DW/L-THIA Sediment Transport Model Training Workshop for the Burns Ditch and Trail Creek Watersheds

Portage, Indiana
December 19, 2006

Co-sponsored by: U.S. Army Corps of Engineers, Chicago District and the Northwestern Indiana Regional Planning Commission
Assisted by: Great Lakes Commission

Welcome and Introductions ***Dan Gardner, NIRPC***

Gardner opened the workshop by welcoming the participants and highlighting several related initiatives currently underway at the Northwestern Indiana Regional Planning Commission (NIRPC). These include a Watershed Management Framework Plan, the Marquette Visioning project to recapture the Indiana shoreline for public access, a partnership with Chicago Wilderness, and additional flood control and reclamation projects within northwestern Indiana. Additional information on these efforts is available by contacting Gardner at (219) 763-6060 or dgardner@nirpc.org.

Gardner then introduced representatives from the U.S. Army Corps of Engineers (USACE), the Great Lakes Commission (GLC), Purdue University, and Michigan State University (MSU) that would be leading the remainder of the day's sessions. (See Appendix A for a copy of the workshop agenda.)

Introduction to the Great Lakes Tributary Modeling Program ***Jan Miller, USACE***

Miller briefly described the authority and purpose of the Great Lakes Tributary Modeling Program, from which the funding was provided to conduct the modeling effort for the Burns Ditch and Trail Creek watersheds. He presented several examples of applications of completed tributary models and highlighted the regional applicability of the program for decision-making with respect to land use planning, conservation and pollution prevention. Workshop participants may view the Great Lakes Tributary Modeling Program website (www.glc.org/tributary) to learn more about the program and other completed watershed projects.

Workshop Objectives ***David Bucaro, USACE Chicago***

Bucaro outlined the schedule for the day and provided an overview of the project website (http://glc.org/tributary/models/burns-trail.html), including relevant meeting summaries from earlier phases of the project. The project website is intended to serve as a point of entry for accessing the model created for the Burns Ditch and Trail Creek watershed communities and for disseminating future information and announcements specific to this project.

Bucaro then asked the participants to introduce themselves. A total of 34 participants were in attendance at the workshop, including representatives from the Great Lakes Commission (GLC); Indiana Department of Environmental Management (IDEM); Indiana Department of Natural Resources (IDNR); Integrated Environmental Solutions; LaPorte County; Little Calumet River Basin Commission; Michigan City Port Authority; Michigan State University (MSU); Northwesterrn Indiana Regional Planning Commission (NIRPC); Porter County; Purdue University; Purdue University – IL/IN Sea Grant; Save the Dunes Conservation Fund; Save the Dunes Council; Town of Chesterton; U.S. Environmental Protection Agency Region 5 (EPA R5); U.S. Army Corps of Engineers (USACE) Chicago District and the Great Lakes and Ohio River Division. A participant list is available in Appendix B.

Finally, Bucaro highlighted the objectives for the day, which included:

- Introduce the Burns Ditch and Trail Creek Water Management System, demonstrate its functionality and discuss its limitations;
- Provide an adequate opportunity for hands-on training; and
- Obtain feedback from workshop participants and engage in a dialogue on what worked well and what needs to be improved with respect to the model and the training workshop.

Introduction to the Digital Watershed and Long-Term Hydrologic Impact Analysis (L-THIA) Tool ***Bernie Engel, Purdue University***

Engel first presented an overview of the tool and its capabilities to address sedimentation issues within a watershed setting. L-THIA is a tool that was developed by researchers at Purdue University to predict and analyze changes in runoff, recharge, and nonpoint source pollution (including sediment) in urban settings resulting from past or proposed land use changes. L-THIA results are intended to provide insight into the relative hydrologic impacts of different land use scenarios, and can be used to generate community awareness of potential long-term problems and support physical planning aimed at minimizing disturbance of critical areas.

