GeoWEPP ArcGIS 9.x Interface
Steps for CWE: Analysis for Unburned Subwatershed

PLEASE NOTE: The parameters for the suggested management scenario are very extreme and partially unrealistic. They were chosen only to show the capabilities of GeoWEPP to assess spatial and temporal pattern of erosion, runoff, and sediment yield. We assume that the user, after getting the idea, will use moderate and realistic input parameters for their management scenarios.

Start GeoWEPP and Load CWE Example Data

Starting GeoWEPP and loading the example data is easy to accomplish. GeoWEPP was designed to automatically load the data from the example data sets. Follow the steps below to start GeoWEPP and load the data you will need to run GeoWEPP and complete this case study.

1. Double click on the ArcGeoWEPP shortcut on your desktop (if you have one) or navigate to the ArcGeoWEPP folder (default install at “C:\GeoWEPPArcMap”) and double click on ArcGeoWEPP.exe. A “Welcome to GeoWEPP for ArcGIS 9” splash screen will appear. Please read through the greeting and click OK.

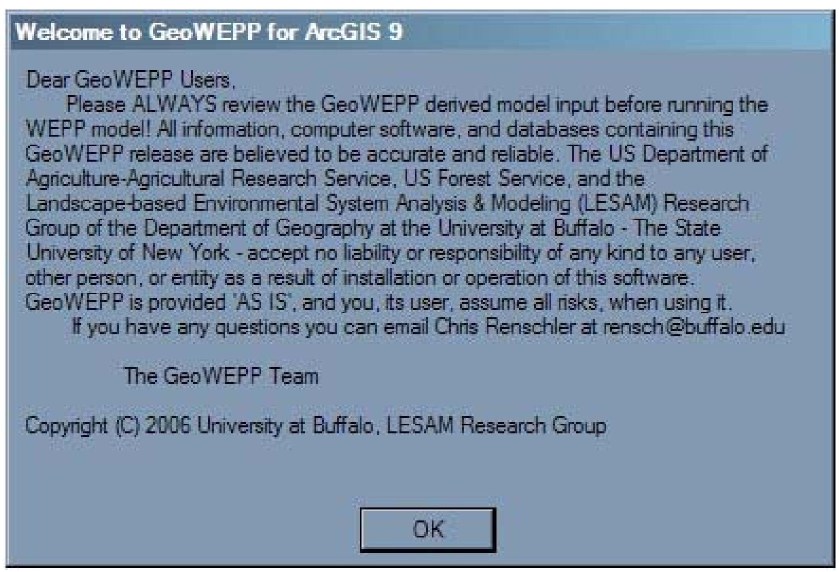


Figure 1 – Welcome to GeoWEPP for ArcGIS 9

2. The next window that appears is the GeoWEPP Wizard. This window provides a starting place for all your GeoWEPP needs, including starting a new project or continuing a previously save one. The Wizard also provides you with links to the GeoWEPP webpage and the webpage for each of its collaborators and supporters. In this case study, we will be using example data, so click on **Use Example GIS Data** button.

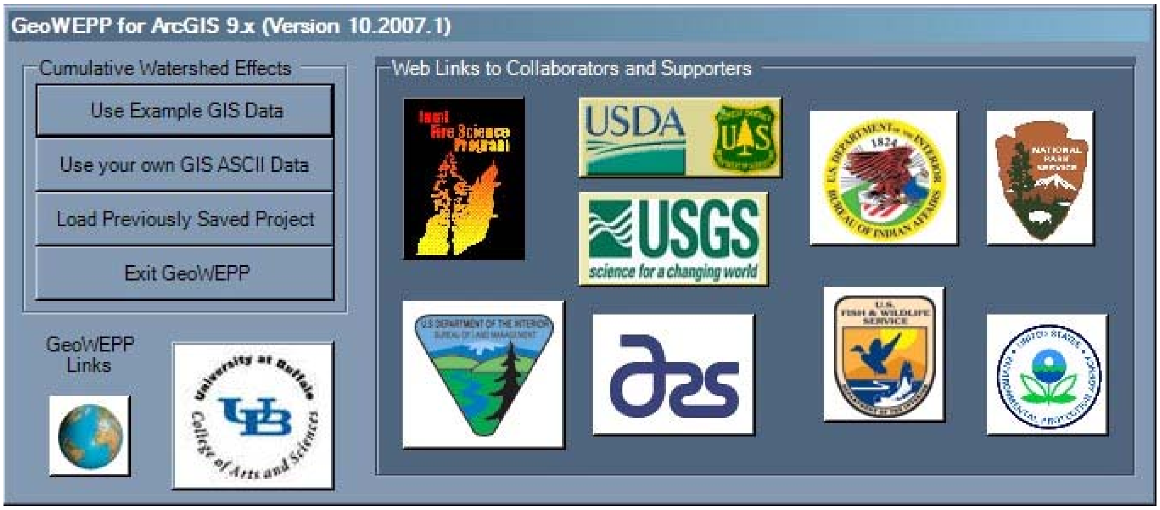


Figure 2 – GeoWEPP for ArcGIS 9 Wizard window

3. The **Select an Example GIS Data Set** window will appear. There are four sets of example data to choose from. This case study uses a pre-fire forest condition; click on the **Pre-Fire Forest** button.

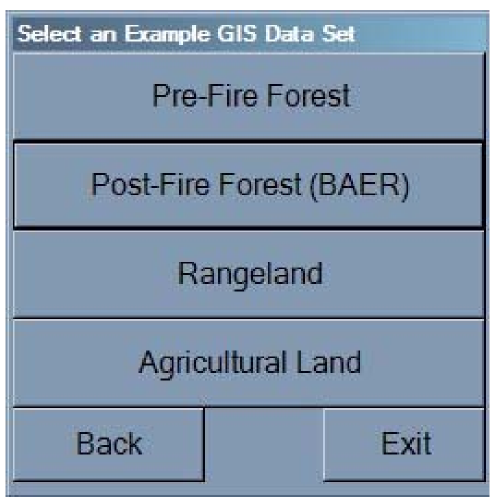


Figure 3 – Select an Example GIS Data Set window

GeoWEPP will now load all the necessary data and create the channel network for the study area automatically. You will see a GeoWEPP status window displaying the steps it is currently working on and the ones it has already completed. Once GeoWEPP has completed the pre-processing stage, ArcMap will begin.

4. Once ArcMap begins, GeoWEPP will convert the ASCII grid data to raster layers. This process may take some time depending on the speed of your computer. Click OK on the **Possible Time Intensive Function** alert window to begin the conversion process.

Figure 4 – Possible Time Intensive Function

As the conversion process proceeds, each layer will be added after it has been converted. You should see seven layers once the process has been completed: **dem**, **hillshade**, **soils**, **landcov**, **Topo Image**, and **network**. GeoWEPP has completed the loading process.

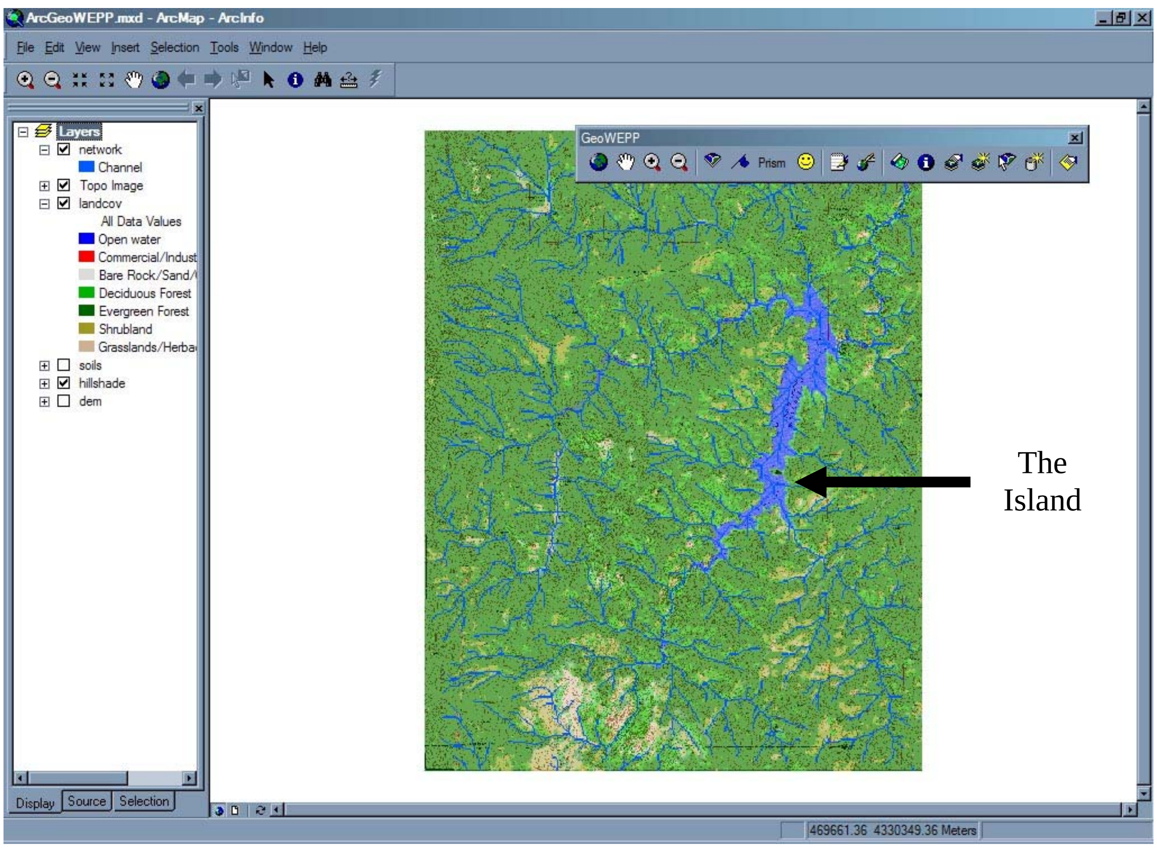
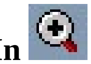


Figure 5 – All necessary data has been converted and loaded into ArcMap

Modifying the Network and Creating the Watershed

Now that the data has been added to ArcMap, we can delineate our watershed.

1. We are interested in the network channels and the watershed that is next to **The Island** in Cheesman Lake (see arrow in Figure 5). Using the **Zoom In**  tool from **the GeoWEPP toolbar**, zoom into the area around **The Island**.

We are interested in the slope that is south east of **The Island**.

Figure 6 – Zoomed in view of The Island and our study area. NOTE: Your view may vary.

2. In this case study, we want to work with multiple subcatchments (also know as hillslopes). The current channel network will only generate 3 subcatchments; we need more. To modify the channel network, click on the **Modify Channel Network Delineation**  tool. This will open the **Channel Network Delineation** window.

