**System Requirements:**

1. ArcGIS 10.1 or later (developed and tested on 10.1)
2. TauDEM 5.0 or later (<http://hydrology.usu.edu/taudem/taudem5/downloads.html>)
   1. Download and install the TauDEM 5.1.2 Self extracting zip file install package
3. Python 2.7 (needs to be the 32-bit version that came with ArcGIS, developed and tested on 2.7.2)
   1. Requires OS, ArcPY, NumPY, SciPy, Math, GLOB, SHUTILS, datetime, calendar, time, math, csv and string modules.
4. Enough RAM (Tested on 8GB)
5. Enough Storage (At least 2GB)
6. Python Scripts (current version available for download on server): [\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow](file:///\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow) > Script
   1. SoCal Models:
      1. PostFireDFAssessment\_Step1\_CalcStreamNet\_201X-XX-XX.py
      2. PostFireDFAssessment\_Step2\_SoCal\_ModelCalcs\_201X-XX-XX.py (Arc10-2)
   2. Intermountain West Models:
      1. PostFireDFAssessment\_Step1\_CalcStreamNet\_201X-XX-XX.py
      2. PostFireDFAssessment\_Step2\_IMW\_ModelCalcs\_201X-XX-XX.py (Arc10-2)
   3. NOTE : THESE SCRIPTS NEED TO BE STORED IN YOUR WORKING DIRECTORY WHERE YOU HAVE YOUR xxx\_df­\_input.gdb BUILT/STORED (See Pre-Script GIS Data Preparation Step 1).
7. Server location [\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow](file:///\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow) mapped as your P: drive
8. Make sure that there are ***NO SPACES IN ANY PATH!!!!!!!***

**Required Data:**

1. Digital Elevation Model as xxx\_dem in Raster format, saves time if projected as WGS84 Web Mercator (see below for instructions)
2. Classified Burn Severity Data as xxx\_sev in Raster format, saves time if projected as WGS84 Web Mercator (see below for instructions)
3. Fire perimeter as a feature class within the input gdb, saves time if projected as WGS84 Web Mercator in (see below for instructions)
4. Soils Data is stored on server, but you need to have [\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow](file:///\\igskcicgvmshare\gis\Landslides\PostWildfireDebrisFlow) mapped as P:
5. Developed Area data is stored on server, same setup needed as for Soils Data.
6. Precip Data:
   1. For the IMW model where States = ID, WY, MT, OR, WA you need to manually input your precipitation frequency intensity and duration values into the step 2 script.

**Optional Data:**

1. *Debris retention basins.* We do not want to model streams/basins below sediment retention basins. These data are sparse outside of LA County, but sometimes do exist. If you track down these data they need to be stored in the xxx\_df\_input.gdb as a point feature class named xxx\_db\_feat, saves time if projected as WGS84 Web Mercator and should have the field DB\_ID as a unique short integer identified.

**Pre-Script GIS Data Preparation:**

1. Create a working directory on your local drive. Add (copy & paste) Python Scripts Step 1 and Step 2 to working directory folder. See System Requirements step #6.
2. Decide upon your three letter fire prefix. For example, the Mountain fire used “mtn”, the Colby fire used “col”.
3. Create Input Geodatabase in your working directory (from step 1)
   1. Open ArcCatalog
   2. Navigate to directory where you want to work
   3. Right Click, New > File Geodatabase
   4. Name the file geodatabase to fit the naming convention such that the name is “xxx\_df\_input.gdb” where xxx represents the three letter abbreviation you decided upon in step #2.
4. Download DEM Data and put in input file geodatabase created in step #3
   1. Link To DEM Data: <http://viewer.nationalmap.gov/viewer/>
   2. Zoom to area of interest
   3. Click on download data icon (blue box with white arrow)
   4. Either draw box or enter extent
   5. Check “elevation”, next
   6. Check “National Elevation Dataset (1/3 Arc Second) in ArcGrid Format), next
   7. Checkout
   8. Enter and Verify Email, Place Order
   9. You will receive an email with the download link.
   10. Download and unzip.
   11. Project Raster to WGS84 Web Mercator (this step NOT NECESSARY ANYMORE)
       1. Open ArcToolbox (via ArcCatalog or ArcMap)
       2. Navigate to your downloaded DEM:

