



OEM

Office of Environmental Markets

The Nutrient Tracking Tool (NTT)

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About NTT

NTT is an online, field-scale tool for estimating N, P and sediment losses from crop and pasture lands.

ntt.tiaer.tarleton.edu





History of NTT

- Developed to facilitate Water Quality Trading
- Prototyped by Texas Institute for Applied Environmental Research (TIAER) and NRCS in 2008 – 2010
- OEEP/OEM worked to TIAER to develop the current version of NTT which is national in scope and represents the 3rd generation of NTT

Purpose of NTT

- OEEP/OEM supported development of NTT as the science tool behind water quality trading
- Other applications:
 - Corporate sustainability/Supply chain sust.
 - Education & outreach
 - Planning
 - Research & analysis



Let's get technical...

- NTT uses the Agriculture Policy Environmental eXtender (APEX) model
- Data used by APEX
 - National Soils Database (SSURGO)
 - PRISM climate database
 - 30m resolution DEM data (to estimate slope)



Tailoring APEX to Regional Conditions

- 2 phases of parameterization
 - 1. State-level parameterization using publically available data (e.g. yield).
 - 2. Parameterizaiton using local field-scale data (where available)
- Phase I parameterization is complete for the lower 48.
- Site-level parameterization completed for Ohio/Great Lakes, Iowa and Minnesota. Working on several others.



Modeled Structural Practices

- Irrigation/Fertigation
- Tile drain
 - Drainage water management & Bioreactors
- Wetlands
- Ponds/WASCBs
- Grass/Forest buffers
- Terraces
- Land Leveling
- Contour buffers
- Fencing*



Modeled Cultural Practices

- No-till/Low till
- Manure management
- Nutrient management
 - Rate
 - Timing
 - Placement
 - Source
- Cover crops
- Conservation Cover
- Crop Rotation
- Land Conversion (to pasture/grass, to forest, to crop, etc.)
- Rotational Grazing



NTT Example

- The following slides walk through NTT
- User will first sign in, create a project and define fields
- For each field user will enter one or more management scenarios that can be compared



United States Department of Agriculture

ntt.tiaer.tarleton.edu

NTT - Nutrient Tracking Tool

Welcome

Welcome to the Nutrient Tracking Tool (NTT) – a tool to estimate nutrient and sediment losses from crop and pasture. NTT was developed by the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University with funding and technical support from USDA's Office of Environmental Markets.

Sign in

Sign in

New User

[Forgot Password?](#)



Nutrient Tracking Tool





mindy My Projects

[Create New Project](#) [Upload Project](#)

To select an existing project, click on the project name.

Project Name	Description	Last Modified	Actions
11-30_test		2017-11-30	
12-7_test		2017-12-07	
aft ohio demo		2018-10-09	
aft_test	aldjf	2017-10-06	
AFT_test_1	test for AFT	2017-10-06	
ames cover crop		2019-03-05	
ames cover crop_demo		2019-03-20	
ames cover crop_test		2019-03-28	
ames iowa project		2019-06-20	
arturo_test		2017-12-12	
bill_test	asdfs	2017-08-30	
california		2017-11-30	
california_grapes		2018-10-09	
cedar rapids land retirement		2019-02-14	
cella_test		2019-02-13	
colorado_test		2017-10-03	
colorado_test_2	test for csu	2017-10-03	



Project: launch demo

Location

Fields

Field Routing (Watershed)

Home » Projects » launch demo » Location



Area of Interest Selection (AOI)

Option 1: Upload Shapefile +

AOI shapefile

No file chosen

Option 2: Zoom and draw the AOI +


A. Zoom to the AOI using one of the following choices

1. Address (Ex. 1802 Paddock, Stephenville, TX)

2. Latitude, Longitude (32.231012, -98.215376)

3. State and County

4. Manual zoom on the map

B. Use the drawing utility  on the map to draw the AOIs.

Drawing Tools

How to draw AOIs +



Home » Projects » demo for bill

Fields

To select a field, click on the field name

Field Name	Field Area (ac)	Actions
pasture	44.19	
field 2	40.74	

Project: launch demo

Location

Fields (field 1)

Soils

Management Scenarios

Results

Field Routing (Watershed)

Home » Projects » launch demo » Fields » field 1 » Soils

Soils

Field name

Field area (ac.)

