

Wabaunsee County Afforestation

30 March 2022

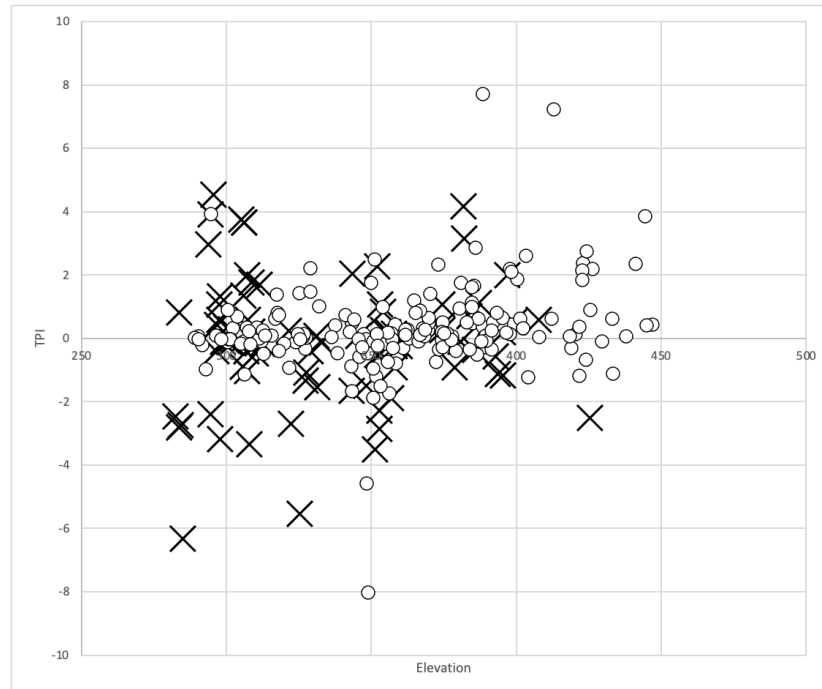
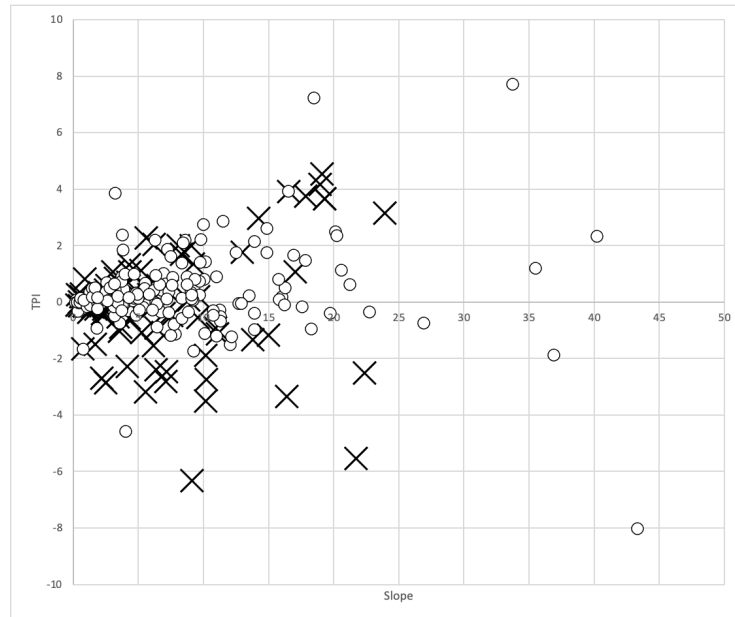
- MAYBE Marlon's negative results are a consequence of projection problems? The rasters are all in projection 102384, which is a UTM in meters, but the LUH points data are in a project that is "invalid." So..... setting out to fix that ...
- Started with sheet 1 in LUH_vis_4.xlsx
- Imported into QGIS via the latitude and longitude
- Saved reduced version as LUH_fix_1.xlsx, and the version for QGIS import as LUH_fix_2.txt
- Imported /Users/town/Dropbox (ATP)/Rephoto_Afforestation/20220330_work_fixproj/LUH_fix_2.txt into QGIS, saved in WGS84 as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/20220330_work_fixproj/LUH_fix_3.shp
- Reprojected thus:

Format	ESRI Shapefile
File name	x (ATP)/Rephoto_Afforestation/20220330_work_fixproj/LUH_fix_4.shp  
Layer name	
CRS	ESRI:102384 - NAD_1983_2011_UTM_Zone_15N 

