CONSERVATION INNOVATION GRANTS
Updated Progress Report

Grantee Name: World Resources Institute	
Project Title: A Multistate Water Quality Trading Platform for the Chesapeake Bay	
Agreement Number: 69-3A75-10-144	
Project Director: Mindy Selman	
Contact Information: World Resources Institute 10 G St. NE Suite 800 Washington, DC 20002	**Phone Number:** 202-729-7644 **E-Mail:** mselman@wri.org
Period Covered by Report: September 16, 2010 to January 16, 2014	
Project End Date: January 16, 2013 (includes extension requested 7/11/13)	

A) Purpose of Grant

The purpose of this project was to build a multistate online platform for water quality trading in the Chesapeake Bay that standardizes market infrastructure, standardizes calculation tools for nutrients, incorporates calculations for carbon and sediment co-benefits that result from BMP implementation, and includes a farm profit calculator. Through this grant we completed a multistate credit registry and marketplace (the Chesapeake Bay Nutrient Registry) and a multistate agricultural credit estimation tool (the Chesapeake Bay Nutrient Trading Tool). These tools promote consistency among the state water quality trading programs by harmonizing critical infrastructure components within the existing state trading platforms. By harmonizing the credit calculation tools, marketplace and registry, states will be able to consistently define a unit of trade (credit), and consistently track and trade these credits throughout the watershed. A single platform also allows for easier updating of state programs as revisions are made to the list of approved BMPs, the Chesapeake Bay Watershed Model efficiencies, boundaries of watershed segments, delivery factors, land use, and soil data which impact elements of the trading program. A single multistate trading platform can also help facilitate interstate trades and can serve as a model for large-scale basin-wide trading programs in other parts of the country.

The multistate water quality trading platform developed under this grant includes Maryland, West Virginia, Pennsylvania, Virginia, and Delaware. The platform was based off of the integrated NutrientNet/NTT platform that WRI and the Texas Institute for Applied Environmental Research (TIAER) previously developed for Maryland.

B) Deliverables

- Chesapeake Bay Nutrient Trading Tool
- Chesapeake Bay Nutrient Registry
- Chesapeake Bay Farm Profit Calculator
- Chesapeake Bay Nutrient Trading Tool User's Guide
- User outreach sessions

C) Summary of work performed

The project team has completed and delivered the Chesapeake Bay Nutrient Tracking Tool (CBNTT), the Chesapeake Bay Nutrient Registry, the Chesapeake Bay Farm Profit Calculator, state outreach sessions, and help documents and related documentation. The following describes work completed under each of the tasks.

Task 1: Conduct stakeholder meetings and gather requirements

WRI held a series of stakeholder meetings during the initial stages of the project to address shared expectations and requirements. Throughout the project WRI was engaged with partners to discuss tool development and refine requirements. WRI engaged with state partners to discuss how emerging regulations would impact the tool as well. WRI became an official member of Virginia's Regulatory Advisory Panel, a stakeholder group charged with reviewing and providing feedback on new nutrient trading regulations. WRI is also a part of Maryland Nutrient Trading Advisory Committee which allowed us to stay abreast of recent developments.

Task 2: Collect data and develop the multistate trading platform

Task 2.1: Collect and process data

WRI worked with Olivia Devereux to help collect and process the following data for use in the tool:

- Chesapeake Bay watershed model (CBWM) segments
- 8-digit watershed boundaries/names
- 12-digit watershed boundaries/names
- TMDL watersheds for Maryland
- TMDL watersheds for Virginia
- Weather data for all counties
- CBWM BMP efficiencies
- WIP allocation values by major basin for crop/pasture/hay as derived from the CBWM
- Landuse conversion factors from the CBWM
- Typical manure values for all typically confined and pastured animals in the region (including N and P ratios, moisture content, excretion rates, etc.)
- Soil P test labs and conversion equations
- Delivery ratios by segment from the CBWM

Tasks 2.2, 2.3 & 2.4: Develop the multistate trading tool (interactive map, field calculations & animal confinement calculations)

The multistate trading tool includes an interactive map, a farm-level summary, and the ability to address individual crop, hay, pasture and animal confinement areas within the farm. The application was developed using Ruby Rails and is hosted by TIAER at the web

address www.cbntt.org. The application features secure login, a user's guide, password recovery, and the ability to save multiple projects.

WRI worked with Missouri CARES to develop an online map which includes the entire Chesapeake Bay watershed boundary. The map returns the CBWM watershed segment, the 8-digit HUC, the 12-digit HUC, the TMDL watershed name (if any), area, and soils data from the SSURGO soils database. The map uses a Google API and embedded drawing tools to outline the parcel and associated fields. User is able to zoom in by address, county or zip code. Map views include street map, satellite, topographic, or a combined street/satellite view.

