mappies2.R

Audrey McCombs

Fri Mar 09 18:00:35 2018

```
library(sp)
```

```
## Warning: package 'sp' was built under R version 3.2.5
```

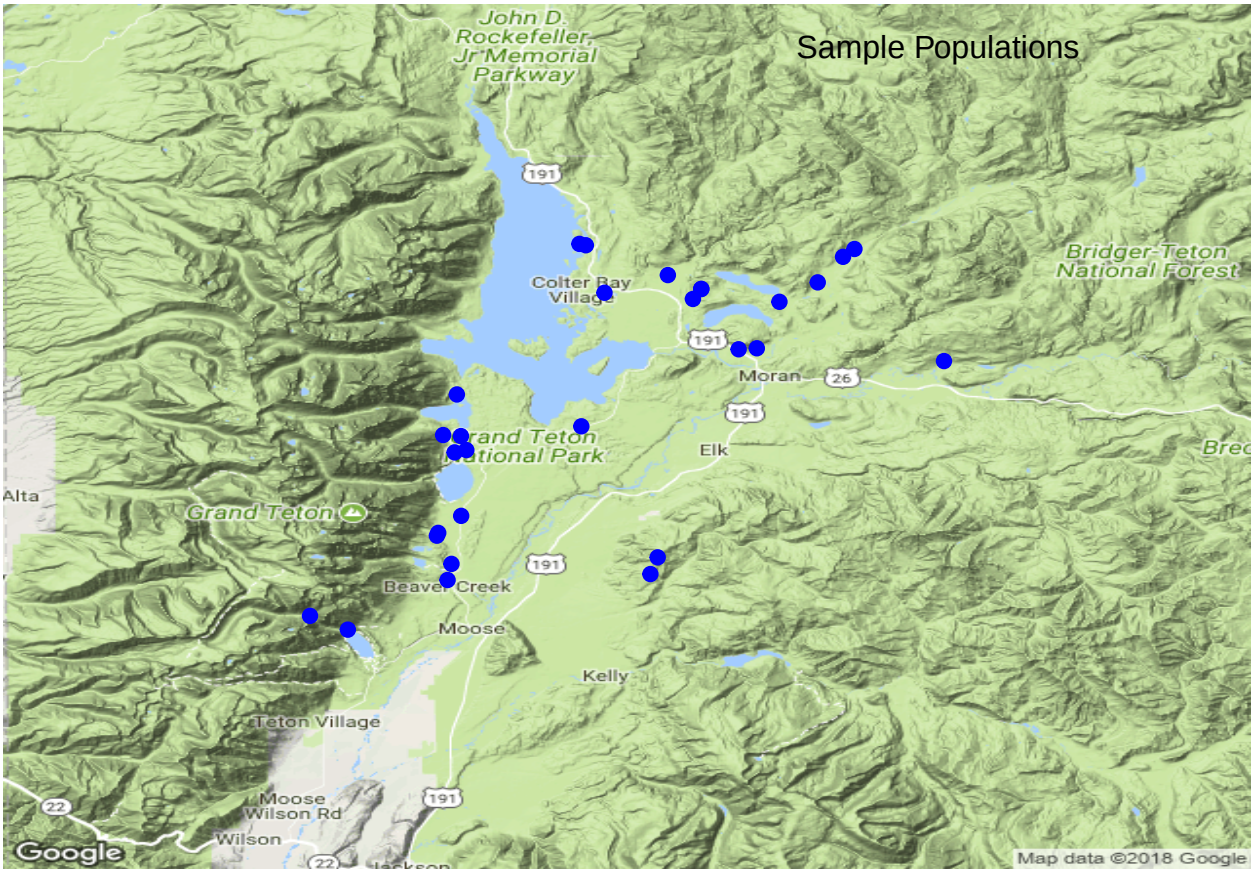
```
library(RgoogleMaps)
```

```
## Warning: package 'RgoogleMaps' was built under R version 3.2.5
```

```
library(mapplots)  #for draw.pie function
```

```
## Warning: package 'mapplots' was built under R version 3.2.5
```

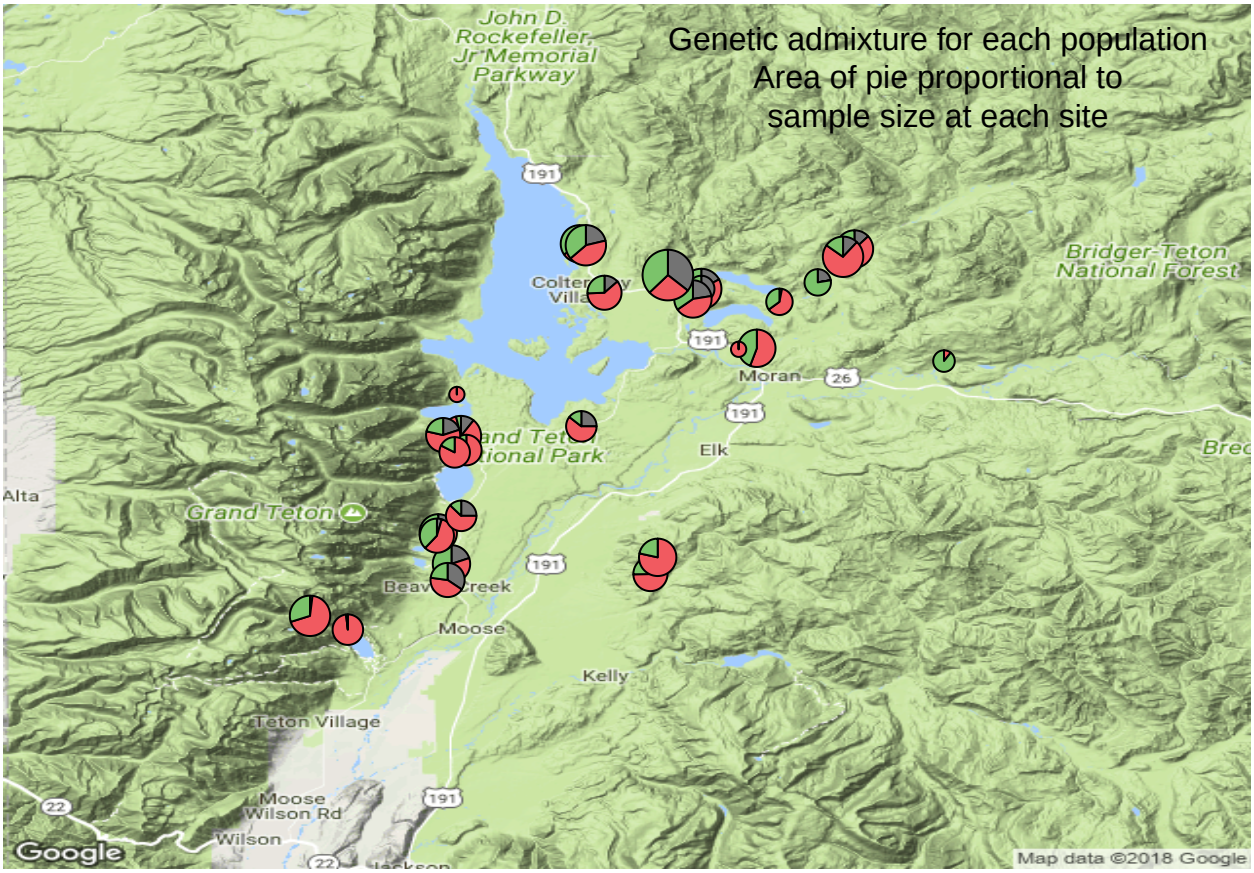
```
setwd("D:/Iowa State University/Debinski Lab/Parnassius genetics/ParnassiusGenetics")

op <- par()

# Set up data structures

pop.means <- read.csv("analysis/LEA_analysis/PopMeans.csv", header = T)

xmin <- min(pop.means$Longitude)
xmax <- max(pop.means$Longitude)
xmid <- (xmin + xmax)/2
ymin <- min(pop.means$Latitude)
ymax <- max(pop.means$Latitude)
ymid <- (ymin + ymax)/2

pies <- as.matrix(pop.means[,c("V1","V2","V3")])
