rm(list=ls(all.names = TRUE))

####

#### LIBRARIES

####

# install.packages(c("plyr","reshape2","rjags","coda"))

library("plyr") # data wrangling

library("reshape2") # data wrangling

library("RColorBrewer") # good color palattes

library("mgcv") # for fitting GAMMs

##library("gamm4") # for fitting GAMMs

library("scales") # for color transparency in plots

**#GLOBAL**

finaliso\_dat<-subset(finaliso\_full,

pft=="grass"|

pft=="shrub"|

pft=="forb")

global\_gamm<-gam(dpercm~s(depth,k=3), data=finaliso\_dat)

AIC(global\_gamm)

**FUNCTIONAL GROUPS. Do functional types differ in low may, low July, hi may, hi july**

finaliso\_full<-read.csv("C:/users/a00287902/desktop/hardwaregammready.csv")

finaliso\_dat<-subset(finaliso\_full,

pft=="grass"|

pft=="shrub"|

pft=="forb")

july\_dat<-subset(finaliso\_full,

month=="july")

julyhi\_dat<-subset(july\_dat,

lohi=="hi")

forbtrt\_dat<-subset(julyhi\_dat,

pft=="shrub" |

pft=="forb"|

pft=="grass")

shrubtrt\_dat\_trt<-forbtrt\_dat

group1<-"forb"

group2<-"grass"

group2<-"shrub"

shrubtrt\_dat\_trt$group<-0

shrubtrt\_dat\_trt [which(shrubtrt\_dat\_trt $pft %in% group1), "group"] <- 1

shrubtrt\_dat\_trt [which(shrubtrt\_dat\_trt$pft %in% group2), "group"] <- 2

shrubtrt\_dat\_trt [which(shrubtrt\_dat\_trt$pft %in% group2), "group"] <- 3

shrubtrt\_dat\_trt $group<-as.factor(shrubtrt\_dat\_trt $group)

root\_gamm<-gam(dpercm~group+s(depth,by=group,k=3,fx=TRUE,bs="fs"),method="REML",data=shrubtrt\_dat\_trt,family=betar(link="logit"))

global\_gamm<-gam(dpercm~s(depth,k=3,fx=TRUE,bs="fs"),method="REML",data=forbtrt\_dat, family=betar(link="logit"))

AIC(global\_gamm, root\_gamm)

BIC(global\_gamm,root\_gamm)

logLik(global\_gamm)

logLik(root\_gamm)

**#group grass and forb vs. shrub**

shrubtrt\_dat\_trt<-forbtrt\_dat

group1<-c("forb","grass")

group2<-"shrub"

shrubtrt\_dat\_trt$group<-0

shrubtrt\_dat\_trt [which(shrubtrt\_dat\_trt $pft %in% group1), "group"] <- 1

shrubtrt\_dat\_trt [which(shrubtrt\_dat\_trt$pft %in% group2), "group"] <- 2

shrubtrt\_dat\_trt $group<-as.factor(shrubtrt\_dat\_trt $group)

shrub\_gamm<-gam(dpercm~group+s(depth,by=group,k=3,bs="fs"),method="REML",data=shrubtrt\_dat\_trt)

AIC(global\_gamm, root\_gamm, shrub\_gamm)

BIC(global\_gamm,root\_gamm, shrub\_gamm)

logLik(global\_gamm,root\_gamm, shrub\_gamm)

#visualize#

ggplot(forbtrt\_dat,aes(x=depth,y=dpercm,colour=month))+

geom\_point()+

geom\_smooth(method='loess',se=FALSE)+

scale\_colour\_brewer(type = 'qual',palette='Dark2')+

theme(legend.position ='top')

**TREATMENT**

finaliso\_full<-read.csv("C:/users/a00287902/desktop/hardwaregammready.csv")

finaliso\_dat<-subset(finaliso\_full,

pft=="grass"|

pft=="shrub"|

pft=="forb")

grass\_dat<-subset(finaliso\_dat,

pft=="shrub")

grassmay\_datb<-subset(grass\_dat,

month =="may")

grassmay\_dat<-grassmay\_datb

group1<-"low"

group2<-"hi"

grassmay\_dat$group<-0

grassmay\_dat[which(grassmay\_dat$lohi%in%group1), "group"]<-1

grassmay\_dat[which(grassmay\_dat$lohi%in%group2), "group"]<-2

global\_gamm<-gam(dpercm~s(depth,k=3, fx=TRUE, bs="fs"), method="REML", data=grassmay\_dat,family=betar(link="logit"))

grassmay\_dat $group<-as.factor(grassmay\_dat $group)

root\_gamm<-gam(dpercm~s(depth,by=group,k=3 , fx=TRUE, bs="fs"), method="REML", data=grassmay\_dat ,family=betar(link="logit"))