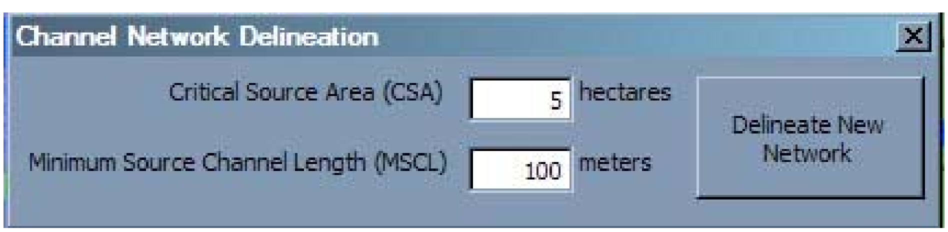


Figure 7 – Channel Network Delineation window

3. Change the **CSA** to 2; leave the **MSCL** as 100. Click the **Delineate New Network** button to delineate the new channel network. Once this button is clicked, GeoWEPP will remove the current channel network and create a new one. You will notice that a DOS window will appear; this is the channel network delineation program, **TOPAZ,** running.

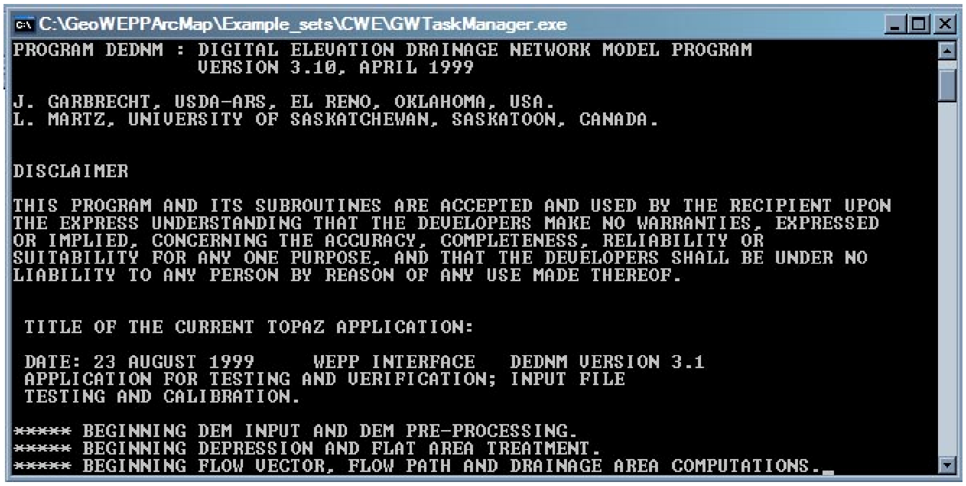


Figure 8 – DOS window. Other DOS windows may appear during GeoWEPP's operation.

Once the process is completed, the DOS window will disappear and the new channel network will be loaded.

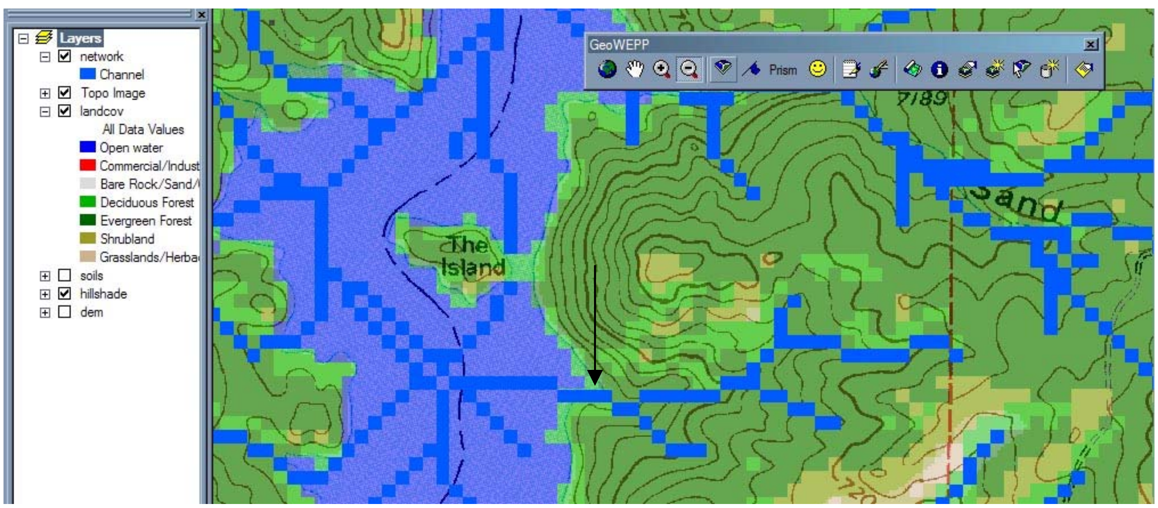


Figure 9 – New channel network has been generated. Compare this network with Figure 6.

4. The next step is to create a watershed by selecting the watershed's outlet point. To do this, click on the **Select a Watershed Outlet Point (channel cell only)** tool from the toolbar. Now click on the channel cell near the lake shore (see Figure 9). A message box will appear to prevent you from double clicking on the channel cell. Click **OK** to continue.

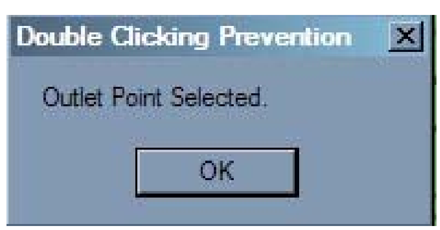


Figure 10 - Double Click Prevention

Once again you will see a DOS window appear. TOPAZ is now analyzing the DEM and network to generate the subcatchments for the watershed based on the outlet point.

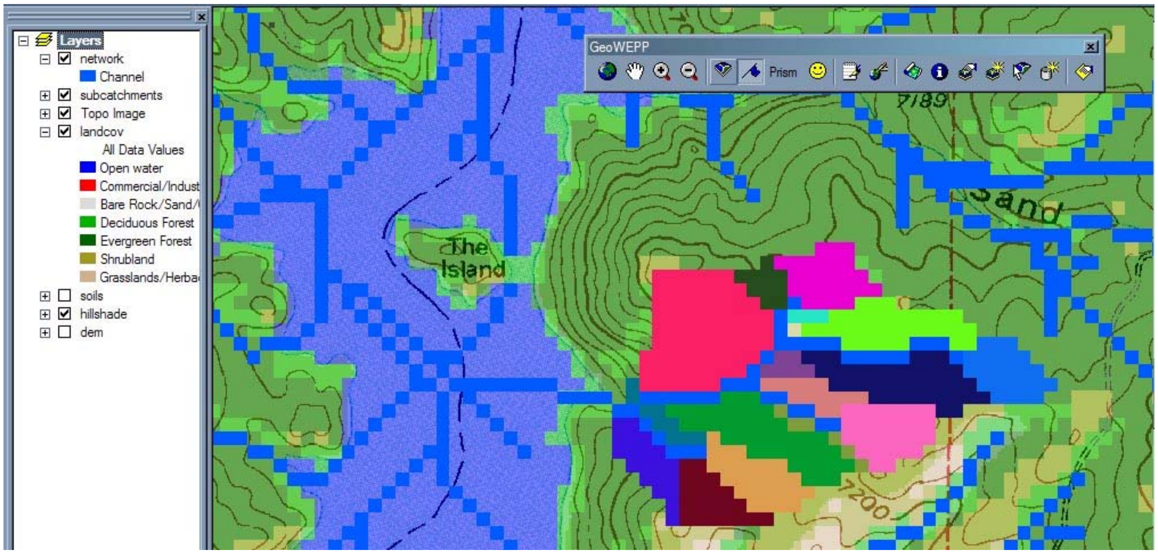


Figure 11 – Watershed has been delineated.

If you generate a different watershed than what can be seen in Figure 11, all you need to do is click on a different channel cell to generate a new watershed. You will be asked if you wish to discard the current one and generate a new one. Click **Yes** to generate a new subcatchment.

Saving the Project

It is very important that you save your projects periodically. There is nothing worse than spending hours working on a study site to only have it all ruin because of a computer or program error. There are several ways you can save the current GeoWEPP project. You can save it by selecting **File→Save** or by click the **Save Project**  tool on the GeoWEPP toolbar. If you wish to exit this case study and return later, you can load your project from the GeoWEPP Wizard or by navigating to the project folder and double-clicking the MXD document.

GeoWEPP has automatic save points incorporated into it, just in case. Please do not count on these; the save points are during certain stages, not during certain times. You can spend hours on one section and never reach a save point. I highly recommend getting in the habit of saving often.

The First WEPP Simulation

We have generated our case study's watershed and can now proceed with the first WEPP simulation.

1. Click on the **Accept Watershed Delineation**  button on the **GeoWEPP toolbar**. This will begin the WEPP simulation process.

2. First, we need to generate the climate for the study area. We will use the Cheesman County, Colorado climate station data as the source of our climate data. In the **WEPP Climate Selection** window, click the **Use Selected Station** button to accept the current weather station. This will create 100 years of climate input data for the study area. Click **OK**.

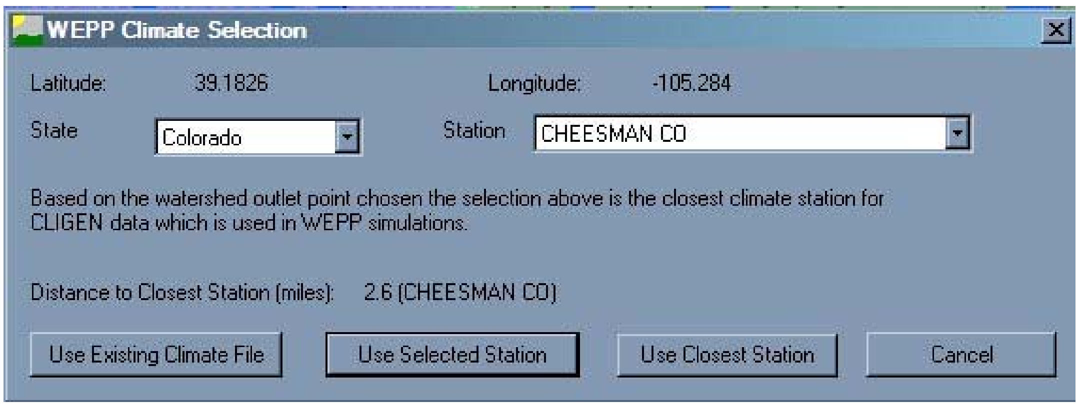


Figure 12 – WEPP Climate Selection window.