coords <- as.matrix(pop.means[,c("Longitude","Latitude")])
n <- as.vector(pop.means[,2])

coords.sp <- pop.means
coordinates(coords.sp) <- c("Longitude", "Latitude")
proj4string(coords.sp) <- CRS("+proj=longlat +datum=WGS84")

#Plot the sample sites
gtnp <- GetMap(center = c(ymid, xmid), zoom = 10, maptype = "terrain")
sites.map <- PlotOnStaticMap(gtnp, coords.sp@coords[,2], coords.sp@coords[,1], pch = 19, col = 4)
TextOnStaticMap(sites.map, lat = 44.08, lon = -110.39, labels = "Sample Populations", add = T)
```




```
#Plot the pies using the mapplots package
par(op)
```

```
## Warning in par(op): graphical parameter "cin" cannot be set
## Warning in par(op): graphical parameter "cra" cannot be set
## Warning in par(op): graphical parameter "csi" cannot be set
## Warning in par(op): graphical parameter "cxy" cannot be set
## Warning in par(op): graphical parameter "din" cannot be set
## Warning in par(op): graphical parameter "page" cannot be set
```

```
goog2 <- LatLon2XY.centered(gtnp, coords.sp@coords[,2], coords.sp@coords[,1], zoom = 10)
gtnp.map <- PlotOnStaticMap(gtnp)
TextOnStaticMap(gtnp.map, lat = 44.06, lon = -110.39, labels = "Genetic admixture for each population\n
draw.pie(z = pies, x = goog2$newX, y = goog2$newY, radius = (sqrt(n/pi)*10), labels = "")
```

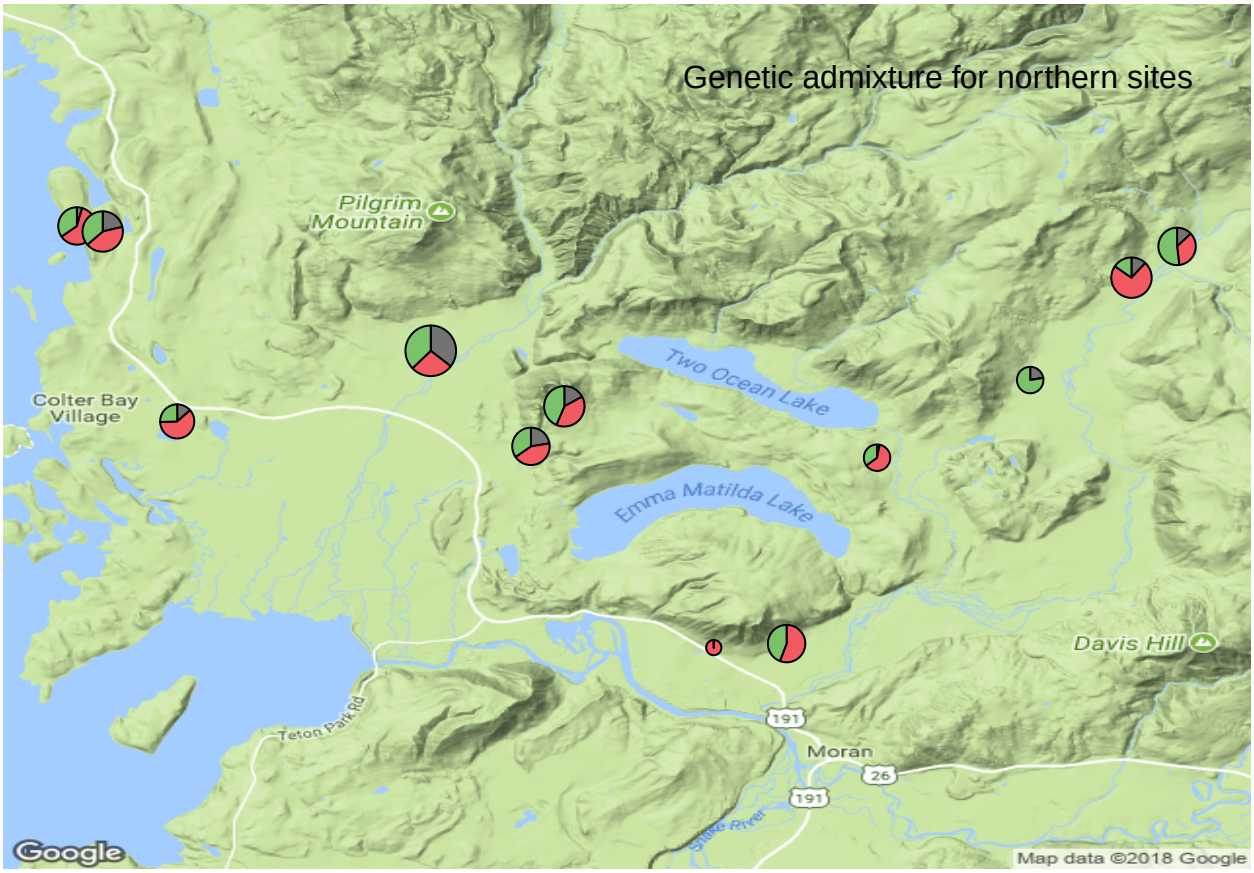



```
#Make smaller submaps
  #Northern sites
ns <- c(1,2,3,8,12,13,14,18,26,27,28,29) #indicies for northern sites
north.sites <- pop.means[ns,]
n.ns <- north.sites[,2]

xmin.ns <- min(north.sites$Longitude)
xmax.ns <- max(north.sites$Longitude)
xmid.ns <- (xmin.ns + xmax.ns)/2
ymin.ns <- min(north.sites$Latitude)
ymax.ns <- max(north.sites$Latitude)
ymid.ns <- (ymin.ns + ymax.ns)/2

coords.sp.ns <- north.sites
