DTAP
Delaware Targeting And Planning Tool

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Watershed Assessment and Management Section
DTAP History

ATTAINS Assessments
- Unassessed
- Good
- Polluted

Total Nitrogen Percent Load Reductions as Required by Total Maximum Daily Loads:
- Not listed
- 0%
- 5%
- 10%
- 15%
- 20%
- 25%
- 30%
- 35%
- 40%
- 45%
- 50%
- 55%
- 60%
- 65%
- 70%
- 75%
- 80%
- 85%
- 90%
- Variable by Location (0-90%)

Total Phosphorous Percent Load Reductions as Required by Total Maximum Daily Loads:
- Not listed
- 0%
- 19%
- 23%
- 27%
- 30%
- 34%
- 38%
- 42%
- 46%
- 50%
- 54%
- 58%
- 62%
- 66%
- 70%
- Variable by Location (0-90%)

Enterococcus Bacteria Percent Reductions as Required by Total Maximum Daily Loads:
- Not listed
- 0%
- 4% Fresh, 1% Marine
- 8% Fresh, 6% Marine
- 12% Fresh, 17% Marine
- 16% Fresh, 21% Marine
- 20% Fresh, 25% Marine
- 24% Fresh, 30% Marine
- 28% Fresh, 35% Marine
- 32% Fresh, 40% Marine
- 36% Fresh, 45% Marine
- 40% Fresh, 50% Marine
- 44% Fresh, 55% Marine
- 48% Fresh, 60% Marine
- 52% Fresh, 65% Marine
- 56% Fresh, 70% Marine
- 60% Fresh, 75% Marine
- 64% Fresh, 80% Marine
- 68% Fresh, 85% Marine
- 72% Fresh, 90% Marine
- 76% Fresh, 95% Marine
- Variable by Location (29-95%)

► TMDLs!
How can we accelerate water quality improvement?

► Understand background/baseline loads
► Model impacts of current BMPs
► Evaluate impacts of potential/future BMPs to get closer to TMDLs
Started with CAST...

A web-based nitrogen, phosphorus and sediment load estimator tool where users specify a geographical area, and then select BMPs to develop plans to meet goals.

How do we want to customize to meet DE’s needs?

What worked and what didn’t?
Goals of DTAP

A Delaware-specific tool that can help model background loads and identify BMPs to achieve water quality standards.

DTAP is intended to be a modeling tool—
not a regulatory tool.

Identify opportunities to reach load reduction goals for TMDLs, WIPs, PCSs, etc.
Major differences between DTAP & CAST

- Evaluating impacts to local streams (TMDLs) vs. bay-wide
  - Edge of Stream = the load that reaches the edge of a small stream
  - Edge of Tide = the load that reaches the edge of the tidal portion of the Bay
  - DTAP is currently a water quality model and not a hydrodynamic model
- Modeling statewide and a various scales
- Modeling nitrogen, phosphorus, sediment AND bacteria
- Simplified/condensed list of BMPs
1. Edge of Tide vs. Edge of Stream

CAST

This is the load that reaches the edge of the tidal portion of the Bay.

DTAP

This is the load that reaches the edge of a small stream.
How does DTAP work?

1. User defines year and geographic scope
2. BMPs applied
3. Loads are calculated
4. DTAP reports available
User defines year and geographic scope

BMPs applied

Loads are calculated

DTAP reports available

- Choose landuse/base conditions for years 1990-2025

- An average hydrological condition used for all years

- Geographic scales – next slide
DTAP: Scenario Scales

Major Basin:
- Piedmont
- Delaware Bay
- Inland Bays/Atlantic Ocean
- Historic Watersheds
- Municipalities
- HUC8 (Delaware Only)
- HUC10 (Delaware Only)
- HUC12 (Delaware Only)
- NHD Plus V2 Catchments
- Chesapeake Watershed

Legend:
- HUC8 (orange)
- HUC 10 (blue)
- HUC12 (purple)
- NHD

Maps showing major basins, historic watersheds, and municipalities.
User defines year and geographic scope