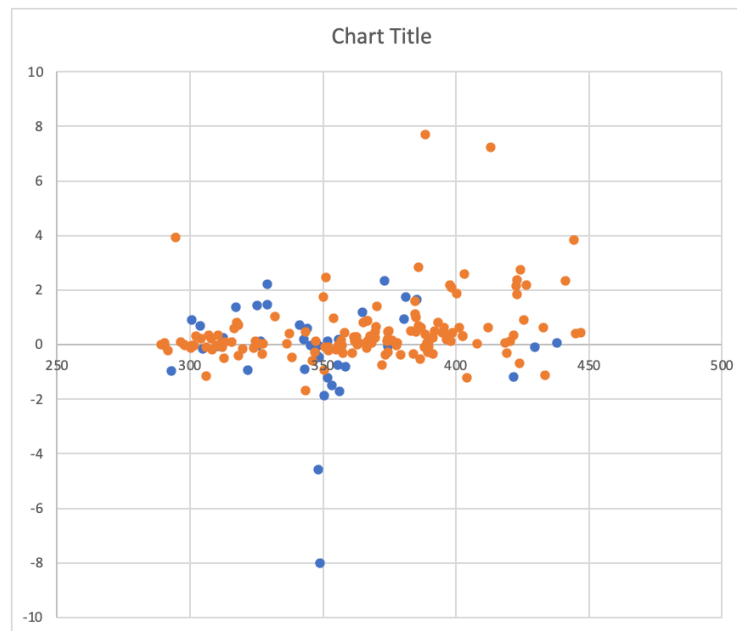
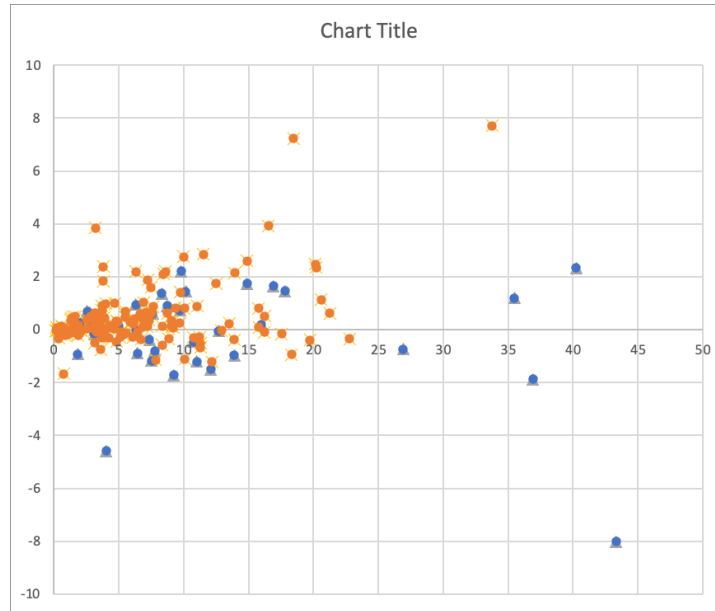
- Note that QGIS is synonymizing projections 6344 and 102384 but I think that it is OK
- Will use predictors only the following: slope, TPI, and elevation; leave soil permeability out ... not continuous variation
- LUH_fix_6.xlsx has all of the environmental data ... points 39 and 329 have the same data between this version and my last attempt, but the association of old forest/open with TPI looks strong on the map ... what am I doing wrong????

26 March 2022

- Marlon tried 3 major ML approaches to the data, and got basically no separation among the classes. I fear that I may have messed up the input data. Indeed, exploring the data a bit, there is clearly no separation among the two classes:
 - For "old forest" versus "old open", no differences:



- For “old open” becoming “new forest” versus “new open”, there is nothing going on... here are two bivariate plots relating TPI, slope, and elevation:



- Unfortunately, my fear is that I messed up obtaining the data from the GIS, so I need to back up further...

16 March 2022

- From Marlon: OK, here is the script and the csv file used to run the initial analyses. Basically, it is a glm using the elasticnet parameterization. I tried the normal glms, they predict only like 20%. The ones I am sending predict up to 68%. In the script, you are going to prepare data and visualize them, after that models will be fit using multiple parameterizations and sets of variables.

