Host: Toledo Metropolitan Area Council of Governments

Workshop by: Institute of Water Research – Michigan State University and Department of Agricultural and Biological Engineering, Purdue University.

# HIT Exercise

Presenter:
Glenn O'Neil
Institute of Water Research – Michigan State University

Introduction (slides) to HIT:    http://35.9.116.206/hit2/support/hit_overview.pptx
This document:                         http://35.9.116.206/hit2/support/hit_tutorial.pdf

This document is a hands-on exercise and will address a series of questions related to one topic.  The document will explain how to use the High Impact Targeting (HIT) System to address the questions.
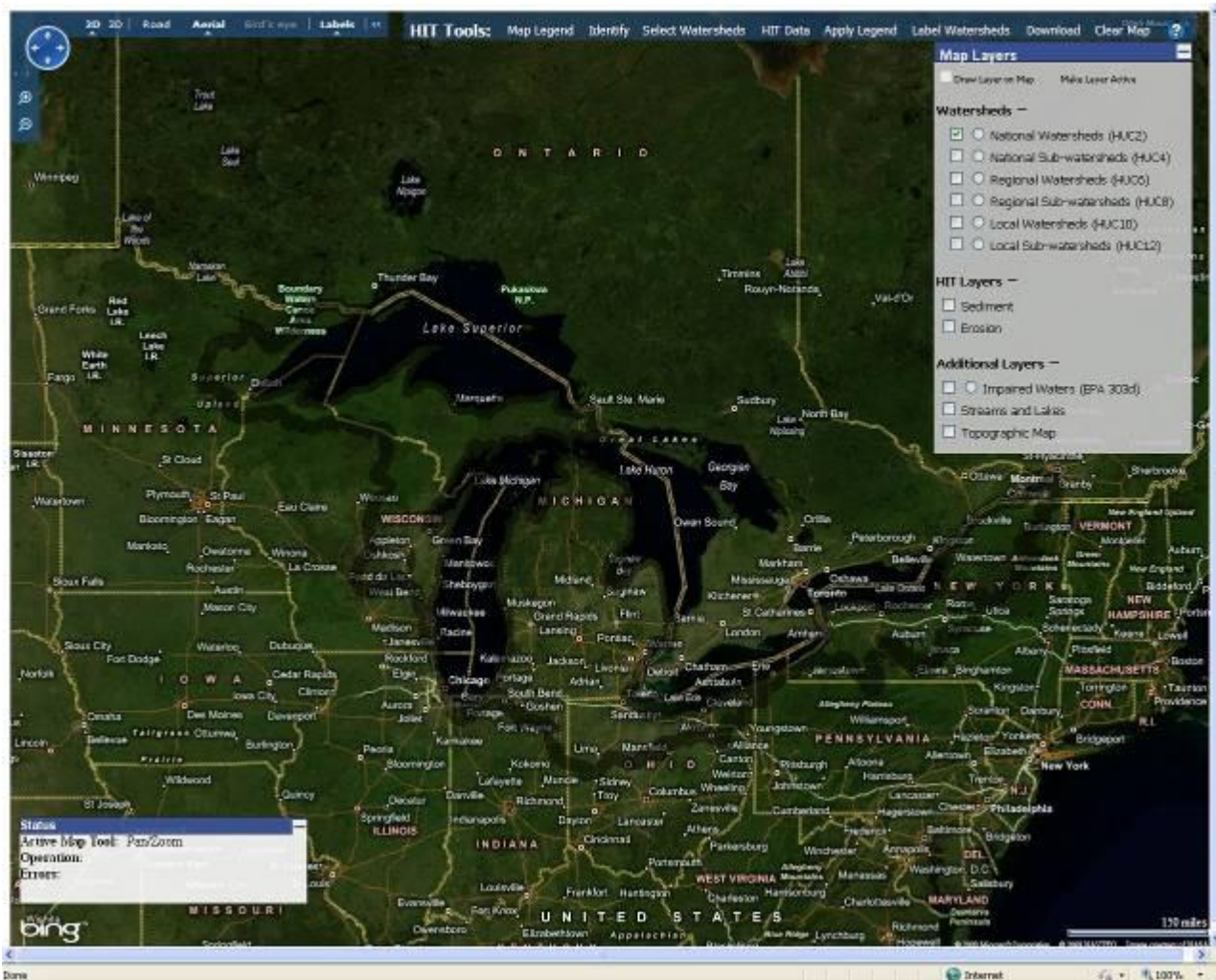
**Topic**: The Lucas County Soil and Water Conservation District has received funding ($20,000) from EPA's 319 program (http://www.epa.gov/nps/cwact.html) to place Best Management Practices (BMPs) on farmlands of the Swan Creek River Watershed in order to reduce erosion and sediment loading.

