CHESAPEAKE BAY BACKGROUND

- Maryland, Pennsylvania, and Virginia have point to nonpoint source nutrient trading policies
- Estimating nonpoint source credits can be challenging
- Variations in how these programs estimate nonpoint credits create inconsistencies in credit definitions across the watershed
PURPOSE OF THE CHESAPEAKE BAY NUTRIENT TRADING TOOL (CBNNT)

• To estimate on-farm nutrient and sediment loads, trading eligibility, and credit generation

• To create consistency and transparency in credit estimation across the Chesapeake Bay watershed
CBNTT FEATURES

- Multistate platform to create common currency for all credits
- Interactive map
- Site-specific edge-of-field nutrient, sediment, and carbon estimates using:
  - SURGO soils and slopes
  - 50 years of weather data
  - Calculations powered by APEX model
- Watershed-specific delivery factors
- Chesapeake Bay Program BMP effectiveness estimates
- State-specific policy information to determine trading eligibility
- Future scenario runs
- Credit generation estimates
Chesapeake Bay Nutrient Trading

Agricultural Project Worksheets

Username
Password
Remember me
Sign in

Sign up
Forgot your password?
Didn’t receive unlock instructions?
CBNTT OVERVIEW

CBNTT Calculations

= NTT

= NutrientNet Operations

= Chesapeake Bay Watershed Model

Chesapeake Bay Watershed Model

Trading Eligibility

Current Load (EOS)

TMDL Baseline (EOS)

Spatial Info

Management Info

NTT

NTT Output (Edge of Farm)

Structural BMPs

EOS Delivery
Spatial Info Inputs

- Farm and field locations using interactive map
Spatial Info Outputs

- Farm and field area
- Soil
- Slope
- Climate
- Watershed
- Chesapeake Bay Watershed Model land-river segment
Spatial Info Outputs

- Farm and field area
- Soil
- Slope
- Climate
- Watershed
- Chesapeake Bay Watershed Model land-river segment
**CBNTT OVERVIEW**

**CBNTT Calculations**

- **NTT**
- **NutrientNet Operations**
- **Chesapeake Bay Watershed Model**

**Chesapeake Bay Watershed Model**

- **Current Load (EOS)**
- **TMDL Baseline (EOS)**

**Trading Eligibility**

- **Spatial Info**
- **Management Info**

**NTT Output (Edge of Farm)**

- **Structural BMPs**
- **EOS Delivery**

**CBNTT Calculations**

\[ \text{CBNTT} = \text{NTT} = \text{NutrientNet Operations} = \text{Chesapeake Bay Watershed Model} \]
### Management Info Inputs

- Crop rotation
- Planting and harvesting information
- Fertilizer and manure applications
- Tillage operations
- Cover crops
- Grazing operations
CBNTT OVERVIEW

CBNTT Calculations

Chesapeake Bay Watershed Model

Trading Eligibility

TMDL Baseline (EOS)

Current Load (EOS)

NTT = NutrientNet Operations = Chesapeake Bay Watershed Model

Spatial Info Management Info

Spatial Info

Current Load (EOS)

TMDL Baseline (EOS)

NTT Output (Edge of Farm)

Structural BMPs

EOS Delivery

NTT = Chesapeake Bay Operations

Bay Watershed Model

= Chesapeake Bay Watershed Model

= NutrientNet

CBNTT OVERVIEW

WATER RESOURCES INSTITUTE
### Nutrient Tracking Tool
Output at Edge of Field

- Loading rates for:
  - Nitrogen
  - Phosphorus
  - Sediment

- Flow
- Carbon
- Crop Yield

#### NTT RESULTS SUMMARY

Below are the results from the NTT model run. NTT models the N, P and Sediment leaching at the edge of the field based on field management, soils data and historic weather. The results represent nutrient losses at the edge of the field and prior to any structural BMPs (i.e. any BMPs in the “current BMPs” tab) being applied.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N (before BMPs applied)</td>
<td>8.47 lbs/ac</td>
</tr>
<tr>
<td>Sediment (Organic N)</td>
<td>2.52 lbs/ac</td>
</tr>
<tr>
<td>Soluble N (NO₃)</td>
<td>5.94 lbs/ac</td>
</tr>
<tr>
<td>Tile Drained N</td>
<td>0.00 lbs/ac</td>
</tr>
<tr>
<td>Total P (before BMPs applied)</td>
<td>0.35 lbs/ac</td>
</tr>
<tr>
<td>Sediment (Organic P)</td>
<td>0.17 lbs/ac</td>
</tr>
<tr>
<td>Soluble P</td>
<td>0.18 lbs/ac</td>
</tr>
<tr>
<td>Tile Drained P</td>
<td>0.00 lbs/ac</td>
</tr>
<tr>
<td>Flow</td>
<td>13.53 in</td>
</tr>
<tr>
<td>Sediment</td>
<td>526.71 lbs/ac</td>
</tr>
<tr>
<td>Carbon</td>
<td>48.40 lbs/ac</td>
</tr>
<tr>
<td>Crop Yield</td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>143 bu/ac</td>
</tr>
<tr>
<td>Soybeans</td>
<td>50 bu/ac</td>
</tr>
</tbody>
</table>
CBNTT OVERVIEW

CBNTT Calculations

- NTT
- NutrientNet Operations
- Chesapeake Bay Watershed Model

Chesapeake Bay Watershed Model

Trading Eligibility

Current Load (EOS) ↔ TMDL Baseline (EOS)

NTT Output (Edge of Farm)

Structural BMPs

EOS Delivery
Structural BMP Input

- Buffers
- Wetlands
- Fertilizer setbacks
- Land use conversion
- Water control structures
- Streambank restoration
- Conservation plans
- Decision/precision agriculture
- P sorbing materials
- Streambank fencing
- Offstream watering
- Prescribed grazing
CBNTT OVERVIEW