AIC(global\_gamm, root\_gamm)

BIC(global\_gamm,root\_gamm)

logLik(global\_gamm,root\_gamm)

**MONTH**

**Shrubs, grasses, forb response to month in hi or low**

finaliso\_full<-read.csv("C:/users/a00287902/desktop/hardwaregammready.csv")

finaliso\_dat<-subset(finaliso\_full,

pft=="grass"|

pft=="shrub"|

pft=="forb")

grass\_dat<-subset(finaliso\_dat,

pft=="grass")

forbtrt\_datb<-subset(grass\_dat,

lohi=="low")

forbtrt\_dat<-subset(forbtrt\_datb,

month=="may"|

month=="july")

forbtrt\_dat\_trt<-forbtrt\_dat

group1<-"may"

group2<-"july"

forbtrt\_dat\_trt$group<-0

forbtrt\_dat\_trt[which(forbtrt\_dat\_trt $month %in%group1), "group"]<-1

forbtrt\_dat\_trt[which(forbtrt\_dat\_trt $month %in%group2), "group"]<-2

forbtrt\_dat\_trt$group<-as.factor(forbtrt\_dat\_trt $group)

root\_gamm<-gam(dpercm~ +s(depth,by=group,k=3,fx=TRUE,bs="fs"),method="REML",data=forbtrt\_dat\_trt,family=betar(link="logit"))

global\_gamm<-gam(dpercm~s(depth,k=3,fx=TRUE,bs="fs"),method="REML",data=forbtrt\_dat\_trt, family=betar(link="logit"))

AIC(global\_gamm, root\_gamm)

BIC(global\_gamm,root\_gamm)

logLik(global\_gamm)

logLik(root\_gamm)

#visualize#

ggplot(forbtrt\_dat,aes(x=depth,y=dpercm,colour=month))+

geom\_point()+

geom\_smooth(method='loess',se=FALSE)+

scale\_colour\_brewer(type = 'qual',palette='Dark2')+

theme(legend.position ='top')

**stem diameter**

stemdiameter\_full<-read.csv("C:/users/a00287902/desktop/stemdiameter.csv")

stemdiam\_dat<-stemdiameter\_full

group1<-"low"

group2<-"hi"

stemdiam\_dat$group<-0

stemdiam\_dat[which(stemdiam\_dat$trt%in%group1), "group"]<-1

stemdiam\_dat[which(stemdiam\_dat$trt%in%group2), "group"]<-2

stemdiam\_dat $group<-as.factor(stemdiam\_dat $group)

global\_gamm<-gam(stemdiam~s(day), data=stemdiam\_dat,)

root\_gamm<-gam(stemdiam~s(day,by=group), data=stemdiam\_dat)

AIC(global\_gamm, root\_gamm)

BIC(global\_gamm,root\_gamm)

logLik(global\_gamm)

logLik(root\_gamm)

#visualize#

ggplot(stemdiam\_dat,aes(x=day,y=stemdiam,colour=group))+

geom\_point()+

geom\_smooth(method='loess',se=FALSE)+

scale\_colour\_brewer(type = 'qual',palette='Dark2')+

theme(legend.position ='top')

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**vegetation cover**

vegcover\_full<-read.csv("C:/Users/andre/OneDrive/Desktop/hardveg.csv")

grass\_dat<-subset(vegcover\_full,

pft=="anng")

grass\_datb<-subset(grass\_dat,

type=="low"|

type=="hi")

growth\_habit\_dat<-subset(grass\_datb,

year=="2016"|

year=="2017"|

year=="2018"|

year=="2019"|

year=="2020")

vegcover\_dat<-growth\_habit\_dat

group1<-"low"

group2<-"hi"

vegcover\_dat$group<-0

vegcover\_dat[which(vegcover\_dat$type%in%group1), "group"]<-1

vegcover\_dat[which(vegcover\_dat$type%in%group2), "group"]<-2

vegcover\_dat $group<-as.factor(vegcover\_dat $group)

global\_gamm<-gam(cover~s(year, k=4 ), data=vegcover\_dat)

root\_gamm<-gam(cover~s(year,by=group, k=4), data=vegcover\_dat)

AIC(global\_gamm, root\_gamm)

BIC(global\_gamm,root\_gamm)

logLik(global\_gamm)

logLik(root\_gamm)

#visualize#

ggplot(vegcover\_dat,aes(x=year,y=cover,colour=group))+

geom\_point()+

geom\_smooth(method='loess',se=FALSE)+

scale\_colour\_brewer(type = 'qual',palette='Dark2')+

theme(legend.position ='top')