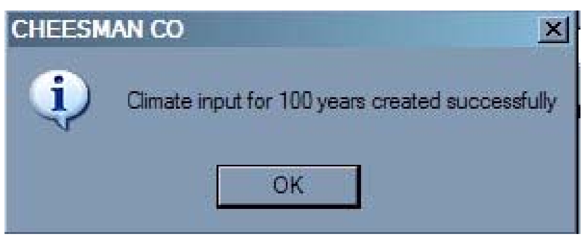


Figure 13 – 100 years of climate data generated.

3. The next step is to review the management and soil WEPP files used in the simulation; this is done in the **WEPP Management and Soil Lookup** window. This window allows you to compare the GIS Landuse and GIS Soil information with the corresponding WEPP management and soil data files to insure that they are assign properly. We will need to change some of the management WEPP files so that the entire watershed is considered a 20 year old forest.

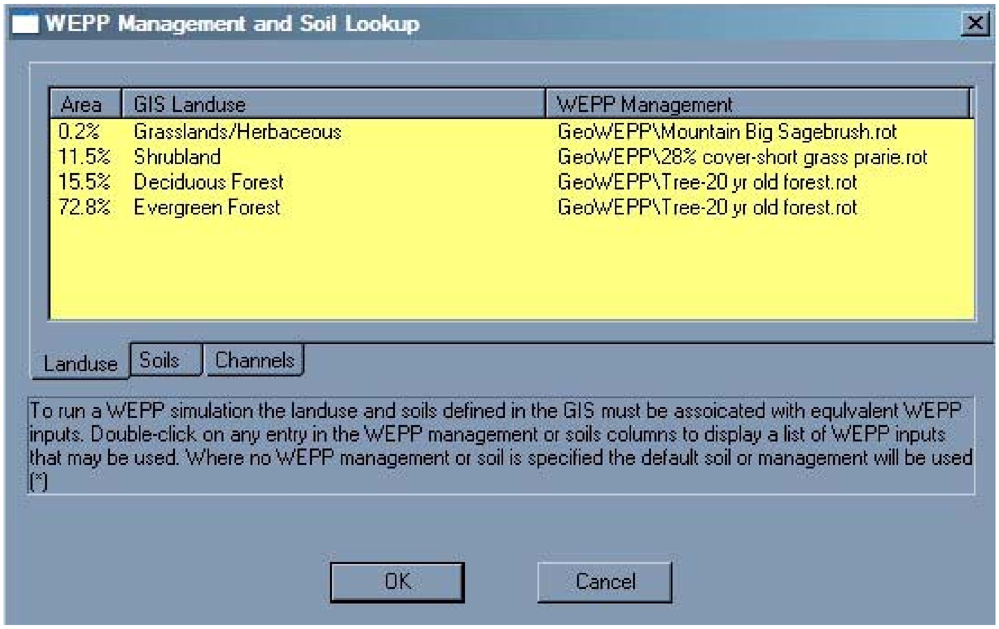


Figure 14 - WEPP Management and Soil Lookup window displaying land management information

To change the management file, double-click on the name you wish to change. We need to change the "Mountain Big Sagebrush.rot" file to "Tree-20 yr old forest.rot", so double-click on the "GeoWEPP\Mountain Big Sagebrush.rot". This will bring up the **Select a Management file:** window (Figure 15) – the same window that appears when changing the management layer within WEPP. Double click oh the **GeoWEPP** folder and then click on **Tree-20 yr old forest.rot** to highlight the file name. Click **OK**.

Figure 15 - Select a Management file window

You will notice that the WEPP Management for “Grasslands/Herbaceous” has been change to “GeoWEPP\Tree-20 yr old forest.rot”.

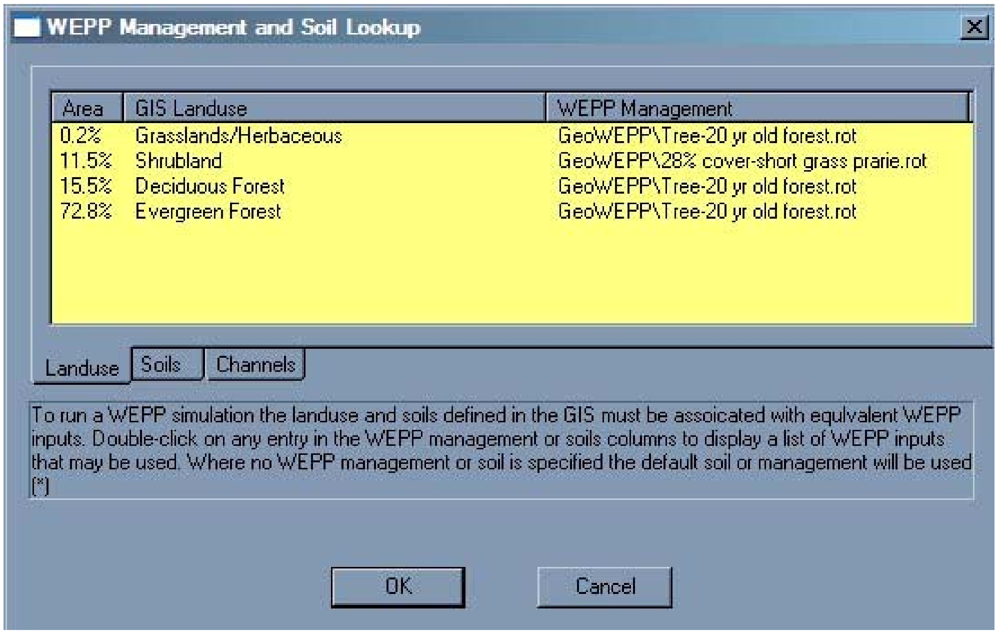


Figure 16 - Land management file has been changed.

Repeat this process for the “28% cover-short grass prarie.rot”. Change it to “Tree-20 yr old forest.rot” as well.

4. You will also need to change the WEPP soil files as well. Click on the Soils tab to display the Soils Lookup Table. You will notice that all the soils use the “KEITH.sol” WEPP file.

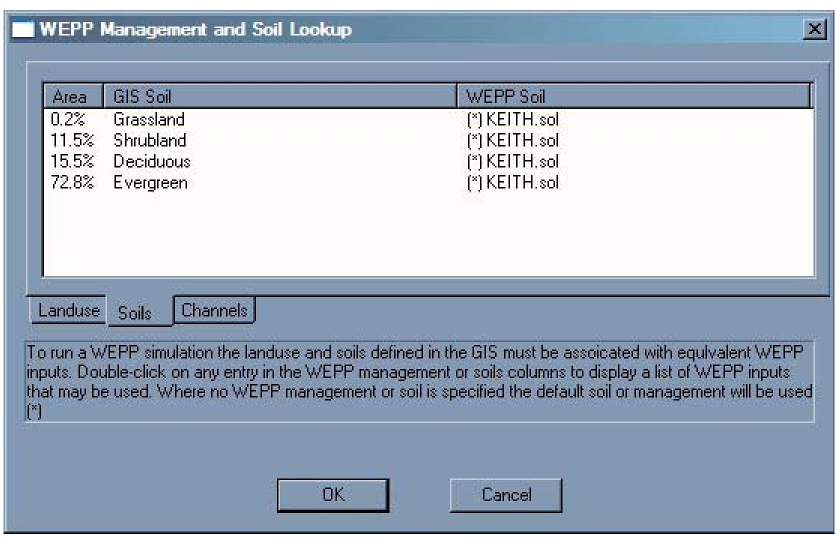


Figure 17 - WEPP Management and Soil Lookup window displaying soil information

Use the same steps you used to change the land management above to change all the soil files to match those displayed in Figure 18. These file can found by double–clicking the **Forest** folder and then double-clicking the **Disturbed WEPP** folder.

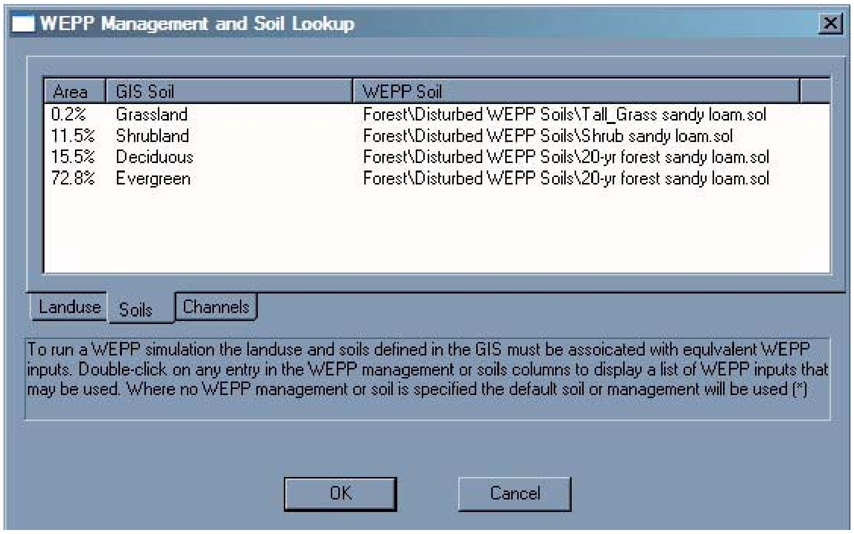


Figure 18 - All soil files have been changed.

Once you have changed all the soil files, click **OK**.

5. Now we can set our WEPP simulation parameters. This is done in the **WEPP/TOPAZ Translator** window. For this study we will be running a 30 year simulation using both the **Watershed and Flowpaths** methods. Change the **Number of Years** from 2 to 30. The **Simulation Method** has already been set to “Watershed and Flowpaths”. This is the final window before the WEPP simulation begins; it is also your last change to change any of the parameters for this run. A list of the soil and management parameters for each hillslope is displayed on the right. We have made all of our changes so we can now start the WEPP simulation run. Click **Run WEPP**.

