MaxEnt Toolbox

Oakology

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Scenario Selection

# Can either choose specific scenario or run them all at once

1. If choosing scenario selection make sure to turn off scenario for loops in each section by commenting them out.
2. Running them all at once will work without modifications but will take awhile.

\*\*\*Make new extents based on fog and copy over all necessary data to those folders

#Change scenario- one thing to change throughout  
scenario<-"allislands\_270m"  
  
#Options:  
#allislands\_270m  
#ni\_270m  
#sca\_270m  
#sca\_int\_270m  
#scr\_270m  
#sri\_270m  
#sri\_adultyoung\_270m  
#sri\_seedsap\_270m  
#scr\_foginc\_270m  
#scr\_fogdec\_270m  
#sri\_foginc\_270m  
#sri\_fogdec\_270m  
#scr\_fogelev\_270m  
#sri\_fogelev\_270m  
#scr\_fogconstant\_270m  
#sri\_fogconstant\_270m  
#MainlandCA  
  
scen<-c("allislands\_270m","ni\_270m","sca\_270m","sca\_int\_270m","scr\_270m","sri\_270m","sri\_adultyoung\_270m","sri\_seedsap\_270m","scr\_foginc\_270m","scr\_fogdec\_270m","sri\_foginc\_270m","sri\_fogdec\_270m","scr\_fogelev\_270m","sri\_fogelev\_270m", "scr\_fogconstant\_270m", "sri\_fogconstant\_270m", "MainlandCA")

# Should create a section to make a new scenario and add needed folders?

Load Packages

#If packages missing use install.packages("packagename")  
library(tidyverse)

## Warning: package 'tidyverse' was built under R version 3.4.4

## Warning: package 'tibble' was built under R version 3.4.4

## Warning: package 'tidyr' was built under R version 3.4.4

## Warning: package 'purrr' was built under R version 3.4.4

## Warning: package 'dplyr' was built under R version 3.4.4

library(sf)

## Warning: package 'sf' was built under R version 3.4.4

library(raster)

## Warning: package 'sp' was built under R version 3.4.4

library(sp)  
library(rgdal)

## Warning: package 'rgdal' was built under R version 3.4.4

library(tools)  
#library(maptools)  
#library(dismo)

Extent #Check in on this code on other computer

#Create scenario extent that will be used throughout the rest of the processes, based off the minimum BCM data available as well as the Channel Island CUSP outlines  
  
#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
  
#If else statements for scenarios: read in the correct data for each scenario  
if (scenario=="allislands\_270m"){  
 #All Islands  
 scenario\_extent<-read\_sf("G:/data/islands/all\_islands/extent/allislandsoutline.shp")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="ni\_270m"){  
 #Northern Islands  
 scenario\_extent<-read\_sf("G:/data/islands/all\_islands/ni\_outline/ni\_outline.shp")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="scr\_270m"|scenario=="scr\_foginc\_270m"|scenario=="scr\_fogdec\_270m"|scenario=="scr\_fogelev\_270m"|scenario=="scr\_fogconstant\_270m"){  
 #Santa Cruz  
 scenario\_extent<-read\_sf("G:/data/islands/scr/scr\_extent/scr\_extent.shp")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="sri\_270m"|scenario=="sri\_adultyoung\_270m"|scenario=="sri\_seedsap\_270m"|scenario=="sri\_foginc\_270m"|scenario=="sri\_fogdec\_270m"|scenario=="sri\_fogelev\_270m"|scenario=="sri\_fogconstant\_270m"){  
 #Santa Rosa  
 scenario\_extent<-read\_sf("G:/data/islands/sri/sri\_extent/sri\_extent.shp")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="sca\_270m"){  
 #Santa Catalina  
 scenario\_extent<-read\_sf("G:/data/islands/sca/sca\_extent/sca\_extent.shp")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="sca\_int\_270m"){  
 #Santa Catalina Interpolated  
 scenario\_extent<-read\_sf("G:/data/islands/sca/sca\_extent/sca\_extent.shp")  
 min\_data<-raster("G:/data/climate/GIS\_Input\_SCAInterpolated/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else if (scenario=="MainlandCA"){  
 #Mainland CA  
 scenario\_extent<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
 min\_data<-raster("G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif")  
}else  
 print ("No Scenario Selected")  
  
