**ESS162 Lab5: CA wildland ecology**

**This is a partner report lab**

**This will be due right class on lab on Fri Feb 19 (one weeks from the coming Friday)**

**Goals this week:**

You will be plotting and analyzing datasets that describe the spatial patterns of ecosystem distribution across California. You will be working ArcGIS, Google Earth and Excel.

The datasets are contained in a single zip file on the class website (Lab5.zip), which you will download and unzip into a single folder.

The key datasets are:

1. AET.kmz is a Google Earth kmz image of the annual mean AET across CA, where green indicates higher rates of AET
2. Biomass2.kmz is a Google Earth kmz image of the Biomass across CA, where green and blue indicate higher tree biomass.
3. DNDMI4km.kmz is a Google Earth kmz image of the death of forest trees during CA’s 2012-15 drought, where red indicates greater vegetation loss due to fires or tree death.
4. P-ET4km3.kmz is a Google Earth kmz image of the annual mean P-AET across CA, during CA’s 2012-15 drought, where red indicates ET > P (areas that came under severe water stress).
5. Whr4km.kmz is a Google Earth kmz image of the vegetation types across CA, where the different colors are different vegetation types.
6. biomass\_k1\_2016.tif, which is a much higher resolution layer of forest biomass that you will open in ArcMap
7. landcov0 polygon, which is a much higher resolution and more detailed layer of vegetation type that you will open in ArcMap
8. srgrayi1kml.tif, which is a shade relief image of CA that you will use as a base map in ArcMap.
9. CAecology.xlsx is an Excel spreadsheet of the gridded raster data for the local water across all of CA. You can think of it as the actual numbers that underlie the various shp and kmz described above.

**Get ArcMap running:**

We’re going to give ArcMap a shot this week. You have two options for how you will work with Arc.

Option 1: Apporto.

Login at: https://uci.apporto.com/user/login

Launch UCI lab desktop

Maximize the screen with the upper left outwards arrow symbol

At this point it should behave like a normal Windows 10 machine

Open Google Chrome in Apporto, go to Canvas (https://canvas.eee.uci.edu/courses/34130), and download the lab5 files and unzip on the virtual desktop

Start ArcMap in Apporto

Option 2: Your Windows machine

You can get a free copy of ArcGIS as a student – it will probably expire after a year or sooner – but, hey, it’s free.

Which option should you use?

If you have a Mac or older Windows machine or one that is limited wrt available memory, you should stick with Apporto, at least initially. If you’re not especially interested in exploring GIS, then stick with Apporto, it will be easier and there’s no reason to take up the space on your computer. If you’re unsure, you can start with Apporto and if you like GIS you can grab a copy and explore more. If you want to learn more about GIS and have a Mac or just want to learn all you can, speak with down the road – there are other GIS options that are open sources on cross platform.

**Tools, steps and commands:**

We’ll be jumping back and forth between machines this week. These instructions are written assuming you do the Arc pieces on Apporto and the Excel and Google Earth on your personal machine. Adjust things if you do it a different way.

Go to Canvas (https://canvas.eee.uci.edu/courses/34130) on your personal machine, download the lab5 files and unzip on your desktop.

Google Earth Pro (on your personal machine)

Open and familiarize yourself with the various kmz files – you don’t need to make any plots – the goal here is just to see what the data in the Excel file looks like.

ArcGis (on Apporto)

Start ArcMap

Introductions – Menus, Geoprocessing, Toolbars, Toolbox

View – data vs layout

Add data layers - biomass\_k1\_2016.tif, srgrayi1kml.tif, landcov0 polygon

Table of contents, order, on-off

Zoom, pan, identify, measure

Symbology for color ramp on biomass, stretch

Biomass transparency over shaded relief

Open and look at table for landcover

Symbology for WHR class 1

Layout view

Now load high high resolution image layer (more like Google Earth)

Add Data, GIS Servers, Add ArcGIS Server, Use GIS Services, Next, Server

URL: <http://gis.apfo.usda.gov/arcgis/services>

Add Data, GIS Servers, arcgis on gis.apfo.usda.gov, NAIP, USDA\_CONUS\_PRIME

Create and hand 5 images total – 1) big view of biomass over shaded relief, 2) big view of WHR over shaded relief, 3) zoom view of biomass over shaded relief, 4) zoom view of WHR over over shaded relief.

Excel (on your personal machine)

Open CAecology.xlsx Add columns for vegetation band:

=1+TRUNC(D2/200) and fill down (where D2 is elevation)

Create a table of the mean (or mode) value for each elevation band

=AVERAGEIF($M:$M,"=1",E:E)

=MODE(IF(M:M=1,H:H)) (you’ll need to enter “ctrl shift enter” once you’ve typed the equation in – should show curly brackets)

Fill down and change target elevation band for each row

Fill right

End product is a table of how everything varies with elevation

Plot elevation gradients of everything and include

Explain the elevation gradients

**Writeup (you will need to move things back and forth from your personal machine to Apporto)**

Create and hand in 4 images based on ArcGIS – 1) big view of biomass over shaded relief, 2) big view of WHR over shaded relief, 3) zoom view of biomass over shaded relief, 4) zoom view of WHR over shaded relief.

Make line plots of the average (or mode) elevation gradients of vegetation type through tree death (5 properties) and include

Explain the average (or mode) elevation gradients

Make the following scatterplots and include: AET vs Biomass, Tmax vs Biomass, Precip vs Biomass, P-ET vs tree death

Explain the 4 scatter plots