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10 March 2022

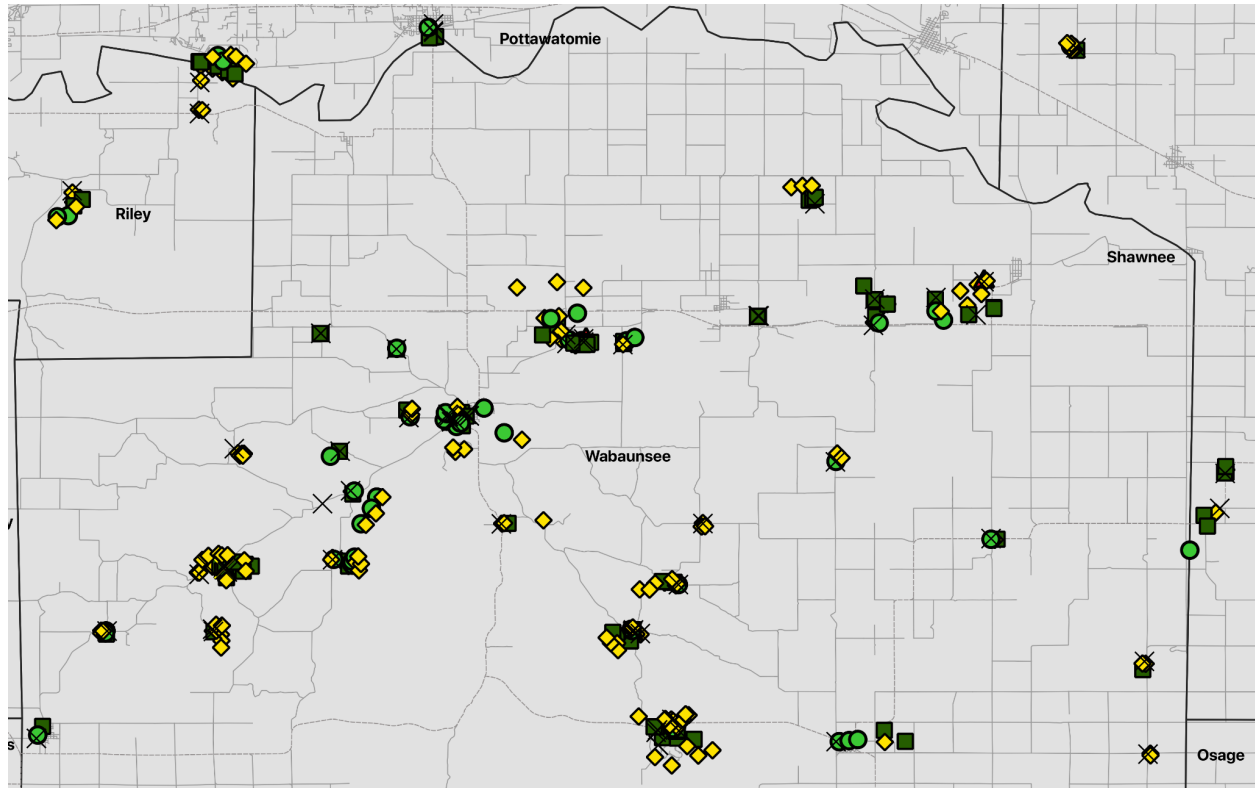
- Need to reproject to meters (UTM Zone 15N... 102384 projection) to get a proper slope measurement
- Saved as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/20220311_work/DEM_reproj_UTM_Zone15N.tif
- Created project UTM_DEM.qgz for the reprojected analyses
- Moved everything to the projected environment ...