# cropped <- crop(min\_data, extent(scenario\_extent)) #Crop to extent of outlines  
# scen\_extent <- mask(cropped, scenario\_extent) #Mask to the exact island outline(s)  
# extent(scen\_extent)<-round(extent(scen\_extent),1) #Rerun with rounded extent so extents same decimal amount  
# writeRaster(scen\_extent, filename=paste0("G:/data/islands/MaxEnt/Extent/", scenario, ".tif"), overwrite=TRUE)#write extent raster  
  
# }#To run all scenarios at once. Comment out if running scenario by scenario  
  
#Extent will be used throughout Script. Will call in the extent each time just to be careful.

Oak Combined and Individual

#Read in Oak Points  
sca\_oaks<-read\_sf("G:/data/islands/sca/Quertome/SCAOakPoints\_AEA.shp")  
sri\_oaks<-read\_sf("G:/data/islands/sri/OakPoint/SRI\_OakPoints\_Updated.shp")  
scr\_oaks<-read\_sf("G:/data/islands/scr/OakPoint/SCR\_OakPoints\_Updated.shp")  
  
  
#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
  
#If else statements for scenarios: read in the correct data for each scenario  
if (scenario=="allislands\_270m"|scenario=="MainlandCA"){  
 #All Islands or Mainland CA  
 sca\_xy<-st\_coordinates(sca\_oaks)  
 sri\_xy<-st\_coordinates(sri\_oaks)  
 scr\_xy<-st\_coordinates(scr\_oaks)  
 all\_oaks<-rbind(sca\_xy[,1:2],sri\_xy[,1:2],scr\_xy[,1:2])  
}else if (scenario=="ni\_270m"){  
 #Northern Islands  
 sri\_xy<-st\_coordinates(sri\_oaks)  
 scr\_xy<-st\_coordinates(scr\_oaks)  
 all\_oaks<-rbind(sri\_xy[,1:2],scr\_xy[,1:2])  
}else if (scenario=="scr\_270m"|scenario=="scr\_foginc\_270m"|scenario=="scr\_fogdec\_270m"|scenario=="scr\_fogelev\_270m"|scenario=="scr\_fogconstant\_270m"){  
 #Santa Cruz  
 scr\_xy<-st\_coordinates(scr\_oaks)  
 all\_oaks<-scr\_xy[,1:2]  
}else if (scenario=="sri\_270m"|scenario=="sri\_foginc\_270m"|scenario=="sri\_fogdec\_270m"|scenario=="sri\_fogelev\_270m"|scenario=="sri\_fogconstant\_270m"){  
 #Santa Rosa  
 sri\_xy<-st\_coordinates(sri\_oaks)  
 all\_oaks<-sri\_xy[,1:2]  
}else if (scenario=="sca\_270m"|scenario=="sca\_int\_270m"){  
 #Santa Catalina and Santa Catalina Interpolated  
 sca\_xy<-st\_coordinates(sca\_oaks)  
 all\_oaks<-sca\_xy[,1:2]  
}else if (scenario=="sri\_adultyoung\_270m"){  
 #Santa Rosa Adult and Young  
 sri\_ay<-subset(sri\_oaks, sri\_oaks$Age=="adult"|sri\_oaks$Age=="young") #Fix this so it works  
 sri\_xy<-st\_coordinates(sri\_ay)  
 all\_oaks<-sri\_xy[,1:2]  
}else if (scenario=="sri\_seedsap\_270m"){  
 #Santa Rosa Seedling and Saplings  
 sri\_ay<-subset(sri\_oaks, sri\_oaks$Age=="seedling"|sri\_oaks$Age=="sapling") #Fix this so it works  
 sri\_xy<-st\_coordinates(sri\_ay)  
 all\_oaks<-sri\_xy[,1:2]  
}else  
 print ("No Scenario Selected")  
  
