



### **TUTORIAL**

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## CHAPTER 1 INTRODUCTION

The Nutrient Tracking Tool<sup>1</sup> (NTT) is a web-based computer tool that enables users to determine the impacts that alternative practices or management options have on crop yields, and sediment and nutrient losses from individual fields. Impacts of alternative practices on sediment and nutrient losses can be readily converted to water quality credits for use in a water quality trading program. Estimates of the impacts of conservation practices on water quantity are an additional benefit of NTT. Based on recent enhancements, air quality credits can also be estimated from NTT output for use in trading.

#### 1.1. Motivation

NTT was developed primarily as a tool for estimating environmental credits for water quality trading. As the interest in water and air quality trading involving agriculture has grown over the past several years, so has the need for tools that can reliably estimate nutrient and sediment credits associated with alternative practices. Reliable data on credits will equip farmers with the information needed to make wise decisions about environmental credit trading and choose the potentially most cost-effective practices required for those trades. NTT aids in the calculation of nutrient and sediment credits by providing estimates of nutrient and sediment losses associated

<sup>&</sup>lt;sup>1</sup> Formerly referred to as the Nutrient Trading Tool.

with baseline conditions, and the levels of those indicators for each alternative practice or scenario under consideration.

#### **1.2. Basic Structure of NTT**

NTT is a web-based program. Users can access the beta version of the program by using their internet browser to go to the main NTT home page: <u>http://nn.tarleton.edu/nttWebARS/</u>. The current version is limited to a few sites within the US and the results are being verified. Users can select the state and county relevant for their applications and then proceed to define scenarios and run NTT to obtain estimates of nutrient and sediment losses as well as other indicators for each scenario they define.

NTT is a user-friendly program. Virtually all the data required for a number of states and counties are already available on the NTT server. If users are interested in evaluating management alternatives that are typical for one of these states and counties, they need not provide any specific information other than the size of the field or land area they wish to evaluate. All other data required for these areas can be selected by users from drop-down list boxes on the NTT web pages. If users desire to estimate nutrient and sediment losses for management practices that are not available in the NTT program for one of these counties, they can easily select options to either modify existing management practices (operations) or create new ones. Data required for NTT application in other counties and states in the U.S. are being added to the NTT server and should be completed in the near future.

The NTT program consists of three main components:

- 1. Web interface, which is visible to the user
- 2. Computer simulation programs, which run in the background in response to user requests
- 3. Supporting databases, subsets of which can be viewed and customized by the user, based on the selections they make via the NTT web interface.

#### 1.2.1. NTT Web Interface

The NTT web interface has been developed for any standard web browser. However, when using Microsoft Internet Explorer, version 6.x or later is preferred on Microsoft Windows computers. When using Netscape Navigator, version 6.x or later is preferred on Microsoft Windows computers.

#### 1.2.2. NTT's Computer Simulation Programs

NTT was initially developed as a Nitrogen Trading Tool by United States Department of Agriculture's Natural Resource and Conservation Service (USDA-NRCS) and Agricultural Research Service (USDA-ARS). Recently, through this USDA Conservation Innovation Grants project the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University linked the Agricultural Policy Environmental eXtender (APEX; Williams et al., 2000) model to the Nitrogen Trading Tool. The result is a tool that in addition to nitrogen (N),

estimates sediment and phosphorus (P) losses, crop yields, and flow. The new version of the tool is called Nutrient Tracking Tool, since it is no longer limited to just nitrogen.

APEX was selected for this trading tool because of its capability to: 1) predict N and P losses, crop yields, and sediment losses; and 2) simulate the impacts of numerous management alternatives, such as filter strips, on predicted nutrient and sediment losses. APEX also has other capabilities that can be useful in future potential augmentations of the tool, such as simulation of pesticide losses and carbon cycles.

The APEX model was developed to simulate whole farms and small watersheds. APEX has components for routing water, sediment, nutrients, and pesticides across complex landscapes and channel systems to the watershed outlet. Recently, the carbon fate and transport functions of the CENTURY model (Parton et al., 1986) were incorporated into APEX (version 2110), which now allows APEX to simulate carbon dynamics in the soil-plant system. APEX also has groundwater and reservoir components. A field or small watershed can be subdivided as much as necessary to ensure that each subarea is relatively homogeneous in terms of soil, land use, management, etc. The routing mechanisms provide for evaluation of interactions between subareas involving surface runoff, return flow, sediment deposition, nutrient transport, and groundwater flow.

### **1.2.3.** Supporting Databases

All the datasets required for running NTT in selected states and counties are housed on the NTT server for ready user access. However, users may enter management information that is different from the pre-defined set available on the NTT program for their county of interest and can also save their information for future use. The following are the NTT databases that are available on the NTT server for selected states and counties and are being developed for the remaining counties in the U.S.

- Weather (precipitation, minimum temperature, maximum temperature)
- Soils
- Crop parameters
- Tillage parameters
- Properties of major fertilizer and manure products
- Typical management practices for each major crop in selected crop management zones

### **1.3.** Organization of the Manual

This manual is organized into seven chapters. This introductory chapter gives a brief overview of the tool and the rationale for its development. Chapter 2 provides a tutorial for standard use of the tool. The tutorial is followed by four chapters that cover various aspects of NTT use including, defining scenarios, selecting pre-defined management data, editing management data, importing soils from the web soil survey, running scenarios, and output display. Chapter 7 shows users how they can save their NTT projects for future use. The manual concludes with a list of the references cited in this document.

## CHAPTER 2 TUTORIAL

The following tutorial gives a general step-by-step guide through the process of using NTT. Two methods for selecting the field(s) to be evaluated are provided by NTT. Users can select a county of interest and then select one of several soil types that define the field to be evaluated. Alternatively, users can access the USDA-NRCS web soil survey (a graphical web-based soil selection tool) and select the specific tract or area of interest (AOI), which may include multiple soil types. An area selection tool in the web soil survey makes it easy to select the specific AOI. The first part of the tutorial walks users through the process of running NTT by selecting a county and then a single soil type. The second part of the tutorial shows how to use the web soil survey to select an AOI that contains one or more soil types and how to use the selected area and its soil type information in the NTT estimations.



Figure 2.1 Welcome screen

When users access the NTT web site, they are presented with a Welcome screen (Figure 2.1) where they can opt to go to **Capture Soil Map Information** through the USDA-NRCS web soil survey, or select a state and county of interest. At the bottom of the Welcome screen, users also have the option of uploading a saved NTT project file.



Figure 2.2 Getting Started screen showing more detail about NTT

#### 2.1. Running NTT with a single soil type

Users can also click a help button on the Home page, to learn more about the NTT tool; an information page containing additional details about NTT is displayed (Figure 2.2).

