03 March 2022 These represent model outputs of fire-promoting invasive plants species in Hawaii, generated based on code provided in https://github.com/kcbrock/HI-inv\_spp-dist-public. All models are "in progress" and are being subjected to further evaluations to improve their accuracy. #get the needed packages if(!require("pacman")){ install.packages("pacman") library(pacman)} p\_load("dplyr", "PresenceAbsence", "DAAG", "ggplot2", 'tidyr', "raster", "sf", "knitr", "dismo", "gam", "randomFo rest", "gbm") # setting paths path.root <- "~/codingwork/fire/" # typical class root dir</pre> # handy projection string prj.wgs84 <- "+proj=longlat +ellps=WGS84 +datum=WGS84 +no\_defs" # epsg:4326</pre> memory.limit(size=25000) ## [1] 25000

- Projected Models Overview

Kelsey Brock

future\_clim <- "RCP8.5"</pre>

Established & Well-known Fire-promoting Invasive Plants Cenchrus ciliaris - Bufflegrass spname = "Cenchrus\_ciliaris"

Projected Probability Model using Historic/Current Climate Data path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

setwd(path.specific) projected <- raster(paste0(spname, "\_final\_ensemble\_raster.img"))</pre> plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi

tude")

Cenchrus\_ciliaris

22.0 **DecimalLatitude** 

20.0 19.0 -160 -159 -158 -157 -156 -155 DecimalLongitude Projected Probability Model using Future Climate Data path.specific <- paste(path.root, "/output/", spname, sep = "")</pre> setwd(path.specific) projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre> plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi tude") Cenchrus\_ciliaris 22.0

**DecimalLatitude** 21.0

20.0 19.0

-160 -159 -158 -157 -156 -155 DecimalLongitude Model Info: Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt), Random Forest (RF), Boosted Regression Trees (BRT) No. of (filtered & thinned) global occurrence points: 705 No. of local (filtered & thinned) occurrence points: 50 Final Model Used: Local Ensemble Model informed by Global Ensemble Model Model Stats: Cutpoint (MaxKappa): 0.59 True Test Statistic [TSS]: 0.69 Receiver Operator Characteristic [ROC]): 0.89 Cenchrus setaceus - Fountaingrass spname = "Cenchrus\_setaceus" Projected Probability Model using Historic/Current Climate Data path.specific <- paste(path.root, "/output/", spname, sep = "")</pre> setwd(path.specific) projected <- raster(paste0(spname, "\_final\_ensemble\_raster.img"))</pre> plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi tude") Cenchrus\_setaceus 22.0

21.0

19.0

-160

setwd(path.specific)

tude")

20.0

19.

Model Info:

20.0

19.0

-160

setwd(path.specific)

-160

spname = "Panicum\_maximum"

Model Info:

Model Stats:

22.0

21.0

20.0

19.0

Model Info:

-160

-159

-158

-157

DecimalLongitude

-156

-155

**DecimalLatitude** 

-159

Random Forest (RF), Boosted Regression Trees (BRT)

-158

Final Model Used: Local Ensemble Model informed by Global Ensemble Model

Megathyrsus maximus - Guineagrass

-157

No. of (filtered & thinned) global occurrence points: 330 No. of local (filtered & thinned) occurrence points: 73

Cutpoint (MaxKappa): 0.53 True Test Statistic [TSS]: 0.60 Receiver Operator Characteristic [ROC]): 0.84

DecimalLongitude

tude")

22.0

-159

-158

path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

-157

DecimalLongitude

projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre>

Melinis\_minutiflora

Projected Probability Model using Future Climate Data

-156

-155

-160

-159

-158

-157

DecimalLongitude

-159

-158

path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

DecimalLatitude 20.0

-157

DecimalLongitude

projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre>

Cenchrus\_setaceus

Projected Probability Model using Future Climate Data

-156

-155

22.0 **DecimalLatitude** 

-156

-155

plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi

Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt), Random Forest (RF), Boosted Regression Trees (BRT) No. of (filtered & thinned) global occurrence points: 647 No. of local (filtered & thinned) occurrence points: 76 Final Model Used: Local Ensemble Model informed by Global Ensemble Model Model Stats: Cutpoint (MaxKappa): 0.50 True Test Statistic [TSS]: 0.63 Receiver Operator Characteristic [ROC]): 0.85 Melinis minutiflora - Molassesgrass spname = "Melinis\_minutiflora" Projected Probability Model using Historic/Current Climate Data path.specific <- paste(path.root, "/output/", spname, sep = "")</pre> setwd(path.specific) projected <- raster(paste0(spname, "\_final\_ensemble\_raster.img"))</pre> plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi tude") Melinis\_minutiflora 22.0 **DecimalLatitude** 21.0