#Make Oak Point CSV based on selected oak points  
alloaks<-as.data.frame(all\_oaks)  
alloaks$Species<-"Quercus tomentella"  
Oaks<-alloaks[,c(3,1,2)]  
oak\_fn<-paste0("G:/data/islands/MaxEnt/MEInputOak/", scenario,"/OakPoints.csv")  
write.csv(Oaks, oak\_fn, row.names=FALSE)  
  
# }#To run all scenarios at once. Comment out if running scenario by scenario

Climate  
#Need to run Mainland CA: figure out issue with historic folder. Run climate separately for different climate projection options.

#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
  
if (scenario=="sca\_int\_270m"){  
 #Santa Catalina Interpolated: Made by KrigingCatalina\_AllBCM.Rmd  
 clim\_dirs<-list.dirs(path="G:/data/climate/GIS\_Input\_SCAInterpolated", full.names=T, recursive=F)  
}else  
clim\_dirs<-list.dirs(path="G:/data/climate/GISModel\_Input", full.names=T, recursive=F)  
  
#Call in appropriate extent  
scen\_extent<-raster(paste0("G:/data/islands/MaxEnt/Extent/", scenario, ".tif"))  
crs(scen\_extent)<-CRS('+init=epsg:3310')   
   
for (clim in clim\_dirs){  
 print (clim) #For loop through climate projections  
 clim\_vars<-list.files(clim, pattern='tif$', full.names=TRUE )  
 for (var in clim\_vars){  
 print (var)#For loop through climate variables  
 clim\_ras<-raster(var)  
 crs(clim\_ras)<-CRS('+init=epsg:3310')  
 clim\_crop <- crop(clim\_ras, extent(scen\_extent)) #Crop to extent of outlines  
 climate <- mask(clim\_crop, scen\_extent) #Mask to the exact island outline(s)  
 extent(climate)<-round(extent(climate),1) #Rerun with rounded extent so extents same decimal amount  
 fn <- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/", file\_path\_sans\_ext(basename(var)), ".asc")  
 writeRaster(climate,fn,format="ascii",overwrite=T)  
 }#End for loop through climate variables  
}#End for loop through climate projections

## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2010\_2039"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2010\_2039/cwd2010\_2039\_ave\_CCSM4\_rcp85\_1539623939.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2010\_2039/ppt2010\_2039\_ave\_CCSM4\_rcp85\_1539624051.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2010\_2039/tmn2010\_2039djf\_ave\_CCSM4\_rcp85\_1541009580.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2010\_2039/tmx2010\_2039jja\_ave\_CCSM4\_rcp85\_1541009354.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2040\_2069"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2040\_2069/cwd2040\_2069\_ave\_CCSM4\_rcp85\_1539624560.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2040\_2069/ppt2040\_2069\_ave\_CCSM4\_rcp85\_1539624684.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2040\_2069/tmn2040\_2069djf\_ave\_CCSM4\_rcp85\_1541010177.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2040\_2069/tmx2040\_2069jja\_ave\_CCSM4\_rcp85\_1541010071.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2070\_2099"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2070\_2099/cwd2070\_2099\_ave\_CCSM4\_rcp85\_1539624992.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2070\_2099/ppt2070\_2099\_ave\_CCSM4\_rcp85\_1539625068.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2070\_2099/tmn2070\_2099djf\_ave\_CCSM4\_rcp85\_1541010573.tif"  
## [1] "G:/data/climate/GISModel\_Input/CCSM4\_rcp85\_2070\_2099/tmx2070\_2099jja\_ave\_CCSM4\_rcp85\_1541010901.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic"  
## [1] "G:/data/climate/GISModel\_Input/historic/cwd1981\_2010\_ave\_HST\_1539127145.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic/ppt1981\_2010\_ave\_HST\_1528215869.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic/tmn1981\_2010djf\_ave\_HST\_1541009191.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic/tmx1981\_2010jja\_ave\_HST\_1541008898.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1921\_1950"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1921\_1950/cwd1921\_1950\_ave\_HST\_1542230427.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1921\_1950/ppt1921\_1950\_ave\_HST\_1542231041.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1921\_1950/tmn1921\_1950djf\_ave\_HST\_1542230974.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1921\_1950/tmx1921\_1950jja\_ave\_HST\_1542230928.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1951\_1980"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1951\_1980/cwd1951\_1980\_ave\_HST\_1542231469.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1951\_1980/ppt1951\_1980\_ave\_HST\_1542231180.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1951\_1980/tmn1951\_1980djf\_ave\_HST\_1542231425.tif"  
## [1] "G:/data/climate/GISModel\_Input/historic\_1951\_1980/tmx1951\_1980jja\_ave\_HST\_1542231391.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2010\_2039"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2010\_2039/cwd2010\_2039\_ave\_MIROC\_rcp45\_1539798802.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2010\_2039/ppt2010\_2039\_ave\_MIROC\_rcp45\_1528216817.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2010\_2039/tmn2010\_2039djf\_ave\_MIROC\_rcp45\_1541012610.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2010\_2039/tmx2010\_2039jja\_ave\_MIROC\_rcp45\_1541011109.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2040\_2069"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2040\_2069/cwd2040\_2069\_ave\_MIROC\_rcp45\_1528217164.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2040\_2069/ppt2040\_2069\_ave\_MIROC\_rcp45\_1528217253.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2040\_2069/tmn2040\_2069djf\_ave\_MIROC\_rcp45\_1541013800.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2040\_2069/tmx2040\_2069jja\_ave\_MIROC\_rcp45\_1541013916.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2070\_2099"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2070\_2099/cwd2070\_2099\_ave\_MIROC\_rcp45\_1539622913.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2070\_2099/ppt2070\_2099\_ave\_MIROC\_rcp45\_1539623107.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2070\_2099/tmn2070\_2099djf\_ave\_MIROC\_rcp45\_1541014189.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp45\_2070\_2099/tmx2070\_2099jja\_ave\_MIROC\_rcp45\_1541014065.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2010\_2039"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2010\_2039/cwd2010\_2039\_ave\_MIROC\_rcp85\_1528396350.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2010\_2039/ppt2010\_2039\_ave\_MIROC\_rcp85\_1528396407.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2010\_2039/tmn2010\_2039djf\_ave\_MIROC\_rcp85\_1541015148.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2010\_2039/tmx2010\_2039jja\_ave\_MIROC\_rcp85\_1541015208.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2040\_2069"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2040\_2069/cwd2040\_2069\_ave\_MIROC\_rcp85\_1542223923.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2040\_2069/ppt2040\_2069\_ave\_MIROC\_rcp85\_1528397068.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2040\_2069/tmn2040\_2069djf\_ave\_MIROC\_rcp85\_1541015385.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2040\_2069/tmx2040\_2069jja\_ave\_MIROC\_rcp85\_1541015295.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2070\_2099"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2070\_2099/cwd2070\_2099\_ave\_MIROC\_rcp85\_1539623500.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2070\_2099/ppt2070\_2099\_ave\_MIROC\_rcp85\_1539623606.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2070\_2099/tmn2070\_2099djf\_ave\_MIROC\_rcp85\_1541015634.tif"  
## [1] "G:/data/climate/GISModel\_Input/MIROC\_rcp85\_2070\_2099/tmx2070\_2099jja\_ave\_MIROC\_rcp85\_1541015705.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2010\_2039"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2010\_2039/cwd2010\_2039\_ave\_MPI\_rcp45\_1539625343.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2010\_2039/ppt2010\_2039\_ave\_MPI\_rcp45\_1539625414.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2010\_2039/tmn2010\_2039djf\_ave\_MPI\_rcp45\_1541015902.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2010\_2039/tmx2010\_2039jja\_ave\_MPI\_rcp45\_1541015796.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2040\_2069"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2040\_2069/cwd2040\_2069\_ave\_MPI\_rcp45\_1539625941.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2040\_2069/ppt2040\_2069\_ave\_MPI\_rcp45\_1539626031.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2040\_2069/tmn2040\_2069djf\_ave\_MPI\_rcp45\_1541016290.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2040\_2069/tmx2040\_2069jja\_ave\_MPI\_rcp45\_1541016359.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2070\_2099"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2070\_2099/cwd2070\_2099\_ave\_MPI\_rcp45\_1539626282.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2070\_2099/ppt2070\_2099\_ave\_MPI\_rcp45\_1539626424.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2070\_2099/tmn2070\_2099djf\_ave\_MPI\_rcp45\_1541016519.tif"  
## [1] "G:/data/climate/GISModel\_Input/MPI\_rcp45\_2070\_2099/tmx2070\_2099jja\_ave\_MPI\_rcp45\_1541016465.tif"