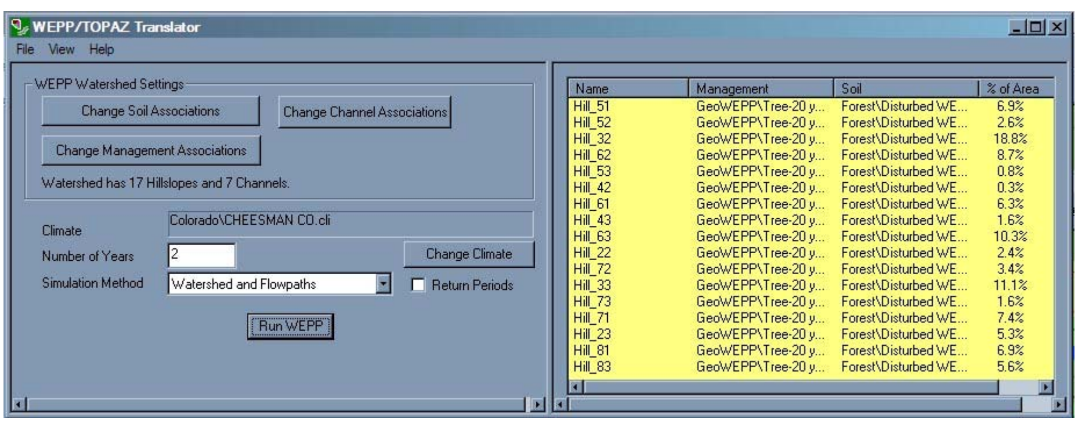


Figure 19 - WEPP/TOPAZ Translator window

GeoWEPP will now perform the WEPP simulation using the Watershed and Flowpaths method for each hillslope in the watershed. A progress window is displayed to let you know how far along the process is. This process may take some time depending on the amount of RAM installed in your computer and your computers CPU speed; please be patient. The more hillslopes and flowpaths within the watershed and the more years in the simulation run increase the amount of time it will take to complete the WEPP simulation.

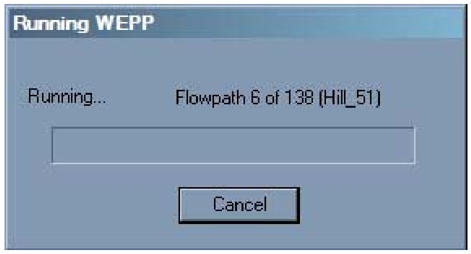


Figure 20 - WEPP Progress window

IMPORTANT: Switching between applications will cause the progress and translator windows to become blank. Do not worry; GeoWEPP and WEPP are still running. In a few minutes they will return to normal, but it is a good idea not to switch between applications while the simulation is running. You may notice that clicking on the progress window causes it to turn white and "(not responding)" will appear in the window's title bar. The program has not crashed; the internal process is still running but windows registers it as not responding. This will change over time.

6. Once the WEPP simulation is done, you will get a **WEPP Completed** window. Click **OK**.

Figure 21 - WEPP simulation has finished.

7. The final step before the results can be displayed is to name the output raster layers. A window will appear with a default name for each result layer (one for the **Watershed** method results called "offsite" and one for the **Flowpaths** method results call "onsite"). You can either accept the defaults or change the name. If you decide to change the name, you will only have a maximum of 13 characters (do not use special characters like "\", "%", ",", or spaces) to use for the name and it can not be the same name as an already existing raster layer; this is also displayed in a message box to remind you. Click **OK** in the reminder window. For this example, accept the default names by clicking **OK** for each naming window.

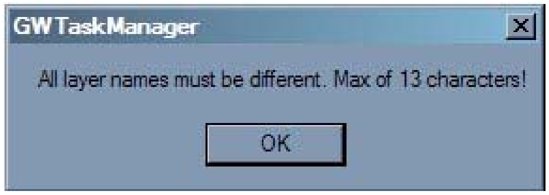
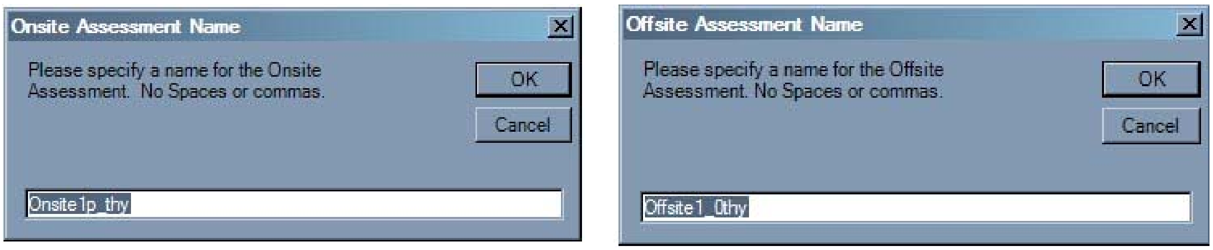


Figure 22 - GeoWEPP naming convention reminder.



(a) **(b)**

Figure 23 – (a) Onsite and (b) Offsite naming windows

The Results of the First Run

Several new layers have been added to ArcMap. These layers correspond to the WEPP simulation results of the Watershed and Flowpaths methods. We only need to concern ourselves with the **Onsite** (Figure 24) and **Offsite** (Figure 25) layers. The legends of each are based on a T-Value that corresponds to a number of tonnes per hectare per year. The default used for the first run is 1 t/ha/yr. You will notice that there is little or no soil loss/sediment yield in the watershed based on this default value.

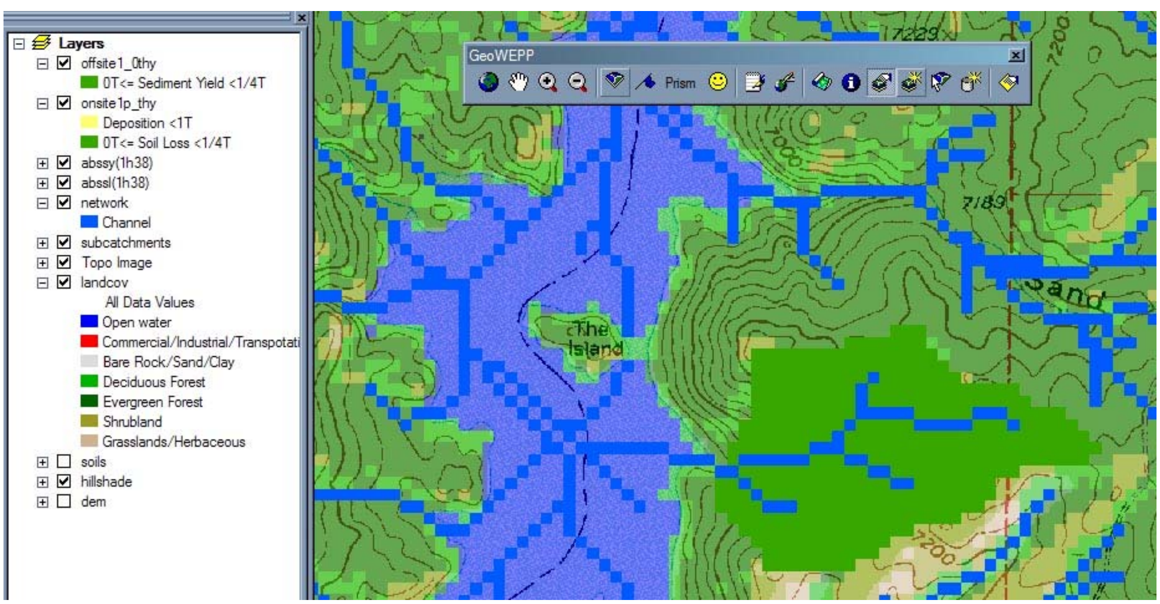


Figure 24 - Watershed or Offsite results

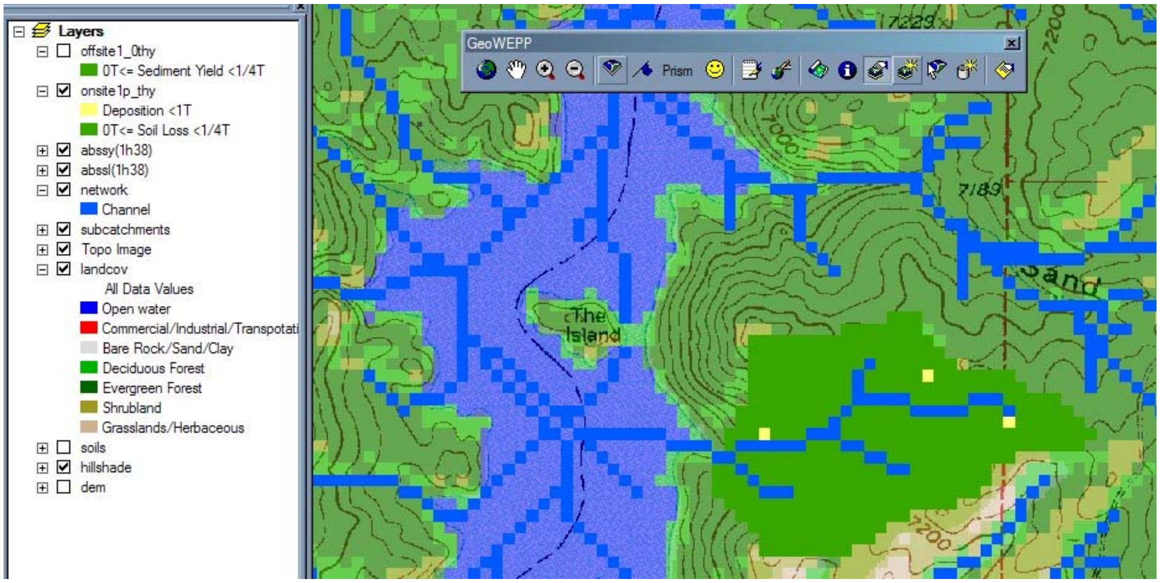
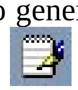


Figure 25 - Flowpaths or Onsite results

Viewing Reports

The WEPP simulation also generated several useful reports. These reports can be accessed by clicking the **Reports**  button on the toolbar. This will open the **Select Reports to Display** window. On the left you will see a list of reports available for display. All reports will be opened using Notepad (or WordPad depending on you system defaults).