For this portion of the tutorial, select the **Select Specific Soil** option and select a state and county of interest. For this example, select Washington from the **State** drop-down box and then Yakima from the **County** drop-down box. Multiple weather stations may be available for a single county, so users may need to make a selection in the **Weather Station** drop-down box as well. In this example, there are four weather stations for Yakima County, Washington – Yakima Station is selected for use in this example(Figure 2.3).

United States D Natural Res Agricultural I	Department of Agri OUICES Confise Research Ser	iculture rvation Ser vice gricelture			Nurren	u Tracking	
		0.11		NTT \	ersions Home	Help About NTT	Contact Us Versi
Search USDA	nome	3011	Ve	rsion 061	3 (Beta)		06
Other Resources  Link to NRCS Office USDA NRCS USDA ARS TIAER	Instructions: Th selecting an area project by select to upload a previ pre-loaded NTT e For more informa	here are four in of interest usi ing an area of i ously saved NT examples, for il ation and help a	nitial choices to start ng the Web Soil Sur interest by state, co IT project; and 4) S lustration purposes. about the Nutrient Tr	a project: 1) vey mapping unty, and dom elect the "Uplo racking Tool u	Select the "Soil Sur system; 2) Select th inant soil; 3) Select bad an Example" op se "Help" option thr	rvey Map" option to start e "Specific Soil" option t t the "Upload Existing Pro tion, to access one of the oughout the program.	a project b o start a oject" option e several
Feedback	Soil	Survey Map	Select Specific S	oil Upload	Existing Project	Upload an Example	
, Comment on the Nutrient Tracking Tool , Report a Problem with NTT	w L	nter your Loc State <sup>®</sup> County <sup>®</sup> eather Station <sup>®</sup>	cation information Washington Vakima (select one) (select one) Finley Paterson WSU HQ	Continue	nty, Weather Sta	iion) - Specific Soil	
	<u>I</u>		Yakima				
	The Nutrient Trac collaboration with the USDA Agricul	cking Tool was In the United Sta Itural Research	designed and develo ates Department of Service (ARS).	PP Select your Agrical care (o	Weather Station. plie	d Environment Research Irces Conservation Servi	(TIAER) ir ce (NRCS)

Figure 2.3 Welcome screen showing selection of State, County, and Weather Station

When users click the **Continue** button, the Management Information screen is shown (Figure 2.4).

United States I Natural Res	epertment of Agriculture ources Conservation S Research Service	Service			TE	AC
TiAER			NIT	Nutrier	Help About N	ng Tool
Search USDA	Home Soil	Management	Verify	Reports		Version 0613
Go			Soil Inform	ation		
Other Resources	On this page, there are two aw, Survey Map was selected : Ent selected: 1) Enter the farm own within the selected country, 3) i model default is 20 ppm, w chemical characteristics of the Click <u>HERE</u> to read more about	allable options. These two er the farm owner and pro- ner and project informatio Enter the farm area (ac), 4 hich can be changed b top layer. entering soil Information.	options are base ject information in in the allocated i) modify slope of y the user to an	d on the users select in the allocated space space, 2) Select th the selected (if new ny value from 0.1)	tion in the previous pa e OFTION 2. Select 5; e soil texture from the ded), 5) input the ini to 500, and 6) modif	pe: OPTION 1. Soil becific Soil was list of available soils tial soil P (ppm), the soil physical and
Feedback	After you have entered all of the	e required (*=Required ) i	nformation, click	the NEXT button to	continue.	
Comment on the Nutrient Tracking Tool		Ente	er your Soll Info	mation.		
Report a Problem with NTT		State: Washi	ngton (	County: Yak	ima	
		Project Name	Test 1			
		Project Description	This will ev:	aluate impact o	f wetlands	
		Foll star ()	Yakima Coun	tv Area, Washing	iton	
		Eoli camer ()	11 Burke silt	loam 5 to 8 perce	ent slones	
		Area/acres)*	100	and a second		
		May Depthilo 17	29.13			
		Slope(%) Y	6.5			
		Soll P (ppm)*	20.00			
		Bulk Density(BD)*	1.23			
		Sand (%)* 1	21.2			
		Silt (96)* 🕜	68.8			
	1.22	Organic Matter (%)* 🕜	1.5			
		PH* 🕐	7.9			
			Back Co	intinue		

Figure 2.4Initial Management Information screen

The **Name** and **Description** boxes of the screen are optional. Name this example "Test1" and enter "This will evaluate impact of wetlands" in the **Description** box. The soil area for this example is Yakima County Area, Washington.

Now select a specific soil name. Click on the Soil name drop-down box and select

"11, Burke silt loam, 5 to 8 percent slopes"

as the specific soil. The slope is automatically calculated as the midpoint of the slope range for our selected soil. Users may modify this slope value to reflect the conditions they want to simulate by modifying the value in any **Slope** textbox (on this first *Management Information* screen and on the next, which is the main, *Management Information* screen). In this case leave the slope at the value indicated. Now in the **Area** input box enter the field size in acres. Type in 100 as an assumed field size and click **Continue**.

The next *Management Information* screen (Figure 2.5) allows users to select **Cropping System**, **Nutrient Management** and other management information that will be simulated for the field under the Baseline and Alternative scenarios.

Search USDA	Home Soil Management Verify Reports Version 0613
Go	Management Information
Other Resources	On this page, users enter the management information needed to compare the runoff, nitrogen, Phosphorous, sediment loss potential, and crop yield between a baseline management system and an alternative conservation management system. Click <u>HERE</u> to read more about entering Management Information.
P TIAER	After you have entered all of the required (*=Required ) information, click the NEXT button to continue.
Feedback	State: Washington County: Yakima
P Report a Problem with NTT	Channel Vegetation Condition 💿 Very Good 💿 Good 💿 Moderate 💿 Poor 💿 Very Poor
	Channel Erodibility 🔘 Very high 🔘 High 🔍 Moderate 🔘 Low 🔘 Very low
	Baseline Alternative
	Cropping System* 🔮
	Select an Existing Cropping System Upload a Saved Cropping System Save Current Cropping System a) Cropping System Create / Modify No Cropping System b) Nutrient Management  c) Tillage Management  d) d) Manual Irrigation  e) Grazing  e
	Auto Irrigation and Fertigation
	Drainage Water Management System
	Wetlands and Ponds
	Stream and Riparian Management
	Contour Buffer (Strip Farming) 🛛
	Land Grading and Management a) Land Leveling  b) Terrace System  c) Liming  Select  C Clear
	Save Project Back Continue

**Figure 2.5** Management Information screen showing options for defining baseline and alternative scenarios



**Figure 2.6** Management Information screen showing specification of cropping system, irrigation and tillage options, and nutrient input information

Next is an evaluation of the impact of a 20-acre wetland on the downslope end of a 100-acre field. The wetland is positioned such that runoff from the 80-acre portion of the field flows into the 20-acre wetland prior to leaving the field. Select Corn-Silage from the **Cropping System** drop-downbox. Select Conventional as the **Tillage** for and click **Upload**. To ensure that the comparisons are valid, select the **Cropping System** and **Tillage** for the Baseline and select **Copy to Alternative**. The screen should look like Figure 2.6 once those selections have been made. Click on **Wetlands and Ponds** under the **Alternative** tab.