Engel noted that the objective of the tool for this project was to create web-based capabilities to help quantify impacts of land management decisions and best management practices (BMPs) on sedimentation within the focus area of Burns Ditch and Trail Creek. He then previewed a few examples of uses of the tool, including assessments of both structural and management-based practices and erosion and sedimentation changes associated with location-specific practices.

Engel talked briefly about the science behind the tool as a function of rainfall, soil properties, slope length and steepness, land cover and land use, and management practices in the form of BMPs. He noted that users of the tool can manipulate several of these factors within the model such as land use changes, changes in land management, and the implementation of BMPs to observe related changes in erosion and sedimentation. Engel also explained that this tool uses the Revised Universal Soil Loss Equation (RUSLE) and a delivery estimate within the specific watershed to estimate sedimentation in a manner that reflects the types of erosion that typically occurs in upland environments, rather than gully erosion.

Demonstration of L-THIA and Digital Watershed ***Tong Zhai, Purdue University and Yi Shi, MSU***

Zhai then presented one way that users might access and utilize the tool directly from the Purdue L-THIA website (http://danpatch.ecn.purdue.edu/~eqip/erosion/). He introduced the various functions of the tool, such as delineating a subwatershed or other area of interest and identifying peak runoff, and then walked the participants through a sample exercise to learn how to operate the tool. Additional documentation for specific factors and calculations within the model is available on the L-THIA website (www.ecn.purdue.edu/runoff/index.html).

Also included in the enhanced watershed tool for the Burns Ditch and Trail Creek watersheds is the SedSpec (Sediment and Erosion Control Planning, Design and Specification Information and Guidance) model. SedSpec is the complement to L-THIA and is used to calculate peak runoff rates and associated erosion issues on a particular site. SedSpec can also aid in the preliminary design of erosion control structures and is best suited for smaller watersheds.

Shi and others then presented a brief demonstration of the Digital Watershed Tool for the workshop participants. The Digital Watershed database contains all regulated facilities, river networks, digital elevation models (DEMs), state soil and other data layers, and is searchable by address, city, zip code, or by using a locator map. Within this enhanced web interface, users will be able to zoom from an 8-digit to a 14-digit watershed scale within the Burns Ditch and Trail Creek watersheds to view more detailed information and finer resolution.

Hands-on Training using DW/L-THIA ***Rick Farnsworth, Purdue University***

Farnsworth then led the hands-on training portion of the workshop, allowing users to follow along as he explored various activities and scenarios that might commonly be conducted by model users. For additional training, a handout was provided to workshop participants containing two training exercises, one from each of the Burns Ditch and Trail Creek watersheds (see Appendix C). More details on the DW/L-THIA model can be obtained by contacting Farnsworth at 765-496-3245 or rlfarnsw@purdue.edu.

Discussion of First Impressions ***David Bucaro, USACE Chicago***

After spending some time working with the model in a group setting, the workshop participants were asked to provide feedback on the model, including what worked well and what areas need to be improved to

enhance the usability of the model for future users. The following comments were recorded during the facilitated group discussion:

- Add ecosystem function
- No double clicking (browser/software compatibility)
- Add additional BMPs types and transitional land uses to the model:
    - constructed wetlands
    - rooftop gardens
    - porous pavement
    - grazing rotations for pasture areas
    - critical area planting (blanket vegetation/land cover)
    - road development
    - low impact development as a land use category
- Add capability to change crop rotations for agricultural areas
- Subwatersheds versus sewersheds (need better delineation data in urban areas, Michigan City)
- Highly erodible soil areas layer in L-THIA
- Have Java program download on site (instead of linking to Java site)
- "Allow pop-ups" note
- Help links throughout the windows and/or FAQs or flowchart to show progress through the site
- Move the Apply and Save buttons up on the page or combine the two so users don't choose one or the other
- Website needs updating / accuracy issues (New Trail Creek Watershed Plan is available)
- Include "hot zones" for contamination clean-up sites (or former sites) – but need to make sure this is accurate so that misinformation is not spread or harmful to planning
- Incorporate U.S. EPA STORET data on pollution discharges and flows

