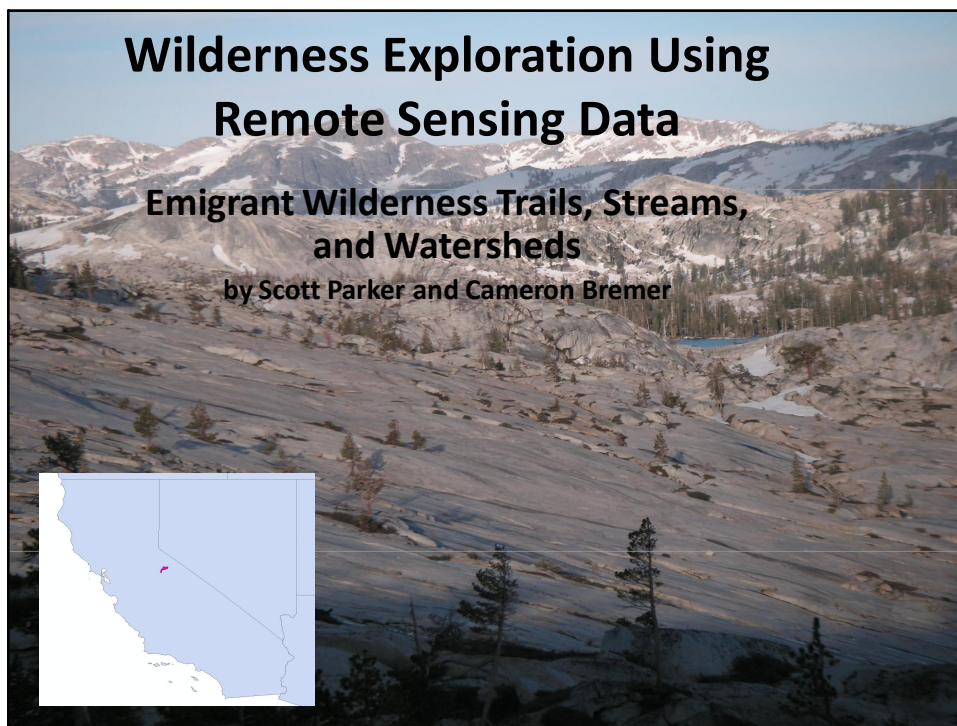
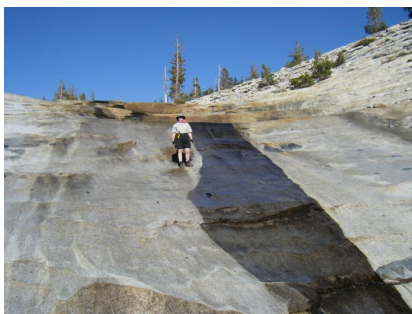
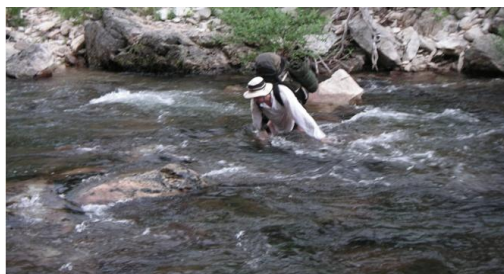




Fall



Spring



Goal: High enough water for waterfalls, low enough water for survival of crossing