A) In what sub-basins of the Swan Creek River Watershed would the targeting of agricultural BMPs yield the maximum benefit per dollar spent?
B) Which combination of BMPs will yield the maximum benefit in the targeted sub-watersheds?
C) What fields within the targeted sub-watersheds should be prioritized for BMP installation?

**Steps:**

1. Open up a web-browser and access the HIT website (www.iwr.msu.edu/hit2). If accessing HIT from the Swan Creek Watershed Management System, skip to step 3.

2. Select the sub-watersheds to analyze:

   a. Make the *HUC10* map layer active by clicking on its radio button.

   

   b. On the "HIT Tools" menu at the top of the screen, select "Select Watersheds" > "Select Watersheds By Name or HUC" and type "Swan Creek". This will show Swan Creek's location.
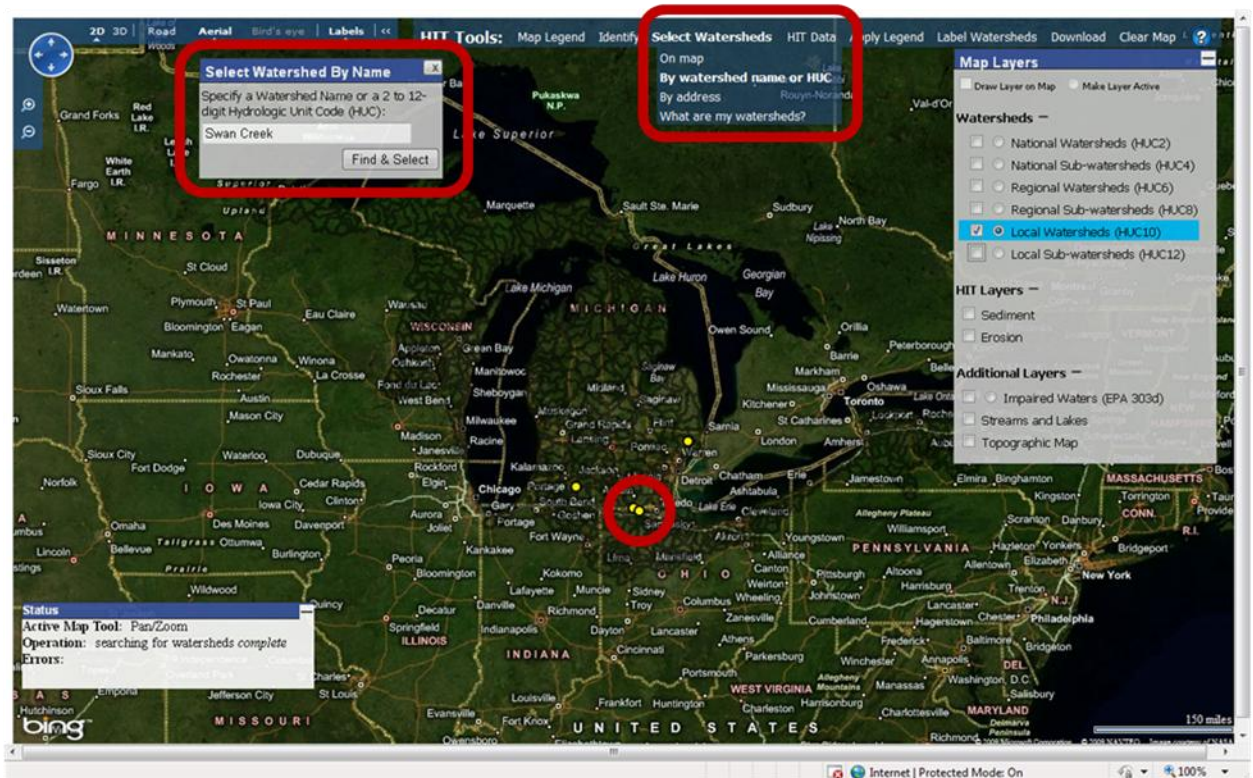
c. Zoom into Swan Creek, turn on and activate the *HUC12* layer. On the "Select Watersheds" tool, click on "On Map" to select watersheds by clicking on the map. Draw a box around the Swan Creek sub-watersheds.
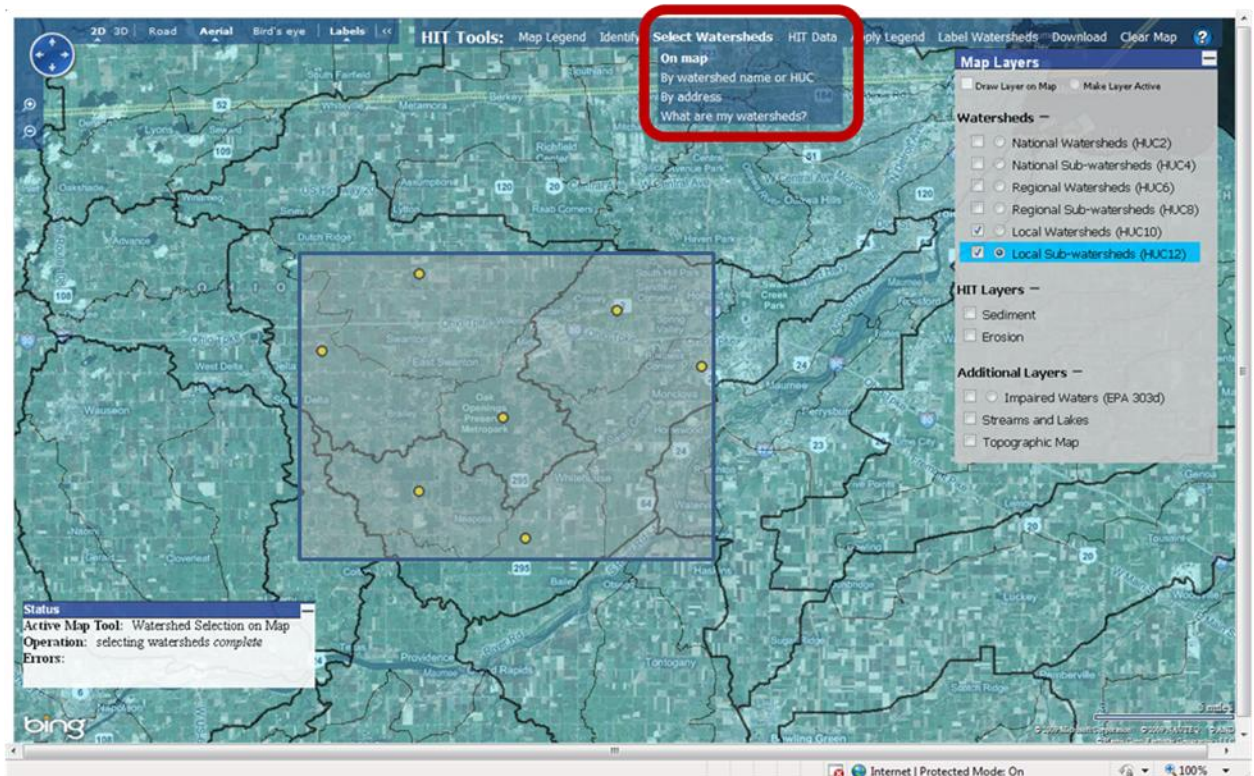