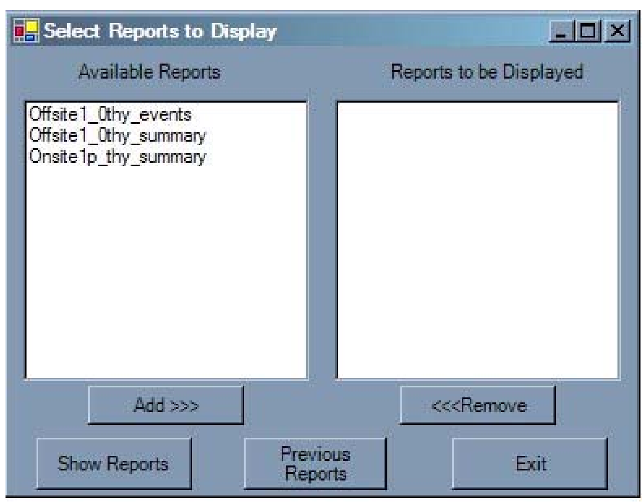
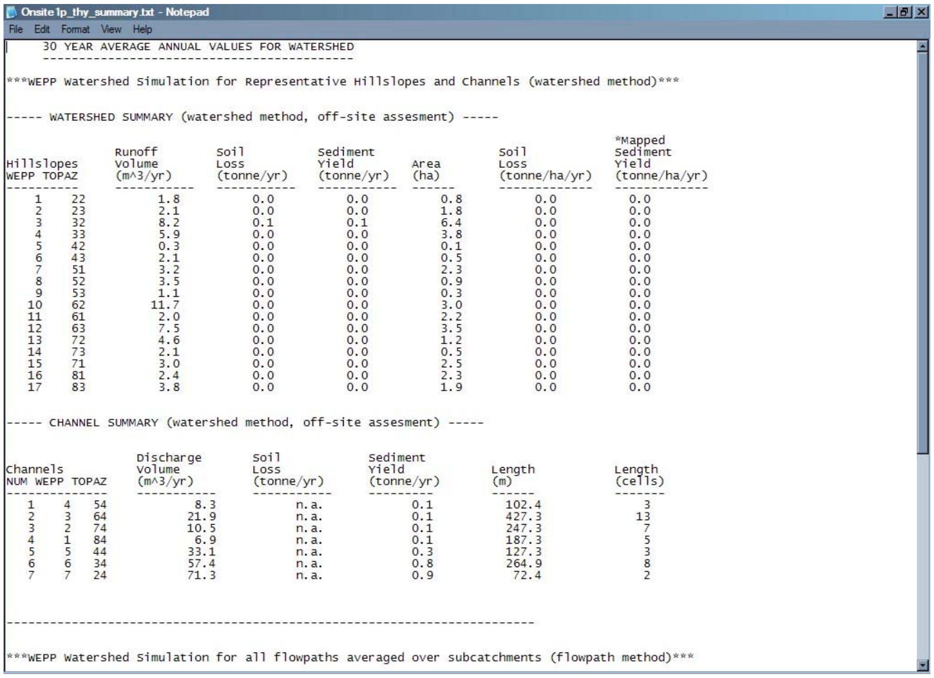


Figure 26 - Select Reports to Display window

Each WEPP simulation will generate 2 to 4 reports depending on which simulation methods you are using and if you wish to generate a Return Periods Analysis report (discussed later in this case study). In the case of our example, three reports are created: Onsite1p_thysummary, Onsite1_0thysummary, Offsite1_0thyevents. The summary reports display the summary information for the onsite and offsite results. The events file lists information for each precipitation event that occurs during the simulation. Below are examples of each report.

These reports can also be accessed by going to the Reports folder with the project folder (in this case study, it would be **…\Example_sets\CWE\Reports**) and double-clicking on the report to be viewed. Each simulation generates a new set of reports.




```
     30 YEAR AVERAGE ANNUAL VALUES FOR WATERSHED
     -------------------------------------------

***WEPP Watershed Simulation for Representative Hillslopes and Channels (watershed method)***

----- WATERSHED SUMMARY (watershed method, off-site assesment) -----

                                                                              *Mapped
                Runoff       Soil         Sediment                Soil          Sediment
Hillslopes      Volume       Loss         Yield        Area       Loss          Yield
WEPP TOPAZ      (m^3/yr)     (tonne/yr)   (tonne/yr)   (ha)       (tonne/ha/yr) (tonne/ha/yr)
----------      ----------   ----------   ----------   ------     ------------  ------------
   1    22        1.8          0.0          0.0         0.8         0.0           0.0
   2    23        2.1          0.0          0.0         1.8         0.0           0.0
   3    32        8.2          0.1          0.1         6.4         0.0           0.0
   4    33        5.9          0.0          0.0         3.8         0.0           0.0
   5    42        0.3          0.0          0.0         0.1         0.0           0.0
   6    43        2.1          0.0          0.0         0.5         0.0           0.0
   7    51        3.2          0.0          0.0         2.3         0.0           0.0
   8    52        3.5          0.0          0.0         0.9         0.0           0.0
   9    53        1.1          0.0          0.0         0.3         0.0           0.0
  10    62       11.7          0.0          0.0         3.0         0.0           0.0
  11    61        2.0          0.0          0.0         2.2         0.0           0.0
  12    63        7.5          0.0          0.0         3.5         0.0           0.0
  13    72        4.6          0.0          0.0         1.2         0.0           0.0
  14    73        2.1          0.0          0.0         0.5         0.0           0.0
  15    71        3.0          0.0          0.0         2.5         0.0           0.0
  16    81        2.4          0.0          0.0         2.3         0.0           0.0
  17    83        3.8          0.0          0.0         1.9         0.0           0.0

----- CHANNEL SUMMARY (watershed method, off-site assesment) -----

                   Discharge      Soil          Sediment
Channels           Volume         Loss          Yield         Length       Length
NUM WEPP TOPAZ     (m^3/yr)       (tonne/yr)    (tonne/yr)    (m)          (cells)
--------------     ----------     ----------    ---------     ------       -------
  1    4    54          8.3          n.a.          0.1         102.4          3
  2    3    64         21.9          n.a.          0.1         427.3         13
  3    2    74         10.5          n.a.          0.1         247.3          7
  4    1    84          6.9          n.a.          0.1         187.3          5
  5    5    44         33.1          n.a.          0.3         127.3          3
  6    6    34         57.4          n.a.          0.8         264.9          8
  7    7    24         71.3          n.a.          0.9          72.4          2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***WEPP Watershed Simulation for all flowpaths averaged over subcatchments (flowpath method)***
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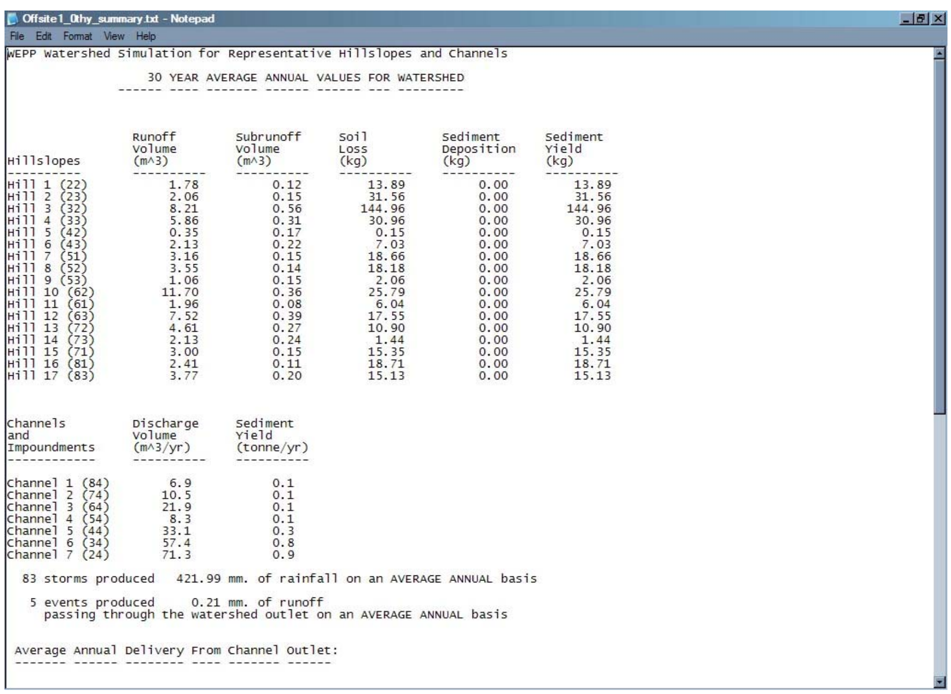
Figure 27 - Example of an Onsite Summary report.




```
WEPP Watershed Simulation for Representative Hillslopes and Channels

               30 YEAR AVERAGE ANNUAL VALUES FOR WATERSHED
           ------ ---- ------- ------ ------ --- ---------



                Runoff        Subrunoff     Soil          Sediment      Sediment
                Volume        Volume        Loss          Deposition    Yield
Hillslopes      (m^3)         (m^3)         (kg)          (kg)          (kg)
----------      ----------    ----------    ----------    ----------    ----------
Hill 1 (22)           1.78          0.12         13.89          0.00         13.89
Hill 2 (23)           2.06          0.15         31.56          0.00         31.56
Hill 3 (32)           8.21          0.56        144.96          0.00        144.96
Hill 4 (33)           5.86          0.31         30.96          0.00         30.96
Hill 5 (42)           0.35          0.17          0.15          0.00          0.15
Hill 6 (43)           2.13          0.22          7.03          0.00          7.03
Hill 7 (51)           3.16          0.15         18.66          0.00         18.66
Hill 8 (52)           3.55          0.14         18.18          0.00         18.18
Hill 9 (53)           1.06          0.15          2.06          0.00          2.06
Hill 10 (62)         11.70          0.36         25.79          0.00         25.79
Hill 11 (61)          1.96          0.08          6.04          0.00          6.04
Hill 12 (63)          7.52          0.39         17.55          0.00         17.55
Hill 13 (72)          4.61          0.27         10.90          0.00         10.90
Hill 14 (73)          2.13          0.24          1.44          0.00          1.44
Hill 15 (71)          3.00          0.15         15.35          0.00         15.35
Hill 16 (81)          2.41          0.11         18.71          0.00         18.71
Hill 17 (83)          3.77          0.20         15.13          0.00         15.13


Channels         Discharge     Sediment
and              Volume        Yield
Impoundments     (m^3/yr)      (tonne/yr)
------------     ----------    ----------

Channel 1 (84)        6.9           0.1
Channel 2 (74)       10.5           0.1
Channel 3 (64)       21.9           0.1
Channel 4 (54)        8.3           0.1
Channel 5 (44)       33.1           0.3
Channel 6 (34)       57.4           0.8
Channel 7 (24)       71.3           0.9
  83 storms produced   421.99 mm. of rainfall on an AVERAGE ANNUAL basis

   5 events produced     0.21 mm. of runoff
     passing through the watershed outlet on an AVERAGE ANNUAL basis

