ColoradoView 2017 Invasive Species

Project Team:

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Project Background:

ColoradoView is Colorado's role in the larger AmericaView project, which intends to provide easy, low-cost and widely accessible remotely-sensed GIS analyses for research and educational purposes. The Invasive Species sub-project is currently making use of plot data created by the Bureau of Land Management alongside MODIS fire map imagery to investigate the spread of *B. tectorum* ("Cheat Grass") across the rangelands west of the Continental Divide. These investigations and the resulting analyses will hopefully provide the basis for developing achievable management plans to stop the spread of cheat grass further east.

Research Objectives:

- Create the largest possible time series of rangeland fires occurring in the western US as far back as MODIS data allows for
- Apply the provided BLM data plots to the time series and analyze temporal changes in cheat grass abundance
- Determine a definite, statistically verifiable connection between cheat grass and changes to historical fire regimes

Major Products:

Tabular data of the total averaged BLM sites burnt since 2001.

- Please see L:\Projects_active\ColoradoView\2017\TerrSet\YEAR_all_processes for all data
- The Tabular data is HTML docs named Year_Total_BLM_Sites_Burned a

Data Sources:

- http://modis-fire.umd.edu/pages/BurnedArea.php?target=Download
- https://lpdaac.usgs.gov/dataset_discovery/modis/modis_products_table

- http://www.mtbs.gov/nationalregional/burnedarea.html
- http://www.mtbs.gov/nationalregional/pointdata.html
- http://www.mtbs.gov/nationalregional/download.html
- https://www.geomac.gov/

Help Sheets:

Using MODIS GeoTIFFS

1. Difference between ba_qa.tif and burndate.tif?
    a. Qa = quality analysis of the burn data, essentially analyzes the confidence of the burn data taken from the burn data
    b. Burndate = the data we should be using primarily
2. Suggestions on reclassifying?

lineage : 0 0 1

lineage : 1 1 2

lineage : 0 2 3

lineage : -9999

Getting Data Ready For TerrSet

First – import uncompressed files into TerrSet

- Use TIFF/IDRISI function
    - Select GeoTIFF file name
    - Change image to create name (protocol: year####_month##_win#)

Second – Once uploaded, 'Display' under 'File', select DISPLAY Launch

- 'IDRISI GIS Analysis' > Database Query > Area > click 'Tabular' > select 'Calc Cells'
    - Now you will see a table with JULIAN DATE (day # out of 365) and cell #s
    - This step is to get the accurate 'Julian Date + 1' below, but the generation of the table takes a while. Since all the months will end at the same Julian date….
        - Jan: 33
        - Feb: 61
        - Mar: 91
        - Apr: 121
        - May: 153
        - Jun: 179
        - Jul: 213
        - Aug: 245

- Sep: 275
- Oct: 304
- Nov: 335
- Dec: 367

Third – Pulling out cells (from above); get back to Database Query

- Choose 'RECLASS'
  - Select file name you want
  - 'Build query' > 'Value'

Assign **THIS** value…:	To all values from…:	To just less than…:
1	1	(Highest Julian date) + 1
0	0	1
2	(Highest Julian date) + 1	70000

Ω The above formula is currently saving reclassed files to:

C:\Users\Public\Documents\TerrSet Tutorial\Using TerrSet

∞ MACROS CAN BE WRITTEN FOR ALL STEPS. Steps 1 and 3 are the most critical. Select the proper tools (GeoTIFF, Reclass) in TerrSet and click 'Help', navigate some ways down and there will be a link to instructions on writing a macro (in notepad) for that tool. Macros must be saved as .iml (Idrisi Macro Language) files, and you probably need to be working within a TerrSet project for them to work.