Figure 2.7 Management Information screen

The Management Information screen (Figure 2.7) allows users to select any combination of several conservation practices. After clicking on **Wetlands and Ponds** under the alternative scenario and specify the wetland size as 20 acres. The screen should now look like Figure 2.8.

▶ USDA ARS ▶ TIAER	After you have entered all of the required (*=Required ) information, click the NEXT button to continue.
Feedback	State: Washington County: Yakima
P Report a Problem with NTT	Channel Vegetation Condition 🔘 Very Good 🔘 Good 🔍 Moderate 🔘 Poor 🔘 Very Poor
	Channel Erodibility 💿 Very high 💿 High 💿 Moderate 💿 Low 💿 Very low
	Baseline Alternative
	Cropping System * Select an Existing Cropping System Upload a Saved Cropping System Save Current Cropping System a) Cropping System Cropping System Uploaded Copy to Baseline b) Nutrient Management @ Create / Modify Instinets Applied c) Tillage Management @ Create / Modify Instinets Applied c) Manual Integration @
	e) Grazing V
	Drainage Water Management System
	Wetlands and Ponds
	a) Wetlands 🚱 Ares (ec) 20 Cear b) Ponds 🚱
	Stream and Riparian Management
	Contour Buffer (Strip Farming) 🖗
	Land Grading and Management a) Land Leveling 0 b) Terrace System 0 c) Linning 0 sets 17 Cear
	Save Project Back Continue

**Figure 2.8** Structural Conservation Practices Information screen showing selection of 20-acre wetland

	nome Soll	Management	Verify	Reports	
Go		Ve	erify Inform	nation	
urces		Verify that	your informa	tion is correct.	
Office	State	: Washington			
	County	r: Yakima			
	Weather station	n: Yakima	22		
	Soil survey area	a: Yakima County A	rea, Washing	on	
	Soil series name	a: 11, Burke silt loa	m, 5 to 8 perc	ent slopes	
	Slope(%	): 6.5			
	Area(acres	: 100		•	
ent	Management	Baseline 🙂		Alternative 🙂	
	Cropping system selected	: Corn, silage		Corn, silage	
th NTT	Tillage	Conventional		Conventional	
	and the second	Baseline		Alternative	
	Wetland Area(ac):			20	

Figure 2.9 Verify Information screen prior to running NTT simulation

After users click **Continue**, the *Verify Information* screen appears (Figure 2.9) providing the opportunity to confirm that the information entered is what was intended. Click **Back** to edit the information or **Continue** if the information is correct. When **Continue** is clicked, the NTT interface calls the main simulation program and simulates the Baseline and Alternative scenarios based on the selections made.

Home Soil M	lanagement Verify	NTT Versions Home Help Abo Reports
	Verify In	formation
	Verify that your inf	ormation is correct.
Weather station Soil survey area Soil series name Slope(%) Area(acres)	Yakima Yakima County Area, Was 11, Burke silt loam, 5 to 8 6.5 100	ihington 3 percent slopes
Management Cropping system selected Tillage	Baseline U Corn, silage Conventional	Alternative O Corn, silage Conventional
Wetland Area(ac): Simulate Appl. of Agricultural limestone	Yes	20 Yes
Click the Next button at	the bottom of the page to p	rocess your information. Wait for y

**Figure 2.10** Verify Information screen while NTT simulation is in progress

While the program is running in the background, a message "Calculating ... Please wait" is displayed (Figure 2.10).

	m of the U.S. Department	of Agriculture	X / A		Intrient	Trackin	Tool
			MA INT			1-11	
				NTT Vers	ions Home H	elp About NTT	Contact Us
	Home	Soil Mana	igement	Verify	Reports		Version 0613
Search USDA			5	Summary Rei	port		0010
Go				Download Report	See Detail Report Sa	ve Project Annual/Mo	nthly Avg Graphs
Other Resources							
b Link to NRCS Office	Name	T					
NUSDA NRCS	Description	esti an esti a					
NUSDA ARS		This will evaluate in	mpact of wetla	inds			
h TIAED		Annual Re	esults for Nu	itrients, Flow, S	Sediment, and C	rop Yield	
- Install			Pacolina	Altownstitut	Difference	Reduction	Total for
Feedback	Total N	(ibs/ac)	4 66	0.26	4.40	94.4	440.0
Comment on the Nutrient Tracking Tool	Total P	(lbs/ac)	0,17	0.01	0.16	94.1	16.0
PReport a Problem with NTT	Flow	(in.)	0.24	0.08	0.16	66.7	16.0
	Sediment	(t/ac)	0.1762	0.0150	0.1612	91.5	16.12
	Crop Yield						
	0	CSIL(t/ac)	0.73	0.73	0.00	0.0	-14.60
	W	ETN(t/ac)	0.00	0.00	0.00	N/A	0.00
			Location an	d Additional Si	te Information		
		State:	Vashingto	n			
		Weather station:	Yakima 47	Years Simulati	ion (1960 to 200	)6)	
		Slope(%):	6.5		(1000 10 10	,	
		Area - Acres:	100- Redu	ce Alternative 2	20 ac		
		Soil survey area:	Yakima Co	unty Area, Was	shington		
		Soil series name:	11, Burke s	silt loam, 5 to 8	8 percent slopes		
			Man	agement Infor	mation		
		· · · · · · · · · · · · · · · · · · ·	Baseline	_	Alternative		
		Trrination:	com, snag	e	Com, snage		
		Tillage:	Convention	nal	Convention	al	
			Structural (	Conservation P	ractices Input		
		4.0()-	Baseline		Alternative		
	Simulat	e Appl. of			20		
	Agricult	tural limestone:	162		Tes		
	The res soils an <u>Nutrient 1</u> Total N	ults in this report we id agricultural manag <u>fracking Tool Disclaimer</u> , utrients Loss Saving	ere generated gement syster Note: If the d	by APEX using tl ms. The informati lifference betwee	he information you ion and results in 1 n the Baseline and	supplied for loca this report are su Alternative is ne	tion, weather, bject to the gative, the
	i ocar iv	acherica cosa daving	35 mil be zero.				