 Average Annual Delivery From Channel Outlet:
 ------- ------ -------- ---- ------- ------
```

Figure 28 - Example of an Offsite Summary report.

Offsite1_0thy_events.txt - Notepad

File Edit Format View Help

WATERSHED OUTPUT: DISCHARGE FROM WATERSHED OUTLET
(Results listed for Runoff Volume > 0.005m^3)

Day	Month	Year	Precip. Depth (mm)	Runoff Volume (m^3)	Peak Runoff (m^3/s)	Sediment Yield (kg)
14	7	1	11.0	0.36	0.00045	0.5
18	7	1	20.9	1.51	0.00161	2.0
3	8	1	11.2	0.24	0.00032	0.3
6	8	1	8.3	0.07	0.00010	0.1
22	8	1	13.9	0.67	0.00078	0.9
29	8	1	11.5	0.35	0.00044	0.4
21	9	1	11.4	0.25	0.00033	0.3
7	6	2	13.2	0.58	0.00069	0.8
9	6	2	16.9	0.71	0.00083	0.9
5	7	2	12.2	0.35	0.00044	0.4
23	7	2	10.9	0.33	0.00041	0.4
6	8	2	13.6	0.59	0.00071	0.8
26	8	2	22.1	1.69	0.00178	2.2
28	8	2	13.1	0.48	0.00058	0.6
8	10	2	12.0	0.37	0.00046	0.5
13	10	2	21.2	1.48	0.00159	1.9
16	7	3	13.4	0.67	0.00079	0.9
20	7	3	10.9	0.01	0.00002	0.0
17	9	3	11.5	0.24	0.00031	0.3
5	6	4	17.2	1.05	0.00117	1.4
11	6	4	18.4	1.30	0.00141	1.7
4	7	4	18.5	1.06	0.00118	1.4
5	7	4	16.8	0.95	0.00107	1.3
6	7	4	23.0	1.31	0.00142	1.7
21	7	4	10.7	0.13	0.00018	0.1
11	8	4	17.5	0.69	0.00080	0.9
30	8	4	15.3	0.57	0.00068	0.7
2	9	4	43.5	0.05	0.00008	8.3
9	9	4	18.0	0.84	0.00096	1.1
22	10	4	13.7	0.62	0.00074	0.8
24	7	5	19.2	0.96	0.00108	1.3
31	7	5	19.4	1.30	0.00142	1.7
27	9	5	30.5	0.01	0.00002	1.3
2	6	6	14.4	0.76	0.00088	1.0
17	7	6	15.7	0.92	0.00104	1.2
24	7	6	9.1	0.02	0.00003	0.0
27	7	6	21.1	1.30	0.00141	1.7
28	7	6	17.3	0.82	0.00094	1.1
15	8	6	15.9	0.63	0.00074	0.8
2	10	6	24.9	2.05	0.00211	2.6
6	8	7	14.8	0.60	0.00071	0.8
10	8	7	24.7	1.82	0.00190	2.3
8	9	7	25.0	2.03	0.00210	2.6
19	9	7	11.7	0.10	0.00014	0.1

Figure 29 - Example of an Events report.

Filling Out the CWE Worksheet

The CWE Worksheet consists of four pages: Runoff, Soil Loss, Sediment Yield, and Summary. In this case study, you will need to will in the information for the four hillslopes we are investigating, several channels, and the watershed as a whole. To do this, you will need to view the Onsite and the Offsite report. Open this report after each simulation and record the values on the worksheet.

First, we will look at the Offsite report to get the watershed summary information we need. Scroll down the report until you reach **Average Annual Delivery From Channel Outlet** section. The sediment yield is listed after **Avg. Ann. sediment discharge from outlet**. Record this value under **Sed Yield tonnes** for the year you are investigating.

Just above this section you will find the runoff information. The report will state the number of events that produced an amount of runoff. Record this value under Runoff (mm) for the year you are investigating.

The other three pages will be filled out using information from the Onsite report. This report is divided into three sections, each broken into several columns. We are interested in the first two sections. Let's start with the first section.

The first column of this section lists the WEPP hill number and the corresponding TOPAZ number; the TOPAZ number is the one we want. Find the line that corresponds to the Hillslope you are investigating. For example, if you are interested in Hillslope 83, find the line which has a TOPAZ number of 83. The second page of the CWE worksheet deals with runoff for each hillslope. The second column lists the amount of runoff for each hill. Record the value of the runoff for your hillslope on the worksheet for the corresponding year and hillslope. The fourth page of the worksheet asks for the sediment yield information; this value can be found in the fourth column. Find and record this value.

The third page of the worksheet is for recording the soil loss. This value can be found by scrolling down to the bottom of the report. The third column contains the soil loss for each hillslope. Find and record the value for your hillslope for the year you are investigation.

Repeat this process for the three channels we are interested in: 64, 74, 84. This information can be found the same way as you did for the hillslopes. Scroll to the second section to find these values. The channel number is found in the first column, the runoff (or the discharge volume) is found in the second column, soil loss is in the third (but there are no soil loss values for the channels), and the sediment yield can be found in the fourth column.

Fill in the worksheet for each of the four hillslopes and three channels for each of the four simulation years. Do you see any differences? If so, why do they occur? How could they be reduced? If you don’t see any differences, what could contribute to this?

Remapping the T-Value

As stated above, the WEPP Onsite and Offsite results are displayed using the default T-Value of 1 t/ha/yr. In most cases this will not adequately show what is occurring in the watershed. GeoWEPP provides a tool that will remap the results using a new T-Value, one more fitting for your study area. We will now change the T-Value to get better understanding of what is going on within the watershed.

Click the **Remap with New T-Value**  tool. This will open the **Change T-Value** window. Change 1.0 to 0.1 and click the **New T-Value** button.

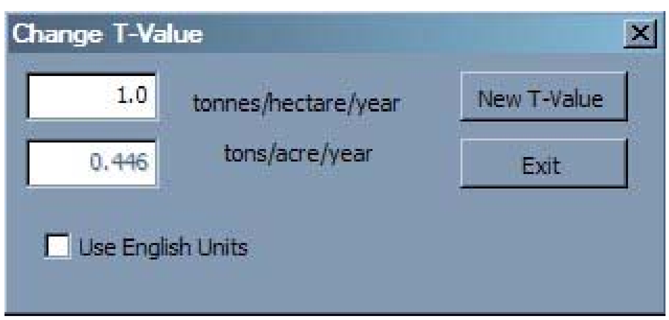


Figure 30 - Change T-Value window

By remapping the T-Value, you will be creating new raster layers in Arc Map. You will need to name these new layers using the same conventions as before. We will be taking the default values again.