To gain additional feedback, Bucaro asked participants to talk about how they plan to use the tool. Responses included:

- Watershed management planning and implementation in target areas
- Quantify changes in water quality and evaluate nutrient reductions from various BMPs (using nonpoint source results from L-THIA) to identify economic value and support cost/benefit calculations (Note: similar capability available from tool on Purdue's EQIP site: http://danpatch.ecn.purdue.edu/~eqip/watershedmanageplan/)

Bucaro also prompted participants to provide feedback on the training workshop, itself. Participants appreciated the number of instructors available to help guide the individual training and suggested that a follow-up session be planned to gather feedback once the tool has been in use for a short while. Additional coordination and training sessions were also suggested for interested users that were unable to attend this initial training session. Several of the participants had concerns about keeping the data in the tool and on the project website up-to-date.

At the close of the feedback session, Bucaro encouraged the workshop participants to complete their feedback forms and to contact him at (312) 846-5583 or David.F.Bucaro@usace.army.mil with any future feedback as the use of the tool continues to evolve. A copy of the evaluation form and a summary of feedback provided by workshop participants via the evaluation form are available as Appendices D and E, respectively.

Please visit the webpage for the Trail Creek and Burns Ditch project (http://glc.org/tributary/models/burns-trail.html) for future information and announcements specific to this project. Presentations from the day's workshop are available at http://danpatch.ecn.purdue.edu/~eqip/erosion/.

Summary submitted by Laura E. Kaminski, Research Associate, Great Lakes Commission (734-971-9135, laurak@glc.org).

Appendix A

DW/L-THIA Sediment Transport Model Training Workshop for the Burns Ditch and Trail Creek Watersheds

December 19th, 2006 @ 9:30 CST

US Army Corps of Engineers ®
Chicago District

Co-sponsored by: U.S. Army Corps of Engineers, Chicago District
and the Northwestern Indiana Regional Planning Commission
Assisted by: Great Lakes Commission

Location: Northwestern Indiana Regional Planning Commission
6100 Southport Road
Portage, Indiana 46368
(219) 762-1653

9:30 a.m.	Welcome, Introductions and Workshop Objectives	David Bucaro / Dan Gardner
10:00 a.m.	Review of Sedimentation Issues and Problems in the Trail Creek and Burns Ditch Watersheds as Identified during the November 2005 Workshop at NIRPC	David Bucaro
10:30 a.m.	Introduction to the DW/L-Thia web-based tool. Model background, data, uses, limitations.	Michigan State University / Purdue University
11:15 a.m.	Live demonstration of DW/L-Thia utilizing a case example.	MSU/Purdue
12:00 p.m.	Lunch	(A buffet style lunch will be served)
1:00 p.m.	Hands-on Training using DW/L-Thia with personal PC. Training material and exercises for both Burns Ditch and Trail Creek watersheds will be utilized during this session. **PLEASE BRING A LAPTOP WITH WIRELESS OR WIRED INTERNET CONNECTION CAPABILITIES**	USACE / MSU / Purdue / NIRPC
2:30 p.m.	Discussion of First Impressions, Survey Form Provided	All
3:00 p.m.	Adjourn	

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Appendix B

DW/L-THIA Sediment Transport Model Training Workshop for the Burns Ditch and Trail Creek Watersheds

Northwestern Indiana Regional Planning Commission
December 19, 2006

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Appendix C

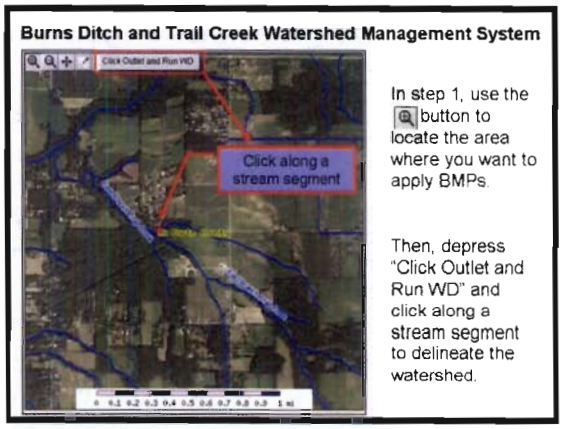
Trail Creek and Burns Ditch Training Exercises Handout