Once the farm and individual fields are delineated, the user is able to enter data for each field individually. Crop, pasture and hay fields are all calculated using NTT. The user interface gathers crop management information from the users and creates an .xml file "on the fly" which is sent to the NTT/APEX model for processing. The results are returned to the application where BMP efficiencies and adjustment factors are applied ex-post in order to determine the average

For animal confinement fields, the user describes the number and type of animals confined. From this information the tool calculates the total amount of N and P that is available for runoff. The user can select from approved BMPs which will reduce the N and P runoff.

For each field, the user is able to define a "current" scenario and a "future" scenario. The tool checks to see if the current scenario meets the trading baseline for the applicable state (baseline requirements change with the state). If the farm does meet baseline, then any reductions generated from the difference between the current and future scenarios can potentially generate credits. If current scenario does not meet baseline, then reductions from future scenario are still calculated, but no credits are estimated.

Please see the Chesapeake Bay Nutrient Trading Tool User's Guide for full details on the functionality of the tool.

Tasks 2.5 and 2.6 (Develop Marketplace & Develop Registry)

As a result of stakeholder input, it was decided to separate the platforms for credit calculation and the registry/marketplace. The credit calculation tool was seen as having a broader level of stakeholder interest, whereas the registry and market-place were solely for the purpose of administration and transaction of credits.

The registry resides at the web address registry.cbntt.org and is hosted by TIAER. The registry includes several "roles" including super administrator (who can see all projects and all states), state administrator (who can see all projects for a single state), user (who

can see only their projects), and verifier (who only has the ability to submit verification reports). There is also a public view of the registry where any user can view approved projects, trades, credits and notices of use.

Projects can be submitted to the registry by registered users or state administrators can create projects themselves. Once projects and associated documentation are reviewed they can be approved by the administrator (or rejected).

Once a project is approved the administrator can issue credits to the project. Credits can be issued multiple times to a project. Credit quantities can also be revised if necessary. If a project status changes from approved to "suspended" or "cancelled" then credits will also change status accordingly. Credits can be issued as term (annual) or permanent. Term credits expire one year from issuance.

Verification notices can be generated by verification users or by administrators. The verification report is attached to a project and is used to recommend a project status change, if any. The administrator must approve the verification report and change the status of the project if necessary.

Trades can be initiated by a user holding credits or by the administrator. The trade is submitted to the administrator for approval. If approved, credits are transferred from the seller account to the buyer account. Any trade ratios can be taken at time of trade (or alternately in case of Maryland, taken at time of credit issuance).

Once a user that holds credits decides to use those credits towards a permit, they must create a "notice of use" record indicating the credits that are to be retired as well as the permit to which they are being applied. All credits associated with a notice of use will be marked as retired.

The Marketplace is a posting board where registered users can post a notice for credits for sale. Alternately a user map post a notice for credits needed. The posts include contact information for parties to contact each other offline. Users may edit or delete their posts as needed. The marketplace can be viewed by the public. But only registered users can post.

Task 2.7: Integrate farm profit calculator

WRI's excel-based farm profit calculator was updated with state-specific costs for all agricultural BMPs. The Farm Profit Calculator allows users to enter the units of each BMP (e.g. acres, feet, etc.) that were used to 1) meet baseline and 2) generate credits. The Farm Profit calculator then calculates annual costs (including installation, maintenance and inflation) to meet baseline and to generate credits. The user enters the number of credits estimated by the calculation tool, and the farm profit calculator will also estimate the per credit cost of generating credits. The Farm Profit Calculator is linked to the Chesapeake Bay Nutrient Trading Tool.

Task 3. Test and calibrate

To calibrate between NTT and the Chesapeake Bay Watershed Model (CBWM) WRI collaborated with the Chesapeake Bay Program modeling team and TIAER (the developers of NTT) to create a methodology for reconciling the two models. The decision was made to calibrate NTT for all of the intrinsic BMPs that are estimated as part of the NTT modeling process. These include nutrient management, conservation tillage, no till, and cover crops. TIAER ran simulations of these BMPs over agricultural soils in the Chesapeake Bay. The results were weighted according to soil dominance and compared to the CBWM efficiencies for those BMPs. TIAER made adjustments to various NTT model parameters where necessary to create parallel responses for these BMPs. Next, the modeling team ran several NTT farm scenarios over all agricultural soils in the Chesapeake Bay watershed and weighted the results into major basins. The NTT scenario results were compared to similar farm scenario runs in the CBWM (e.g. pasture, hay, crop). For each state-basin we created an adjustment factor to be used in the calculation tool that will better align the NTT edge-of-field results to the CBWM edge-of-stream results. The adjustment factor accounts for differences between the models as well as difference between the scale of the results. Results were documented by TIAER and shared with the Chesapeake Bay Watershed Modeling team and EPa Region III.