Figure 2.11 Summary Report screen showing summary output from NTT simulation

Upon completion of the simulations, NTT displays the *Summary Report* screen to users (Figure 2.11). Annual average values for the indicators selected are presented, as well as a summary of the management and other input options selected by the user. Users can click **see Detail Report** to see a more detailed output report, or **Download Report** to create and download a PDF copy of the results.



Figure 2.12 Capture Soil Map screen to start Web Soil Survey from within NTT

#### 2.2. Running NTT with multiple soils from web soil survey

To perform the same kind of wetland evaluation, first select the AOI (Area of Interest) from the USDA-NRCS web soil survey. On the main NTT home page, click **Soil Survey Map**, to capture soil map information. The NTT program presents a new screen (Figure 2.12) that enables users to start the Web Soil Survey (WSS). After selecting the AOI, return to this same screen (Figure 2.12) and capture the soil information in NTT format by clicking **Capture.** Export it to NTT by clicking the **Save** button. At any time, the information pasted in the soil input box can be erased by clicking the **Clear** button to begin again.



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Figure 2.13 Initial screen in the Web Soil Survey (WSS) program prior to area selection

Once the user clicks the **START WSS** button, a new window or browser panel appears (Figure 2.13), which is the main page of the USDA-NRCS Web Soil Survey.

Users may need to temporarily enable pop-ups in order for this to work properly if popup blockers have been installed and enabled on their computers. When the *Web Soil Survey* screen first appears, the continental United States is shown in full extent on the right panel. The left panel of the screen displays several tabs used to navigate to specific areas of interest.

Navigate to the AOI by choosing from the State and County list, or alternatively by selecting from the Soil Survey Area list. For this example select **State and County** and choose Washington from the **State** drop-down box and Yakima from the **County** drop-down box.



**Figure 2.14** WSS screen after selection of State (Washington) and County (Yakima) of interest

Allow enough time for the map on the right panel of the screen to zoom in to the Yakima County, Washington area of the continental United States (Figure 2.14).

Next navigate to the specific AOI by progressively selecting rectangular areas with the zoom-in feature as the active selection tool. To ensure that the zoom-in selection tool is active, users must ensure that the zoom-in button right below the "Area of Interest Interactive Map" title bar is the enabled button. The zoom-in button is typically the leftmost button on the toolbar right below the "Area of Interest Interactive Map" title bar.

Once the zoom-in selection tool is active, users can select any rectangular area, making sure that they are within the vicinity of Yakima County, Washington. Any selection close enough to the center of the map will suffice.



Figure 2.15 WSS screen after zooming into Washington to select a field in Yakima County

After a rectangular area has been selected, the map zooms in to that area (Figure 2.15).



**Figure 2.16** WSS screen after zooming in to Yakima County, Washington

The next zoom level shows the street and field features more prominently (Figure 2.16).

Once a reasonable scale has been reached allowing selection of the AOI, use the AOI selection tool. The AOI selection tool is the button that displays a rectangle with "AOI" right below that rectangle. Users should now click on it to be sure it is enabled. Select a rectangular area that corresponds approximately to the field or area to evaluate.



Figure 2.17 WSS screen showing AOI creation after selecting area of interest

A message "Creating AOI..." appears on the map, indicating that the AOI is being selected (Figure 2.17).

Once the AOI has been selected, summary soil information for the AOI will be displayed in the left pane. If the soil information is not visible, click the **Soil Map** tab.



Figure 2.18 WSS screen after selecting all contents prior to copying into NTT

To export the soil information, go to the **Edit** menu tab of the browser and click on "Select All" (or press ctrl-A) and then "Copy" (ctrl-C) from the **Edit** menu tab of the browser (Figure 2.18).



Figure 2.19 NTT program prior to pasting in selected soil information from WSS

Next, move to the main *Capture Soil Map Information* screen and paste (ctrl-V) the information in the area provided (Figure 2.19).



Figure 2.20 NTT program screen after pasting soil information from WSS

Click the **Capture** button so the soil information is recognized by the program and formatted in the display, as show in Figure 2.20. Then click **Save** to export the data to NTT.

Search USDA Go Other Resources I Link to NRCS Office I USDA NRCS I USDA ARS	Use this <b>Survey</b> S Soil Map	page to captu	۲۳ Capture S	versions	Home	Help	Abo	ut NTT	Cor	ntact
Search USDA Go Other Resources I Link to NRCS Office I USDA NRCS I USDA ARS	Use this <b>Survey</b> S Soil Map	page to captu	Capture S	oil M						
Other Resources	Use this <b>Survey</b> S Soil Map	page to captu		-	ap In	form	atio	n		
P USDA AKS	Chiefe um	and Area of I	re Soil Map Info Click <u>HERE</u> to rea nterest (AOI).	rmation ad more	taken fro about We	m the <b>V</b> b Soil S	Veb Soi Survery		STA	RT
I TIAER	informat	<u>RE</u> to go to the ion.	Nutrient Trackir	ng Tool a	ind enter	soils ai	nd local	tion		
Feedback		E	nter your Web S	oil Surve	ey Soil Ma	p infor	mation			
Tracking Tool	Inform	State: Was County: Area: Vak	Map Unit Lege	Home I chived	Area of	ington,	Part of	• )1) fYakima		
	Symbol	l Name	Inty (WA678)	Acres	Percent	Slope	Sand	Silt	OM	P
	AsA	Ashue loam, slopes	0 to 2 percent	224.9	56.9%	1	43.00	39.50	1.50	7.0
	AsB	Ashue loam, slopes	2 to 5 percent	77.8	19.7%	3.5	43.00	39.50	1.50	7.0
	AuA	Ashue gravel percent slope	ly loam, 0 to 2 es	4.4	1.1%	1	43.00	39.50	1.50	7.0
	NaA	Naches loam slopes	, 0 to 2 percent	88.2	22.3%	1	44.00	40.50	1.50	7.2
	Totals	for Area of In	terest	395.5	100%	0	0.00	0.00	0.00	0.0
			Capture	Clea	ar	Sav	e			

Figure 2.21 NTT program after capturing (importing) soil information from WSS

The data exported to NTT appears in the NTT window as displayed in Figure 2.21. Next specify other aspects of the scenarios, as done in the previous section. The first *Management Information* screen NTT displays (Figures 2.21 and 2.22) indicates that the selected AOI is 395.5 acres in size, and that it consists of 4 soil types.



Figure 2.22 Management Information screen showing multiple soils captured from WSS

Define the scenarios by creating an optional name and description for this NTT project (Figure 2.22) on the first *Management Information* screen.