3. View sediment loading data for the selected sub-watersheds.

a. On the "HIT Tools" toolbar, select "HIT Data".

b. Specify that you want to view "Sediment" "Totals"; and mulch-till, no-till, and grass BMPs on the worst 5% areas, and accept the default costs for those BMPs. Click "Make Table".
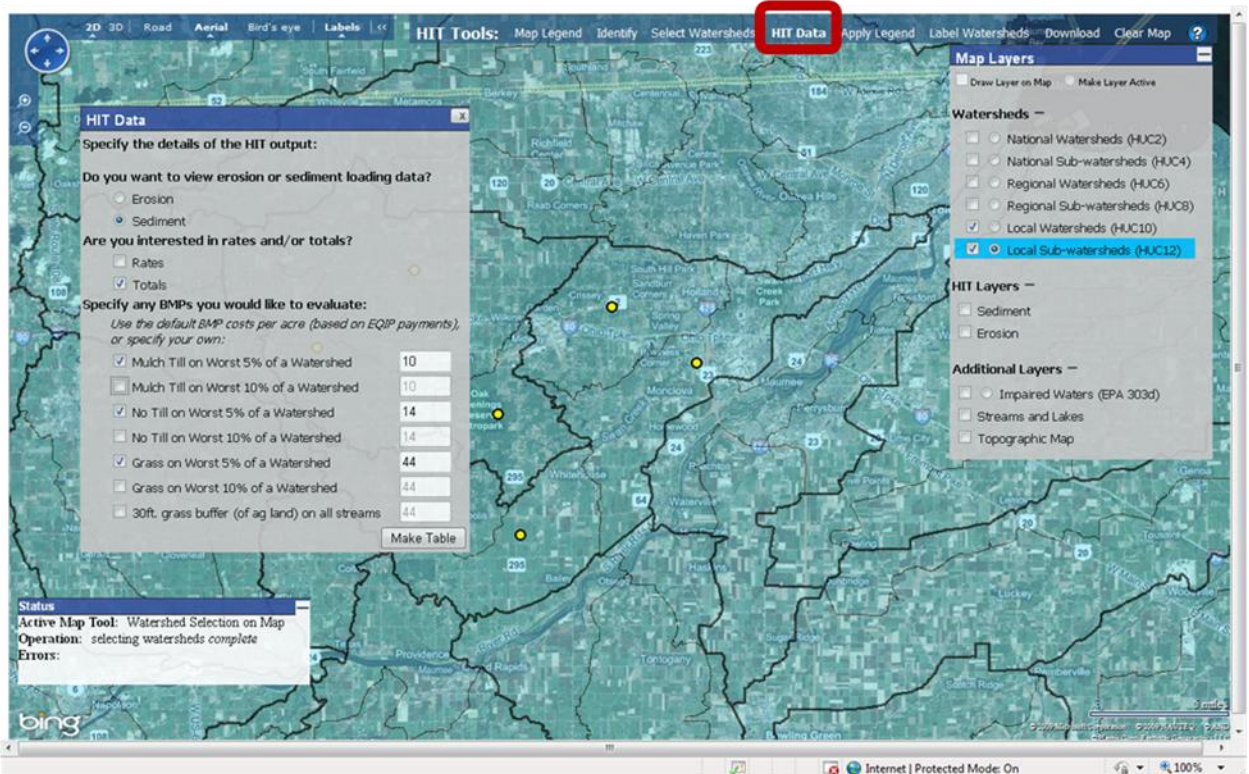
4. Analyze sediment data and BMP cost effectiveness

   a. Take a moment to review the columns of the HIT data table. The first three columns (in white) display some basic information about the selected sub-watersheds of Swan Creek. The grey column displays the estimated sediment loading in tons/acre/year for each sub-watershed. The following columns display the modeled impacts of the selected BMPs. The black columns show the estimated reduction in sediment loading for each BMP. The green columns show the cost-benefit ($ per ton of sediment loading reduced) of each BMP.



   b. Click on the "BMP Cost/Benefit" column for "No Till on the Worst 5%" to sort the table by that column.

**Sediment**

Click on a column title to sort ascending.

| Name | HUC | Acres | Total (tons/yr) | BMP: Mulch Till on Worst 5% of Area | | | | BMP: No Till on Worst 5% | | | | BMP: Grass on Worst 5% of Area | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Reduction (tons/yr) | Reduction % | BMP Cost at $10 per acre | BMP Cost Benefit ($/ton reduced) | Total Reduction (tons/yr) | Reduction % | BMP Cost at $14 per acre | BMP Cost Benefit ($/ton reduced) | Total Reduction (tons/yr) | Reduction % | BMP Cost at $44 per acre | BMP Cost Benefit ($/ton reduced) |
| Fewless Creek-Swan Creek | 041000090702 | 18,111 | 941 | 39 | 4% | $9,056 | $232 | 235 | 25% | $12,678 | $54 | 313 | 33% | $39,845 | $127 |
| Ai Creek | 041000090701 | 32,485 | 1,424 | 52 | 4% | $16,243 | $314 | 311 | 22% | $22,740 | $73 | 414 | 29% | $71,468 | $173 |
| Lower Blue Creek | 041000090802 | 15,653 | 570 | 24 | 4% | $7,827 | $330 | 135 | 24% | $10,957 | $81 | 179 | 31% | $34,437 | $192 |
| Heilman Ditch-Swan Creek | 041000090804 | 23,569 | 790 | 29 | 4% | $11,784 | $411 | 172 | 22% | $16,498 | $96 | 230 | 29% | $51,851 | $226 |
| Upper Blue Creek | 041000090801 | 12,960 | 278 | 13 | 5% | $6,480 | $506 | 75 | 27% | $9,072 | $121 | 100 | 36% | $28,512 | $285 |
| Wolf Creek | 041000090803 | 17,361 | 253 | 9 | 4% | $8,680 | $964 | 54 | 21% | $12,153 | $227 | 71 | 28% | $38,194 | $535 |
| Gale Run-Swan Creek | 041000090703 | 10,805 | 115 | 4 | 3% | $5,403 | $1,351 | 24 | 21% | $7,564 | $319 | 32 | 27% | $23,771 | $755 |
| **TABLE TOTALS** | | 130,945 | 4,372 | 169 | 4 | $65,472 | $387 | 1,005 | 23 | $91,661 | $91 | 1,339 | 31 | $288,078 | $215 |