# }#To run all scenarios at once. Comment out if running scenario by scenario

Island

#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
  
if (scenario!="MainlandCA"){  
  
 #Set final directory  
island\_fn<-paste0("G:/data/islands/MaxEnt/MEInput/", scenario, "/")  
#Call in appropriate extent  
scen\_extent<-raster(paste0("G:/data/islands/MaxEnt/Extent/", scenario, ".tif"))  
crs(scen\_extent)<-CRS('+init=epsg:3310')   
  
  
#Soils  
 soilshp<-read\_sf("G:/data/islands/all\_islands/Soil/soils\_AEA.shp")  
 ext<-extent(scen\_extent)  
 gridsize <- 270  
 soilr <- raster(ext, res=gridsize)  
 soilras <- rasterize(soilshp, soilr, field = 'MapUnit')  
 crs(soilras)<-CRS('+init=epsg:3310')  
 soil\_crop <- crop(soilras, extent(scen\_extent)) #Crop to extent of outlines  
 soils <- mask(soil\_crop, scen\_extent) #Mask to the exact island outline(s)  
 extent(soils)<-round(extent(soils),1)  
 writeRaster(soils,paste0(island\_fn, "soilclasses.asc"),format="ascii",overwrite=T)  
   
  
#Vegetation: Made by VegetationMapGrouping.Rmd  
 #SCR  
 scr\_vegpshp<-read\_sf("G:/data/islands/scr/SCRVegMapClass/SCRVegMapClass.shp")  
 scr\_vegr <- raster(extent(scen\_extent), res=270)  
 scr\_vegras <- rasterize(scr\_vegpshp, scr\_vegr, field = 'Value')  
 crs(scr\_vegras)<-CRS('+init=epsg:3310')  
 #NI  
 ni\_vegpshp<-read\_sf("G:/data/islands/all\_islands/Channel\_Islands\_Veg\_Map\_2017/NIVegMapClass/NIVegMapClass.shp")  
 ni\_vegr <- raster(extent(scen\_extent), res=270)  
 ni\_vegras <- rasterize(ni\_vegpshp, ni\_vegr, field = 'Value')  
 crs(ni\_vegras)<-CRS('+init=epsg:3310')  
 #SCA  
 sca\_vegpshp<-read\_sf("G:/data/islands/sca/SCAVegMapClass/SCAVegMapClass.shp")  
 sca\_vegr <- raster(extent(scen\_extent), res=270)  
 sca\_vegras <- rasterize(sca\_vegpshp, sca\_vegr, field = 'Value')  
 crs(sca\_vegras)<-CRS('+init=epsg:3310')  
 #Merge to New Raster  
 all\_veg<-merge(scr\_vegras, ni\_vegras, sca\_vegras)  
 veg\_crop <- crop(all\_veg, extent(scen\_extent)) #Crop to extent of outlines  
 veg <- mask(veg\_crop, scen\_extent) #Mask to the exact island outline(s)  
 extent(veg)<-round(extent(veg),1)  
 writeRaster(veg,paste0(island\_fn, "veg.asc"),format="ascii",overwrite=T)  
   