Search USDA	Home Soil Management Verify Reports Versio	on 0613
Go	Management Information	
Other Resources	On this page, users enter the management information needed to compare the runoff, nitrogen, Phosphorous, sedim yield between a baseline management system and an alternative conservation management system.	nent loss potential, and crop
▶ USDA NRCS	Click HERE to read more about entering Management Information.	
DISDA ARS DITAFR	After you have entered all of the required (*=Required ) information, click the NEXT button to continue.	
Feedback		
Comment on the Nutrient	State: Washington County: Yakima	
P Report a Problem with NTT	Channel Vegetation Condition 💿 Very Good 💿 Good 💿 Moderate 💿 Poor 💿 Very Poor	
	Channel Erodibility 🔘 Very high 🔘 High 🔘 Moderate 🔘 Low 🔘 Very low	
	Baseline Alternative	
	Cropping System* 🖗	
	Select an Existing Cropping System Upload a Saved Cropping System Save Current Cropping System	
	Select Cropping System: Com, silage 💌	
	Select Tillage: Conventional	
	a) Cropping System	
	b) Nutriget Management	
	c) Tillage Management	
	d) Magual Irriation	
	e) Grazing	
	Auto Irrigation and Fertination	
	Drainage Water Management System	
	Wetlands and Ponds	
	Stream and Riparian Management	
	Contour Buffer (Strip Farming) 🔮	
	Land Grading and Management	
	a) Land Leveling 🖲	
	b) Terrace System 🔮	
	c) Liming 🕐	
	Select 🗹 Clear	

Figure 2.23 Management Information screen with multiple soils after selecting options

Select the **Cropping System**, **Irrigation** types, **Nutrient input** information, and **Tillage** options for the Baseline and Alternative scenarios, as was done in the previous section (Figure 2.23). Users can then click on **Wetlands and Ponds**, as shown for this tutorial (so wetland information may be entered). The procedure for adding a 20-acre wetland is identical to the previous example (Section 2.1) and will not be included in this section. Users may follow the steps outlined in Section 2.1 if they choose to review that process. Click **Continue** if not including Structural Conservation Practices.

Home Soil		NIT	Versions	Home	H	aln	About	NTT	11
	Management	Verify	Report	S	1	- 19 <b>-</b> 2	ADOUN	NT	
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C	ounty: Yakima								
Weather s	tation:								
Descr	name: Test 2	uate impact of w	etlands on	multin		ile			
Management	Baseline D	and an appect of a	A	Iternal	tive	O			
Cropping s	ystem: Corn, silage		C	orn, si	lage	-			
1	Fillage: Conventional		C	onvent	tiona				
SCP	Baseline		A	Iterna	tive				
T Wetland Area(ac):			2	0					
Simulate Appl. of									
Agricultural limesto Click the Next but automatically disp	nne <sup>Yes</sup> ton at the bottom of th ilay.	he page to proce	Y ess your ini	es formati	on. V	/ait fo	r your	repor	t
Agricultural limesto Click the Next but automatically disp Click on the left-si produce a Soils Ev	one Yes ton at the bottom of th ilay. ide <b>checkbox</b> below to raluation report.	he page to proce select individua	Y ess your ini al soils for	es formati evalua	on. V tion.	√ait fo The s	r your electe	repor d soil	t
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Agricultural limesto Click the Next but automatically disp Click on the left:si produce a Soils Ev Sym AsA Ashue loar Slopes AsB Ashue loar AsB slopes AuA Ashue grav AuA Ashue slopes NaA Naches loa slopes	Ves ton at the bottom of the lay. ide checkbox below to valuation report. Map Unit Vakama Nation Irrigat Name n, 0 to 2 percent n, 2 to 5 percent velly loam, 0 to 2 pes m, 0 to 2 percent	he page to proce select individua Legend for Ar ted Area, Washi Acres Percent 224.9 56.5 77.8 19.7 4.4 1.1 88.2 22.3	V ess your ini al soils for rea of Intr ngton, Part ngton, Part ngton, Part 1 58.84 9 58.84 1 58.84 3 58.84	es formation evalua of Yak Slope 1 1 1 1	(AO) (AO) 13 13 13	Vait fo The s Count Soure 20 20 20 20	y Sand 43 43 43 44	repor d soil Silt 39.5 39.5 39.5 40.5	

Figure 2.24 Verify Information screen with multiple soils prior to NTT simulation

Note that on the *Verify Information* screen users can select which soil types they want to include or exclude by using the check boxes shown to the left of each soil type (Figure 2.24). The slope value of selected soils may be modified by clicking in the **Slope** textbox for the soil of interest (although this tutorial will not show this step). By default, NTT will include all soil types captured from the soil capture program in the evaluations.

Once the desired soils are selected and all the information selected is correct, click **Continue** to proceed to run the NTT evaluation. The output display on the *Summary Report* screen will show the impacts by soil type, in addition to the average impact for the entire AOI. The results displayed will be in the same format as those displayed in the earlier example where a single soil type was selected.

## CHAPTER 3 EXAMPLES

The following pages provide illustrative examples that the user can follow to gain additional insight into how NTT can be used to evaluate alternative practices. In all of these examples the single soil option is used to simplify the process. However, users can readily use the web soil survey to select multiple soils and perform the same examples. In that case users should bear in mind that the results would not be identical to those shown here since the soil types would likely be different.

### Example 1: Impact of tillage:

The first example illustrates the impact of tillage. We will use NTT to compare the crop yields and nutrient and sediment losses associated with conventional tillage as opposed to no-till for a corn crop. Choose the "Select Specific Soil" option from the main NTT page and select Indiana and Carroll as the State and County of interest. Then select the "FbB, Fincastle-Starks silt loams, 1 to 3 percent slope" soil series as shown in Figure 3.1.



Figure 3.1. Selection of Soil area and soil series.

After selecting the soil type we will click **Continue** to be taken to the Management Information screen where we can enter the desired management information. We will be selecting corn for each scenario. However, we will select Conventional as the tillage option for the baseline and No-till as the tillage option for the Alternative scenario as shown in Figure 3.2.