Folder Connections > Rt click click > Connect to Folder > Navigate to unzipped DEM

* + 1. In Arctoolbox, project the raster:
       1. Data Management > Projections and Transformations > Raster > Project Raster
       2. Input: Select your downloaded DEM
       3. Output Raster Dataset: Output the Raster into the File Geodatabase you created in Step #3 as “xxx\_dem” where xxx represents the three letter abbreviation you decided upon in step #2.
       4. Output Coordinate System: Select the output projection of WGS84 Web Mercator
          1. Projected > World > WGS 1984 Web Mercator, OK
       5. Select “Bilinear” as your resampling technique
       6. Specify “10” as your output cell size (in X & Y boxes).
       7. OK

1. Download Severity Data, convert to 10m raster if necessary, project to wgs84 web Mercator (select “nearest” as your interpolation method), save as xxx\_sev in xxx\_df\_input.gdb
   1. Link to existing Burn Severity Data: <http://activefiremaps.fs.fed.us/baer/download.php>
   2. If it’s not listed, Contact Carl Albury or Randy McKinley: <http://www.fs.fed.us/eng/rsac/baer/baer_request.html>
   3. Sometimes the data are in shapefile format, you will need to convert this to a raster (ArcToolbox > Conversion > To Raster > Feature to Raster, name it something other than xxx\_sev, as this is only a temporary raster)
   4. Make sure you are using the classified BARC4 data where 0 = no burn, 1 = low/no burn, 2 = low, 3 = moderate and 4 = high. If not, contact Randy or Carl for support.
   5. Project Raster to WGS84 Web Mercator
      1. Open ArcToolbox (via ArcCatalog or ArcMap)
      2. Navigate to your downloaded or converted severity raster
      3. In Arctoolbox, project the raster (this step NOT NECESSARY ANYMORE):
         1. Data Management > Projections and Transformations > Raster > Project Raster
         2. Input: Select your downloaded or converted severity raster (step #5c).
         3. Output Raster Dataset: Output the Raster into the File Geodatabase you created in Step #3 as “xxx\_sev” where xxx represents the three letter abbreviation you decided upon in step #2.
         4. Output Coordinate System: Select the output projection of WGS84 Web Mercator
            1. Projected > World > WGS 1984 Web Mercator, OK
         5. Select “NEAREST” as your resampling technique
         6. Specify “10” as your output cell size (in X & Y boxes).
         7. Click on “Environments…”
            1. Processing Extent > Set your processing extent to your DEM created in Step 4.
            2. Raster Analysis > Set your cell size to your DEM created in Step 4.
            3. OK
         8. OK
2. Download Perimeter, project to wgs84 web Mercator (NOT NECESSARY ANYMORE) , save as xxx\_perim\_feat in xxx\_df\_input.gdb
   1. Download perimeter in shapefile format from geomac: <http://www.geomac.gov/index.shtml>

Services & Data > Download Perimeters > Desired Year Fire Data > State > Fire Name > download most recent .zip file.

* 1. Project to WGS84 (this step NOT NECESSARY ANYMORE) and put output in file geodatabase:
     1. Arctoolbox > Data Management > Projections and Transformations > Project
     2. Input: Select the downloaded perimeter
     3. Output Dataset or Feature Class:Navigate to the file geodatabase created in step 3. Name the output “xxx\_perim\_feat” where xxx represents the three letter abbreviation you decided upon in step #2.
     4. Output Coordinate System: Select output projection of WGS84 Web Mercator

Projected > World > WGS 1984 Web Mercator, OK

* + 1. OK

**Script Preparation (be sure to use the most current version!)**

1. Both Scripts:
   1. Open both scripts using PyScripter, IDLE, text pad, etc. Right click on script > Edit with \_\_\_\_\_.
   2. Modify the fire\_list variable so that it is the 2 or 3 letter abbreviation decided upon above in Pre-Script GIS Data Preparation Step #2.
   3. Modify the contributing area threshold, value is in # of km2 (min 0.02, max 7.5).
   4. Modify the State abbreviation, using capital letters.
   5. Script step 2 only: Check the rain\_avail variable. 1 = NOAA Estimates exist, 0 = rainfall constant needed (see below)
2. IMW Scripts:
   1. If the fire is located in MT, WY, ID, OR, or WA you need to use constants for rainfall values as the NOAA Atlas 14 estimates do not exist for these states.
   2. If you are in these states, set rain\_avail = 0.
   3. Define your storm\_freq\_list
   4. Define your probability and volume rainfall constants.
3. Save script edits.