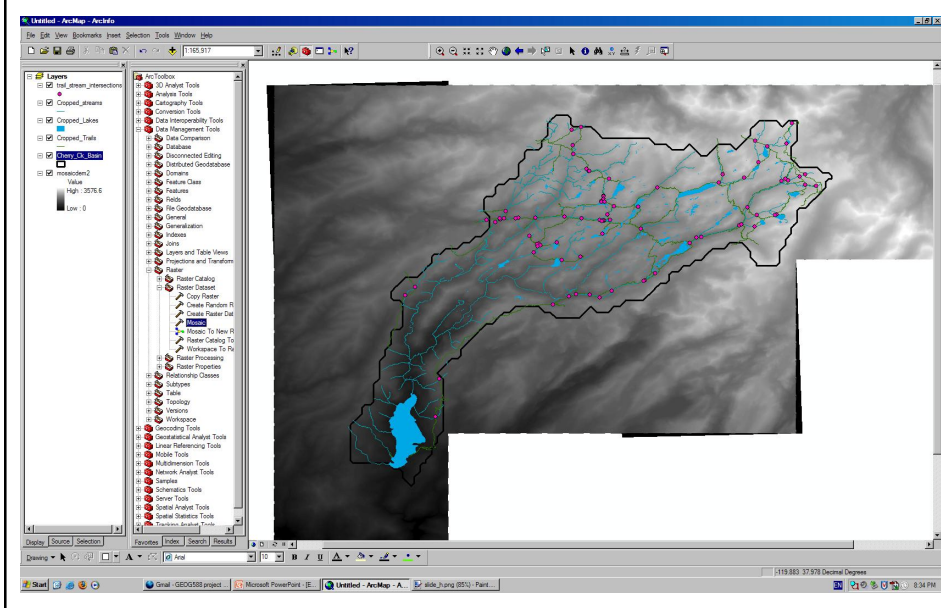
Research Question

estimating stream flows from percentage of watershed covered in snow

Methodology

- identify stream forks (trail/stream intersections)
- delineate watersheds
- import snow coverage data (from .kmz file)
- calculate percentage of watershed covered by snow

Last Semester



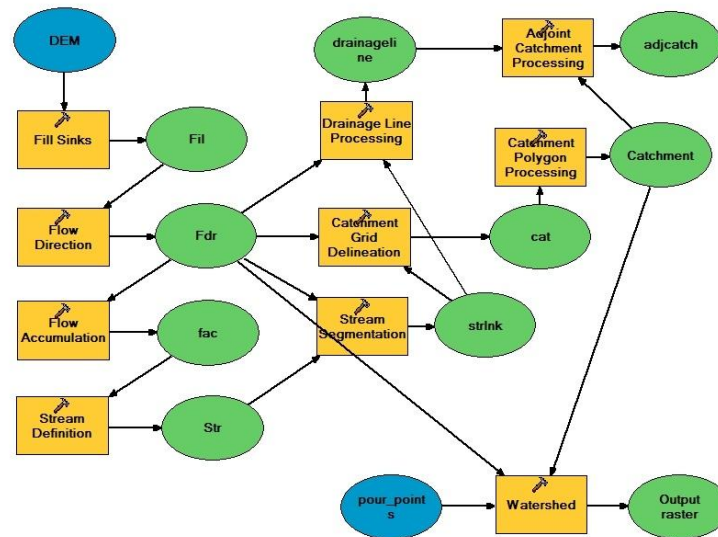
Arc Hydro

The screenshot displays the ArcGIS 10.1 interface with the Arc Hydro Tools menu open. The menu is organized into several categories:

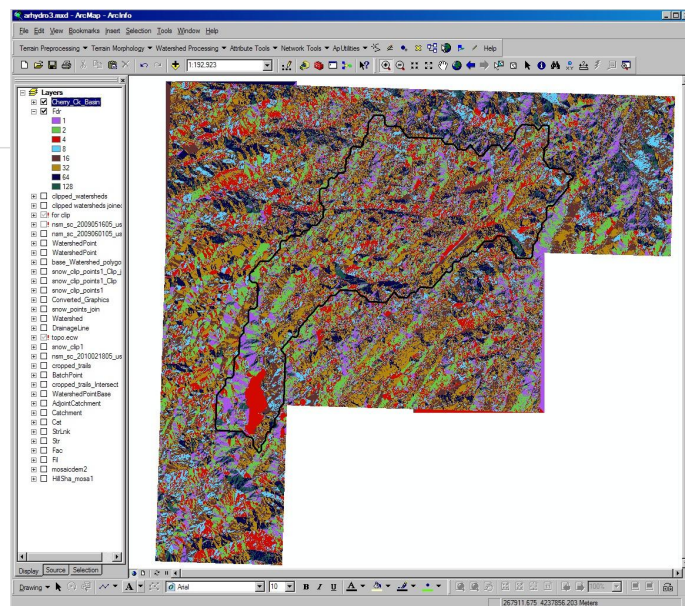
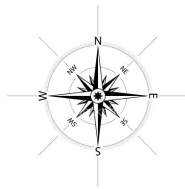
- Terrain Preprocessing**
 - Data Management Terrain Preprocessing
 - DEM Manipulation
 - Flow Direction
 - Flow Direction with Sinks
 - Adjust Flow Direction in Lakes
 - Flow Accumulation
- Terrain Morphology**
 - Stream Definition
 - Stream Segmentation
 - Flow Direction with Streams
 - Drainage Line from Stream
 - Stream Segmentation from Drainage Line
 - Combine Stream Link and Sink Link
- Watershed Processing**
 - Catchment Grid Delineation
 - Catchment Polygon Processing
 - Drainage Line Processing
 - Adjoint Catchment Processing
 - Drainage Point Processing
 - Longest Flow Path for Catchments
 - Longest Flow Path for Adjoint Catchments
 - Accumulate Shapes
 - Slope
 - Slope greater than 30
 - Slope greater than 30 and facing North
 - Weighted Flow Accumulation
- Attribute Tools**