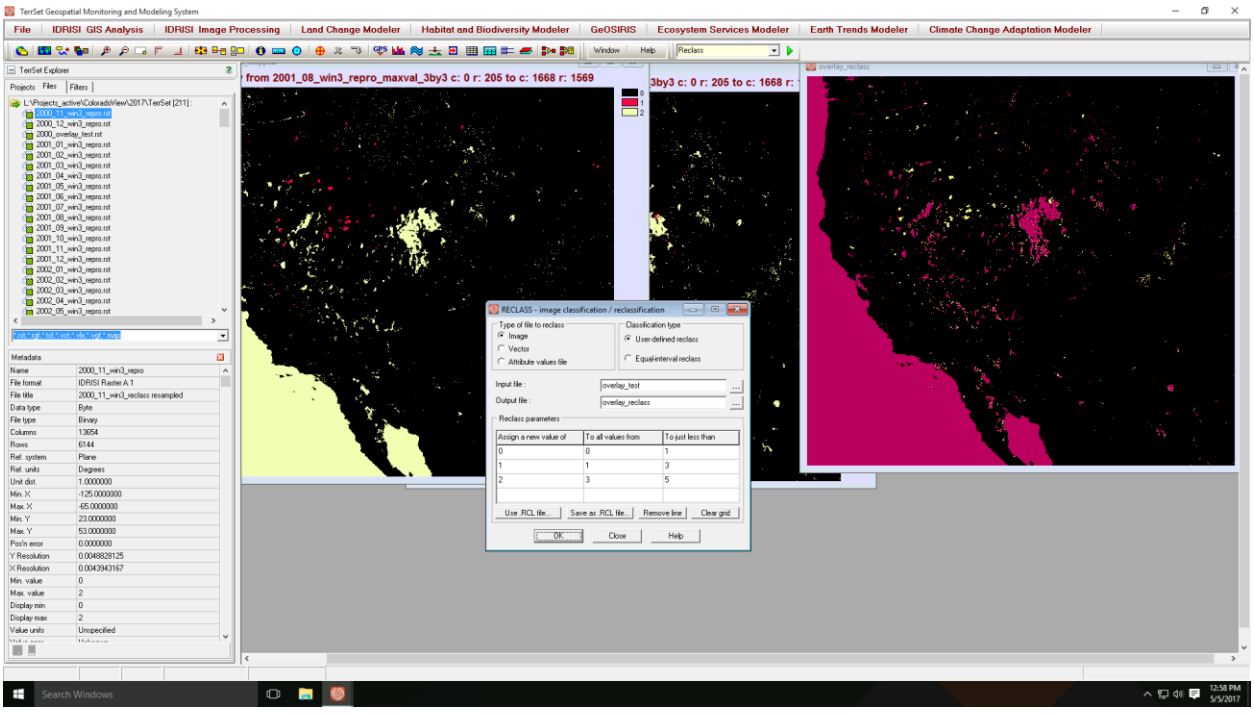
Reprojecting MODIS Tiles:

USA (Conterminous)

- **Min Long: -125**
- **Max Long: -65**
- **Min Lat: 23**
- **Max Lat: 50**

For The Time Series….

- We will need to reproject all the fire maps to an actual projection instead of the simple "plane" projection based on rows and columns. After reading the documentation, it is clear the images for each window (eg USA, AK) are projected into "Plate Carre", which is just a simple lat-long projection. The document gives the bounding coordinates as well. By dividing the total number of degrees in the X and Y directions (east-west and north-south) by the number of cols (in X) and rows (in Y) we find the grid cell (pixel) size.
- So in x (LONG) we have -125 to -65 degrees (from Appendix Table 4) which is 60 degrees, and there are 13654 columns so each column is 13654/60 = .004394 degrees wide. In Y (LAT) we have 6144 rows and 30 degrees so 6144/30 = .004394 again. So that is the grid cell size.
- We will use the **resample tool** in Terrset to do the reprojection. You will find that a .cor (correspondence) file will be needed which gives old and new X and Y coordinates.
- That would be
    - 0 to 13654 (old) and -125 to -65 new (in LONG)
    - 0 to 6144 (old) and 23 to 53 new in (LAT)