Specify new values to recalculate BMP cost: $10    $14    $44

**Recalculate BMP Cost**

c.   According to the HIT output, BMP dollars will go the farthest by investing in No Till in the Fewless Creek-Swan Creek sub-watershed (HUC 041000090702). Though more expensive in total, installing grass on the worst 5% of sediment contributing areas would still be more cost-effective than mulch-till on those locations, given the specified costs/acre; but not more cost-effective than no-till.

5.  Targeting fields within the Fewless Creek-Swan Creek sub-watershed.

a.   Back in the HIT map, hold the cursor over the selected watershed icons to determine which sub-watershed is Fewless Creek-Swan Creek. Alternatively you could use the Name or HUC search to locate, as you did in step 2b.
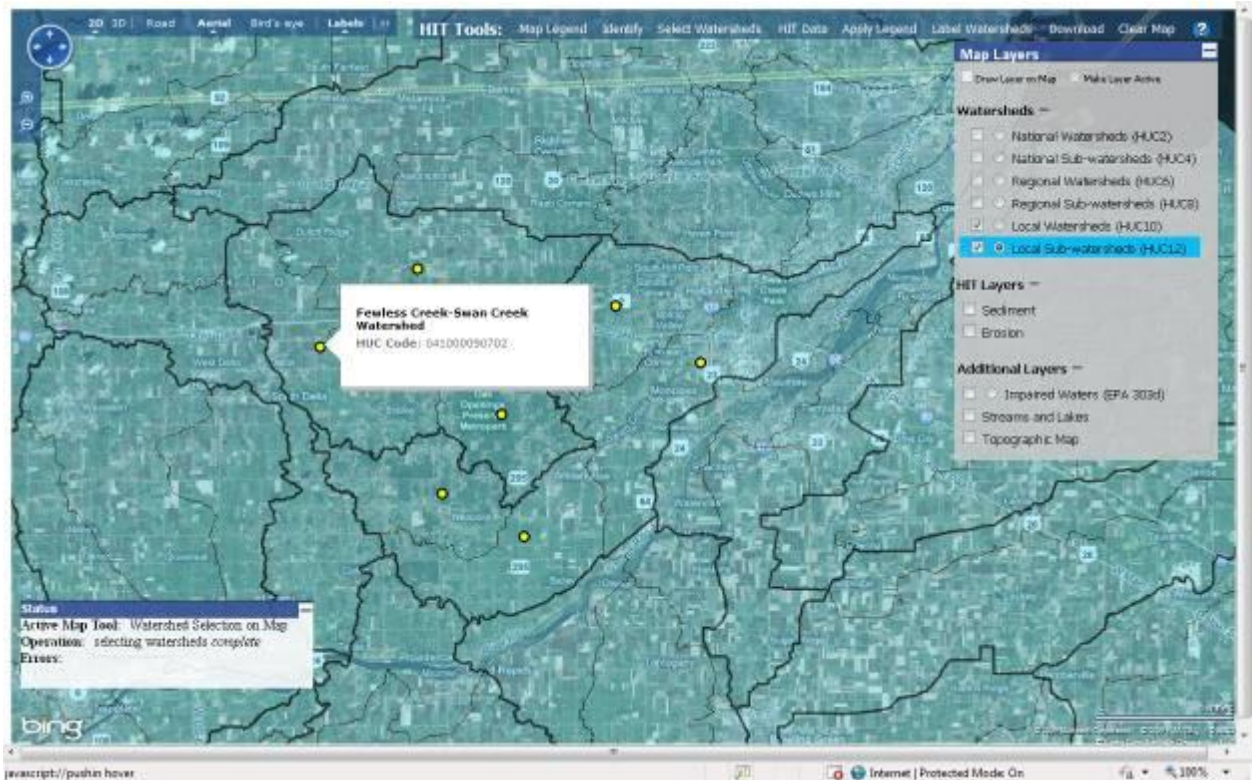
b. Make sure the Status window reports your "Active Map Tool" as "Pan/Zoom". If it does not, simply click on the active tool to disable it. For example, in the image above "Watershed Selection on Map" is the active tool. To disable it, a user would click on Select Watersheds > On Map again to deactivate it.