TRAIL CREEK WATERSHED EXAMPLE

Sediment is a major problem in the Trail Creek watershed. For agricultural lands, best management practices such as conservation tillage, grass waterways, and sediment basins can reduce on-site erosion or trap the flow of eroded soil, thus preventing it from reaching streams and becoming unwanted sediment. The Burns Ditch and Trail Creek Watershed Management System (http://danpatch.ecn.purdue.edu/~eqip/erosion/) allows you to zoom to agricultural areas, delineate a watershed, apply one or more agricultural best management practices (BMPs) and receive a report that summarizes the change in sediment loading.

Go to the System's homepage and click on ***"Burns Ditch and Trail Creek Web-GIS Erosion and Hydrologic Modeling System."*** Work through the steps that follow.

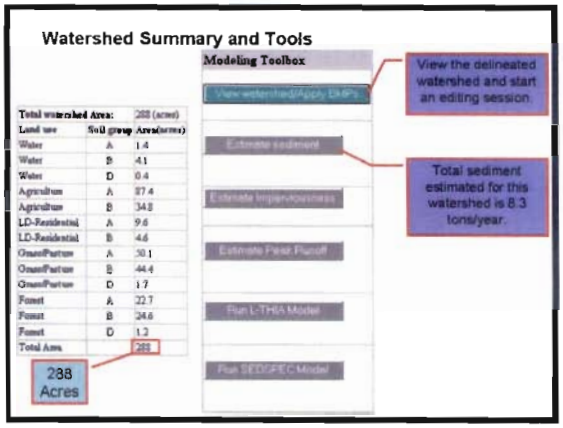
1. Use the "zoom to" tool or a nearby address to locate your area of interest and delineate the watershed encompassing the area.



2. Review the information displayed on the "Watershed Summary and Tools" page. Click "Estimate sediment" for an estimate of current sediment loading. Click "Estimate Imperviousness" to see a percentage estimate of the watershed covered by concrete, housing, and other impervious surfaces.

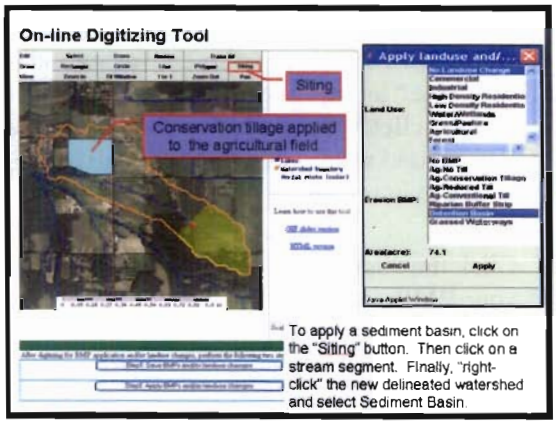
3. Click the "View Watershed/Apply BMPs" button to view the delineated watershed.

4. Click the "Online Digitizing" button to open an editing session and apply BMPs.



5. Apply BMPs such as riparian buffers and no-till, conservation tillage, and reduced till to agricultural fields. Use the "Polygon," "Rectangle," or "Circle" buttons to outline the agricultural field or area. **"Right-click"** inside the outlined area to open the Land use/BMP box. For agricultural fields, you must select "Agricultural" in the Land Use area followed by a tillage BMP in the Erosion BMP area.

6. Apply BMPs such as sediment basins, grass waterways, and riparian buffers. **"Right-click"** and select a structural practice such as sediment basin, riparian buffer, or grassed waterway.