The background map shows a terrain with a stream network, indicating the application of hydrological processing tools.

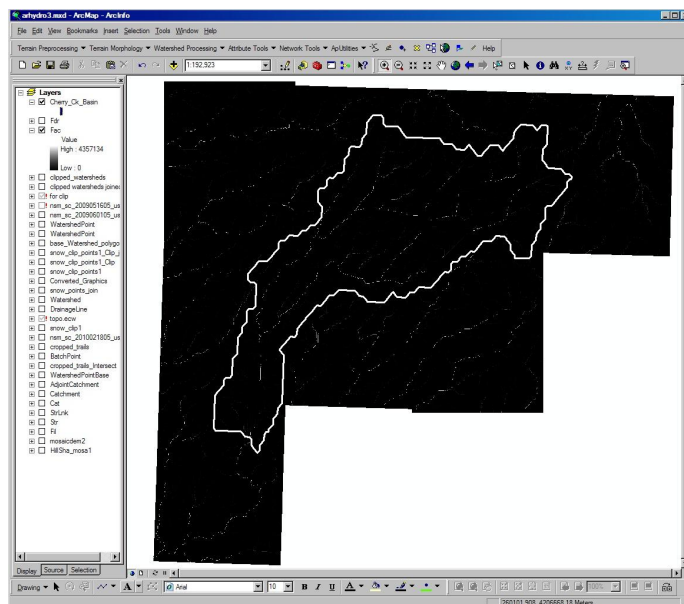
Arc Hydro Watershed Delineation



