

8.1 Minimum Convex Polygon (MCP)

Manual of Applied Spatial Ecology

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Minimum Convex Polygon (MCP) estimation was considered a home range originally described for use with identifying animals recaptured along a trapping grid (Mohr 1947). The reason we removed this from the Home Range Section is because MCP can be used to describe the extent of distribution of locations of an animal but NOT as an estimation of home range size. In fact, reporting size of home range using MCP should be avoided at all costs unless you can justify its use as opposed to the plethora of other estimators we have learned in the previous section. We may use MCP within resource selection function analysis as it has been suggested as a method to describe the extent of area occupied by a species that would be available to animals using either second or third order selection of habitat (Johnson 1980), although this should also be avoided unless specifically justified as to why MCP is better than an alternate home range estimator. The extent of an area an animal uses (i.e., habitat available) should be determined for each species and the most appropriate estimator should be used.

1. Exercise 8.1 - Download and extract zip folder into your preferred location
2. Set working directory to the extracted folder in R under Session - Set Working Directory...
3. Now open the script "MCPscript.Rmd" and run code directly from the script
4. First we need to load the packages needed for the exercise

```
library(adehabitatHR)
library(rgdal)
```

5. Now we will have a separate section of code to include projection information we will use throughout the exercise. In previous versions, these lines of code were within each block of code

```
utm17.crs <- CRS("+proj=utm +zone=17N +ellps=WGS84")
```

6. Load in a mule deer dataset we have used in previous exercises

```
muleys <- read.csv("muleysexample.csv", header=T)
newmuleys <- subset(muleys, muleys$Long > -110.90 & muleys$Lat > 37.8)
muleys <- newmuleys
newmuleys <- subset(muleys, muleys$Long < -107)
muleys <- newmuleys
```

7. Create Spatial Points for all relocations and assign IDs to each location

```
data.xy = muleys[c("X", "Y")]
#Creates class Spatial Points for all locations
xysp <- SpatialPoints(data.xy)
proj4string(xysp) <- CRS("+proj=utm +zone=17 +ellps=WGS84")
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO", prefer_proj
## = prefer_proj): Discarded datum Unknown based on WGS84 ellipsoid in Proj4
## definition
```

```

#Creates a Spatial Data Frame from
sppt<-data.frame(xysp)
#Creates a spatial data frame of ID
idsp<-data.frame(muleys[2])
#Merges ID and Date into the same spatial data frame
merge<-data.frame(idsp)
#Adds ID and Date data frame with locations data frame
coordinates(merge)<-sppt

```

8. We are now ready to create MCPs for our new dataset “merge” by individual animal ID (Fig. 8.1).

```

cp <- mcp(merge[,1], percent=95)#(95% is the default)
## The size of the bounding polygon
as.data.frame(cp)

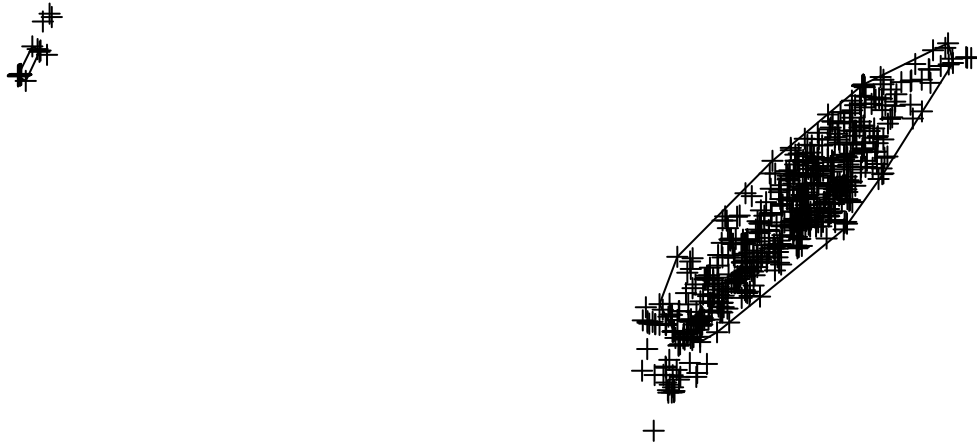
```

```

##      id      area
## D12 D12   5.29995
## D8   D8  515.42075

## Plot the home ranges
plot(cp)
## ... And the relocations
plot(merge, add=TRUE)