   
#DEM THE STRUGGLE-Come back and fix  
 ai\_dem<-raster("G:/data/islands/all\_islands/DEM/ai\_dem270.tif")  
 scr\_dem<-raster("G:/data/islands/all\_islands/DEM/scr\_dem270.tif")  
 sri\_dem<-raster("G:/data/islands/all\_islands/DEM/sri\_dem270.tif")  
 smi\_dem<-raster("G:/data/islands/all\_islands/DEM/smi\_dem270.tif")  
 sca\_dem<-raster("G:/data/islands/sca/DEM/sca\_dem\_alb/sca\_dem\_alb270.tif")  
 all\_dem<-merge(ai\_dem, scr\_dem, sri\_dem, smi\_dem, sca\_dem, tolerance=0.5)#Accepts different origins  
 #all\_dem<-raster("G:/data/islands/all\_islands/DEM/all\_dem270.tif") #Combined all DEMS at 270 in GIS with mosaic to new raster because much quicker and save across all projects  
 all\_dem\_new <- resample(all\_dem, scen\_extent, "ngb")  
 #Figure out cropping and masking issue   
 dem\_crop <- crop(all\_dem\_new, scen\_extent) #Crop to extent of outlines  
 dem <- mask(dem\_crop, scen\_extent) #Mask to the exact island outline(s)  
 extent(dem)<-round(extent(dem),1)  
 writeRaster(dem,paste0(island\_fn, "DEM.asc"),format="ascii",overwrite=T)  
  
 #Slope and Aspect  
 all\_terrain<-terrain(dem, opt=c('slope', 'aspect'), unit='degrees')  
 slope<-all\_terrain$slope  
 aspect<-all\_terrain$aspect  
 writeRaster(slope,paste0(island\_fn, "slope.asc"),format="ascii",overwrite=T)  
 writeRaster(aspect,paste0(island\_fn, "aspect.asc"),format="ascii",overwrite=T)  
  
}else  
 print ("Mainland CA needs data")  
   
# }#To run all scenarios at once. Comment out if running scenario by scenario

Fog

#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
  
scen\_extent<-raster(paste0("G:/data/islands/MaxEnt/Extent/", scenario, ".tif"))  
crs(scen\_extent)<-CRS('+init=epsg:3310')   
  
#If else statements for scenarios: read in the correct data for each scenario  
if (scenario=="scr\_foginc\_270m"){  
 #Future fog changed by a percent (20%) Inc/Dec for SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_increase045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_increase135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_increase225.tif")  
   
}else if (scenario=="scr\_fogdec\_270m"){  
 #Future fog changed by a percent (20%) Inc/Dec for SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_decrease045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_decrease135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SCR/scr\_All\_decrease225.tif")  
  
}else if (scenario=="sri\_foginc\_270m"){  
 #Future fog changed by a percent (20%) Inc/Dec for SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_increase045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_increase135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_increase225.tif")  
  
}else if (scenario=="sri\_fogdec\_270m"){  
 #Future fog changed by a percent (20%) Inc/Dec for SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_decrease045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_decrease135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/PercentChange/SRI/sri\_All\_decrease225.tif")  
  
}else if (scenario=="scr\_fogelev\_270m"){  
 #Future Fog Elevation (+-20%): SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SCR/scr\_all\_elevation045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SCR/scr\_all\_elevation135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SCR/scr\_all\_elevation225.tif")  
   
}else if (scenario=="sri\_fogelev\_270m"){  
 #Future Fog Elevation (+-20%): SRI and SCR  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SRI/sri\_all\_elevation045.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SRI/sri\_all\_elevation135.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/Elevation/SRI/sri\_all\_elevation225.tif")  
  