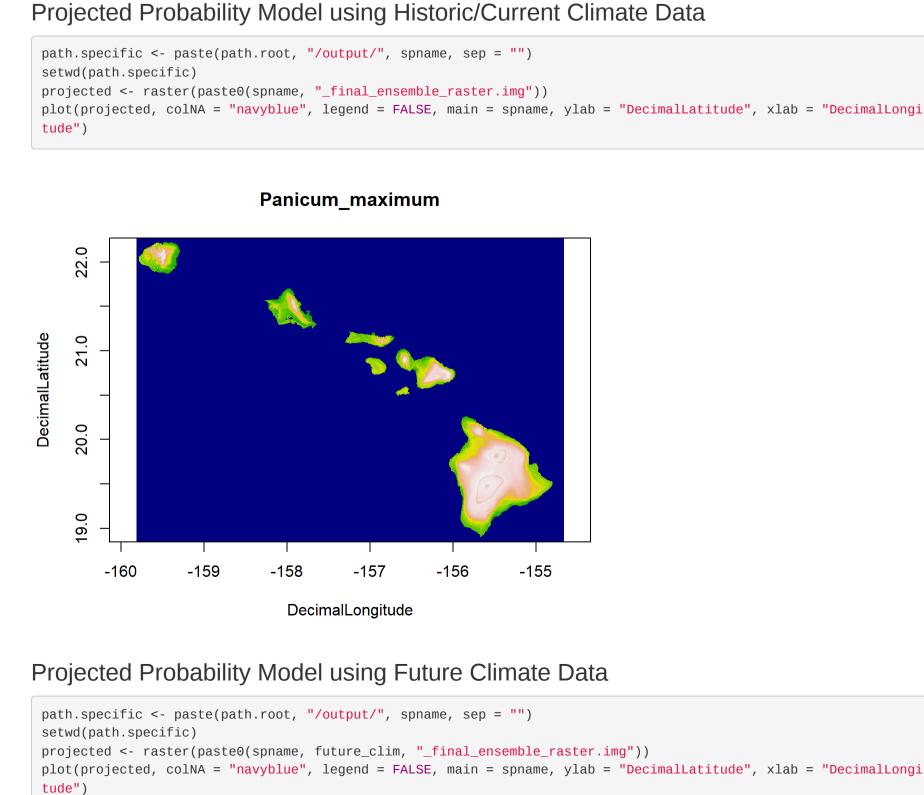
**DecimalLatitude** 21.0 20.0

-156

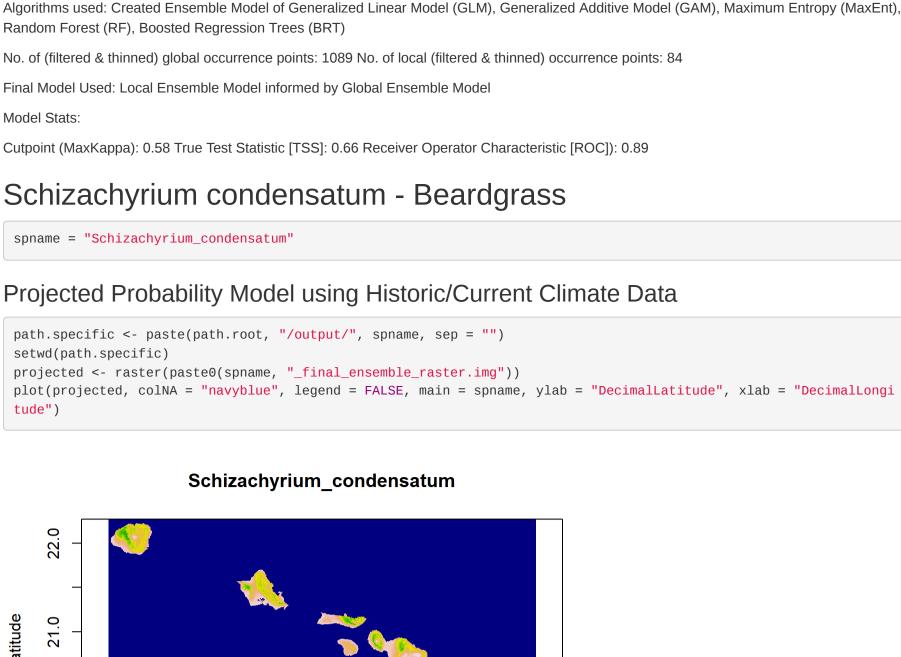
Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt),