BMPs applied

Loads are calculated

DTAP reports available
## DTAP BMPs

<table>
<thead>
<tr>
<th>Sector</th>
<th>BMP Type</th>
<th>BMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Ag Erosion &amp; Sediment Control</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Ammonia Emissions Reduction</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Conservation Plans</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Cover Crop</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Ditch Controls</td>
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<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Nutrient Management</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Pasture Management</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Streambank Fencing</td>
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<tr>
<td>Agriculture</td>
<td>Efficiency</td>
<td>Tillage Management</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Landuse Change</td>
<td>Forest Buffer</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Landuse Change</td>
<td>Grass Buffer</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Landuse Change</td>
<td>Land Retirement</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Landuse Change</td>
<td>Tree Planting</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Landuse Change</td>
<td>Wetland Creation/Restoration</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Pound Reduction</td>
<td>Manure Transport</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Pound Reduction</td>
<td>Waste Management System</td>
</tr>
<tr>
<td>Developed</td>
<td>Efficiency</td>
<td>Erosion and Sediment Control - Level 2</td>
</tr>
<tr>
<td>Developed</td>
<td>Efficiency</td>
<td>Pet Waste Education</td>
</tr>
<tr>
<td>Developed</td>
<td>Efficiency</td>
<td>Runoff Reduction</td>
</tr>
<tr>
<td>Developed</td>
<td>Efficiency</td>
<td>Stormwater Treatment</td>
</tr>
<tr>
<td>Developed</td>
<td>Landuse Change</td>
<td>Impervious surface elimination to pervious surface</td>
</tr>
<tr>
<td>Natural</td>
<td>Pound Reduction</td>
<td>Shoreline Erosion Control</td>
</tr>
<tr>
<td>Natural</td>
<td>Pound Reduction</td>
<td>Stream Restoration</td>
</tr>
<tr>
<td>Septic</td>
<td>Efficiency</td>
<td>Septic Denitrification and Pumping</td>
</tr>
<tr>
<td>Septic</td>
<td>Pound Reduction</td>
<td>Septic Connection</td>
</tr>
<tr>
<td>Septic</td>
<td>Pound Reduction</td>
<td>Sliplines</td>
</tr>
</tbody>
</table>

**DTAP BMP guide currently being developed to help users select correct BMP**

- **Forest Buffer**: Forest buffers are linear wooded areas that help filter nutrients, sediments, and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width is 300 feet, with a 35 feet minimum width required.

  - **Synonymous BMPs**: Tree/brush Establishment, Windbreak/Shelterbelt Establishment, Urban Forest Buffer, Urban Forest Planting, Riparian Forest Buffer, CRP Hardwood Tree Planting (CRP), Riparian Forest Buffer (WRRS 391), Riparian Buffer (FSAS CRP), CRP Riparian Forest Buffer, Riparian Forest Buffer, Woodland Buffer Filter Area

- **BMP Efficiency Ratio**

  - **Forest Buffer Efficiency** differs depending upon land use where it’s implemented:
    - **Ag Open Land**: 0.65, 0.42, 0.56
    - **Commercial**: 0.25, 0.5, 0.5
    - **Construction**: 0.25, 0.5, 0.5
    - **Cultivated Cropland, pasture, hay, and production area**: 0.65, 0.42, 0.56
    - **Highway**: 0.25, 0.5, 0.5
    - **Multi & Single Family Residential**: 0.25, 0.5, 0.5
    - **Open Space**: 0

- **Grass Buffer**: Grass buffers are linear strips of grass or other non-woody vegetation maintained to help filter nutrients, sediments, and other pollutants from runoff. The recommended buffer width for buffers is 100 feet, with a 35 feet minimum width required. Vegetated open channels are modeled identically to grass buffers.

  - **Synonymous BMPs**: Grassed waterway, filter strip, field buffer, Riparian Herbaceous Cover (WRRS 390), Filter Strip (WRRS 393), Filter Strip (FSAS CRP), Field Border (WRRS 386), Grass Waterway (WRRS 329, Nonpoint Source (FSAS CRP), Vegetative Filter, Vegetative Buffer Strip, Vegetated Open Channel

  - **BMP Efficiency Ratio**

    - **Grass Buffer**: 0.46, 0.42, 0.56

- For more information, visit the [DTAP BMP Guide](#).
BMPs can be entered into DTAP manually or by using statewide BMP data.

Statewide BMP data are available for use in DTAP. Data are from DNREC’s BMP Tracking & Reporting Tool, but there are still major gaps in statewide data in the tool.

Models are only as good as the data put into them!
User defines year and geographic scope

BMPs applied

Loads are calculated

DTAP reports available
<table>
<thead>
<tr>
<th>Report Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario Loads Report</td>
</tr>
<tr>
<td>Scenario Loads Comparison</td>
</tr>
<tr>
<td>Scenario Land Use</td>
</tr>
<tr>
<td>Land Use Comparison</td>
</tr>
<tr>
<td>BMP Summary Report</td>
</tr>
<tr>
<td>BMP Input File</td>
</tr>
<tr>
<td>BMP – Submitted vs. Credited</td>
</tr>
</tbody>
</table>
What would be the impact of converting 500 acres of crops to forest buffers in the Inland Bays Basin in 2022?
All users will need a valid login
(managed by DTAP team in DNREC)
Step 1 – Create scenarios & base conditions. Define base condition year and geographic scale.
Step 2 – Add BMPs

- Manually enter BMPs through user interface
- Use Excel template to upload
- Import all BMPs from DE BMP Tracker for a particular year
Step 3 – Run model with “reports”
First double check the acres – looks good!
Let's look at nitrogen loads
What would be the impact of converting 500 acres of crops to forest buffers in the Inland Bays Basin in 2022?