Soil p test

Soil P (ppm)

Name	Group	Slope	Organic Matter (%)	Percentage
Bennington silt loam, 2 to 6 percent slopes	C/D	1.247	<input type="text" value="3.0"/>	42.0
Bennington silt loam, 2 to 6 percent slopes	C/D	1.913	<input type="text" value="3.0"/>	37.86
Centerburg silt loam, 2 to 6 percent slopes	C	2.22	<input type="text" value="2.0"/>	20.14

Save and Continue



Project: launch demo

Location

Fields (field 1)

Soils

Management Scenarios (low till)

Operations (5)

Conservation Practices (0)

Results

Field Routing (Watershed)

Home » Projects » launch demo » Fields » field 1 » Scenarios » low till » Operations

Operations

Add Crop to Rotation

Add Cover Crop

Switch View

Continue

Upload Crop to Rotation

Crop	Planting Year
Select One	1

Upload

Back

Corn [+]

Add New Operation





- Fields (Field 1)
- Soils
- Management Scenarios (split application)
- Operations (16)
- Conservation Practices (1)
- Results
- Field Routing (Watershed)

Add Crop to Rotation Add Cover Crop Switch View Continue

Corn [-] Add New Operation ✖

Planting

Date	Type	Seeding Amount (seeds/sq ft)(optional)	Actions
Year 1, May 5	Regular Planter	0.93	✖

Add Planting Operation

Fertilizer

Date	Type	Amount Applied	Depth	Actions
Year 1, April 15	Element-N	50.0(lbs/ac)	3.0	✖
Year 1, April 15	Element-P	60.0(lbs/ac)	0.0	✖
Year 1, June 10	Element-N	130.0(lbs/ac)	0.0	✖

Add Fertilizer Operation

Tillage



Project: launch demo

Location

Fields (field 1)

Soils

Management Scenarios (split application)

Operations (16)

Conservation Practices (1)

Results

Field Routing (Watershed)

Home » Projects » launch demo » Fields » field 1 » Scenarios » split application » Operations » Editing Operation

Editing Operation

Operation

Crop

Year Date

Fertilizer category

Fertilizer Type

Application Rate (lbs/ac)

Depth (in)

Manure Composition

NO₃-N (0-100%)

PO₄-P (0-100%)

Organic N (0-100%)

Organic P (0-100%)



Location

Fields (field 1)

Soils

Management Scenarios (low till)

Operations (9)

► Conservation Practices (0)

Results

Field Routing (Watershed)

Home » Projects » launch demo » Fields » field 1 » Scenarios » low till » Conservation Practices

Conservation Practices

Select	Name
<input type="checkbox"/>	Autoirrigation/Autofertigation
<input checked="" type="checkbox"/>	Tile Drain
<input type="checkbox"/>	Wetlands
<input type="checkbox"/>	Ponds/Water & Sediment Control Basin
<input checked="" type="checkbox"/>	Grass Buffer/Forest Buffer

Grass Buffer Forest Buffer

Crop

Area (acres) (optional)

Grass Strip Width (ft)

Forest Strip Width (ft)



Project: launch demo

[Location](#)

Fields (field 1)

[Soils](#)

> Management Scenarios

[Results](#)

[Field Routing \(Watershed\)](#)

[Home](#) » [Projects](#) » [launch demo](#) » [Fields](#) » [field 1](#) » [Scenarios](#)

Management Scenarios

Add New Scenario

Copy Scenario from other field

Simulate Selected Scenario

View Results

Download APEX Files

To select a scenario click on the scenario name, to simulate scenarios click on the check box

<input type="checkbox"/>	Name	Weather	Soils	Layers	Operations	Simulation date	Actions
<input type="checkbox"/>	baseline	✓	✓	✓	✓	2018-01-05 15:58:24 UTC	
<input type="checkbox"/>	split application	✓	✓	✓	✓	2018-01-05 15:58:51 UTC	
<input type="checkbox"/>	split application & CC	✓	✓	✓	✓	2018-01-05 15:59:12 UTC	
<input type="checkbox"/>	split application & CC & GW	✓	✓	✓	✓	2018-01-05 15:59:37 UTC	



NTT Results

- After creating one or more scenarios for a field, user can view and compare results.
- NTT displays nutrient and sediment losses at the “edge of the field” as well as estimated yields.
- Results can be viewed in tabular format, or graphical formats (annual or monthly averages).