coordinates(coords.sp.ns) <- c("Longitude", "Latitude")
proj4string(coords.sp.ns) <- CRS("+proj=longlat +datum=WGS84")

north.sites.map <- GetMap(center = c(ymid.ns, xmid.ns), zoom = 12, maptype = "terrain")

par(op)
```

```
## Warning in par(op): graphical parameter "cin" cannot be set
## Warning in par(op): graphical parameter "cra" cannot be set
## Warning in par(op): graphical parameter "csi" cannot be set
## Warning in par(op): graphical parameter "cxy" cannot be set
```

```
## Warning in par(op): graphical parameter "din" cannot be set

## Warning in par(op): graphical parameter "page" cannot be set
```

```
goog.ns <- LatLon2XY.centered(north.sites.map, coords.sp.ns@coords[,2], coords.sp.ns@coords[,1], zoom =
ns.map <- PlotOnStaticMap(north.sites.map)
TextOnStaticMap(gtnp.map, lat = 44.06, lon = -110.39, labels = "Genetic admixture for northern sites", a
draw.pie(z = pies[ns,], x = goog.ns$newX, y = goog.ns$newY, radius = (sqrt(n.ns/pi)*10), labels = "")
```

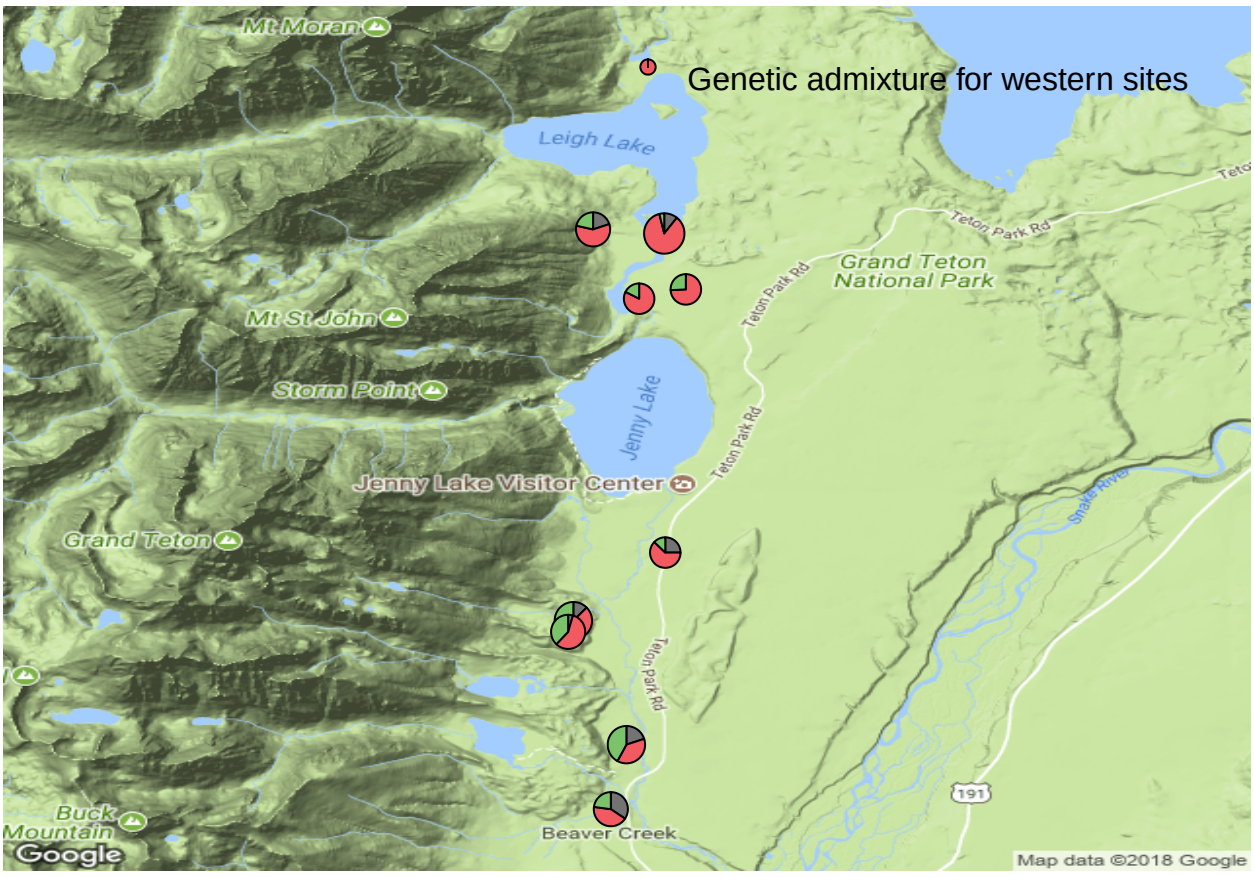



```
  #Western sites
ws <- c(4,5,7,16,17,21,22,23,24,25) #indicies for western sites
west.sites <- pop.means[ws,]
n.ws <- west.sites[,2]

xmin.ws <- min(west.sites$Longitude)
xmax.ws <- max(west.sites$Longitude)
xmid.ws <- (xmin.ws + xmax.ws)/2
ymin.ws <- min(west.sites$Latitude)
ymax.ws <- max(west.sites$Latitude)
ymid.ws <- (ymin.ws + ymax.ws)/2

coords.sp.ws <- west.sites
coordinates(coords.sp.ws) <- c("Longitude", "Latitude")
proj4string(coords.sp.ws) <- CRS("+proj=longlat +datum=WGS84")

west.sites.map <- GetMap(center = c(ymid.ws, xmid.ws), zoom = 12, maptype = "terrain")
```

```
par(op)
```

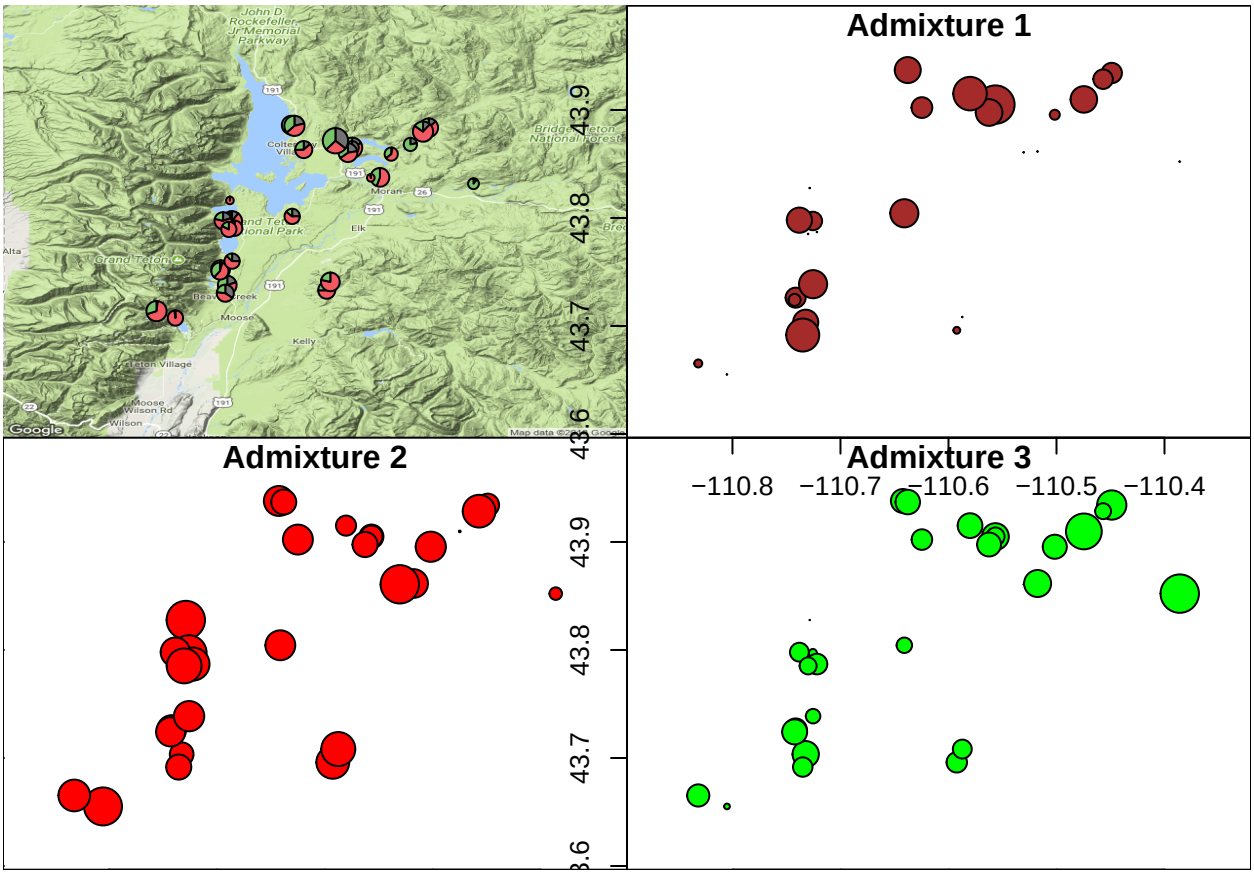
```