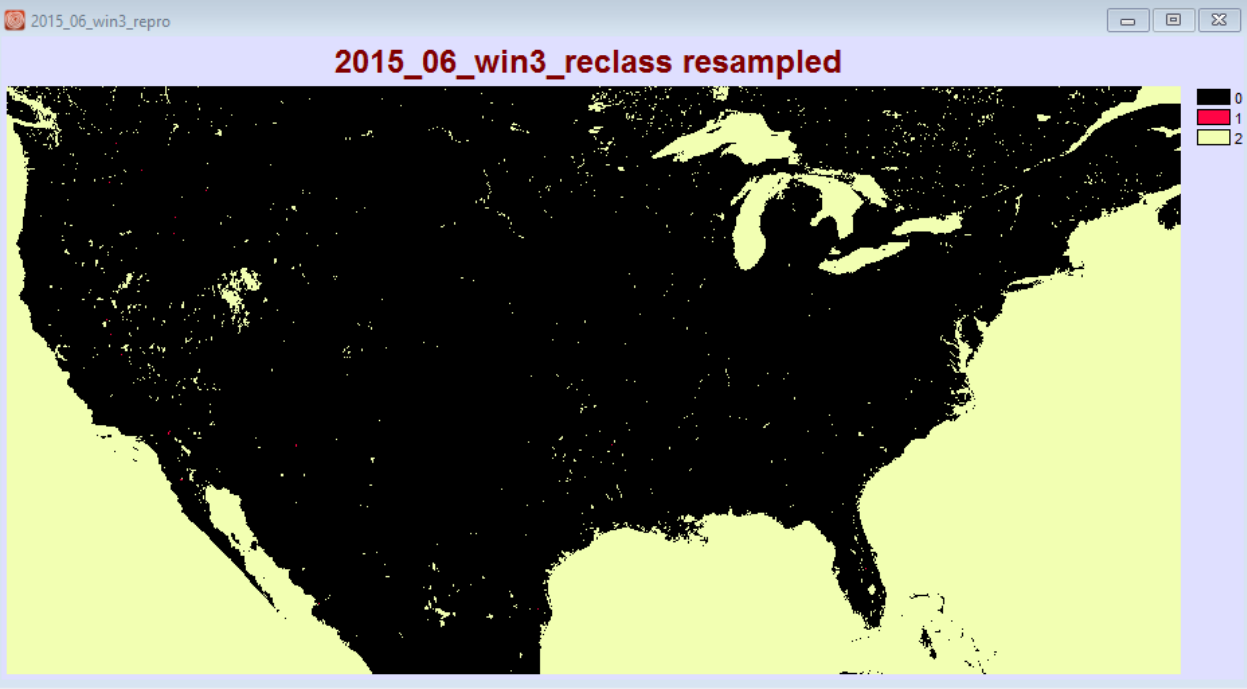


Function RECLASS

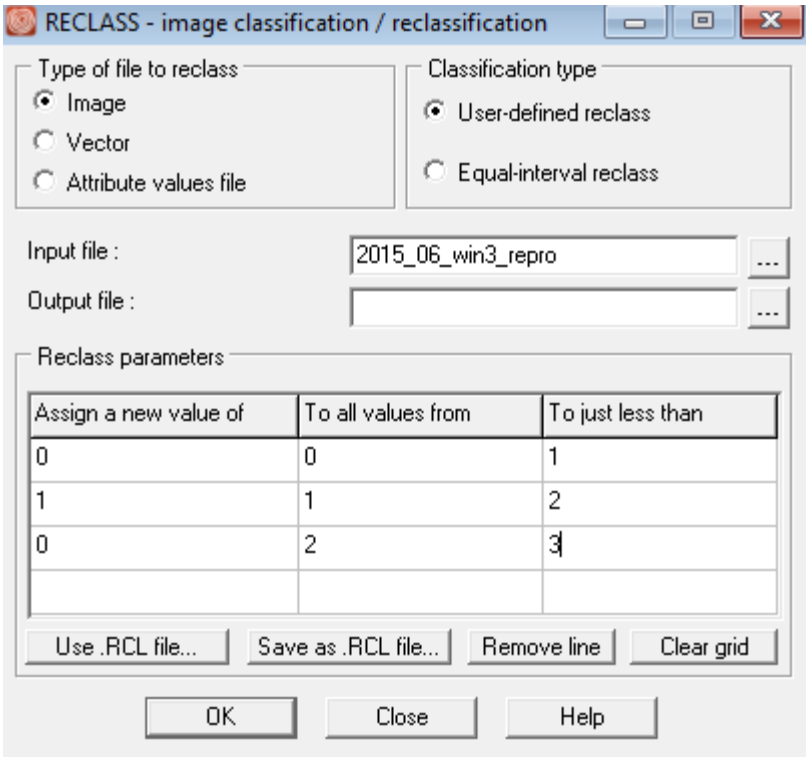
RECLASS reprojected files:

