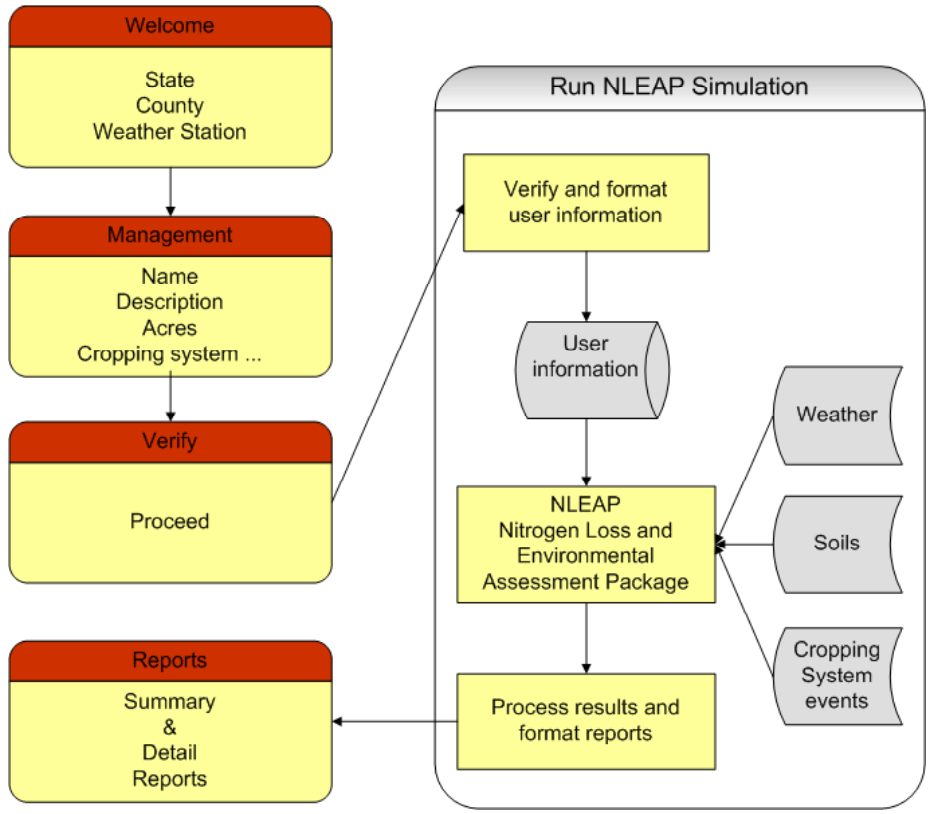
The NTT is currently being implemented only for nitrogen; however, the generic design structure lends itself for adaptation to other pollutants such as phosphorus or sediment.

There is currently no alternative tool with this level of rigor that allows a producer to calculate nitrogen credits as a function of implementing conservation measures at the field scale. Tools that are in use today are crude and often viewed as preliminary until a USEPA–recognized tool like the NTT comes along.

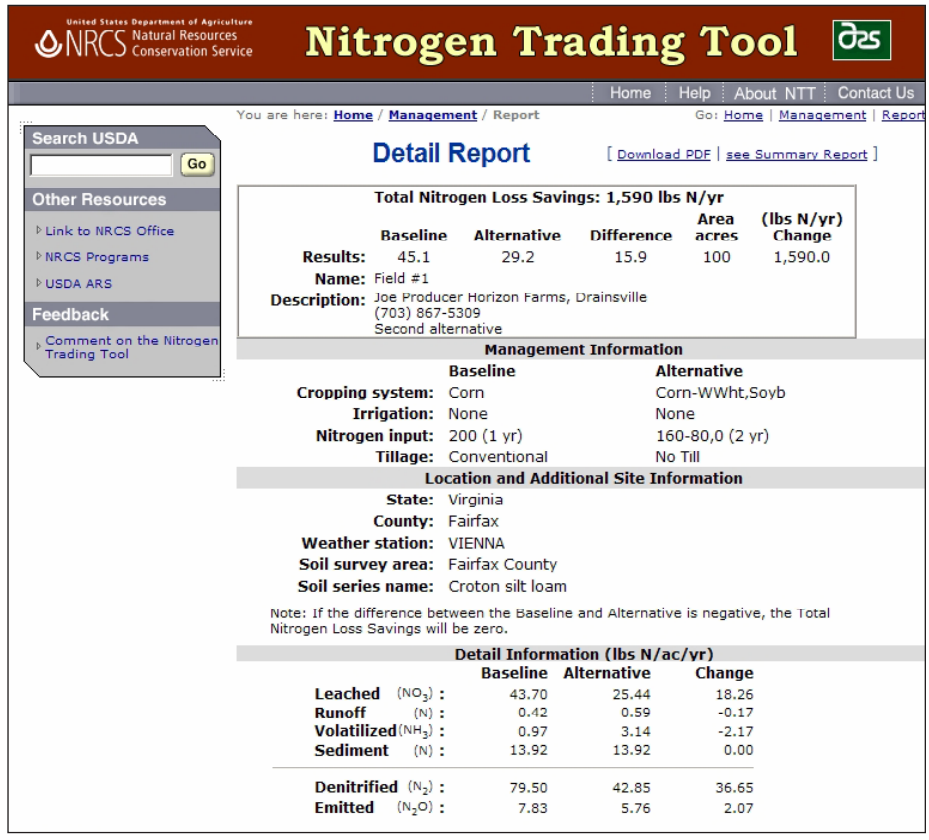
Environmental aggregators, brokers, and water quality traders have all responded positively to the NTT. Now that the prototype is complete, it is being widely vetted, shared, and used as the basis for a collaborative production tool.

In addition to the fully functional prototype, NRCS has developed a map-driven geographical user interface that will fully integrate the NTT with the NRCS Web Soil Survey, the national database for all soil resources.

Market-based initiatives are currently playing a prominent role in improving water quality. The new NTT places NRCS at the forefront of conservation by invoking innovative solutions to achieve cleaner rivers and streams through market instruments. The tool is a concrete example of the NRCS strategic plan's overarching strategy to employ market-based approaches to agriculture. This type of nitrogen calculator will help reduce nitrogen delivery to the environment. Using the NTT for water quality trading also creates the potential to infuse new dollars into conservation.



The Nitrogen Trading Tool couples the scientifically rigorous Nitrogen Loss and Environmental Assessment Package (NLEAP) model with a user-friendly Web interface to allow the producer to easily calculate nitrogen credits.



Nitrogen Trading Tool report showing nitrogen values to facilitate water quality credit trading.

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