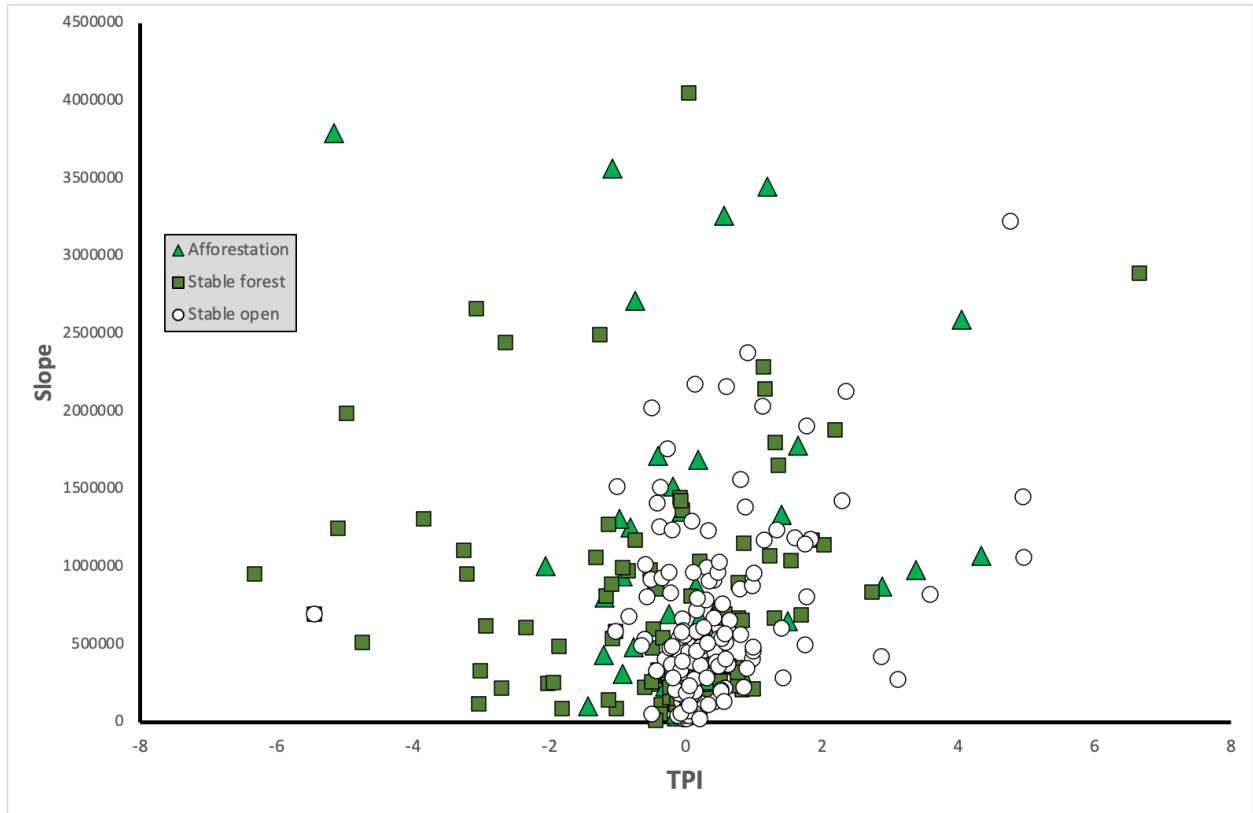
- However, PotRunoff and Depth2Flood were eliminated owing to problems with few values (Permeability) or lack of full coverage (Depth2Flood).
- LUH_vis_5.shp is the reprojected version of the points
- Added values of the 4 rasters (elevation, slope, tpi, permeability), plus the projected X and Y coordinates of each point
- Copied the attributes table of this shapefile, took into Excel
- Saved the working dataset as LUH_data_1.xlsx
- Removed extraneous columns ... LUH_data_2_all.xlsx has all data points, whereas LUH_data_2_reduced.xlsx has removed urban points and “local” evaluations of forest
- So, the testing datasets are:
 - Envision 4 tests:
 - Predicting Old land use: forest versus open
 - Predicting Old-New land use change: among old open, which stay open versus which afforest
 - Each of those two prediction challenges with all data, versus removing urban and local
 - Final data files for testing:
 - LUH_data_3_1sttest_predOld_all.xlsx
 - LUH_data_3_2ndtest_predAfforestation_all.xlsx
 - LUH_data_3_3rdtest_predOld_reduced.xlsx
 - LUH_data_3_4thtest_predAfforestation_reduced.xlsx
 - Sent to Marlon 3/13/2022

3 February 2022

- Finished going through all of the sites
- Saved first version of points as LUH_vis_1.txt
- Did a first interpretation of LUH
- Note that I counted 4 “deforestation” points as “stable open” because they were either very local (a schoolyard) or orchard→cropland