}else if (scenario=="scr\_fogconstant\_270m"){  
 #Current fog level constant across all future projections  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/Historic/scr\_allfog\_270.tif")  
   
}else if (scenario=="sri\_fogconstant\_270m"){  
 #Current fog level constant across all future projections  
 current\_fog<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_10\_40<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_40\_70<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
 future\_fog\_70\_100<-raster("G:/data/climate/Fog/Fog\_270/Historic/sri\_allfog\_270.tif")  
   
}else  
 print ("No Fog Data Available")

## [1] "No Fog Data Available"

if (scenario=="scr\_foginc\_270m"|scenario=="scr\_fogdec\_270m"|scenario=="sri\_foginc\_270m"|scenario=="sri\_fogdec\_270m"|scenario=="scr\_fogelev\_270m"|scenario=="sri\_fogelev\_270m"|scenario=="scr\_fogconstant\_270m"|scenario=="sri\_fogconstant\_270m"){  
   
#Goes through the climate folders and inserts current into historic and future into different climate projections  
   
 #Resample  
 current\_fog\_new <- resample(current\_fog, scen\_extent, "ngb")  
 future\_fog\_1040\_new <- resample(future\_fog\_10\_40, scen\_extent, "ngb")  
 future\_fog\_4070\_new <- resample(future\_fog\_40\_70, scen\_extent, "ngb")  
 future\_fog\_70100\_new <- resample(future\_fog\_70\_100, scen\_extent, "ngb")  
 #Crop and Mask  
 current\_fog\_crop <- crop(current\_fog\_new, scen\_extent) #Crop to extent of outlines  
 current\_fog\_mask <- mask(current\_fog\_crop, scen\_extent) #Mask to the exact island outline(s)  
 future\_fog\_1040\_crop <- crop(future\_fog\_1040\_new, scen\_extent) #Crop to extent of outlines  
 future\_fog\_1040\_mask <- mask(future\_fog\_1040\_crop, scen\_extent) #Mask to the exact island outline(s)  
 future\_fog\_4070\_crop <- crop(future\_fog\_4070\_new, scen\_extent) #Crop to extent of outlines  
 future\_fog\_4070\_mask <- mask(future\_fog\_4070\_crop, scen\_extent) #Mask to the exact island outline(s)  
 future\_fog\_70100\_crop <- crop(future\_fog\_70100\_new, scen\_extent) #Crop to extent of outlines  
 future\_fog\_70100\_mask <- mask(future\_fog\_70100\_crop, scen\_extent) #Mask to the exact island outline(s)  
 #Extent  
 extent(current\_fog\_mask)<-round(extent(current\_fog\_mask),1)  
 extent(future\_fog\_1040\_mask)<-round(extent(future\_fog\_1040\_mask),1)  
 extent(future\_fog\_4070\_mask)<-round(extent(future\_fog\_4070\_mask),1)  
 extent(future\_fog\_70100\_mask)<-round(extent(future\_fog\_70100\_mask),1)  
   
 clim\_dirs<-list.dirs(path="G:/data/climate/GISModel\_Input", full.names=T, recursive=F)  
 for (clim in clim\_dirs){  
 #print (clim) #For loop through climate projections  
 if(basename(clim)=="historic"|basename(clim)=="historic\_1921\_1950"|basename(clim)=="historic\_1951\_1980"){  
   
 current\_fog\_fn <- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/fog.asc")  
 writeRaster(current\_fog\_mask,current\_fog\_fn,format="ascii",overwrite=T)  
   
 }else if (basename(clim)=="CCSM4\_rcp85\_2010\_2039"|basename(clim)=="MIROC\_rcp45\_2010\_2039"|basename(clim)=="MIROC\_rcp85\_2010\_2039"|basename(clim)=="MPI\_rcp45\_2010\_2039"){  
   
 future\_fog\_fn <- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/fog.asc")  
 writeRaster(future\_fog\_1040\_mask,future\_fog\_fn,format="ascii",overwrite=T)  
   