	USDA united states Depurine to Agriculture Natural Resources Societaviation Service Agricultural Research Service	
Search USDA Ge Other Resources F Link to NRCS Office F USDA NRCS F USDA ARS F TABR	UTT Versions         Home         Heip         About NTT         Contact Us           Home         Soil         Management         Verify         Reports         Version 0613           Management Information         Management Information         Version 0613         Version 0613           On this page, users enter the management information needed to compare the runoff, nitrogen, Phosphorous, sediment loss potentia         Version 0613           On this page, users enter the management system and an alternative conservation management system.         Click <u>InSet</u> to read more about entering Management Information.           Click <u>InSet</u> to read more about entering Management Information.         After you have entered all of the required ( <sup>#</sup> =Required ) information, click the NEXT button to continue.	II, and crop
Feedback Comment on the Nutrient Tracking Tool Report a Problem with NTT	State: Indiana County: Carroll Channel Vegetation Condition Very Good Cood Moderate Poor Very Poor Channel Erodibility Very high High @ Hoderate Low Very low	
	Cropping System* Select an Existina Crooping System Select Cropping System: Salect Cropping System: Select Cropping System: Com a) Cropping System Create / Modfy Croping System Uploaded Copy to Baseline b) Nutrient Management @ Create / Modfy Nutrients Applied c) Tillage Management @ Create / Modfy Nutrients Applied c) Tillage Management @ Create / Modfy Nutrients Applied c) Grazing @	
	Auto Irrigation and Fertigation           Drainage Water Management System	
	Wetlands and Ponds	

Figure 3.2. Selection of pre-existing crop management options

We will then click on the **Continue** button where we will be taken to the Verify Information screen. At this time, check to make sure your input selections correspond to what is shown in Figure 3.3. Once you are comfortable that you have made the correct input selections, click **Continue** to run the NTT calculation tool. The results of this hypothetical example are shown in Figure 3.4.

2	Home Soil M	anagement	NTT Verify	Versions Home Help About Reports	NTT Con
rch USDA			Verify Infor	mation	
er Resources		Verify t	hat your inform	ation is correct.	
k to NRCS Office DA NRCS DA ARS ER dback mment on the Nutrient cking Tool cost a Perblem with NTT	State: County: Weather station: Soil survey area: Siope(%): Area(acres): Management Cropping system selected: Tillage:	Indiana Carroll Carroll County FbB, Fincastle 2 100 Baseline D Corn Conventional	r, Indiana - Starks silt loa	ms, 1 to 3 percent slopes Alternative ① Corn No Till	
	Simulate Appl. of Agricultural limestone	Baseline Yes		<b>Alternative</b> Yes	
	Click the Next button at Report to automatically d	the bottom of th lisplay.	e page to proce	ess your information. Wait for your	Summary

Figure 3.3. Verify Information screen summarizing selected options

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			NIT Vers	ions Home H	alp About NITT	Contact L
Home	Soil Mana	gement	Verify	Reports	eip : Adout NTT	Vers
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Name:						
Description:						
	Annual Re	sults for Nu	trients, Flow, S	ediment, and C	rop Yield	
		12110200	242-407712-0		Reduction	Total fo
Total N	(the last)	Baseline	Alternative	Difference	(%)	Are
Total P	(ibs/ac)	0.45	0.65	0.11	14.5	11
Flow	(in.)	3,67	3.69	-0.02	-0.5	-2
Sediment	(t/ac)	0.4661	0.1702	0.2959	63.5	29.5
Crop Yield						
со	RN(bu/ac)	176	174	-2	-1.1	-20
		Location an	d Additional Sit	e Information		
	State:	Indiana				
	County:	Carroll				
	Weather station:	Carroll 4/	Years Simulatio	n (1960 to 2006	»)	
	Slope(%):	2				
	Soil curvey areas	Carroll Cou	oty Indiana			
	Soil series name:	FbB, Fincas	tle-Starks silt l	pams, 1 to 3 pe	rcent slopes	
		Man	agement Infor	mation		
		Baseline		Alternative		
c	ropping system:	Corn		Corn		
	Irrigation:					
	Tillage:	Convention	al	No Till		
		Structural (	Conservation P	actices Input		
Simulate	Appl. of	Baseline		Alternative		
Sundiaco		Yes		Yes		

Figure 3.4. Summary Report page showing results of NTT calculations for the tillage options Note that, as expected, no-till resulted in lower sediment losses.

### Example 2: Impact of slope:

One of the most well documented and intuitive principles in resource conservation is that the prevailing slope of a field has significant impact on soil and nutrient losses from that field and crop yields on the field. To illustrate this we will use the same example as above but this time we will select the "HkG, Hennepin loam, 30 to70 percent slope" soil series from Carroll County in Indiana (Figure 3.5) after choosing the "Select Specific Soil" option from the NTT main page. We are using a 100-acre field size as before. Click **Continue** to choose the same corn management information as before with Conventional tillage for the baseline and no-till for the alternative scenario. The results are shown in Figure 3.8.



Figure 3.5. Selection of an alternative soil type (Hennepin) with high slope.

#### Nutrient Tracking Tool User's Manual

ļ	ISDA United States Deputiment of Annulture Natural Resources Performation Service
	Agricultural Research Service
4	TIAER
	NIT Versions Home Help About NTT Contact Us
Search USDA	Home Soil Management Verify Reports Version 0613
Go	Management Information
Other Resources	On this page, users enter the management information needed to compare the runoff, nitrogen, Phosphorous, sediment loss potential, and crop
Link to NRCS Office     LISDA NRCS	yield between a baseline management system and an alternative conservation management system.
▶ USDA ARS	Click <u>HERE</u> to read more about entering Management Information.
▶ TIAER	After you have entered all of the required (*=Required ) information, click the NEXT button to continue.
Feedback	State: Indiana County: Carroll
Tracking Tool	
	Channel Vegetation Condition 🔍 Very Good 🔍 Good 🔍 Moderate 🔍 Poor 🔍 Very Poor
	Channel Erodibility 🔘 Very high 🔍 High 🔍 Moderate 🔍 Low 🔍 Very low
	Baseline Alternative
	Cropping System* 🔮
	Select Cropping System: Com
	Select Tillage: No Till
	UbLoad
	Create / Modify No Cropping System
	b) Nutrient Management 🖗
	c) Tillage Management 🔮
	e) Grazing 🚱
	Auto Irrigation and Fertigation
	Drainage Water Management System
	Wetlands and Ponds

Figure 3.6. Selection of crop, nutrient, and tillage options

National States			NTT Ve	rsions Home Help About	NTT Con
arch USDA Go	Home Soil M	anagement V	Verify erify Inform	Reports	
er Resources		Verify tha	t your informa	tion is correct.	
SDA NRCS SDA ARS AER	County: Weather station: Soil survey area: Soil series name: Slope(%): Area(arcs):	Carroll Carroll Carroll County, J HkG, Hennepin I 50	Indiana oam, 30 to 70	percent slopes	
section the Nutrient soking Tool	Management Cropping system selected: Tillage:	Baseline O Corn Conventional		Alternative ① Corn No Till	
	Simulate Appl. of Agricultural limestone	Baseline Yes		Alternative Yes	
	Click the Next button at t	the bottom of the	page to proces	s your information. Wait for your	Summary

Figure 3.7. Verify Information screen prior to simulating scenarios on high slope Brinklow soil.