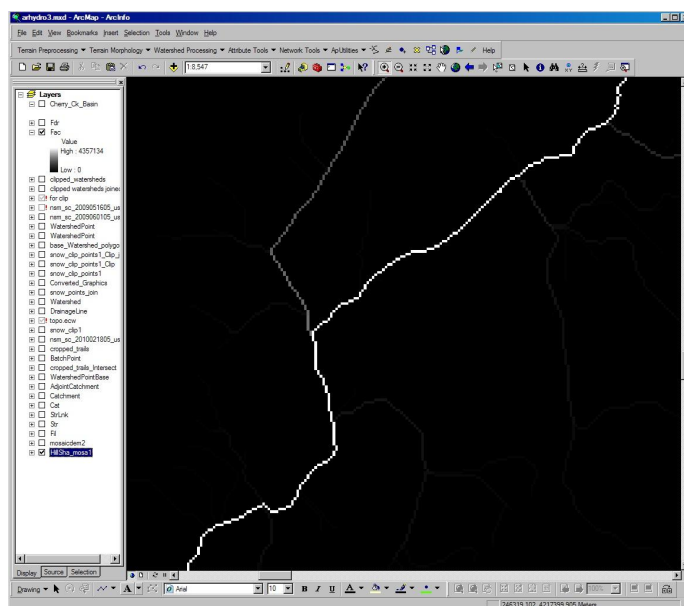
Flow Direction



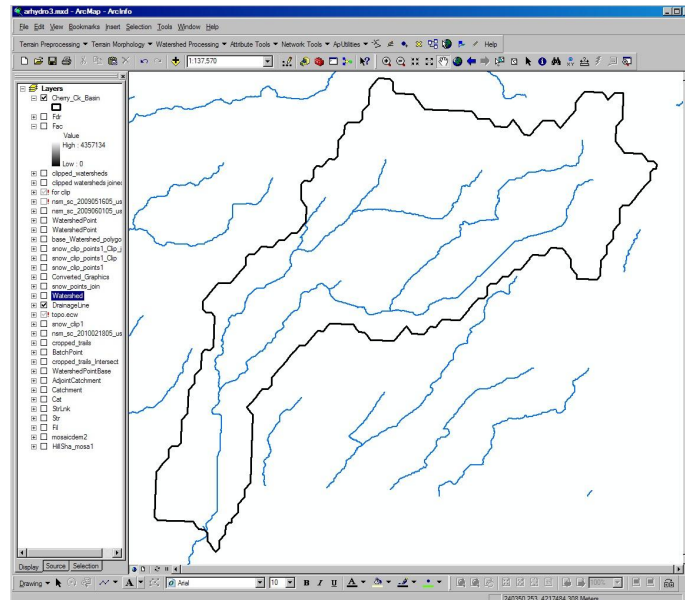
Flow Accumulation



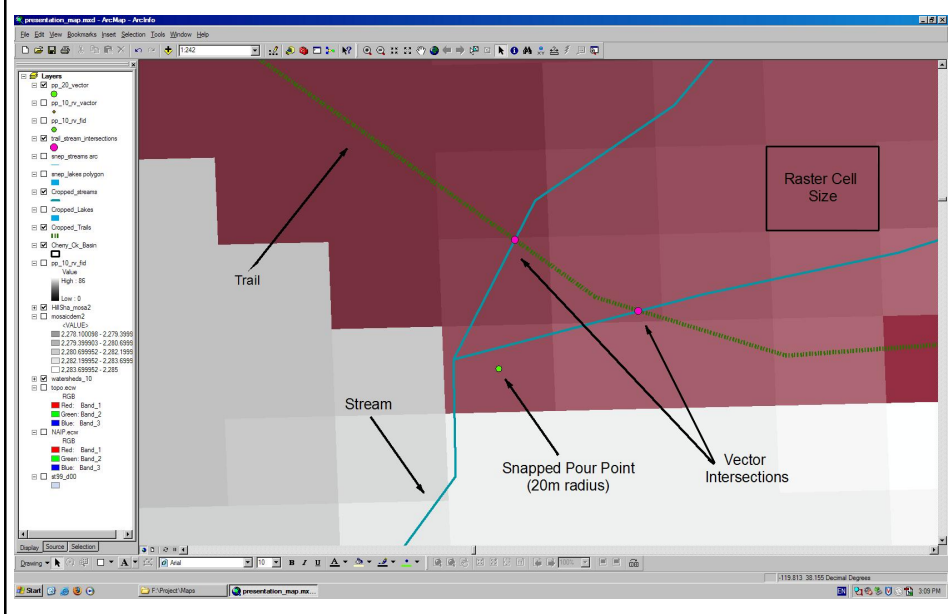
Flow Accumulation



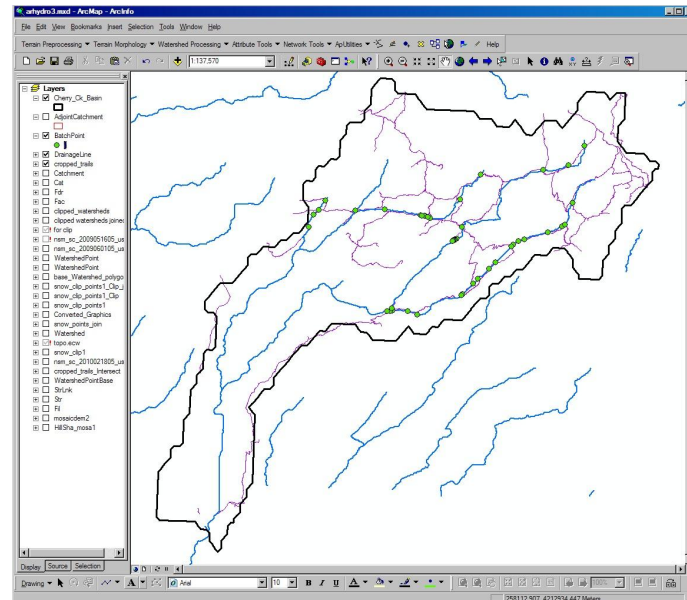