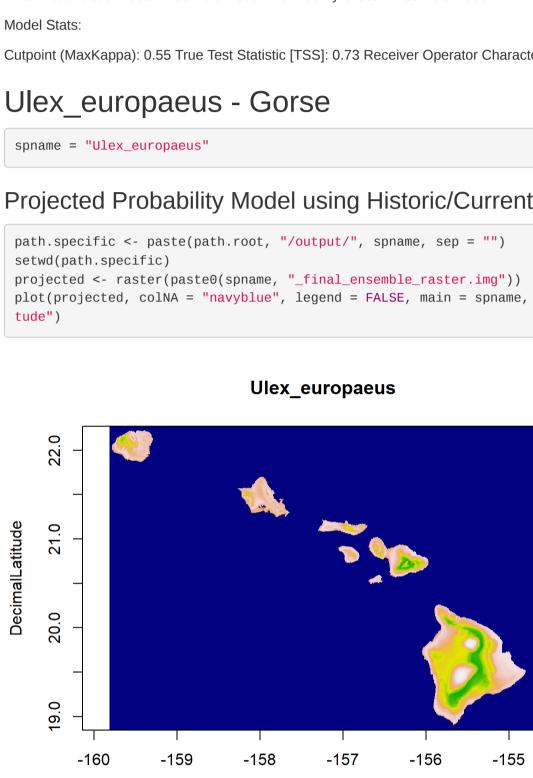
-155

plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi



Panicum\_maximum





Projected Probability Model using Future Climate Data

projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre>

Ulex\_europaeus

plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi

path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

setwd(path.specific)

tude")

22.0

20.0

19.0

Model Info:

Model Stats:

22.0

21.0

20.0

19.0

Model Info:

Model Stats:

itude")

itude")

Model Info:

Model Stats:

-160

setwd(path.specific)

setwd(path.specific)

Random Forest (RF), Boosted Regression Trees (BRT)

-159

Random Forest (RF), Boosted Regression Trees (BRT)

-158

Final Model Used: Local Ensemble Model informed by Global Ensemble Model

-157

No. of (filtered & thinned) global occurrence points: 616 No. of local (filtered & thinned) occurrence points: 21

DecimalLongitude

-156

Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt),

#plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLong

#plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLong

Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt),

-155

**DecimalLatitude** 

-160

-159

Random Forest (RF), Boosted Regression Trees (BRT)

-158

Final Model Used: Local Ensemble Model informed by Global Ensemble Model

-157

No. of (filtered & thinned) global occurrence points: 411 No. of local (filtered & thinned) occurrence points: 40

Cutpoint (MaxKappa): 0.45 True Test Statistic [TSS]: 0.68 Receiver Operator Characteristic [ROC]): 0.85