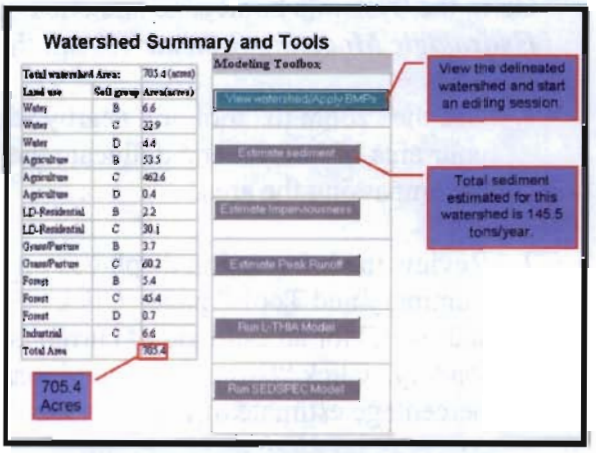
7. Click the "Save" and "Apply" buttons after you have added your BMPs.

8. Review the information displayed on the "Watershed Summary and Tools" page. Click "Estimate sediment" for an estimate of current sediment loading.

BURNS DITCH WATERSHED EXAMPLE

Sediment is a major problem in the Burns Ditch watershed. For agricultural lands, best management practices such as conservation tillage, grass waterways, and sediment basins can reduce on-site erosion or trap the flow of eroded soil, thus preventing it from reaching streams and becoming unwanted sediment. The Burns Ditch and Trail Creek Watershed Management System (http://danpatch.ecn.purdue.edu/~eqip/erosion/) allows you to zoom to agricultural areas, delineate a watershed, apply one or more agricultural best management practices (BMPs) and receive a report that summarizes the change in sediment loading.

Go to the System's homepage and click on ***"Burns Ditch and Trail Creek Web-GIS Erosion and Hydrologic Modeling System."*** In the example below, a riparian buffer, grassed waterway, and sediment basin were added to reduce sediment. The example and steps outlined below show you how to use the System.



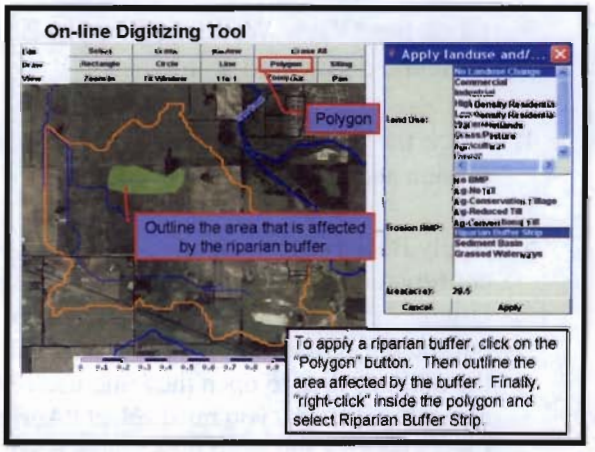
1. Use the "zoom to" tool or a nearby address to locate your area of interest and delineate the watershed encompassing the area.

2. Review the information displayed on the "Watershed Summary and Tools" page. Click "Estimate sediment" for an estimate of current sediment loading. Click "Estimate Imperviousness" to see a percentage estimate of the watershed covered by concrete, housing, and other impervious surfaces.

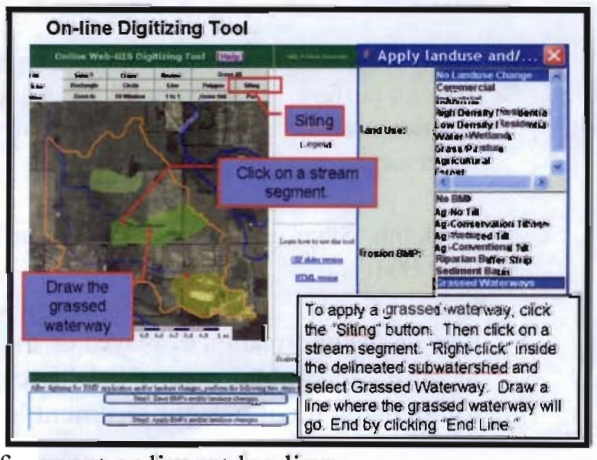
3. Click the "View Watershed/Apply BMPs" button to view the delineated watershed.