Drainage Lines



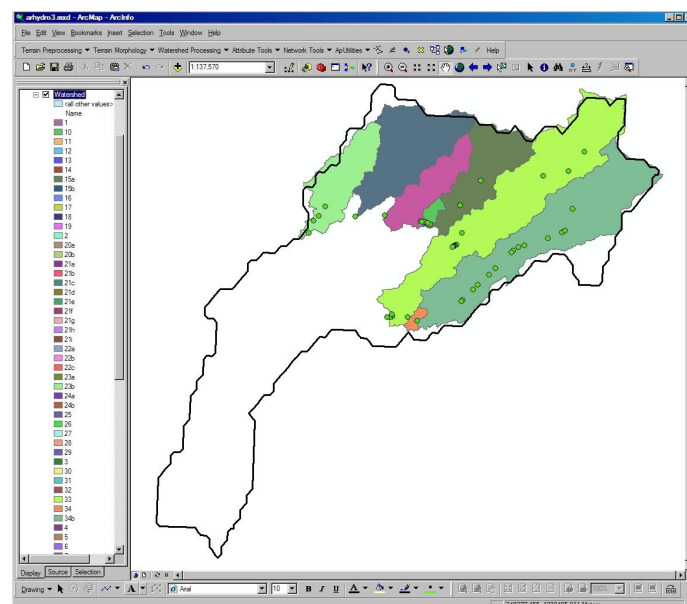
Watershed Problems

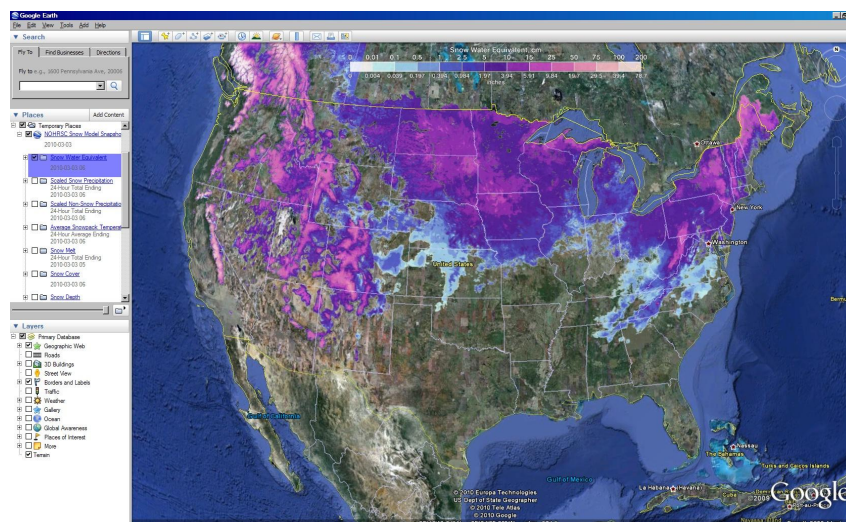


New Trail/Stream Intersections (Fords)

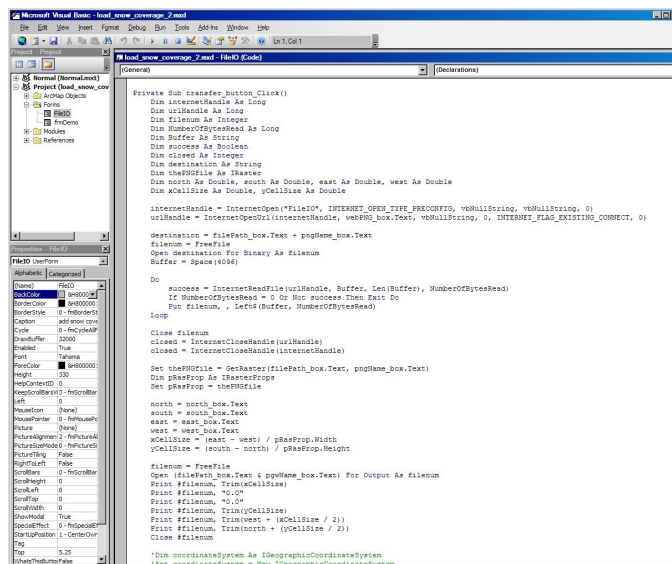


Watersheds!