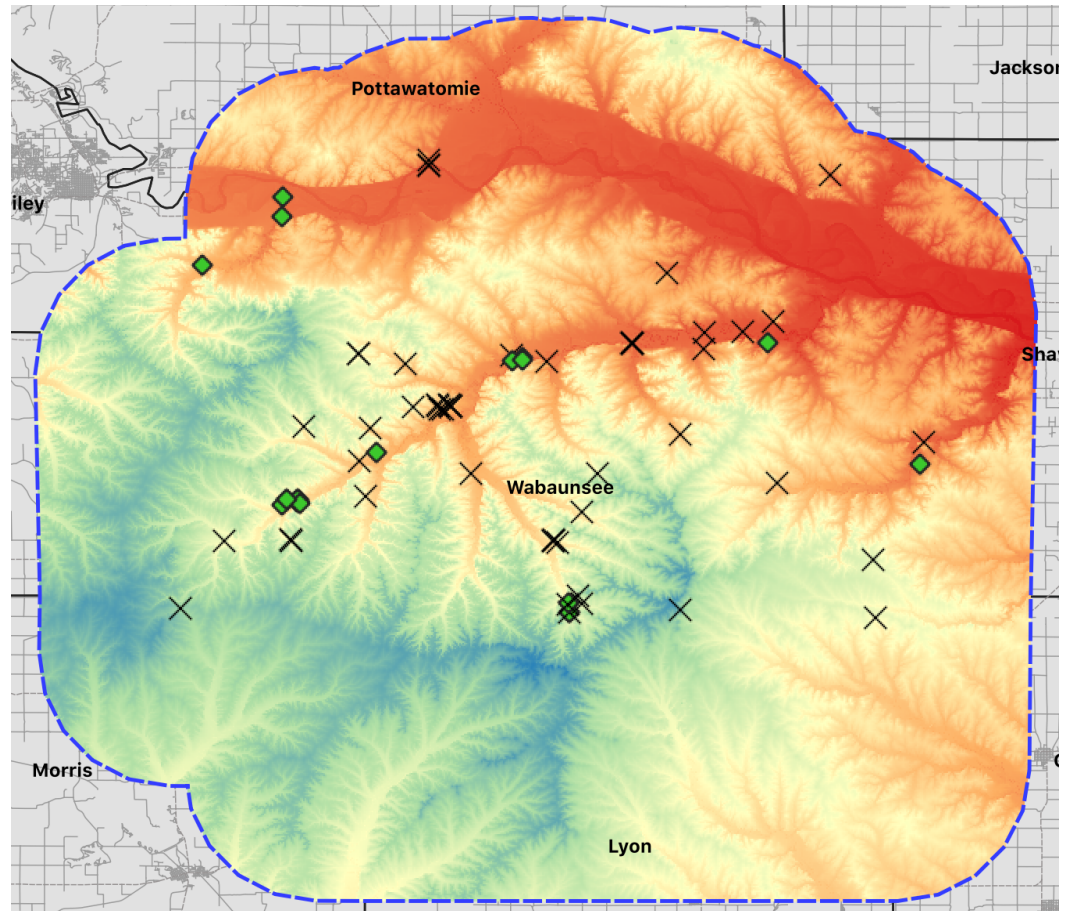
- Good spread and good detail around the photo points
- Saved the LUH data as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/LUH_vis_2.shp
- Used Point Sampling Tool to add slope and TPI to each point
- Saved output as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/LUH_vis_3.shp
- Explored in Excel ... looks like this, in terms of slope x TPI



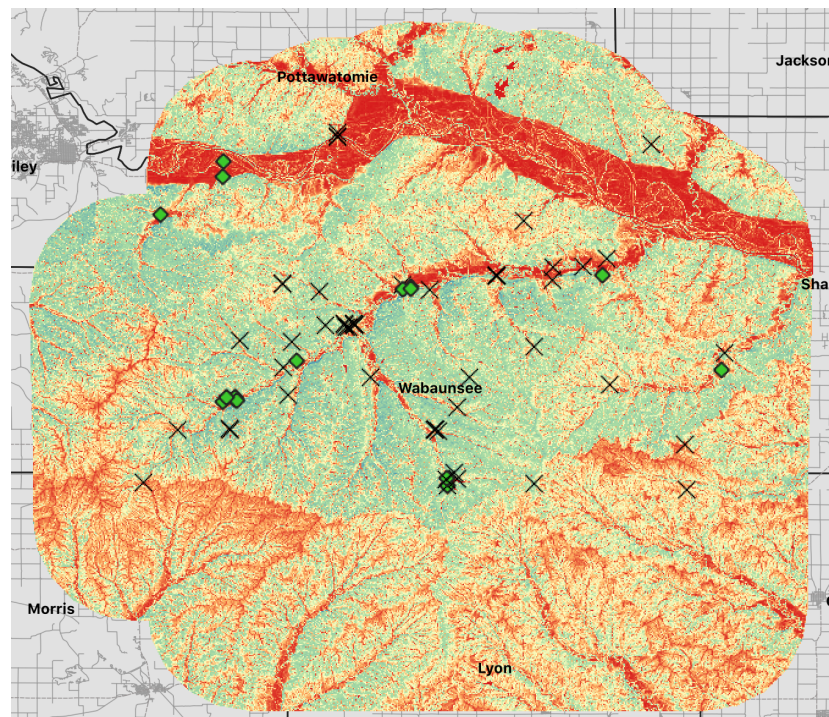
- Note that Stable Forest and Stable Open sort out very well by TPI