## Warning in par(op): graphical parameter "cin" cannot be set
## Warning in par(op): graphical parameter "cra" cannot be set
## Warning in par(op): graphical parameter "csi" cannot be set
## Warning in par(op): graphical parameter "cxy" cannot be set
## Warning in par(op): graphical parameter "din" cannot be set
## Warning in par(op): graphical parameter "page" cannot be set
```

```
goog.ws <- LatLon2XY.centered(west.sites.map, coords.sp.ws@coords[,2], coords.sp.ws@coords[,1], zoom = 
PlotOnStaticMap(west.sites.map)
TextOnStaticMap(gtnp.map, lat = 44.06, lon = -110.39, labels = "Genetic admixture for western sites", a
draw.pie(z = pies[ws,], x = goog.ws$newX, y = goog.ws$newY, radius = (sqrt(n.ws/pi)*10), labels = "")
```




```
#Bubble plots for the three genetic groups
radV1 <- sqrt(pop.means$V1/pi)
radV2 <- sqrt(pop.means$V2/pi)
radV3 <- sqrt(pop.means$V3/pi)

par(mfrow = c(2,2))

PlotOnStaticMap(gtnp)
goog2 <- LatLon2XY.centered(gtnp, coords.sp@coords[,2], coords.sp@coords[,1], zoom = 10)