Research S	ervice				
TTO DE DEPARTMENT	er Ageiculture			utriemi	Trackin
			NTT Vers	ions Home H	elp About NTT
Home	Soil Mana	gement	Verify	Reports	
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Name:					
Description:					
2				1 1 1 C	w 11
	Annual Ke	esuits for Nu	crients, Flow, 5	ediment, and C	Reduction
		Baseline	Alternative	Difference	(%)
Total N	(ibs/ac)	77.77	85.79	-8.02	-10.3
Total P	(ibs/ac)	9.18	13.32	-4.14	-45.1
Flow	(in.)	9.36	9.50	-0.14	-1.5
Sediment	(t/ac)	9.7559	8.8470	0.9089	9.3
Crop Yield					
CC	RN(bu/ac)	162	158	-4	-2.5
Crop Yield CORN(Subsc) 162 158 -4 Location and Additional Site Information					
	State:	Indiana			
	Weather stations	Carroll 47 V	and Cimulatia	a (1960 to 200	c)
	Clone(0/a)	50	ears onnulatio	1 (1500 10 200	5)
	Area - Acres:	100			
	Soil survey area:	Carroll Cou	ntv. Indiana		
	Soil series name:	HkG, Henne	pin loam, 30 t	o 70 percent sl	opes
		Mana	gement Infor	mation	10 C
		Baseline		Alternative	
c	Cropping system:	Corn		Corn	
	Irrigation:				
	Tillage:	Convention	al	No Till	
		Structural C	onservation Pr	actices Input	
		Baseline		Alternative	
Cinclet	And of				

Figure 3.8. Summary Report screen for simulations on Hennepin soil with 50% slope

Note that all sediment and nutrient losses are higher with this new soil type – likely because the average slope is 50%, much higher than the soil used in Example 1. Now click the Soil tab at the top of the Summary Report screen to go back to the Soil selection screen and manually enter 2% as the slope instead of 50% (Figure 3.9). Click **Continue** three times to rerun the same management options and get back to the Summary Report page. Your Verify Information screen should look like Figure 3.10. The results presented on the Summary Report page are as shown in Figure 3.11. It is obvious that the reduction in slope led to increased crop yields and reduced sediment for both the baseline and alternative scenarios. The alternative scenario with no-till is still projected to result in lower sediment losses. However, both scenarios show lower sediment and nutrient losses relative to the high-slope situation.

Other Resources USDA NRCS Office USDA NRCS USDA ARS USDA ARS TTAR Feedback Comment on the Nubrient Tracking Tool Report a Problem with NTT	On this page, there are two available options. These two options are based on the users selection in the previous page: OPTION 1. Soil Survey Map was selected : Enter the farm owner and project information in the allocated space OPTION 2. Select Specific Soil was selected: 1) Enter the farm owner and project information in the allocated space , 2) Select the soil texture from the list of available soils within the selected county, 3] Enter the farm area (ac), 4) modify slope of the selected (if needed), 5) input the initial soil P (ppm), model default is 20 ppm, which can be changed by the user to any value from 0.1 to 500, and 6) modify the soil physical and chemical characteristics of the top layer. Click <u>HERE</u> to read more about entering soil Information. After you have entered all of the required (*=Required ) information, click the NEXT button to continue.
	Enter your Soil information.
	State: Indiana County: Carroll
	Project Name 🚱
	Project Description
	Soil area* 🚱 Carroll County, Indiana 💌
	Soil name* 🕐 HkG, Hennepin Ioam, 30 to 70 percent slopes
	Area(acres)* 🚱 100
	Max. Depth(in.)* 2 59.84
	Slope(%)* 🧐 🛛
	Soil P (ppm)* 20.00
	Sand (%)* () 37
	Silt (%)* <b>3</b>
	Organic Matter (%)* 🔮 4.3
	PH* 🔮 7.2
	Pade Costinua

Figure 3.9. Manual editing of soil information to enter 2% slope for Hennepin soil

	Home Soil M	i Ianagement Verify	ITT Versions Home Help About Reports	NTT Cont
Go		Verify Int	formation	
er Resources		Verify that your inf	ormation is correct.	
ik to NRCS Office IDA NRCS IDA ARS	State County Weather station Soil survey area Soil series name	: Indiana : Carroll : Carroll : Carroll County, Indiana : HkG, Hennepin Ioam, 30 ti	o 70 percent slopes	
ACK	Slope(%)	: 2		
entrack mment on the Nutrient acking Tool sport a Problem with NTT	Management Cropping system selected Tillage	Baseline : Corn : Conventional Baseline	Alternative  Corn No Till Alternative	
	Simulate Appl. of Agricultural limestone	Yes	Yes	
	Click the Next button at Report to automatically	the bottom of the page to pr display.	ocess your information. Wait for your	Summary

Figure 3.10. Verify Information screen showing input selections but with 2% slope