2 February 2022

- Study area
 - Buffered WabCo by 0.1 deg = ~11 km
 - /Users/town/Dropbox (ATP)/Rephoto_Afforestation/StudyArea_WabCo_Buff0pt1deg.shp
- DEM
 - Grabbed the 1 arc second 3DEP DEM products for the 4 1-degree blocks that cover the study area
 - USGS_1_n40w096_20190917
 - USGS_1_n40w097_20210223
 - USGS_1_n39w096_20170310
 - USGS_1_n39w097_20160718
 - Source: <https://apps.nationalmap.gov/downloader/#/>
 - Loaded these four, and merged using the Merge raster command
 - Saved as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/DEMs/Merged_1.tif
- Clipped DEM with Study Area shapefile
 - Saved as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/DEMs/Merged_2_clip.tif
 - Here is the distribution of points on the DEM

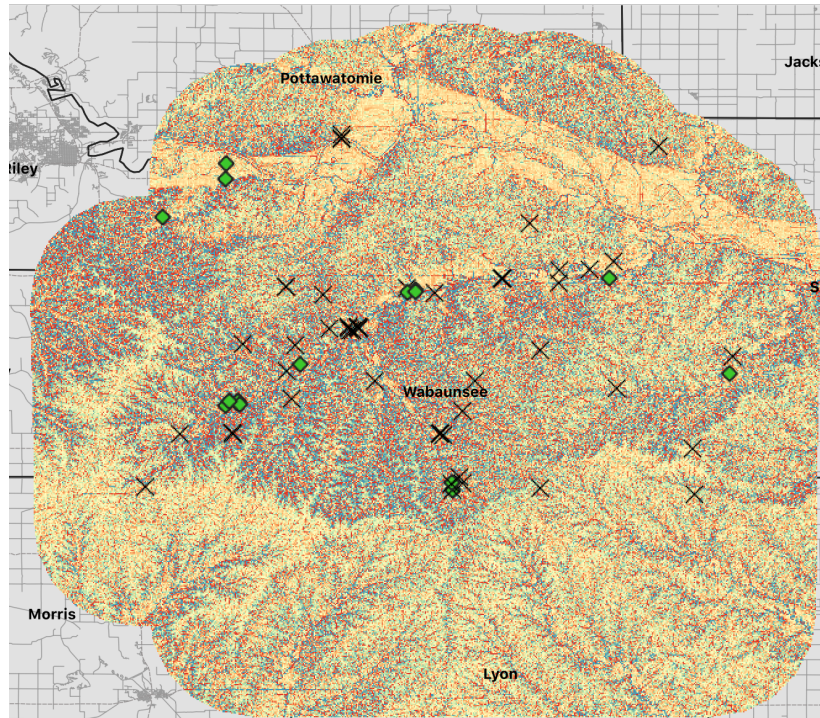


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- Slope output LOOKS nice



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- But it has weird values ... in the 10^4 to 10^6 range