**Run Script Step 1**

There are many was to do this. I use PyScripter, but you can also run from IDLE or from Windows Command line. ArcGIS must be closed before the script is run.

1. Ensure that you have the required input data in the xxx\_df­­­­\_input.gdb:
   1. DEM as xxx\_dem in WGS84 Web Mercator (Raster)
   2. Classified Burn Severity as xxx\_sev in WGS84 Web Mercator at same resolution and extent as DEM (Raster)
   3. Perimeter as xxx\_perim\_feat in WGS84 Web Mercator
2. Ensure that you have the required scripts in your working directory.
3. Run > Run Module

**Pour Point Calculation:**

Instead of creating pour points, the user specifies the stream network that should be modeled. Most of the work is done in step 1, but the user needs to verify/edit the modeled stream network using the following steps.

1. Open ArcMap
2. Add the following layers to your map (located in “xxx\_df\_input.gdb”:
   1. Xxx\_debrisbasins\_feat (if it exists)
   2. Xxx\_step1\_strm\_feat
   3. Xxx\_perim\_feat
   4. Xxx\_shd\_feat
   5. Any other basemap that is appropriate (topo, streets, etc)
   6. NOTE: DO NOT EDIT xxx\_step1\_strm\_feat\_PREEDITCOPY. THIS IS A BACKUP IN CASE YOU SCREW UP!!!
3. Display Classified xxx\_step1\_strm\_feat using the “ModelClass” field where 1 = modeled, 0 = not modeled (you will be manually changing these where necessary).
4. Rt click layer in TOC > Properties > Symbology > Show: Categories > Value Field: drop down to ModelClass > Add All Values, OK
5. Start Editing Session
   1. Make sure that the editing toolbar is active:
      1. Customize > Toolbars > Editor should be checked
6. Begin editing xxx\_step1\_strm\_feat where appropriate:
   1. Edit segments that should be / should not be modeled:
      1. Make xxx\_step1\_strm\_feat the only selectable layer
         1. Rt click layer in TOC > Selection > Make this the only selectable layer
      2. Use “Select Features” button (map with arrow) to select stream segments (“shift” allows multiple streams to be selected).
      3. Rt click layer in TOC > Open Attribute Table > Show Selected Records button (at bottom) > Rt click ModelClass column > Field Calculator:
7. Change the ModelClass field to “1” if stream segment should be modeled.
8. Change the ModelClass field to “0” if stream segment should not be modeled.
   * 1. Split stream segment using Editor: Split Tool if necessary, be sure to change the split segment that should be modeled to ModelClass== 1, or those not to be modeled to ModelClass == 0.
     2. Once finished, save edits.
     3. Stop editing, exit ArcMap
9. You can now exit ArcMap and run the Step 2 python script.

**Assessment Map (Official Maps done by Greg with steps 3 & 4 and published by Lisa)**

After running the Step 2 Python Script, you will generate a hazard assessment map.

1. Open ArcMap
2. Add the following layers to your map:
   1. From “xxx\_df\_input.gdb”:
      1. Xxx\_perim\_feat
      2. Xxx\_shd
   2. From “xxx\_dfestimates\_DATE.gdb”:
      1. Xxx\_basinpt\_feat
      2. Xxx\_segment\_dfpredictions\_xxyr (Where xxyr represents the desired storm interval)
      3. Xxx\_basin\_dfpredictions\_xxyr
3. Adjust the display of both the segment & basin\_dfpredicitons. Do the following steps for each layer:
   1. Rt click layer in TOC > Properties > Show: Categories > Value Field: drop down to PCl\_xxyr\_Legend > Add All Values, OK (Where xx represents the storm interval)

\*Note: Add/edit Stream Edits (pour point calculations)

-Go to working directory on local drive

-Select all folders except xxx\_step1\_backup\_DATE; delete

-go into xxx\_step1\_backup\_DATE folder; copy all folders

-back into working directory; paste

-open ArcMap and edit step1\_strm\_feat again; save; run step 2 script…..