```



9. Use the rgdal package to write to a shapefile

```

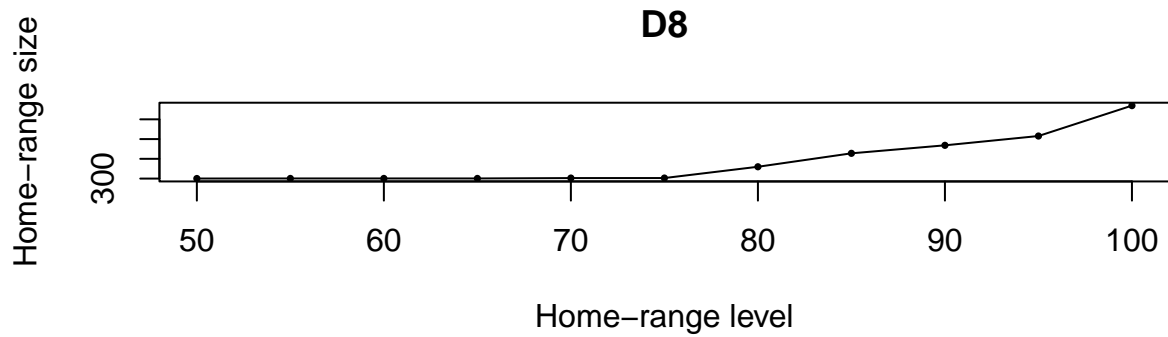
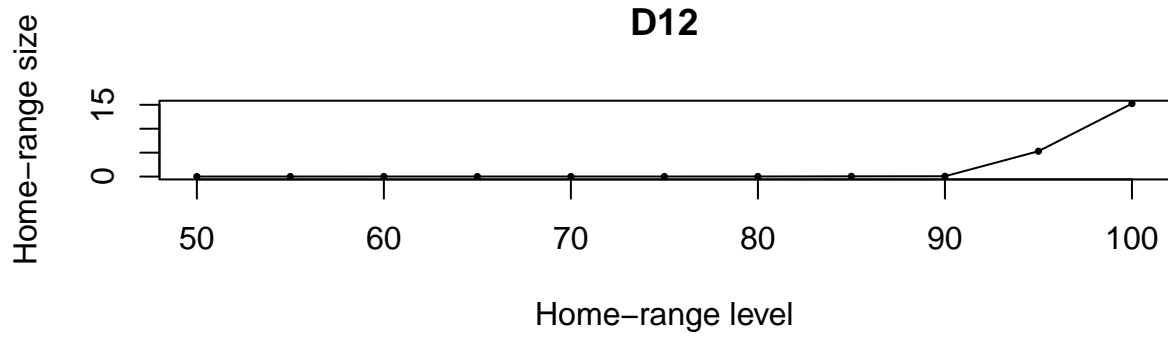
writeOGR(cp, dsn = ".", layer="MCPPhomerange", driver = "ESRI Shapefile")

```

10. We have chosen to exclude 5% of the most extreme relocations, but we could have made another choice.

We may compute the MCP for various choices of the number of extreme relocations to be excluded, using the function `mcp.area`:

```
hrs <- mcp.area(merge[,1], percent=seq(50, 100, by = 5))
```



```
hrs
```

##	D12	D8
## 50	0.01405	300.3191
## 55	0.01480	300.6203
## 60	0.01600	300.6898
## 65	0.01670	300.7083
## 70	0.01725	302.6114
## 75	0.02005	302.6438
## 80	0.02340	359.7976
## 85	0.04850	427.8537
## 90	0.06580	468.4115
## 95	5.29995	515.4207
## 100	15.24355	669.3478