Image: Name:       Image: Name:       Name:         Sources       Sources       Sources       Sources         Starch USDA       Go       Management       Verify       Reports         Summary Report       Downlead Report See Project Annual/Mandhin Ang Graphe May, Mag. E         Starch USDA       Sources       Summary Report         Star to NRCS Office       Jasa       Downlead Report See Project Annual/Mandhin Ang Graphe May, Mag. E         Star to NRCS Office       Sources       Reduction       Total         Star to NRCS Office       Baseline       Alternative       Difference (%0)         Star to NRC Not Set to NATION       Total N       (main 2000)       Soid       Soid         Sedment on the Nutrient Set to National Site Information       State:       Indiana       Soid       Soid         Sediment (Nex)       0.7349       0.3157       0.4192       57.0       Soid         Contry: Carroll       Weather station:       Carroll 47 Years Simulation (1960 to 2006)       Soid survey area:       Cont         Soid survey area:       Carroll County, Indiana       Soid survey area:       Corn       Corn         Maagement Information       Baseline       Alternative       Marcanatice         Marca Acres:       100       Soid se	2				K		1110		Service	griculture servation ervice	artment of A CES Corre search S
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Name: Description: Description: SDA RCS SDA R											10000
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Annual Results for Nutrients, Flow, Sediment, and Crop Yield Reduction Tot Baseline Alternative Difference (%) Total N (184/842) 15.27 17.94 -2.67 -17.5 - Total P (184/842) 1.34 1.29 0.05 3.7 Total P (184/842) 1.34 1.29 0.05 3.7 Flow (18.) 5.09 5.13 -0.04 -0.8 Sediment (19.2) 0.7349 0.3157 0.4192 57.0 Crop Yield CORN(184/842) 171 171 0 0.0 Location and Additional Site Information State: Indiana County: Carroll Weather station: Carroll Weather station: Carroll Weather station: Carroll Additional Site Information Siol survey area: Carroll County, Indiana Soil survey area: Corron Corn Irrigation: Tillage: Conventional No Till Structural Conservation Practices Input Baseline Alternative											Description
In the Nutrient of the			field	, and Crop	edimen	ts, Flow, S	Nutrie	sults	nnual Re	A	
Ite Notivent In Notivent Total N         Testal N         <	tal for	То	duction	Re							
Under with NTT         Total N         (Max/MC)         15.27         17.94         -2.67         -17.5         - -17.5           Total P         (Max/MC)         1.34         1.29         0.05         3.7         - 	Area		(%)	ence	Diffe	ernative	A	Base			
Total P         (Maxinet)         1.34         1.29         0.05         3.7           Flow         (m.)         5.09         5.13         -0.04         -0.8           Sediment         (Maxinet)         0.7349         0.3157         0.4192         57.0           Crop Yield         0.00         171         171         0         0.0           Corp Yield         Cornol and Additional Site Information         50.00         171         171         0         0.0           State:         Indiana         County:         Carroll         County:         Carroll         Area           Weather station:         Carroll         Carroll         Years Simulation (1960 to 2006)         Siole(%):         2           Area - Acres:         100         Soil survey area:         Carroll County, Indiana         Soil series name:         HKG, Hennepin Ioam, 30 to 70 percent slopes           Soil series and:         Krot, Hennepin Ioam, 30 to 70 percent slopes         Management Information         Soil series and:         Soil series a	-267.0	8	-17.5	2.67		17.94	rii -	1		(lbs/ac)	fotal N
Kinitian         Sediment         (%)         5.09         5.13         -0.04         -0.8           Sediment         (%)         0.7349         0.3157         0.4192         57.0           Crop Yield          0.7349         0.3157         0.4192         57.0           Cop Yield          171         171         0         0.0           CORN(%)         171         171         0         0.0           State:         Indiana           County:         Carroll           Weather station:         Carroll 47 Years Simulation (1960 to 2006)         Soil Survey area:           Soli survey area:         100         Soil series name:         HKG, Hennepin loam, 30 to 70 percent slopes           Management Information         Baseline         Alternative         Management Information           Irrigation:           Irrigation:         Tillage:         Corn         Corn           Irrigation:           Tillage:         Conventional         No Till	5.0		3.7	0.05		1.29	ł.			(lbs/ac)	Total P
Sediment     (rec)     0.7349     0.3157     0.4192     57.0       Crop Yield     CORN(teqaec)     171     171     0     0.0       Location and Additional Site Information       State:     Indiana       County:     Carroll       Weather station:     Carroll 47 Years Simulation (1960 to 2006)       Signe(%):       Area - Acrees:       Management Information       Soil survey area:       Carroll County, Indiana       Soil survey area:       Soil survey area:       Carroll County, Indiana       Soil series name:       HkG, Hennepin Ioam, 30 to 70 percent slopes       Management Information       Baseline       Alternative       Corventional       Tirlage:       Conventional       No Till	-4.0		-0.8	0.04		5.13	)			(in.)	low
Crop Yield       CORN(№/∞)     171     171     0     0.0       State:     Indiana       County:     Carroll       Weather station:     Carroll 47 Years Simulation (1960 to 2006)       Slope(%):       Slope(%):       Carroll County, Indiana       Soil series name:       Management Information       Soil series name:       KRG, Hennepin Ioarn, 30 to 70 percent slopes       Management Information       Coropping system:       Coron       Irrigation:       Tillage:       Conventional       No Till       Structural Conservation Practices Input       Baseline       Alternative	41,92		57.0	4192	0	0.3157	•	0.7		(t/ac)	Sediment
CORN(Newe)     171     171     0     0.0       Location and Additional Site Information       State: Indiana       County: Carroll       Weather station: Carroll 47 Years Simulation (1960 to 2006)       Siope(%): 2       Area - Acres: 100       Soil survey area: Carroll County, Indiana       Interview       Management Information       Baseline       Alternative       Tillage: Conventional       Alternative											Crop Yield
Location and Additional Site Information       State:     Indiana       County:     Carroll       Weather station:     Carroll 47 Years Simulation (1960 to 2006)       Slope(%):     2       Area - Acres:     100       Soil survey area:     Carroll County, Indiana       Soil series name:     HkG, Hennepin Ioam, 30 to 70 percent slopes       Management Information     Baseline       Cropping system:     Corn       Tirlage:     Conventional       No Till     Structural Conservation Practices Input       Baseline     Alternative       Baseline     Alternative	0		0.0	0		171				RN(bu/ac)	CC
State: Indiana County: Carroll Weather station: Carroll 47 Years Simulation (1960 to 2006) Slope(%): 2 Area - Acres: 100 Soil servey area: Carroll County, Indiana Soil series name: HKG, Hennepin Ioam, 30 to 70 percent slopes Management Information Baseline Alternative Corn Irrigation: Corn Corn Irrigation: Tillage: Conventional No Till Structural Conservation Practices Input Baseline Alternative				nation	e Infor	ditional Sit	and A	Locat			
County: Carroll Weather station: Carroll 47 Years Simulation (1960 to 2006) Slope(%): 2 Area - Acres: 100 Soil survey area: Carroll County, Indiana Soil series name: HkG, Hennepin Ioam, 30 to 70 percent slopes Management Information Baseline Alternative Cropping system: Corn Corn Irrigation: Tillage: Conventional No Till Structural Conservation Practices Input Baseline Alternative								India	State:	1.8	
Weather station:     Carroll 47 Years Simulation (1960 to 2006)       Slope(%):     2       Area - Acres:     100       Soil survey area:     Carroll County, Indiana       Soil series name:     HKG, Hennepin Ioam, 30 to 70 percent slopes       Management Information     Baseline       Alternative     Corn       Irrigation:     Corn       Tillage:     Conventional       No Till     Structural Conservation Practices Input       Baseline     Alternative							1000	Carro	County:	•	5
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Agricultural limestone: Yes Yes					Yes			Yes	one:	a Appl. of ural limesto	Simulate Agricult

Figure 3.11. Summary Report screen showing results for Hennepin soil with 2% slope.

### REFERENCES

- Parton, W. J. 1996. The CENTURY model. In: D. S. Powlson, P. Smith, and J. U. Smith, (Eds.), Evaluation of soil organic matter models using existing long-term datasets, Springer-Verlag, Berlin, Germany, pp. 283-293.
- Shaffer, M.J., A.D. Halverson and F.J. Pierce. 1991. Nitrate leaching and economic analysis package (NLEAP):model description and application. In Managing Nitrogen for Groundwater Quality and Farm Profitability. Eds. Follett et al., pp 285-322. Soil Science Society of America, Madison, Wisconsin.
- Williams, J.R., J.G. Arnold, and R. Srinivasan. 2000. "The APEX model." BRC Report No. 00-06, Oct. 2000. 121 P.