WRI led the testing efforts for the CBNTT tool. Testing was done for each major component as it was developed. TIAER also helped with initial testing. Once the tool was in “alpha” stage, testing was enlarged to include some of the “power users” including Craig McSparren at MDA, Peter Hughes of Red Barn consulting, and Robert Ensor of Howard County Soil and Water Conservation District. Bugs or usability issues that resulted from testing were logged and addressed before release of the beta version.

Task 4. Conduct rollout and outreach

WRI held initial meetings with tool users from Maryland to discuss upcoming changes and functionality additions. Once we had the Alpha version of CBNTT, WRI conducted initial outreach to the state partners via webinar. WRI demonstrated the tool to Virginia, Maryland and Pennsylvania and elicited initial comments and feedback that were used to finalize the tool. Due to some set-backs which led to delay of the development of the tool, we did not have as much time to do rollout and outreach after the Beta version of the tool was finalized. Beta version was finalized more or less at the end of the grant period. For the most part, rollout and outreach for the Beta version of the tool is being conducted as part of a follow-on CIG grant through the Chesapeake Bay Foundation. To date we have done additional outreach to the states to show them the completed product. We’ve also worked with the Chesapeake Bay Foundation and MDA to set up farmer outreach sessions in Virginia, Pennsylvania and Maryland. All sessions have been very successful and we’ve gotten positive feedback on the tool. We will continue to do

outreach and support of the CBNTT and the registry over the course of the next CIG grant.

Initial outreach to Maryland users:

03/16/11 Owings Mills, MD
02/22/12 Boonsboro, MD
01/09/13 Owings Mills, MD
01/14/13 Frederick, MD
01/17/13 Chestertown, MD
06/12/13 Upper Marlboro, MD
07/01/13 Annapolis, MD
07/18/13 Annapolis, MD
08/28/13 Leonardtown, MD

Webinars to state partners to demonstrate Alpha version of the tool:

10/18/13 Webinar with MDA
10/25/13 Webinar with VADEQ
1/2/14 Webinar with PADEP

Results/Accomplishments/Lessons Learned/Issues

WRI successfully completed a multistate tool for calculating agricultural credits that combines the WRI NutrientNet platform and USDA's NTT tool. This tool is useful not only for trading, but also for other state-level programs such as the Certainty program being piloted by Maryland. Through this process we worked with states and the Chesapeake Bay Program staff to create a tool that is transparent and has state buy-in. We have been careful to work with the modeling team at the Chesapeake Bay Program office to ensure that there is congruity between the CBWM and the results of our field-scale tool.

In addition, our registry creates an opportunity for the states to more comprehensively track projects, credits, trades in their own states, and also creates fewer opportunities for fraud or double-counting by creating a single registry instead of distributed state registries.

Finally, our Farm Profit Calculator is a fun and quick tool that producers can use to easily estimate their costs of installing BMPs and relate those costs to the credit price.

It is likely that our calculation tool and registry will be used for Pennsylvania, Maryland and Virginia water quality trading programs which will ensure that credits are estimated in such a way as to make them fungible between states. In addition, Delaware, West Virginia and New York have the ability to use this tool for any trading or certification programs they may wish to explore in the future.

We accomplished all the tasks set out in the original scope of the project. However, we did not have ample time at the end of the project to do adequate rollout and outreach to the state partners and agricultural users. This was due to early delays on the project caused by state programs being in flux and inability to nail down requirements. After development was underway we suffered another setback when our developer quit and we needed to find a new developer with only 9 months remaining on the project. We extended the project by another 3 months and were able to tie up all the loose ends by the new project end date of January 16, 2014. However, it would have been nice to have additional time for rollout. Nevertheless, outreach and rollout is occurring under a different grant and the tool and registry have gotten good reviews from both the state partners and the agricultural users.

As for lessons learned…through this process we've learned that engaging stakeholders early and often is key getting buy-in to the tool. While we were good about engaging the state partners we were not as diligent about engaging the CBWM modeling team up front. This caused some issues later on. However, we began to hold regular meetings with this group in the past year and I believe we were able to secure their support of our tool and methods.

EQIP and CIG grant provisions

There have been no direct or indirect payments for structural vegetative or management practices through this grant.

Budget

See financial documents attached.