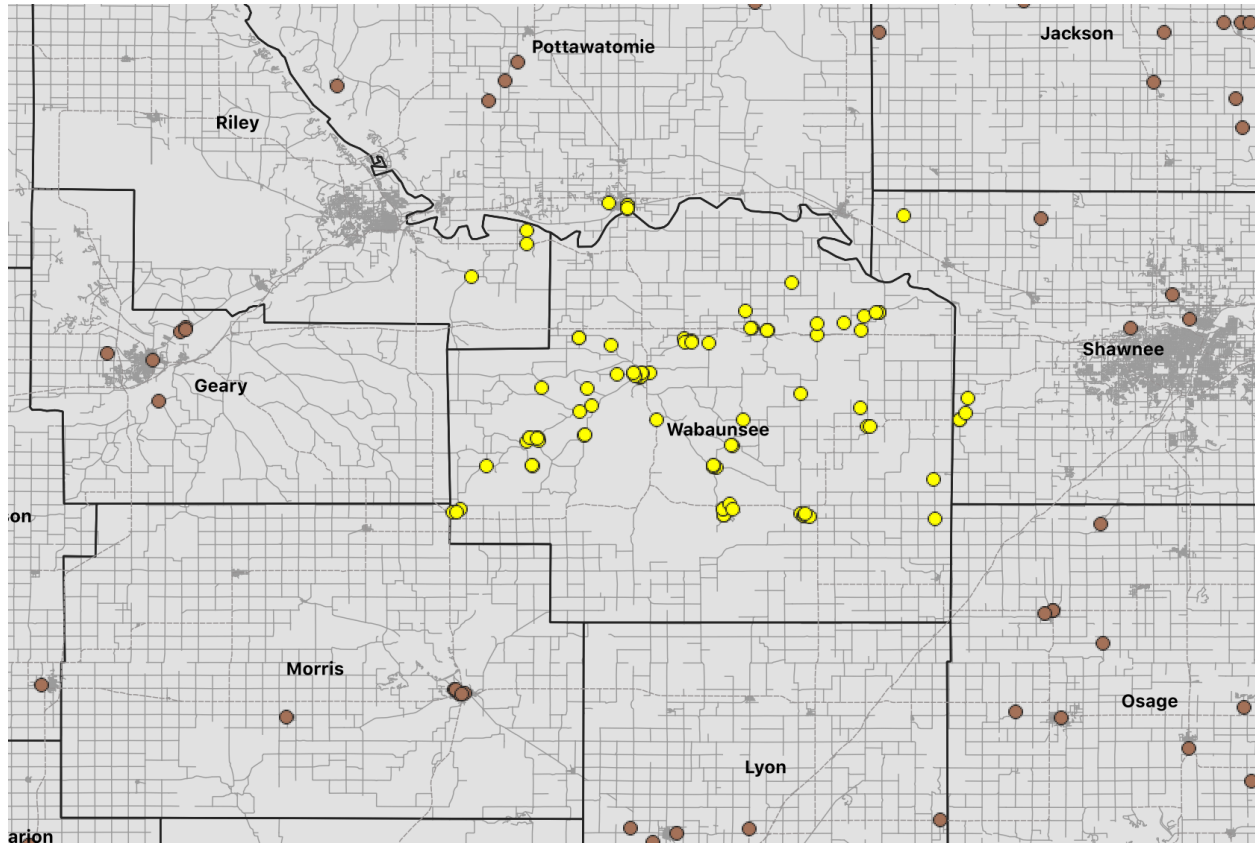
- TPI = Topographic Position Index
 - “Outputs a single-band raster with values computed from the elevation. TPI stands for Topographic Position Index, which is defined as the difference between a central pixel and the mean of its surrounding cells.”



- Peaks = high values of TPI, Valleys = low (negative) values of TPI
- Other data ... went to the Kansas DASC at <https://www.kansasgis.org/catalog/index.cfm>.
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28 January 2022

- Created Rephoto_Afforestation in Dropbox
- There saved KS_Rephotos_Done_20220128.xlsx, which is the current “done” file
- Also saved KS_Rephotos_Done_20220128.txt, for import into QGIS
- Project saved as Afforest_1.qgz
- Focal region:



- So it is Wabaunsee County, plus adjacent parts of Shawnee County, Pottawatomie County, and Riley County, aiming for spatial cohesion
- Saved this set of photos as /Users/town/Dropbox (ATP)/Rephoto_Afforestation/Sites_1.shp
 - Initially had 112 views
- Reviewed and eliminated:
 - Removed 33 photos that did not have non-urban landscape views
 - Left 79 photos, saved as Sites_2.shp
 - Later removed 3 more from this shapefile
 - Removed 1043 (too recent... missile base), 355 (too recent), #368 (same as #1894)
 - Had 73 sites at the end
- Created a form for capturing the before and after land use data, at https://docs.google.com/forms/u/0/d/e/1FAIpQLSdAJ19GVWJ8v_ADDPVufr35-ft_GCTZETug5TivMBCSwE-dIA/formResponse
- Started capturing data ... note that old pasture versus grassland versus cropland is uncertain, so I will probably have to distill it down to open versus forest