Home » Projects » launch demo » Fields » field 1 » Results

Tabular

Select up to 3 scenarios for view

baseline split application split application & Unit Area Total Area [View](#) [Download PDF](#) [Download Excel](#)

(±) = Confidence Interval

Description	baseline	split application		split application & CC	
	Losses(±)	Losses(±)	Change(%)	Losses(±)	Change(%)
Total N (lbs/ac) <input checked="" type="checkbox"/>	33.6 (10.7)	22.3 (4.3)	-11.3 (-33.7)	19.3 (4.3)	-14.3 (-42.5)
Org N (lbs/ac)	3.00 (1.1)	3.41 (1.2)	0.41 (13.66)	2.69 (1.0)	-0.31 (-10.29)
Runoff N (lbs/ac)	13.90 (7.4)	1.50 (0.4)	-12.40 (-89.20)	1.40 (0.4)	-12.50 (-89.92)
Subsurface N (lbs/ac)	0.49 (0.1)	0.56 (0.2)	0.08 (15.83)	0.52 (0.2)	0.03 (6.26)
Tile Drain N (lbs/ac)	16.23 (2.1)	16.82 (2.4)	0.59 (3.6)	14.72 (2.7)	-1.51 (-9.3)
Total P (lbs/ac) <input type="checkbox"/>	1.7 (0.5)	1.2 (0.3)	-0.5 (-26.9)	1.0 (0.3)	-0.6 (-37.7)
Surface/Subsurface/Tile Drain Flow (in) <input type="checkbox"/>	19.3 (1.8)	19.3 (1.8)	0.0 (0.0)	19.2 (1.8)	-0.1 (-0.5)
Total Other Water Info (in) <input type="checkbox"/>	1.6 (0.2)	1.6 (0.2)	-0.0 (-0.7)	1.6 (0.2)	0.0 (1.2)
Total Sediment (t/ac) <input type="checkbox"/>	0.4 (0.2)	0.4 (0.2)	0.0 (12.3)	0.3 (0.1)	-0.1 (-16.1)
Crop Yield <input type="checkbox"/>					



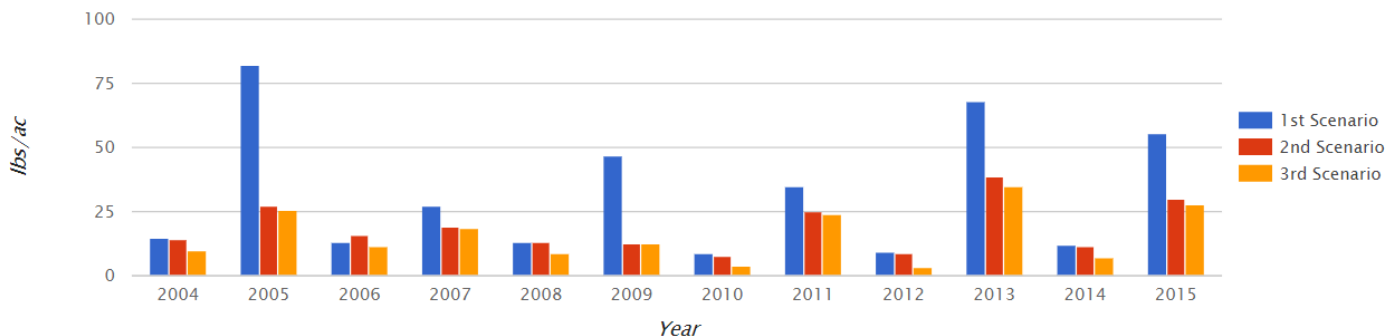
Home » Projects » launch demo » Fields » field 1 » Results

View Annual-Charts

Select up to 3 scenarios for view

baseline
split application
split application & CC
Nitrogen Losses
Select Type
View

Total N (up to the last 12 years)