4. Click the "Online Digitizing" button to open an editing session and apply BMPs.

5. Apply BMPs such conservation tillage and riparian buffer strips. For a riparian buffer, use the "Polygon," button to outline an area that will be impacted by it. **"Right-click"** inside the outlined area to open the Land use/BMP box. Select "Riparian Buffer Strip."



6. Apply BMPs such as sediment basins and grass waterways. Click the "Siting" button and then click a stream segment. **"Right-click"** the new subwatershed and select the practice. For grassed waterways, you will need to add the grass waterway on the map screen.



7. Click the "Save" and "Apply" buttons after you have added your BMPs.

8. Review the information displayed on the "Watershed Summary and Tools" page. Click "Estimate sediment" for an estimate of current sediment loading.

Appendix D

Workshop Evaluation Form

Evaluation of the ACOE Sediment Runoff Predictive Tool and Training Session
December 19th, 2006 at NIRPC, Portage, Indiana

Indicate the organizational unit that you are representing as well as your job title:

Training Material

How well did the training meet its stated objectives (not at all, partially, fully)? Why?

Please rate the overall training materials on content (excellent, good, fair, poor)
and presentation (excellent, good, fair, poor) for both the Burns Ditch and Trail Creek watersheds.

What did you like most and least about the training exercises?

Web Site Design and Content

1 = Poor 5 =Exceptional

1 2 3 4 5 Navigability is good. Links are clearly labeled. Can move from page to page easily.
1 2 3 4 5 This site offers interactivity. The visitor is engaged using the site.
1 2 3 4 5 This site uses appropriate page format. Pages are not inordinately long.
1 2 3 4 5 Can easily find information
1 2 3 4 5 This site is aesthetically appealing. Good use of graphics and color.

1 2 3 4 5 Additional resource links are included.
1 2 3 4 5 Information is useful
1 2 3 4 5 Rich content and will likely be revisited.
1 2 3 4 5 How this website compares in content to similar websites
1 2 3 4 5 Please indicate the usefulness of the Watershed Tools and Summary?

1 2 3 4 5 **View watershed/Apply BMPs**
Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.

1 2 3 4 5 **Estimate sediment**
Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the Revised Universal Soil Loss Equation (RUSLE) and the sediment delivery ratio approach.

1 2 3 4 5 **Estimate Imperviousness**
Use this tool to estimate percent imperviousness in the watershed.

1 2 3 4 5 **Estimate Peak Runoff**
Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.

1 2 3 4 5 **Run L-THIA Model**
The Long-Term Hydrologic Impact Assessment Model estimates average annual runoff and nonpoint source pollutant levels in the watershed.

1 2 3 4 5 **Run SEDSPEC Model**
The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

How would use the Watershed Tools and Summary in your workplace?

View watershed/Apply BMPs

Estimate sediment

Estimate Imperviousness

Estimate Peak Runoff

Run L-THIA Model

Run SEDSPEC Model

Other Comments:

Thank you for your feedback! (Optional) Your name and/or email address: _____

Return survey to:
Jon Bartholic
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101A Manly Miles Building
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Appendix E

Summary of Feedback from Workshop

Evaluation of the ACOE Sediment Runoff Predictive Tool and Training Session
December 19th, 2006 at NIRPC, Portage, Indiana

Indicate the organizational unit that you are representing as well as your job title:

Received 7 evaluations

Training Material

How well did the training meet its stated objectives (not at all, partially, fully)? Why?

4/7 responses = fully
2/7 responses = good
1/7 response = partially

Please rate the overall training materials on content (excellent, good, fair, poor)
and presentation (excellent, good, fair, poor) for both the Burns Ditch and Trail Creek watersheds.