As you can see below, two new layers with the new T-Values were created. There is no change between the Offsite layers, but if you compare Onsite1_0thy and Onsite0_1thy, you see that Onsite0_1thy now has lighter green pixels as well as some red pixels, meaning less tolerable levels of erosion.

Figure 31 - New Onsite layer based on new T-Value. Compare with Figure 25.

It is best to save the project again before we continue on.

Cumulative Watershed Effects (CWE) Analysis

Now, we will work with the Cumulative Watershed Effects (CWE) Analysis Worksheet. We will do some prescribed burns in selected areas at different times in our watershed; we will perform a sequence of prescribed burns in four subcatchments (hillslopes) and then see how each recovers over time. We specifically will investigate the effects of vegetation coverage on soil loss, runoff and sediment discharges from the hillslopes, subcatchments (channel outlets) and at the main watershed outlet (main channel segment outlet). We want to manage these hillslopes differently in four consecutive years and do a 30-year simulation for each of these changes. A simulation this long can show us how the prescribed burns will affect the area over time. We will work with hillslopes 83, 81, 71, and 61 (see Figure 32).

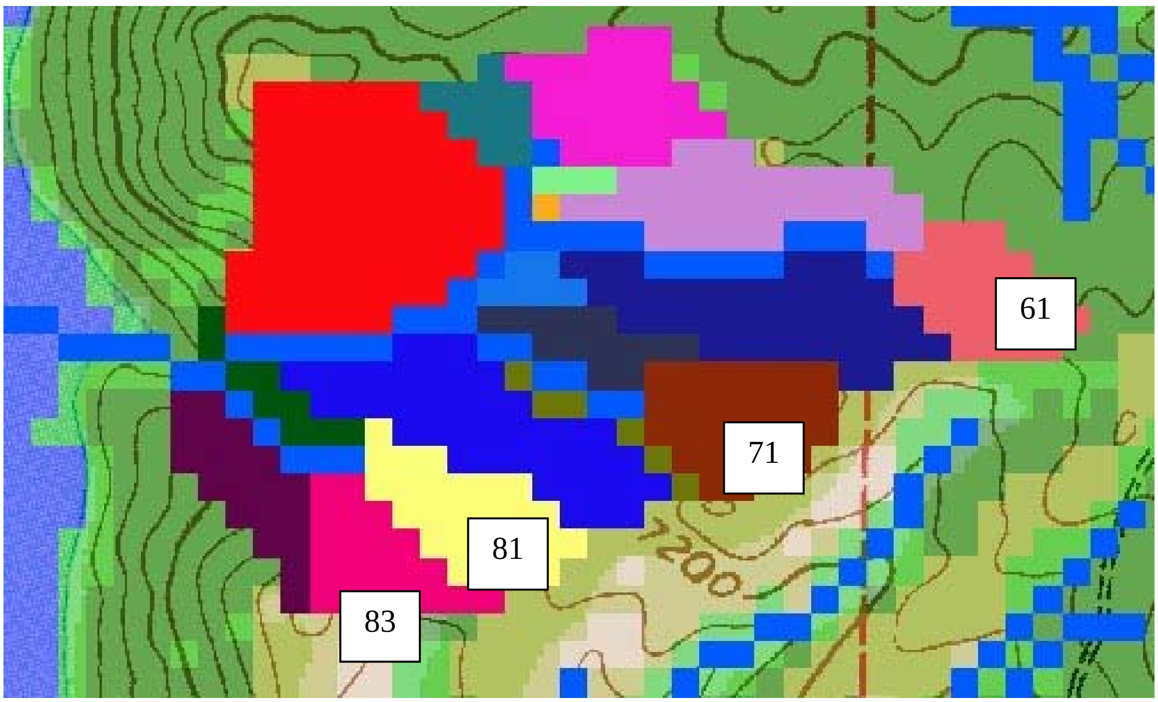


Figure 32 - Case study watershed with hillslopes of interest marked.

Table 1 shows how management and soil parameters will change in each of the four years. With these prescribed burns, we do not want too much erosion, and this is why we will go from one subcatchment to a different subcatchment each year.

Table 1 - Landuse and Soil parameters for each hillslope over the four years.

	Hillslope 83		Hillslope 81		Hillslope 71		Hillslope 61	
	Landuse	Soil	Landuse	Soil	Landuse	Soil	Landuse	Soil
Year 1	High	High	-	-	-	-	-	-
Year 2	Medium	High	High	High	-	-	-	-
Year 3	Low	Low	Medium	High	High	High	-	-
Year 4	Forest	Forest	Low	Low	Medium	High	High	High

Year 1: Modify WEPP Parameters for Hillslope 83

For the first year, we will apply a prescribed burn to Hillslope 83. To represent this occurrence, we need to change the Land Management and Soil WEPP parameters for Hillslope 83.

1. Click on the **Change Hillslope WEPP Parameter**  tool and then click on Hillslope 83. You will notice another double-click prevention message box. Click **OK** to continue.

2. You will then be asked if you wish to change the land management for Hill 83 from the current landuse. Click **Yes**.

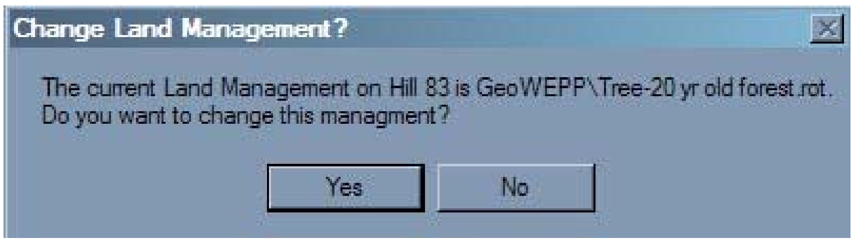


Figure 33 - Change Land Management window

3. A new window will appear similar to the one used when we change the management files before the first WEPP simulation. In this window, double-click the **GeoWEPP** folder and select **25% cover-high severity burn**. Click **OK**. The land management has been changed.

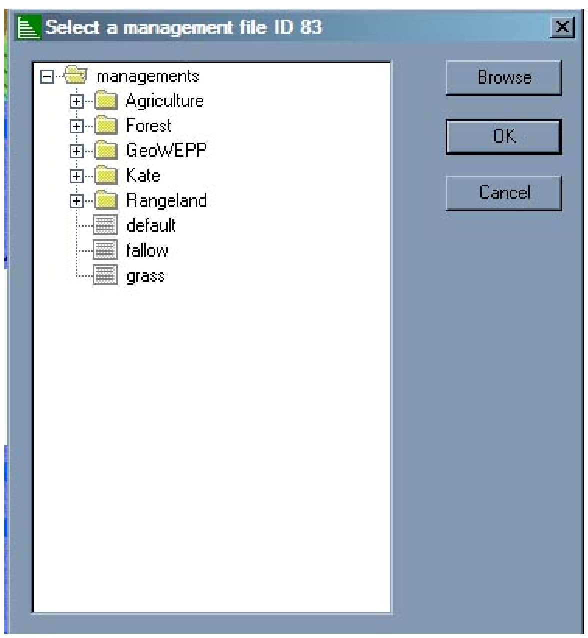


Figure 34 - Select a Management File for Hill 83 window

4. Next you will be asked if you wish to change the WEPP soil parameter for Hill 83. Since we need to modify the soil, click **Yes**.

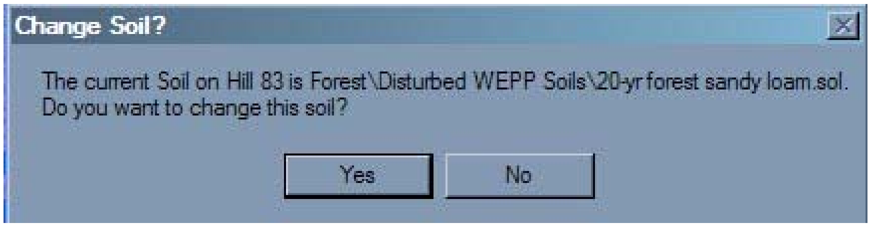


Figure 35 - Change Soil window

5. In the **Select a Soil File** window that appears, double-click on the **GeoWEPP** folder and select **High severity fire-sandy loam**. Click **OK**.

6. We have finished modifying the hillslope parameters, so now we need to run a new WEPP. Click in the **Rerun WEPP**  button on the toolbar. Unlike the first simulation, you will be able to set the T-Value you wish to use for the results. The **T-Value for WEPP Rerun** window will appear; change the **tonnes/hectare/year** value from 1.0 to 5.0 and click **Run WEPP**.

Figure 36 - T-Value for New WEPP Run

The **WEPP Management and Soil Lookup** window will appear again. Notice that there is a new land management and soil that was not there earlier (Figure 37 and 38). This is for the hillslope we just changed. Click **OK** to continue.

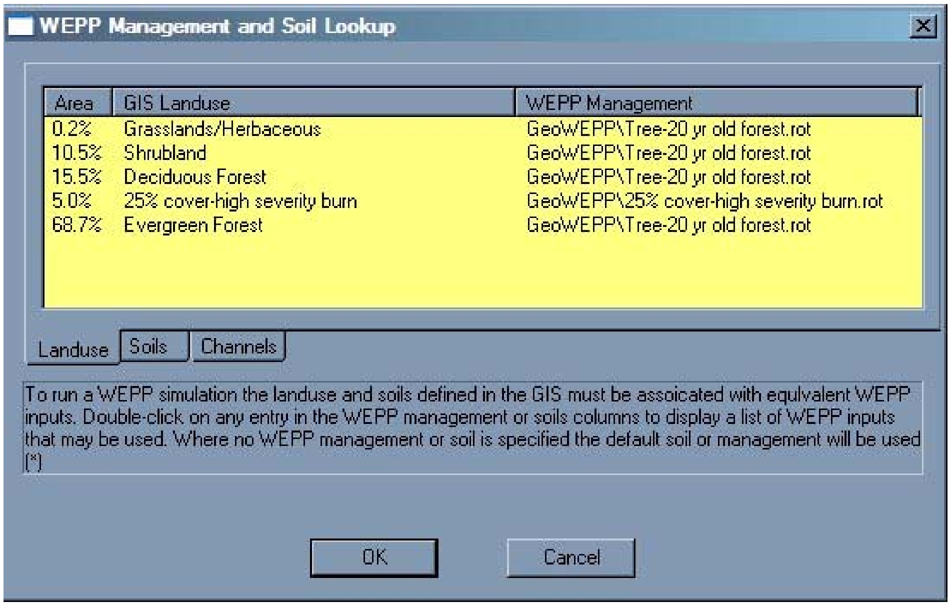


Figure 37 - New land management appears in WEPP Management and Soil Lookup window

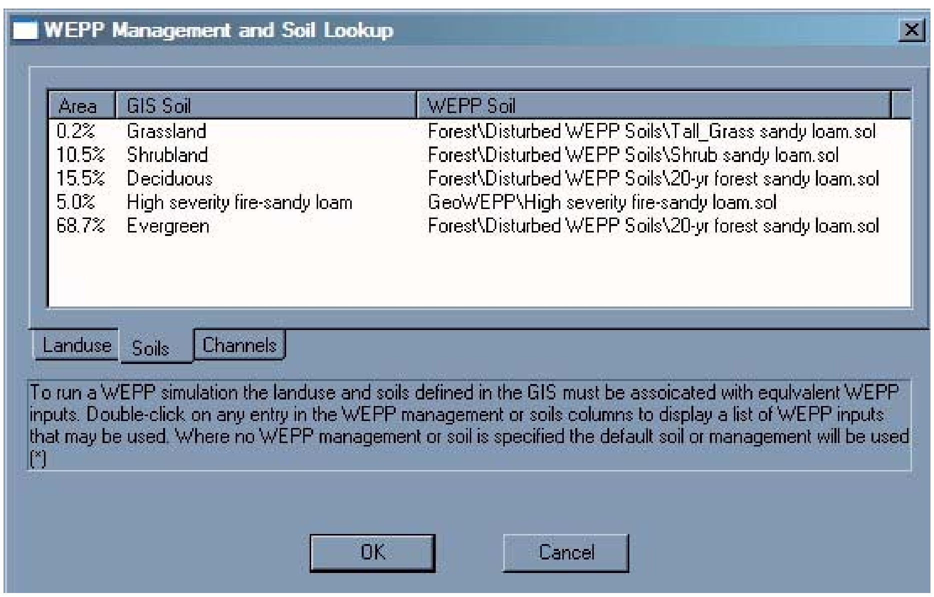
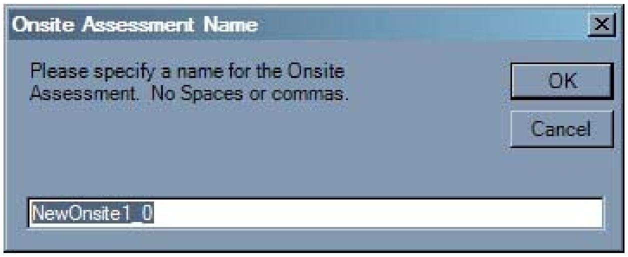
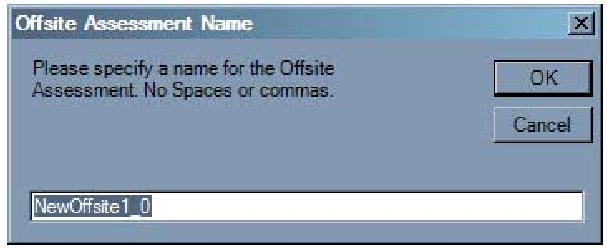


Figure 38 - New soil appears in WEPP Management and Soil Lookup window

7. Once again, we will be running a 30-year simulation using the **Watershed and Flowpaths** method. In the **WEPP/TOPAZ Translator** window change the **Number of Years** to 30 and click **Run WEPP**.

8. Just like in the first simulation, WEPP result layers are generated and need to be named. Since this is the first year of our prescribed burn management scenario, we will label the onsite layer **Year1_On** and the offsite layer **Year1_Off**. Note that GeoWEPP is aware of the new simulation and has modified the default names.



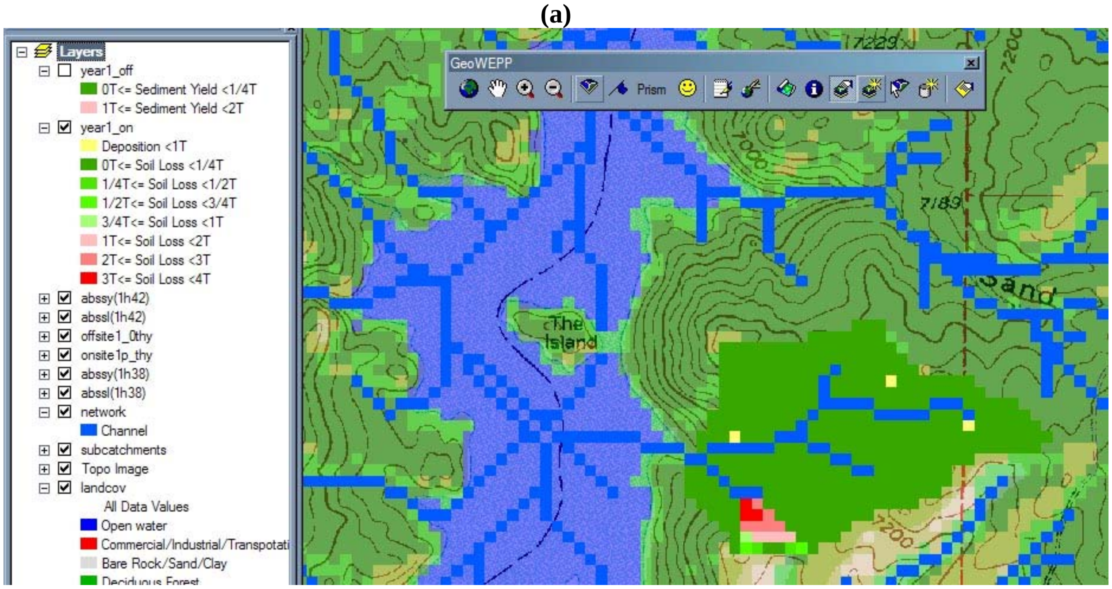


(a) **(b)**

Figure 39 – (a) New Onsite and (b) New Offsite naming windows

Once you have changed the names of the layers, GeoWEPP will load the new results. Notice the change in the results; the results for hillslope 83 are clearly visible. Display the new reports and record the corresponding values on your CWE Worksheets.

(a)



(b)

Figure 40 - New T-Value provides a better understanding of the soil loss on the hillslope.

Year 2: Modify Hillslope 83 and 81

For the second year we need to modify two hillslopes – 83 and 81. In this year, a prescribed burn is performed on Hillslope 81 while some vegetation returns on Hillslope 83. To reflect these changes we need to modify the landuse and soil WEPP parameters for these hillslopes.

Table 2 – Year 2 Parameters