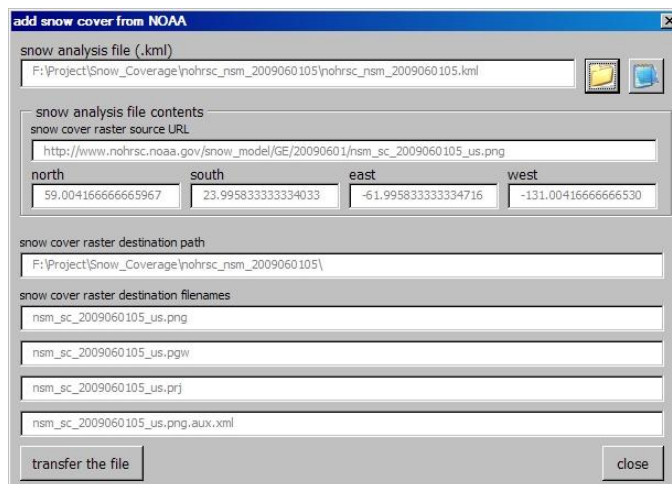




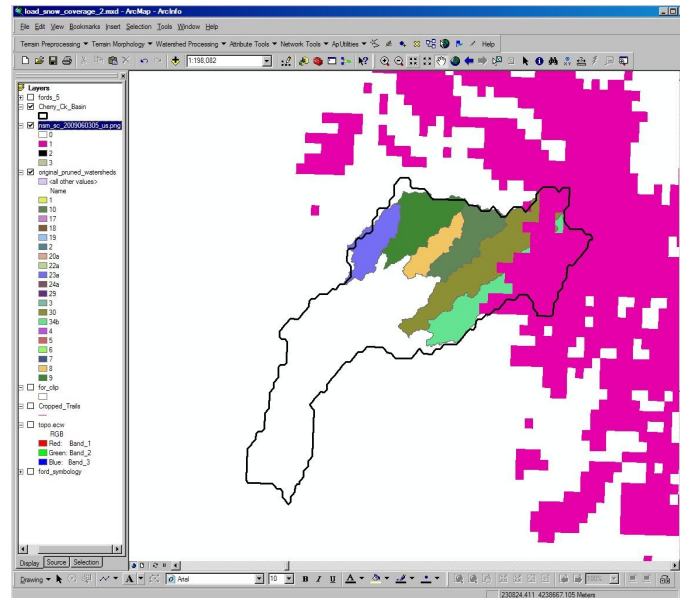
Importing .kml file to ArcMap



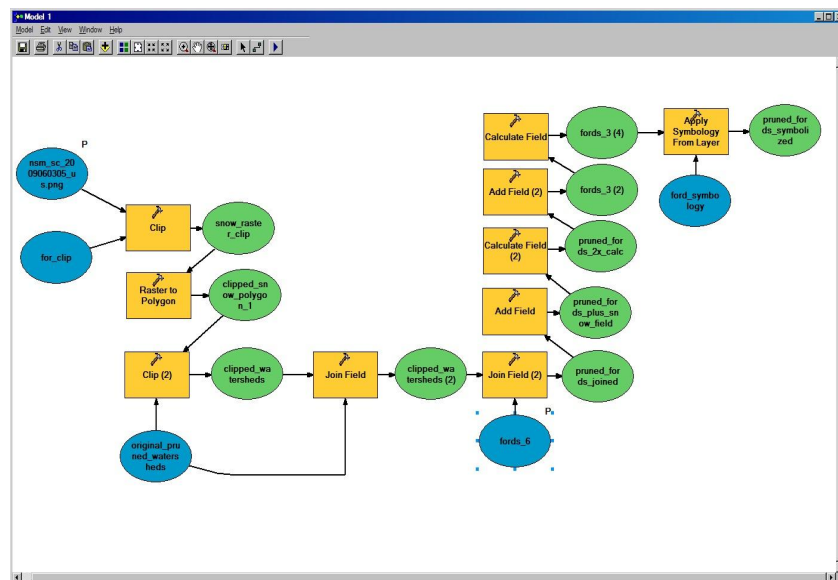
Importing .kml file to ArcMap



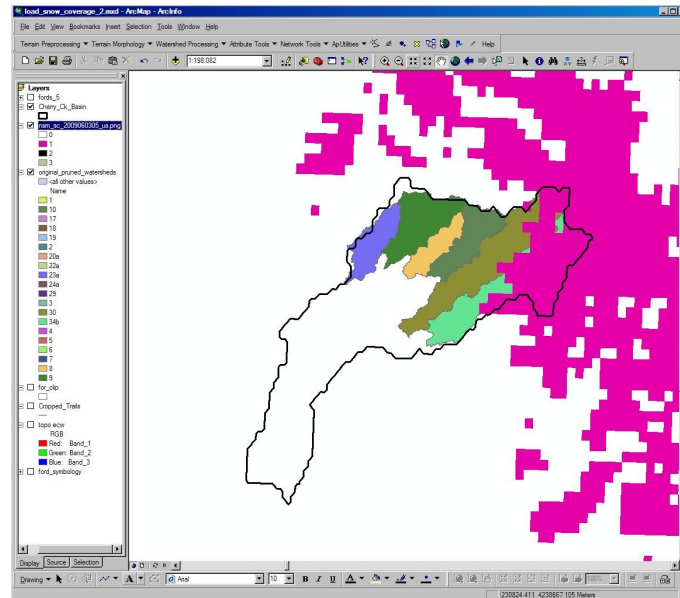
Importing .kml file to ArcMap



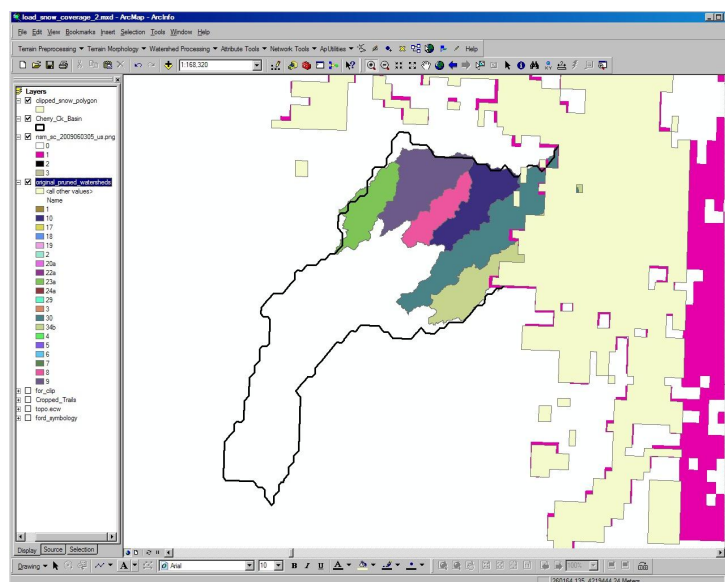
Final Model



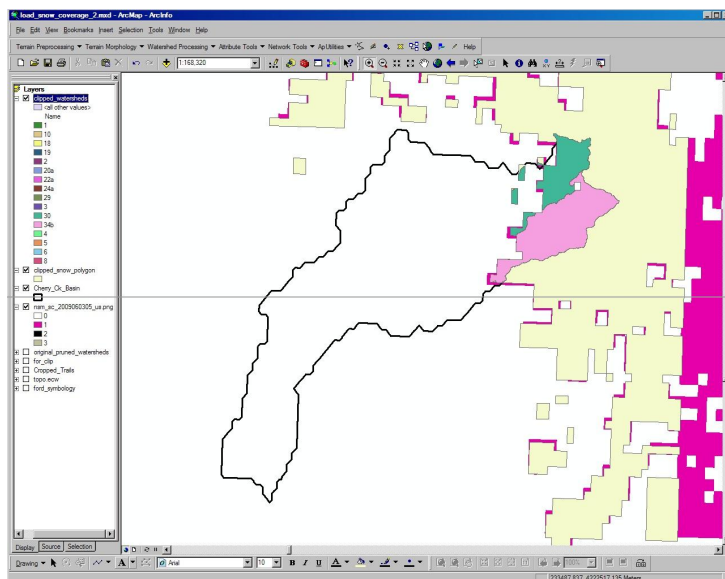
Snow Raster-to-Polygon



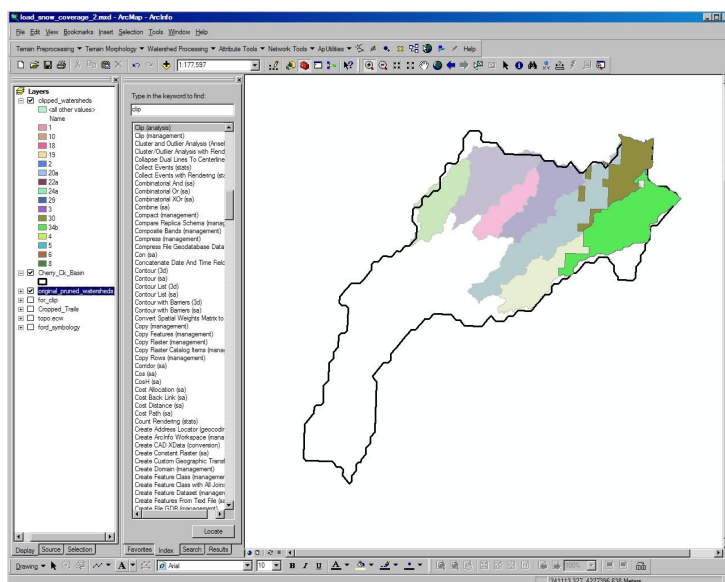
Snow Raster-to-Polygon



Clip Watersheds by Snow Polygon



Clip Watersheds by Snow Polygon

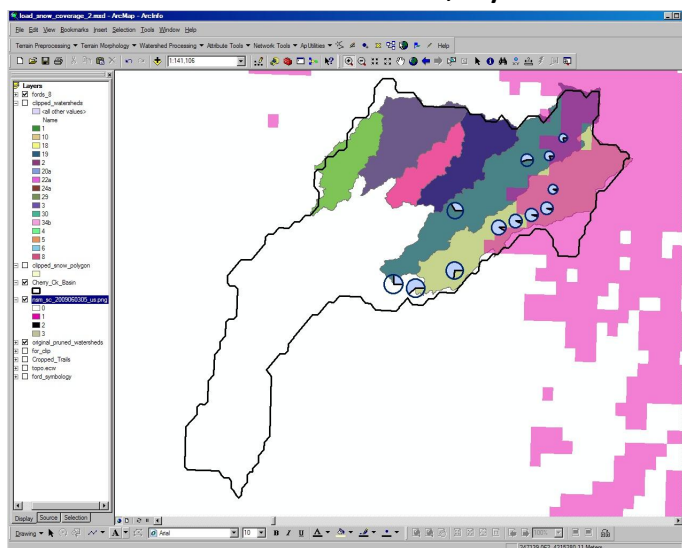


Clipped Watersheds Attributes

SnapOn	SrcType	no_snow	Shape_Length	Shape_Area	Shape_Area
1	0	0	20143.247578	9043639.253528	10115000.055