draw.pie(z = pies, x = goog2$newX, y = goog2$newY, radius = (sqrt(n/pi)*10), labels = "")
```

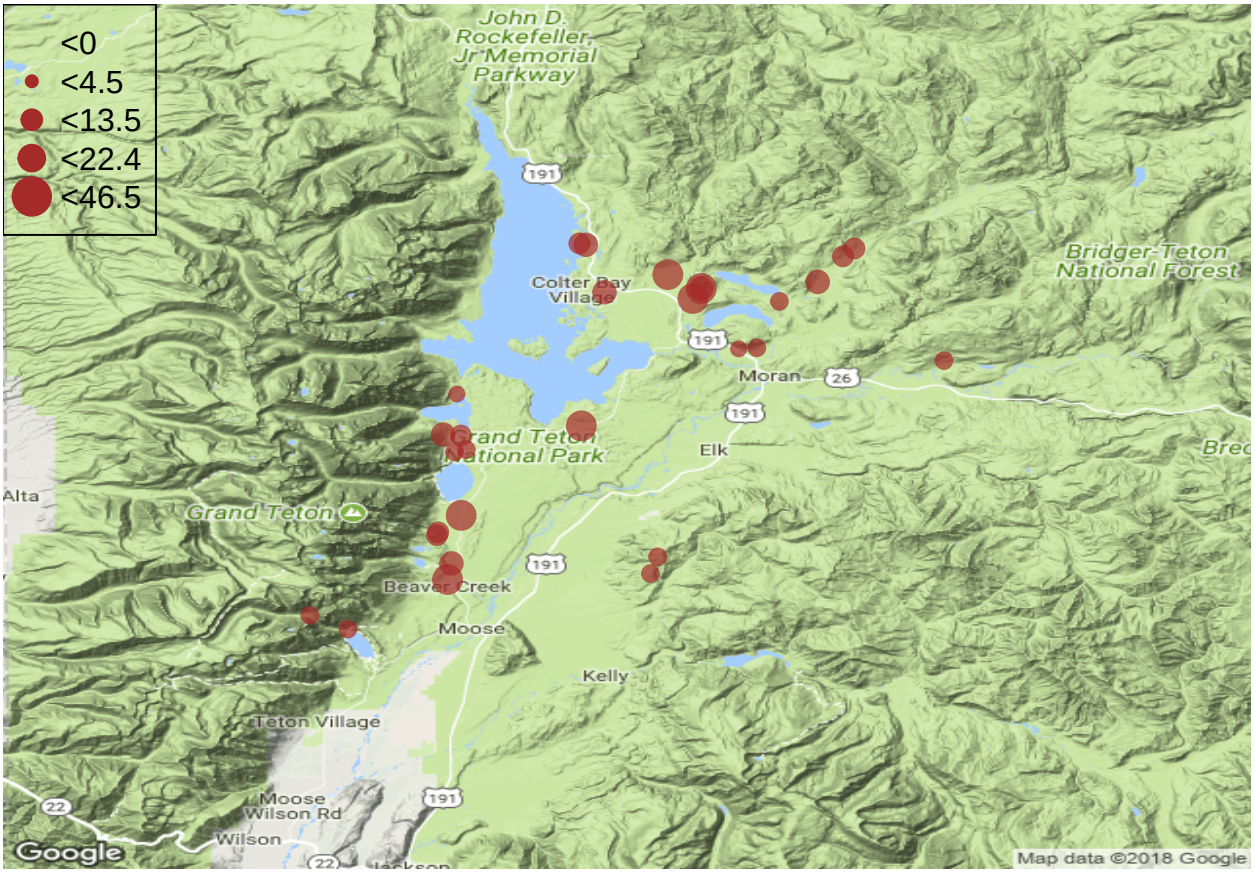
```
symbols(x = coords[,1], y = coords[,2], circles = radV1, inches = 0.1, bg = "brown", main = "\nAdmixture
symbols(x = coords[,1], y = coords[,2], circles = radV2, inches = 0.1, bg = "red", main = "\nAdmixture 2
symbols(x = coords[,1], y = coords[,2], circles = radV3, inches = 0.1, bg = "green", main = "\nAdmixture
```



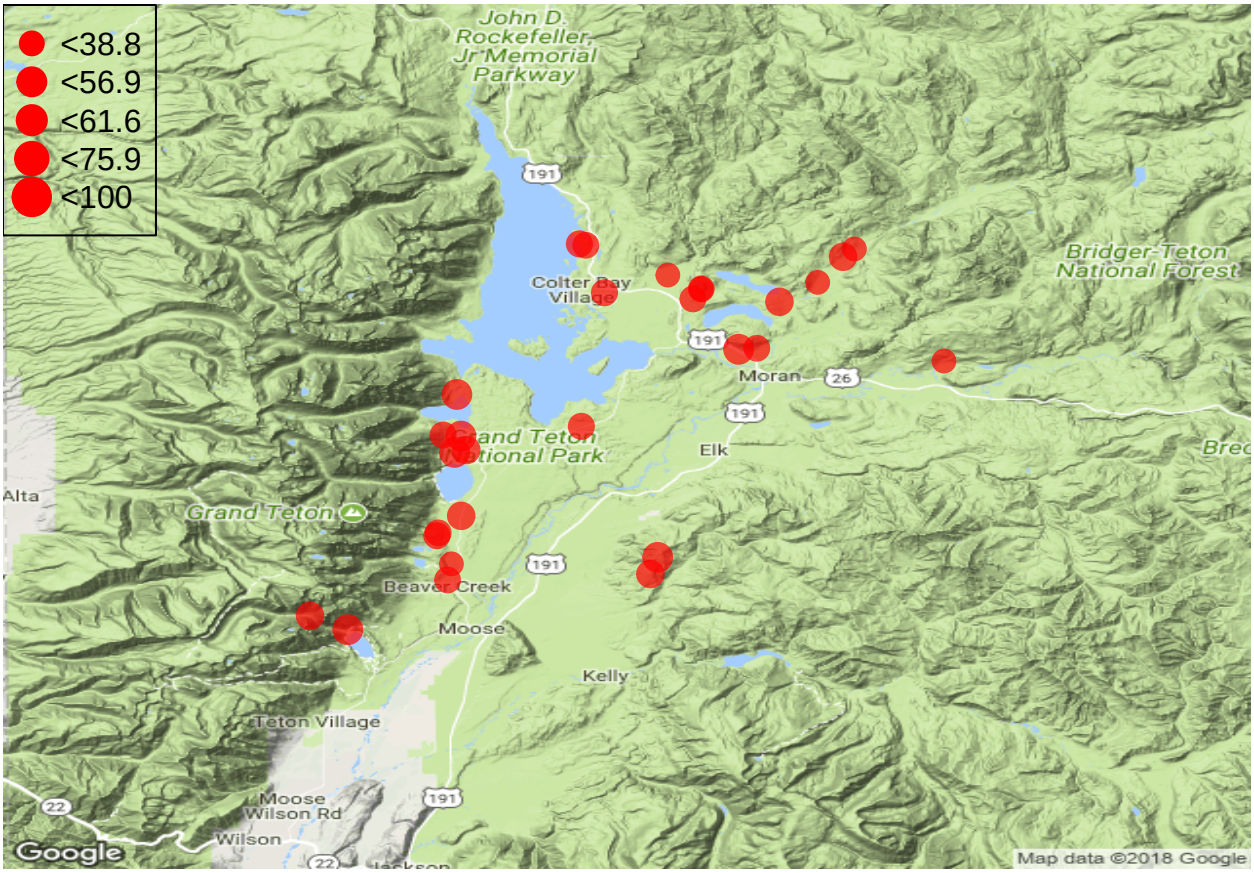

```
coords.sp.bp <- coords.sp
coords.sp.bp@data$V1 <- coords.sp@data$V1 * 100
coords.sp.bp@data$V2 <- coords.sp@data$V2 * 100
coords.sp.bp@data$V3 <- coords.sp@data$V3 * 100

par(op)
```

```
## Warning in par(op): graphical parameter "cin" cannot be set
## Warning in par(op): graphical parameter "cra" cannot be set
## Warning in par(op): graphical