	Hillslope 83		Hillslope 81	
	Landuse	Soil	Landuse	Soil
Year 1	High	High	-	-
Year 2	Medium	High	High	High

Repeat the same steps you performed in Year 1 for Hillslopes 83, changing the land management and soil as noted in the table above for Hillslope 81 and Hillslope 83.

1. Change the land management for Hillslope 83 from **25% cover-high severity burn** to **45% cover-moderate severity burn**. Leave the soil parameter the same by clicking **No** when ask if you wish to change the soil WEPP parameter.

2. Change the land management and soil WEPP parameter files for Hillslope 81 to the same files you used for Hillslope 83 in Year 1: **25% cover-high severity burn** and **High severity fire-sandy loam**.

3. Rerun WEPP again using the same T-Value of 5.0 thy. Notice that the new land management and soil WEPP parameters are present in the **WEPP Management and Soil Lookup** window. Run a 30 year simulation using the **Watershed and Flowpaths** methods. Change the onsite layer name to **Year2_On** and the offsite layer name to **Year2_Off**.

Notice the changes in the soil loss and sediment yields in Year 2 for both hillslopes (Figure 42).

4. Review the reports and record the corresponding values.

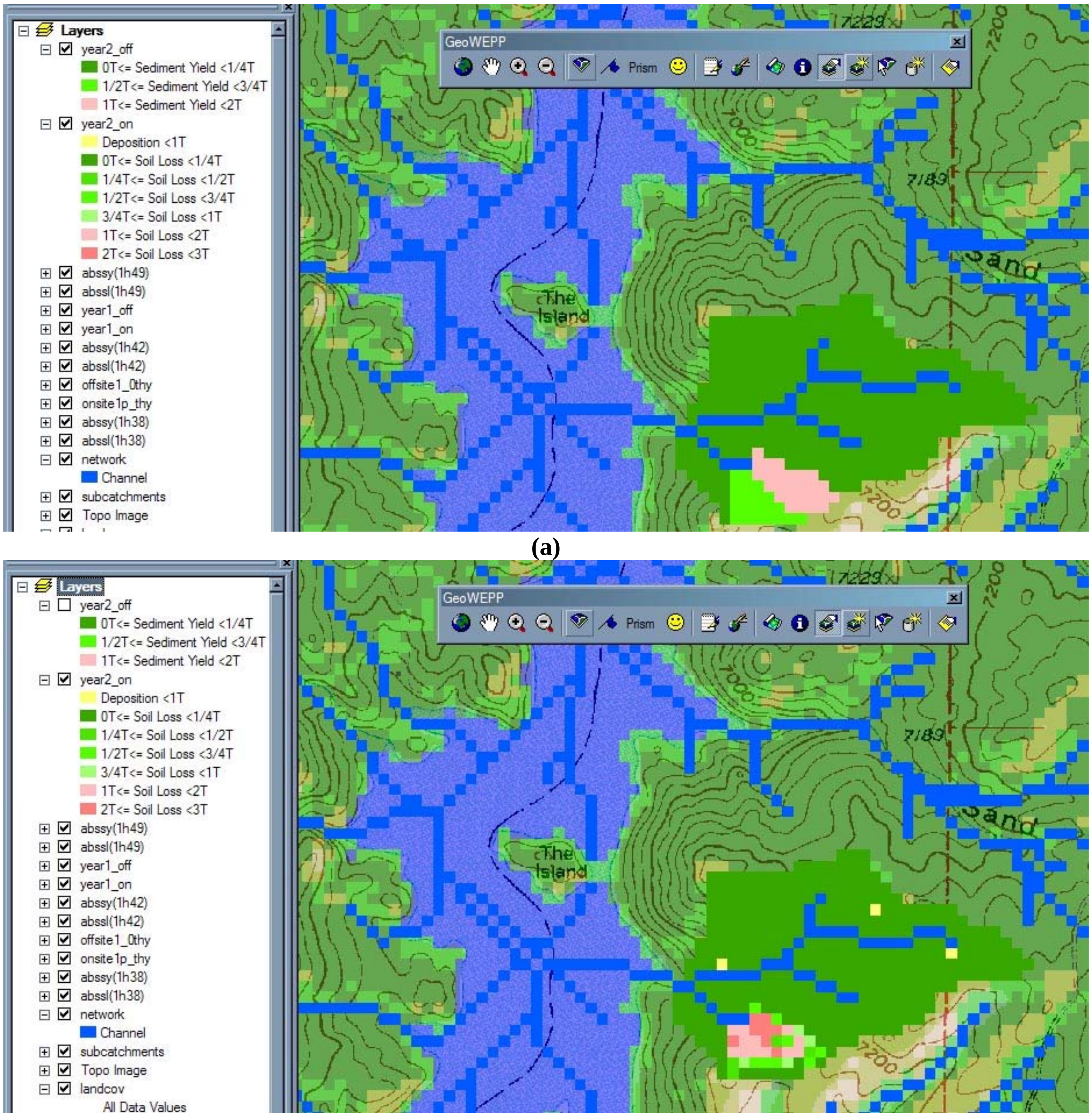


Figure 41 - Results for Year 2 with a T-Value of 5 t/ha/yr. Note the changes compared to Figure 41.

Year 3 and Year 4: The remainder of the case study

Table 3 - Parameter information for each hillslope for each year. Remaining years are in bold.

	Hillslope 83		Hillslope 81		Hillslope 71		Hillslope 61	
	Landuse	Soil	Landuse	Soil	Landuse	Soil	Landuse	Soil
Year 1	High	High	-	-	-	-	-	-
Year 2	Medium	High	High	High	-	-	-	-
Year 3	**Low**	**Low**	**Medium**	**High**	**High**	**High**	**-**	**-**
Year 4	**Forest**	**Forest**	**Low**	**Low**	**Medium**	**High**	**High**	**High**

Now, it is your job to finish the simulation for the Year 3 and Year 4. The paths for the files are given below:

Management
High: GeoWEPP\25% cover high severity burn
Medium: GeoWEPP\45% cover moderate severity burn
Low: GeoWEPP\90% cover low severity burn
Forest: GeoWEPP\Tree 20 yr old forest

Soil
High: GeoWEPP\High severity fire sandy loam
Low: GeoWEPP\Low severity fire sandy loam
Forest: GeoWEPP\10 yr forest sandy loam

IMPORTANT: Remember to use different names for each of the layers:

	Onsite	Offsite
Year 3	Year3_On	Year3_Off
Year 4	Year4_On	Year4_Off

Write down all the results on CWE worksheet.

If you wish, you can go farther and do the following:

1. Make the catchment area all forest and do the simulation.
2. Make the catchment area all burned and do the simulation.

"GeoWEPP ArcGIS 9.x Interface – Steps for CWE: Analysis for unburned subwatershed" was adapted from "GeoWEPP ArcView Interface – Steps for CWE: (analysis for unburned subwatershed)" created by Thomas Stieve.

Updated: 1/1/08

GeoWEPP

Soil and Water Engineering Research
Rocky Mountain Research Station
Moscow, Idaho

Cumulative Watershed Effects Analysis Worksheet-SUMMARY

March, 2005

Climate:___________ Annual Precip: _______mm. Soil: ____________ Watershed Name: ____________ Area: ________ Ha

									Watershed Outlet	
Hill No.									Runoff (mm)	Sed Yield tonnes
All Wildfire →										
		Fire Cycle:		Years	Average Sediment from Wildfire:					
All Forest →										
	Surface Erosion Background Erosion = Forest + Avg Wildfire =									
Year	Vegetation - Cover									
1										
2										
3										
4										
5										
6										
7										
Add additional years as needed				Average During Treatment Period:						

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Cumulative Watershed Effects Analysis Worksheet – RUNOFF (m^3/yr)

March, 2005

Climate:___________ Annual Precip: _______mm. Soil: ____________ Watershed Name: ____________ Area: ________ Ha

								Channel		
Hill No.	83	81	71	61				84	74	64
All Wildfire										
		Fire Cycle:			Years	Average Sediment from Wildfire:				
All Forest										
	Surface Erosion Background Erosion = Forest + Avg Wildfire =									
Year										
1										
2										
3										
4										
5										
6										
7										
Add additional years as needed				Average During Treatment Period:						

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Cumulative Watershed Effects Analysis Worksheet – SOIL LOSS (tonne/yr)

March, 2005

Climate:___________ Annual Precip: _______mm. Soil: ____________ Watershed Name: ____________ Area: ________ Ha

								Channel		
Hill No.	83	81	71	61				84	74	64
All Wildfire										
		Fire Cycle:			Years	Average Sediment from Wildfire:				
All Forest										
	Surface Erosion Background Erosion = Forest + Avg Wildfire =									
Year										
1										
2										
3										
4										
5										
6										
7										
Add additional years as needed				Average During Treatment Period:						

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Cumulative Watershed Effects Analysis Worksheet – SEDIMENT YIELD (tonne/yr)

March, 2005

Climate:___________ Annual Precip: _______mm. Soil: ____________ Watershed Name: ____________ Area: ________ Ha

								Channel		
Hill No.	83	81	71	61				84	74	64
All Wildfire										
		Fire Cycle:		Years	Average Sediment from Wildfire:					
All Forest										
	Surface Erosion Background Erosion = Forest + Avg Wildfire =									
Year										
1										
2										
3										
4										
5										
6										
7										
Add additional years as needed				Average During Treatment Period:						

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