1	0	0	25791.687986	11413761.123569	12543400.014
1	0	0	35255.123604	13926394.396333	20754599.952
1	0	0	854.210952	29259.548021	10622400.067
1	0	0	27423.964531	13231035.611551	13503599.934
1	0	0	854.210952	29259.548021	14526899.974
1	0	0	854.210952	29259.548021	30956599.931
1	0	0	854.210952	29259.548021	19199500.039
1	0	0	31843.963931	20436035.651551	20708599.974
1	0	0	41427.880347	15086459.559873	36182100.101
1	0	0	33723.963731	22311635.609551	22584199.932
1	0	0	38654.52104	23470487.417981	24294000.05
1	0	0	40534.539873	27361262.60068	28949499.979
1	0	0	44862.113102	29208911.840348	39180999.915
1	0	0	41427.880347	15086459.559873	48956100.041
1	0	0	44862.113102	29208911.840348	46443099.947

Record: 1 Show: All Selected Records (0 out of 16)

Calculate Snow/No-Snow Areas, Join Fields to Points, Symbolize



References, Data Sources, Acknowledgments

- Sierra Nevada Ecosystem Project
 - <http://www.ice.ucdavis.edu/snep/default.htm>
- Geocommunity
 - <http://www.geocomm.com/>
- US Forest Service
 - <http://www.fs.fed.us/r5/rsi/projects/frdb/tables/table121.html>
- USDA National Agriculture Imagery Program (NAIP)
 - <http://datagateway.nrcs.usda.gov/>
- ESRI Support – Hydro Data Model (Arc Hydro Tools Documentation)
 - <http://support.esri.com/index.cfm?fa=downloads.datamodels.filteredgateway&dmid=15>
- NOAA - National Snow Analyses 3D Interface
 - <http://www.noahsc.noaa.gov/earth/>

Thanks to Geoffrey Duh, Kevin Martin and graduate student James for their help