CBNTT Calculations

- **Spatial Info**
- **Management Info**

**Chesapeake Bay Watershed Model**

- **NTT**
- **NutrientNet Operations**
- **Chesapeake Bay Watershed Model**

**Trading Eligibility**

- **Current Load (EOS)**
- **TMDL Baseline (EOS)**

**NOTES**

- **CBNTT Calculations**
- **Spatial Info**
- **Management Info**

**WORLD RESOURCES INSTITUTE**
**Edge-of-Stream Output & Trading Eligibility**

CBNTT estimates edge-of-stream loads for:
- Nitrogen
- Phosphorus
- Sediment

**NTT RESULTS SUMMARY**
Below are the results from the NTT model run. NTT models the N, P and Sediment material balances on a field basis. NTT uses field management, soils and weather data and historic weather. The results represent nutrient losses at the edge of the field and prior to any structural BMPs (i.e., the "current BMPs" tab) being applied.

<table>
<thead>
<tr>
<th>Material</th>
<th>Current Load (BMPs applied)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td>8.47 lbs/ac</td>
</tr>
<tr>
<td>Sediment</td>
<td>2.52 lbs/ac</td>
</tr>
<tr>
<td>Soluble N</td>
<td>5.94 lbs/ac</td>
</tr>
<tr>
<td>Tile Drained N</td>
<td>0.00 lbs/ac</td>
</tr>
<tr>
<td>Total P</td>
<td>0.35 lbs/ac</td>
</tr>
<tr>
<td>Sediment</td>
<td>0.17 lbs/ac</td>
</tr>
<tr>
<td>Soluble P</td>
<td>0.18 lbs/ac</td>
</tr>
</tbody>
</table>

Actual field loads are compared to baseline loads to determine trading eligibility.
ESTIMATING CREDITS IN FUTURE SCENARIO

• If farm meets baseline, user can enter an alternate scenario

• Follow same data input steps as for current scenario

• Shortcuts available to cut entry time

• Planned management might include additional BMPs, alternate management, or alternate crops

• Credits are calculated as difference between current and planned
**Future Scenario Results**

CBNTT estimates future scenario edge-of-stream loads for:

- Nitrogen
- Phosphorus
- Sediment

Future loads are compared to current loads to determine creditable reductions to the Bay.
## FARM SUMMARY

### N LOAD INFORMATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm meets N baseline:</td>
<td>Yes</td>
</tr>
<tr>
<td>Baseline N load fields (EOS):</td>
<td>1,213.39 lbs/yr</td>
</tr>
<tr>
<td>Current N load fields (EOS):</td>
<td>392.63 lbs/yr</td>
</tr>
<tr>
<td>Future N load fields (EOS):</td>
<td>364.64 lbs/yr</td>
</tr>
<tr>
<td>Current N load for Animal HQ (EOS):</td>
<td>35.62 lbs/yr</td>
</tr>
</tbody>
</table>

**Future N load for animal HQ (EOS):** 35.62 lbs/yr
**Delivery Ratio:** 1.0
**Total Reductions (EOS):** 27.98 lbs/yr
**Eligible reductions:** 27.98 lbs/yr

**Credits:** 28

### P LOAD INFORMATION (EOS)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm meets P baseline:</td>
<td>Yes</td>
</tr>
<tr>
<td>Baseline P load fields (EOS):</td>
<td>99.28 lbs/yr</td>
</tr>
<tr>
<td>Current P load fields (EOS):</td>
<td>34.01 lbs/yr</td>
</tr>
<tr>
<td>Future P load fields (EOS):</td>
<td>27.87 lbs/yr</td>
</tr>
<tr>
<td>Current P load for Animal HQ (EOS):</td>
<td>4.69 lbs/yr</td>
</tr>
</tbody>
</table>

**Future P load for animal HQ:** 4.69 lbs/yr
**Delivery Ratio:** 1.0
**Total Reductions (EOS):** 6.14 lbs/yr
**Eligible reductions:** 6.14 lbs/yr

**Credits:** 6

### SEDIMENT LOAD INFORMATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm meets sediment baseline:</td>
<td>Yes</td>
</tr>
<tr>
<td>Baseline sediment load fields (EOS):</td>
<td>12,458.08 lbs/yr (6.23 t/yr)</td>
</tr>
<tr>
<td>Current sediment load fields (EOS):</td>
<td>2,505.87 lbs/yr (1.25 t/yr)</td>
</tr>
<tr>
<td>Future sediment load fields (EOS):</td>
<td>1,940.93 lbs/yr (0.97 t/yr)</td>
</tr>
<tr>
<td>Current load for Animal HQ (EOS):</td>
<td>39.42 lbs/yr (0.02 t/yr)</td>
</tr>
</tbody>
</table>

**Future sediment load for animal HQ (EOS):** 39.42 lbs/yr (0.02 t/yr)
**Delivery Ratio:** 1.0
**Total Reductions (EOS):** 564.94 lbs/yr (0.28 t/yr)
**Eligible reductions:** 564.94 lbs/yr (0.28 t/yr)

**Credits (delivered lbs):** 565
ADDITIONAL CBNTT COMPONENTS

• Multistate, publically accessible credit registry
• Multistate trading marketplace
• Cost tool
FUTURE PLANS

• Release new version this fall
  – Recalibrated to EPA Chesapeake Bay Watershed Model
  – Finer resolution slope and weather data
  – Capability to import shapefiles

• Update tool as program policies change

• Develop comparable tool for Maryland’s urban development offset market
THANK YOU!

Sara Walker
Associate, Water Program
swalker@wri.org
202-729-7824

WRI.org

Image: Chesapeake Bay Program