parameter "csi" cannot be set
## Warning in par(op): graphical parameter "cxy" cannot be set
## Warning in par(op): graphical parameter "din" cannot be set
## Warning in par(op): graphical parameter "page" cannot be set
```

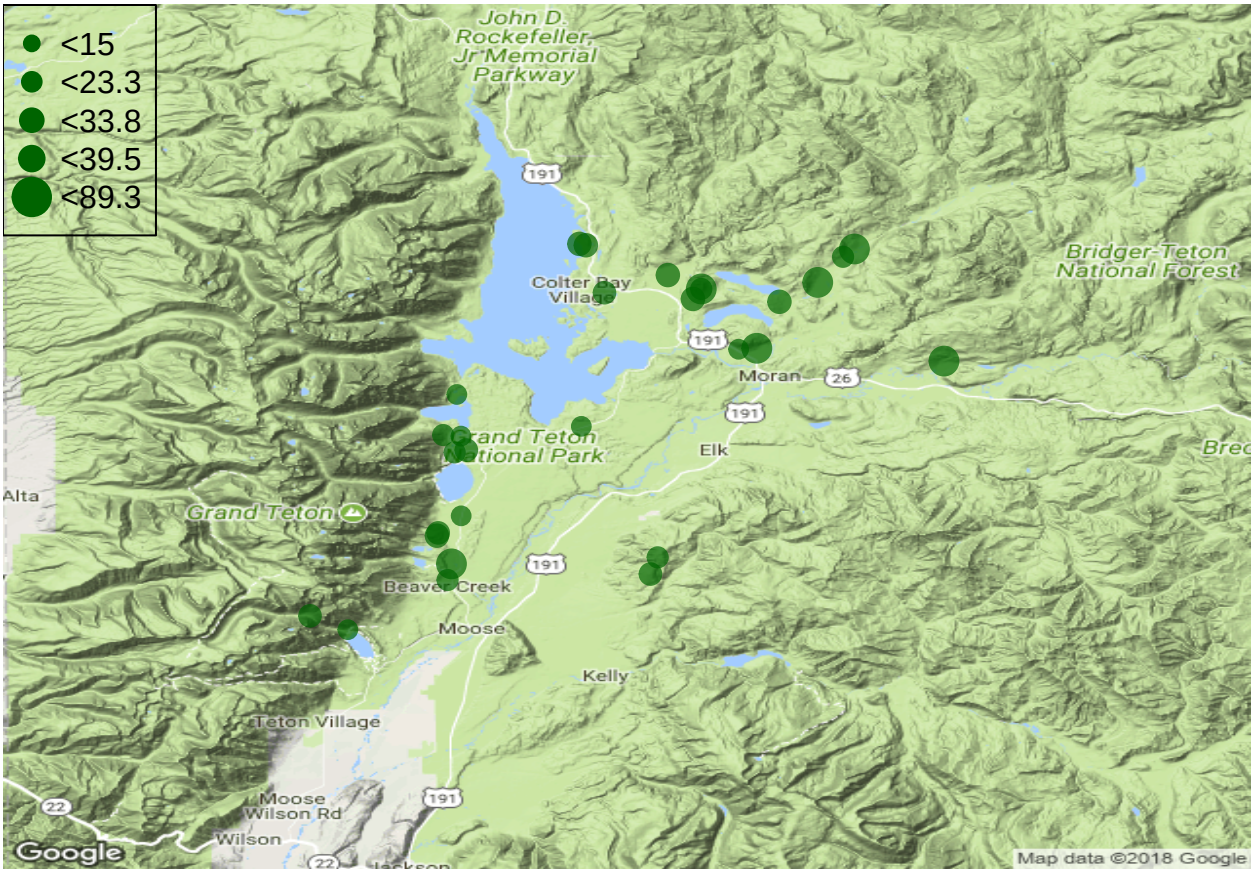
```
bubbleMap(coords.sp.bp, coords = c(goog2$newX, goog2$newY), map = gtnp, zcol = "V1", col = "brown")
```




```
bubbleMap(coords.sp.bp, coords = c(goog2$newX, goog2$newY), map = gtnp, zcol = 'V2', col = "red")
```




```
bubbleMap(coords.sp.bp, coords = c(goog2$newX, goog2$newY), map = gtnp, zcol = "V3", col = "darkgreen",
```


<15
<23.3
<33.8
<39.5
<89.3
John D. Rockefeller, Jr Memorial Parkway
Bridger-Teton National Forest
Colter Bay Village
Moran
Elk
Grand Teton National Park
Grand Teton
Alta
Beaver Creek
Moose
Kelly
Teton Village
Moose Wilson Rd
Wilson
191
26
22
Google
Map data ©2018 Google