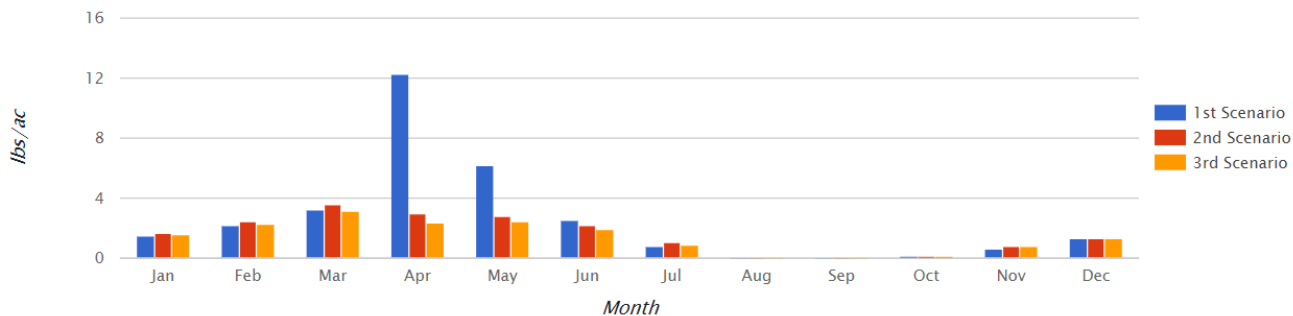
scenario	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
baseline	14.6	82.0	13.1	27.3	13.3	46.8	8.6	34.6	9.4	68.1	12.2	55.7
split application	14.3	27.4	15.8	19.1	13.1	12.8	7.9	25.1	8.9	38.4	11.4	29.7
split application & CC	9.7	25.8	11.5	18.3	8.5	12.3	3.8	24.0	3.4	34.9	7.1	27.5



View Monthly-Charts

Select up to 3 scenarios for view

Runoff N



scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
baseline	1.5	2.2	3.2	12.2	6.1	2.5	0.8	0.0	0.0	0.1	0.6	1.3
split application	1.6	2.4	3.6	3.0	2.8	2.2	1.0	0.0	0.0	0.1	0.8	1.3
split application & CC	1.6	2.2	3.1	2.3	2.4	1.9	0.9	0.0	0.0	0.1	0.8	1.3

NTT Watershed Feature

- Users can define a “watershed” or field routing scenario by linking one or more fields
- NTT will simulate the “edge of watershed” load by routing runoff from one field to the next.



Project: launch demo

Location

Fields

Field Routing (Watershed)

Home » Projects » launch demo

× Watershed scenario was successfully created.

List of fields in watershed 1

Add fields in the order they are going to be routing from one to the next one and select the scenario that is going to be simulated with the field selected.

[Add Field / scenario](#) [Back](#)

Select Field ▾ Select Scenario ▾

[Add](#)

Field Name	Scenario Name	Actions
field 1	split application & CC	×
field 2	split application & CC copy	×



Project: launch demo

Location

Fields

Field Routing (Watershed)

Tabular

▶ Tabular

Graphic

Annual

Monthly

Home » Projects » launch demo » Results

View

Select up to 3 watersheds for view

default | split application | watershed test | Unit Area Total Area [View](#)

(±) = Confidence Interval

Description	Scenario Name	Scenario Name	Scenario Name	Scenario Name	
	Losses(±)	Losses(±)	Change(%)	Losses(±)	Change(%)
Total N (lbs/ac) <input type="checkbox"/>	50.7 (12.6)	15.0 (3.0)	-35.7 (-70.4)	44.3 (16.3)	-6.4 (-12.6)
Total P (lbs/ac) <input type="checkbox"/>	2.6 (0.7)	0.8 (0.2)	-1.8 (-70.7)	2.0 (0.5)	-0.5 (-21.0)
Surface/Subsurface/Tile Drain Flow (in) <input type="checkbox"/>	14.5 (1.4)	21.6 (2.0)	7.1 (48.8)	15.4 (1.5)	0.9 (6.3)
Total Other Water Info (in) <input type="checkbox"/>	4.9 (0.4)	3.5 (0.3)	-1.5 (-29.8)	4.8 (0.4)	-0.1 (-1.6)
Total Sediment (t/ac) <input type="checkbox"/>	0.7 (0.1)	0.2 (0.1)	-0.4 (-65.7)	0.5 (0.1)	-0.1 (-19.7)
Crop Yield <input type="checkbox"/>					