 }else if (basename(clim)=="CCSM4\_rcp85\_2040\_2069"|basename(clim)=="MIROC\_rcp45\_2040\_2069"|basename(clim)=="MIROC\_rcp85\_2040\_2069"|basename(clim)=="MPI\_rcp45\_2040\_2069"){  
   
 future\_fog\_fn <- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/fog.asc")  
 writeRaster(future\_fog\_4070\_mask,future\_fog\_fn,format="ascii",overwrite=T)  
   
 }else if (basename(clim)=="CCSM4\_rcp85\_2070\_2099"|basename(clim)=="MIROC\_rcp45\_2070\_2099"|basename(clim)=="MIROC\_rcp85\_2070\_2099"|basename(clim)=="MPI\_rcp45\_2070\_2099"){  
   
 future\_fog\_fn <- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/fog.asc")  
 writeRaster(future\_fog\_70100\_mask,future\_fog\_fn,format="ascii",overwrite=T)  
   
 }else  
 print ("No fog for this projection")  
 }#End for loop through climate projections  
}else  
 print ("No Fog Data Available")

## [1] "No Fog Data Available"

# }#To run all scenarios at once. Comment out if running scenario by scenario

Organization

#Move files over to correct layer for MaxEnt and name them correctly  
  
scen<-c("allislands\_270m","ni\_270m","sca\_270m","sca\_int\_270m","scr\_270m","sri\_270m","sri\_adultyoung\_270m","sri\_seedsap\_270m","scr\_foginc\_270m","scr\_fogdec\_270m","sri\_foginc\_270m","sri\_fogdec\_270m","scr\_fogelev\_270m","sri\_fogelev\_270m", "scr\_fogconstant\_270m", "sri\_fogconstant\_270m")  
#Need to run mainland and re-run new scenarios when created  
  
#If want to run all scenarios at once. Scen defined in scenarios section.  
# for (s in scen){  
# print (s)  
# scenario<-s  
 clim\_dirs<-list.dirs(path="G:/data/climate/GISModel\_Input", full.names=T, recursive=F)  
 for (clim in clim\_dirs){  
 #print (clim) #For loop through climate projections  
 #Select files to pull from due to names set above  
 #Which folders to pull from and send to for climate and fog variables  
 clim\_from<- paste0("G:/data/climate/MEInput/", scenario, "/", basename(clim), "/")  
 clim\_to<-paste0("G:/data/tools/MaxEnt/Input/", scenario, "/", basename(clim), "/layers/")  
   
 #Which folders to pull from and send to for oak csv-just send to historic samples folders  
 oak\_from<-paste0("G:/data/islands/MaxEnt/MEInputOak/", scenario, "/OakPoints.csv")  
 oak\_to<-paste0("G:/data/tools/MaxEnt/Input/", scenario, "/historic/samples/OakPoints.csv")  
   
 #Which folders to pull from and send to for island information-coded out because not sending unless needed  
 #island\_from<- paste0("G:/data/islands/MaxEnt/MEInput/", scenario, "/")  
 #island\_to<-paste0("G:/data/tools/MaxEnt/Input/", scenario, "/", basename(clim), "/layers/")  
   
 files <- list.files(path = clim\_from, pattern = ".asc$")  
 for (i in files){  
 var<-substr(i, 1, 3)  
 file.copy(from=paste0(clim\_from, i), to=paste0(clim\_to,var, ".asc"), overwrite=TRUE)  
 }#End climate move  
   
 #Turn on if want to move over island variables  
 #files <- list.files(path = island\_from, pattern = ".asc$")  
 #for (i in files){  
 #file.copy(from=paste0(island\_from, i), to=paste0(island\_to,var, ".asc"), overwrite=TRUE)}  
   
 }#End per climate  
 #Oak points, because not dependent on climate projections  
 file.copy(from=oak\_from, to=oak\_to, overwrite=TRUE)

## [1] TRUE

# }#End per scenario