Average score

Content	***4/7 responses = excellent***	***Presentation***	***4/7 responses = excellent***
	2/7 responses = good		***1/7 responses = good***
	1/7 response = fair		***2/7 response = fair***

What did you like most and least about the training exercises?

Most:

1 Being able to see real-life examples being shown during the discussion
1 instructor helpfulness
1 new tools
1 real application
1 great hands-on training with plenty of one-on-one assistance when needed

Least:

1 need more outreach to watershed planners
1 some of the on-screen materials were too small or too dark to me

Web Site Design and Content

1 = Poor 5 =Exceptional

Mean score

4.0 Navigability is good. Links are clearly labeled. Can move from page to page easily.
4.0 This site offers interactivity. The visitor is engaged using the site.
4.0 This site uses appropriate page format. Pages are not inordinately long.
4.0 Can easily find information
4.1 This site is aesthetically appealing. Good use of graphics and color.

4.0 Additional resource links are included.
4.0 Information is useful
4.2 Rich content and will likely be revisited.
4.1 How this website compares in content to similar websites
4.1 Please indicate the usefulness of the Watershed Tools and Summary?

4.3 **View watershed/Apply BMPs**
Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.

4.0 **Estimate sediment**
Use this tool to estimate long-term average annual sediment yield (tons/year) from the watershed using the Revised Universal Soil Loss Equation (RUSLE) and the sediment delivery ratio approach.

4.2 **Estimate Imperviousness**
Use this tool to estimate percent imperviousness in the watershed.

4.0 **Estimate Peak Runoff**

Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.

4.0 **Run L-THIA Model**

The Long-Term Hydrologic Impact Assessment Model estimates average annual runoff and nonpoint source pollutant levels in the watershed.

3.75 **Run SEDSPEC Model**

The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

How would use the Watershed Tools and Summary in your workplace?

View watershed/Apply BMPs
1 Target specific problems
1 This can provide a "first peak" into land use changes

Estimate sediment
1 Very generic; best guess estimation
1 related to BMPs—before and after

Estimate Imperviousness
1 Look at and compare drainage calculations for new projects
1 to protect coldwater fishery

Estimate Peak Runoff
1 Look at and compare drainage calculations for new projects
1 calculate rough number for peak discharge
1 Impacts on flooding and water quality impacts

Run L-THIA Model
1 Would like ability to change assumption to consider ag. land with land application of manure
1 Changing land use—for watershed planning

Run SEDSPEC Model
1 To identify areas of concern

General comments about above question:
1 We will use all of these since my job entails implementing nonpoint control program in coastal areas and assisting with watershed management planning.

1 Needs: X,Y point input (e.g. add/work on known GPS points); acres of polygon shown while digitize (e.g. I know I need a 120 acre change, how big is that box); show scale bar while digitizing; add sewersheds; add impervious surface from NLCD; waterbodies/streams need work. Landuse? ; Water table vs. sediment basin depth; fix up download page; more BMPs add known amounts of anhydrous added at max rate to NPS results

1 note sure yet—too new to the business

Other Comments:

1 Add more structural and non-structural BMP choices--- EPA has a stormwater BMP database. Chesterton uses this and Indiana's drainage handbook for guidance in appraising (?) certain BMPs for projects in town. What about adding the ability to choose several BMPs for one site?
To account for infrastructure such as storm sewers and the ability to carry stormwater farther and faster, each municipality will have to have solid mapping of inlets, manholes, etc. This could make incorporation of this model very costly!

1 Sewer-shed considerations; way to change assumptions of N-loss from L-THIA (e.g land application of manure)

1 Model doesn't consider the sewershed of urban areas (such as trail creek); Thermal impact; more BMPs i.e. two-stage ditch

1 Conversion of ag land to urban development is one of out biggest threats. For future updatesit would be nice to incorporate various development types (traditional, LID, conservation design, etc) to provide planners with additional discussion. Make tools—currently choices are low density and high density. Also expand BMP options if possible. Great job!

Thank you for your feedback! (Optional) Your name and/or email address: _____

Return survey to:
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