c. Zoom into Fewless Creek-Swan Creek, turn off the *HUC12* layer, and turn on the *Sediment* layer to see areas within fields that are likely eroding and contributing sediment to Swan Creek.

d. Use the "Bird's eye" view option of the Bing Maps toolbar to explore the high-risk areas in even greater detail.
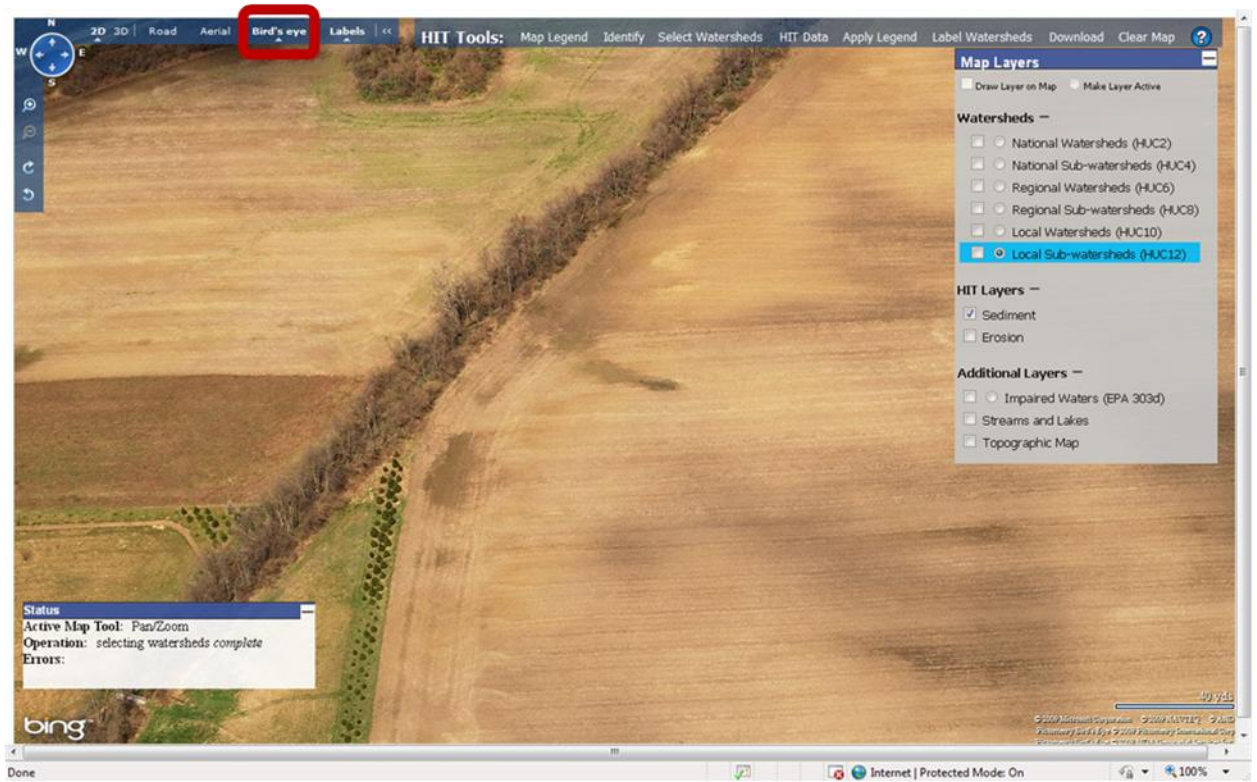
Through these steps, the Lucas County Soil and Water Conservation District can answer the questions posed at the beginning of the exercise:

A) In what sub-basins of the Swan Creek River Watershed would the targeting of agricultural BMPs yield the maximum benefit per dollar spent?

> *Fewless Creek-Swan Creek (HUC 041000090702), though benefits could certainly gained by BMP installations in the other sub-watersheds.*

B) Which combination of BMPs will yield the maximum benefit in the targeted sub-watersheds?

> *No-till and grass installations (grassed waterways, buffer strips, etc.) were the most cost effective BMPs; though, given the default costs of the practices, grass installations may be prohibitively expensive despite their effectiveness.*

C) What fields within the targeted sub-watersheds should be prioritized for BMP installation?

> *See the maps of step 5.*