- **Reclassify every month from 2001-2016**
- **files [Year_month_win3_repro]**
- **1's show locations of fires during that month:**

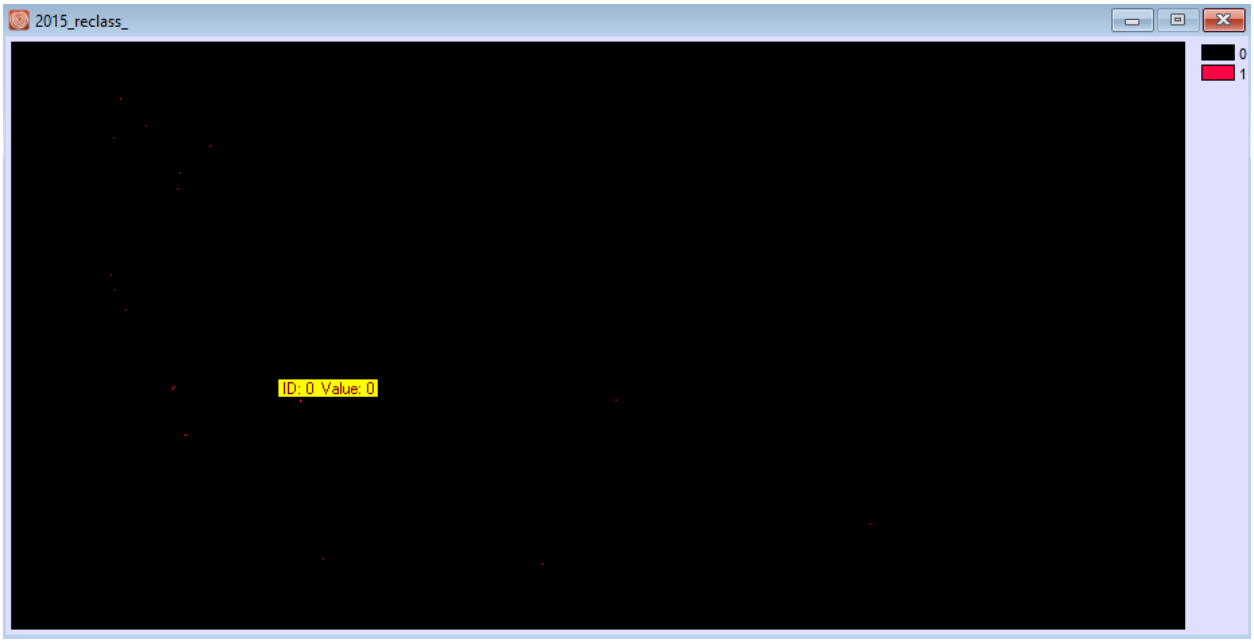
Input image:



Settings:



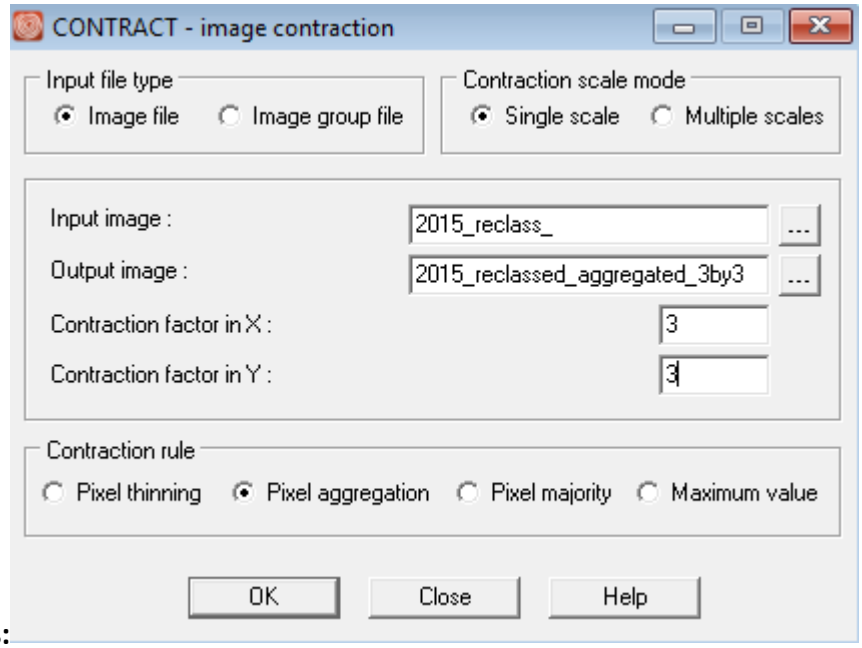
Output image:



Function CONTRACT: to aggregate the data

- **Input reclassed file**
- **Do every month from 2001-2016**

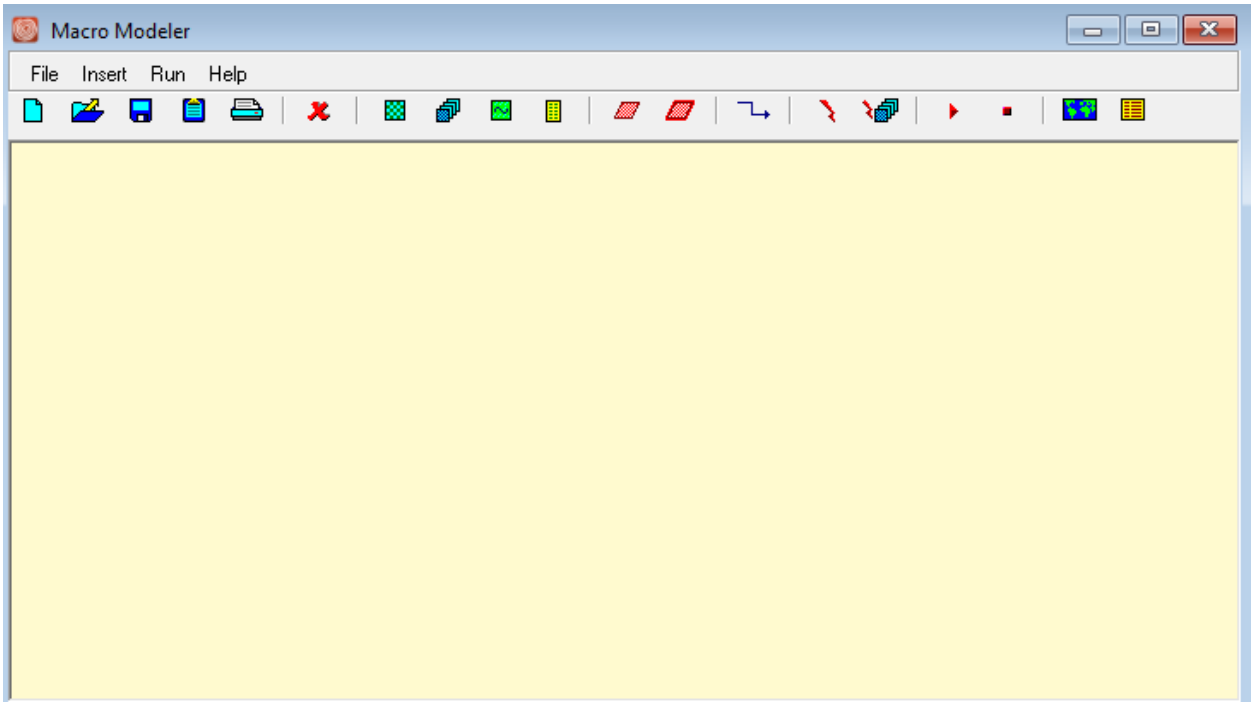
Settings:



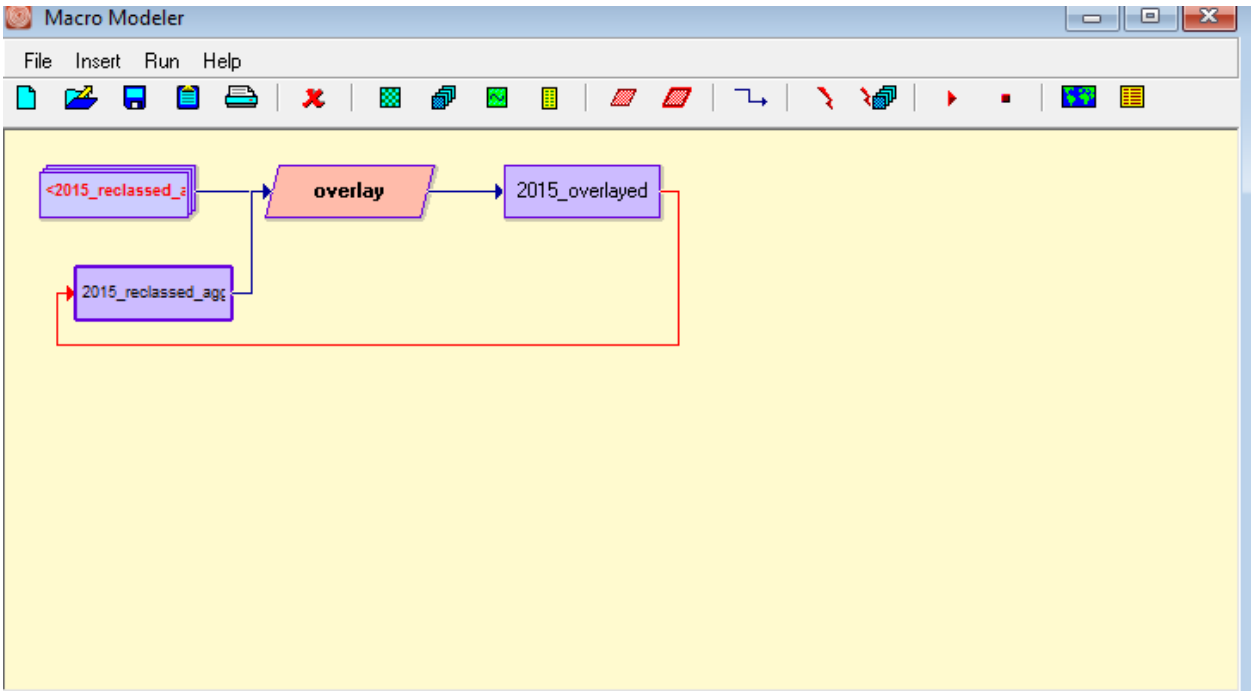
Output image:

Overlay:

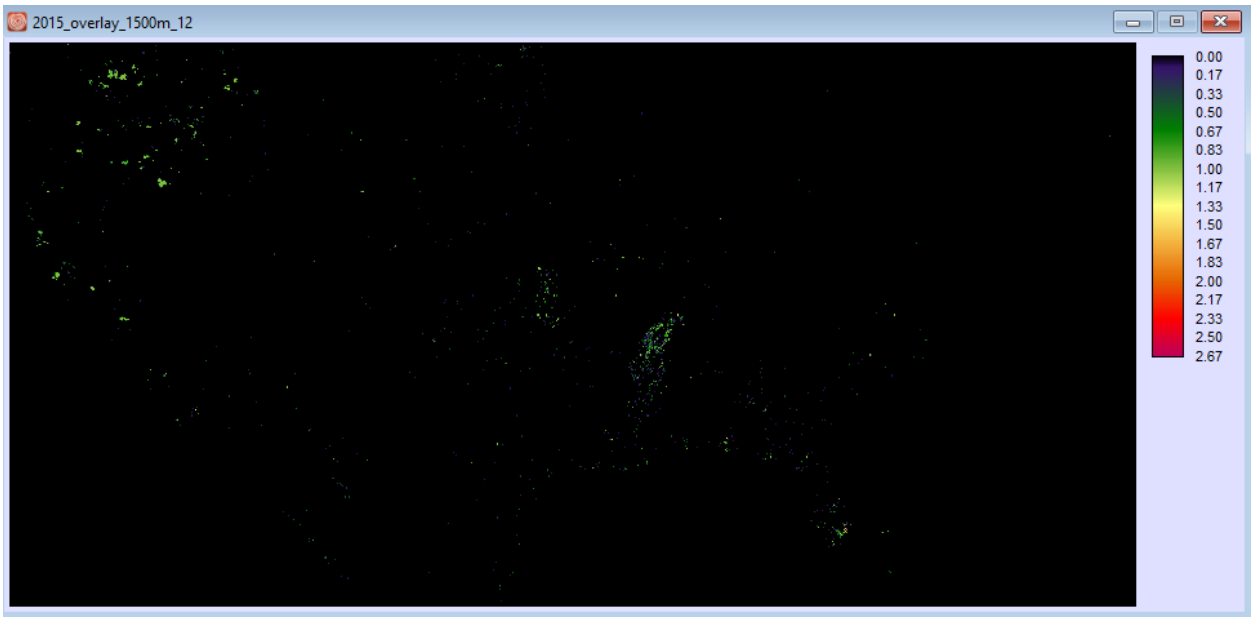
- **Open Macro Modeler**



- **Make a Raster Group of all aggregated files from YEAR**
- **Add them to the Macro Modeler**



- **Must choose image to start the overlay**
  (Choose first month—insert a dyno link(red link above)
- **Run model to get overlay images 1-12**
- **Output imaged wanted is Year_overlay_12**

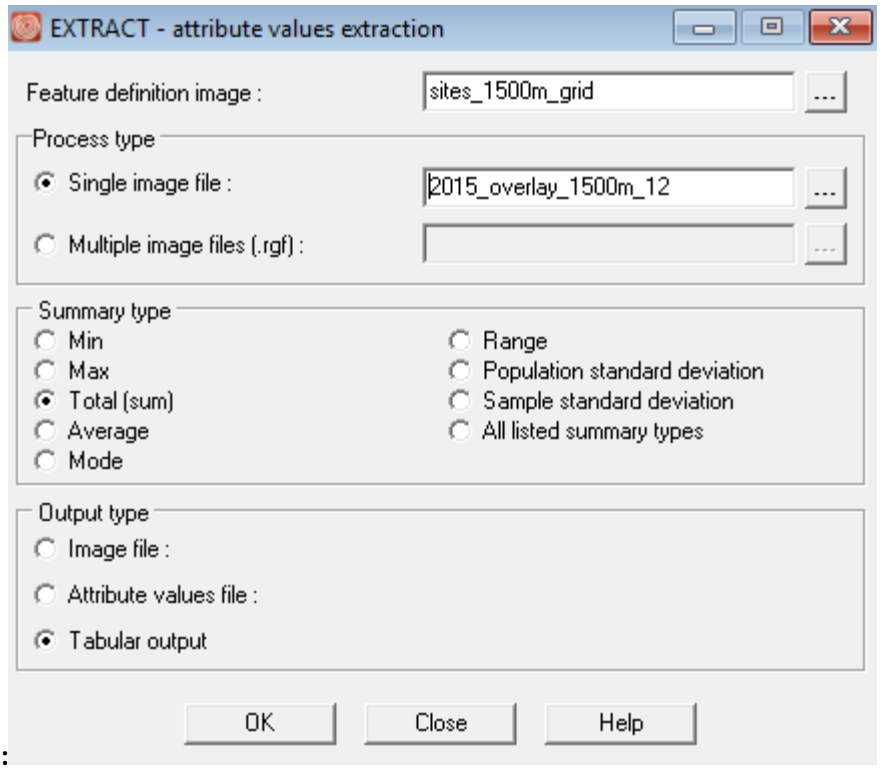


Extract:

- **Must transform BLM sites into a grid that is compatible with imagery == (long lat)**

lineage : This file was created by the POINTRAS module with the command line:
lineage : L:\Projects_active\ColoradoView\2017\TerrSet\BLM_Areas_long_lat.vct*L:\Projects_active\ColoradoView\2017\TerrSet\sites_1500m_grid.rst*1

Settings:



Output:

Totals extracted from 2015_OVERLAY_1500M_12 based on SITES_1500M_GRID

Category	Total
0	18339.333569
1	0
2	0
4	0
5	0
6	0
7	0
10	0
11	0
14	0
15	0
16	0
20	0
21	0
22	0
24	0
26	0
27	0
28	0
29	0
30	0
31	0
32	0
33	0
34	0

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