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Scenario Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (lbs/yr)</td>
<td>-59,632</td>
</tr>
<tr>
<td>Phosphorus (lbs/yr)</td>
<td>-474</td>
</tr>
<tr>
<td>Sediment (lbs/yr)</td>
<td>-444,796</td>
</tr>
<tr>
<td>Bacteria (MPN)</td>
<td>* Still in development</td>
</tr>
</tbody>
</table>
Other ways to utilize DTAP

- Quantify cumulative impacts of BMP implementation
- Look at trends towards meeting TMDLs (WIPs, PCSs, etc.)
- Pollutant hot spot analyses
- Analyze land use change

Opportunities are endless!
<table>
<thead>
<tr>
<th>Category</th>
<th>1990 acres</th>
<th>2000 acres</th>
<th>2010 acres</th>
<th>2020 acres</th>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>63,241</td>
<td>62,925</td>
<td>58,432</td>
<td>54,095</td>
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<tr>
<td>Agricultural Open Land</td>
<td>24</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cultivated Crops</td>
<td>58,867</td>
<td>58,814</td>
<td>55,026</td>
<td>51,015</td>
</tr>
<tr>
<td>Pasture/Hay</td>
<td>4,130</td>
<td>3,891</td>
<td>3,229</td>
<td>2,904</td>
</tr>
<tr>
<td>Production Area</td>
<td>221</td>
<td>220</td>
<td>177</td>
<td>176</td>
</tr>
<tr>
<td><strong>Developed</strong></td>
<td><strong>42,994</strong></td>
<td><strong>45,127</strong></td>
<td><strong>52,058</strong></td>
<td><strong>58,362</strong></td>
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<tr>
<td>Commercial</td>
<td>10,658</td>
<td>11,243</td>
<td>13,016</td>
<td>13,769</td>
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<tr>
<td>Construction</td>
<td>25</td>
<td>36</td>
<td>548</td>
<td>1,964</td>
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<tr>
<td>Highway</td>
<td>4,342</td>
<td>4,550</td>
<td>5,200</td>
<td>5,528</td>
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<tr>
<td>Multi-Family Residential</td>
<td>5,994</td>
<td>6,407</td>
<td>7,424</td>
<td>7,788</td>
</tr>
<tr>
<td>Single Family Residential</td>
<td>21,975</td>
<td>22,890</td>
<td>25,870</td>
<td>29,313</td>
</tr>
<tr>
<td><strong>Natural</strong></td>
<td><strong>99,163</strong></td>
<td><strong>97,346</strong></td>
<td><strong>94,907</strong></td>
<td><strong>92,940</strong></td>
</tr>
<tr>
<td>Forest</td>
<td>53,376</td>
<td>51,879</td>
<td>50,490</td>
<td>48,965</td>
</tr>
<tr>
<td>Harvested Forest</td>
<td>813</td>
<td>790</td>
<td>769</td>
<td>746</td>
</tr>
<tr>
<td>Open Space</td>
<td>11,643</td>
<td>11,777</td>
<td>11,464</td>
<td>11,475</td>
</tr>
<tr>
<td>Water</td>
<td>9,973</td>
<td>9,802</td>
<td>9,264</td>
<td>9,146</td>
</tr>
<tr>
<td>Wetland</td>
<td>23,358</td>
<td>23,098</td>
<td>22,921</td>
<td>22,608</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>205,397</strong></td>
<td><strong>205,397</strong></td>
<td><strong>205,398</strong></td>
<td><strong>205,398</strong></td>
</tr>
</tbody>
</table>

* No BMPs included in this analysis*

Example:
Land use change (acres) throughout the decades

DRAFT – for discussion purposes only
Bacteria – much more complicated than we anticipated!
Next steps

- Testing of PHASE 1 has begun
  - Looking for and working out bugs

- PHASE 2
  - Create an optimization tool that identifies optimal BMPs to improve water quality in a cost-effective manner
  - Development just began and current contract extends to 2025
Questions?

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*Thank you to Driscoll Drones for allowing me to use their pictures*