Incipient Fire-promoting Invasive Plants

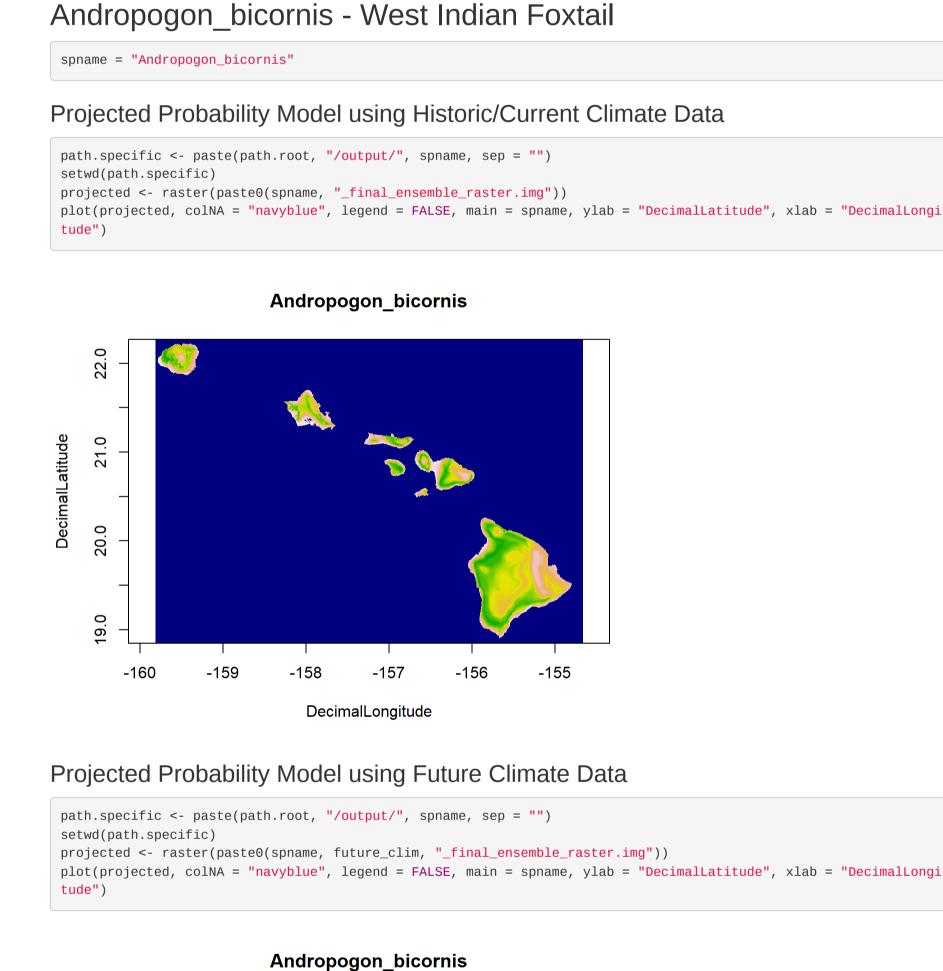
DecimalLongitude

-156

Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt),

-155

**DecimalLatitude** 





path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

path.specific <- paste(path.root, "/output/", spname, sep = "")</pre>

Final Model Used: Local Ensemble Model informed by Global Ensemble Model

#projected <- raster(pasteO(spname, "\_final\_ensemble\_raster.img"))</pre>

Projected Probability Model using Future Climate Data

#projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre>

No. of (filtered & thinned) global occurrence points: No. of local (filtered & thinned) occurrence points:

Cutpoint (MaxKappa): True Test Statistic [TSS]: Receiver Operator Characteristic [ROC]):

Projected Probability Model using Historic/Current Climate Data plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi **DecimalLatitude** 20.0 19.0 -159 -158 -157 -155 -160 -156 DecimalLongitude Projected Probability Model using Future Climate Data path.specific <- paste(path.root, "/output/", spname, sep = "")</pre> setwd(path.specific) projected <- raster(paste0(spname, future\_clim, "\_final\_ensemble\_raster.img"))</pre> plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi tude") Schizachyrium\_condensatum 22.0 **DecimalLatitude** 20.0 19.0 -159 -157 -155 -160 -158 -156 DecimalLongitude Model Info: Algorithms used: Created Ensemble Model of Generalized Linear Model (GLM), Generalized Additive Model (GAM), Maximum Entropy (MaxEnt), Random Forest (RF), Boosted Regression Trees (BRT) No. of (filtered & thinned) global occurrence points: 262 No. of local (filtered & thinned) occurrence points: 27 Final Model Used: Local Ensemble Model informed by Global Ensemble Model Cutpoint (MaxKappa): 0.55 True Test Statistic [TSS]: 0.73 Receiver Operator Characteristic [ROC]): 0.91 Projected Probability Model using Historic/Current Climate Data plot(projected, colNA = "navyblue", legend = FALSE, main = spname, ylab = "DecimalLatitude", xlab = "DecimalLongi DecimalLongitude