Rats Abrolhos

Tati Micheletti / Instituto Brasileiro para Medicina da Conserva??o

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Abrolhos 2019

Santa Barbara 1

```
## Preparing: capture1.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: capture1.txt already present

## Preparing: detector1.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector1.txt already present

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    20
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 60 m
##
## Counts by occasion
##                    1  2  3  4  5 Total
## n                  4  3  2  3  1    13
## u                  4  3  2  3  0    12
## f                 11  1  0  0  0    12
## M(t+1)             4  7  9 12 12    12
## losses             0  0  0  0  0     0
## detections         4  3  2  3  1    13
## detectors visited  4  3  2  3  1    13
## detectors used    20 20 20 20 20   100
```

```
## Preparing detection design matrices
## Finding initial parameter values...
## Initial values  D = 47.47873, g0 = 0.01572, sigma = 16.97056
## Maximizing likelihood...
## Eval     Loglik       g0    sigma
##    1    -42.224  -4.1373   2.8315
##    2    -42.224  -4.1373   2.8315
##    3    -42.224  -4.1373   2.8315
##    4    -42.224  -4.1373   2.8315
##    5    -43.212  -4.5581   2.2217
##    6    -42.170  -4.2124   2.7225
##    7    -42.170  -4.2124   2.7225
##    8    -42.170  -4.2124   2.7225
##    9    -42.167  -4.2407   2.7213
##   10    -42.167  -4.2407   2.7213
##   11    -42.167  -4.2407   2.7213
##   12    -42.159  -4.3599   2.7484
##   13    -42.159  -4.3599   2.7484
##   14    -42.159  -4.3599   2.7484
##   15    -42.155  -4.4432   2.7857
##   16    -42.155  -4.4432   2.7857
##   17    -42.155  -4.4432   2.7857
##   18    -42.154  -4.4732   2.8102
##   19    -42.154  -4.4732   2.8102
##   20    -42.154  -4.4732   2.8102
##   21    -42.154  -4.4749   2.8186
##   22    -42.154  -4.4749   2.8186
##   23    -42.154  -4.4749   2.8186
##   24    -42.154  -4.4732   2.8191
##   25    -42.154  -4.4732   2.8191
##   26    -42.154  -4.4732   2.8191
##   27    -42.154  -4.4729   2.8190
##   28    -42.154  -4.4729   2.8190
##   29    -42.154  -4.4729   2.8190
##   30    -42.154  -4.4728   2.8190
##   31    -42.154  -4.4728   2.8190
##   32    -42.154  -4.4728   2.8190
##   33    -42.154  -4.4727   2.8190
##   34    -42.154  -4.4728   2.8193
##   35    -42.154  -4.4726   2.8190
##   36    -42.154  -4.4727   2.8193
##   37    -42.154  -4.4728   2.8196
## Completed in 0.38 seconds at 00:46:30 25 Apr 2020
```

Home range results (sigma estimate, lcl = lowe95%CI; ucl = upper95%CI):

	link	estimate	SE.estimate	lcl	ucl
g0	logit	0.0112862	0.016616	0.0006162	0.1744607
sigma	log	16.7599721	15.249132	3.6577729	76.7944517

Density results (D estimate, lcl = lowe95%CI; ucl = upper95%CI):

	estimate	SE.estimate	lcl	ucl	CVn	CVa	CVD
esa	0.184754	NA	NA	NA	NA	NA	NA
D	64.951249	69.25018	11.77266	358.3441	0.2886751	1.026363	1.066187

Santa Barbara 2

```
## Preparing: capture2.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: capture2.txt already present

## Preparing: detector2.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector2.txt already present

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    20
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 60 m
##
## Counts by occasion
##                    1  2  3  4  5 Total
## n                  4  4  3  2  4    17
## u                  4  2  1  0  1     8
## f                  3  3  1  0  1     8
## M(t+1)             4  6  7  7  8     8
## losses             0  0  0  0  0     0
## detections         4  4  3  2  4    17
## detectors visited  4  4  3  2  3    16
## detectors used    20 20 20 20 20   100

## Preparing detection design matrices
## Finding initial parameter values...
## Initial values  D = 4.23485, g0 = 0.15309, sigma = 22.7684
## Maximizing likelihood...
## Eval     Loglik       g0    sigma
##    1    -65.789  -1.7105   3.1254
##    2    -65.789  -1.7105   3.1254
##    3    -65.789  -1.7105   3.1254
```

```
##    4    -65.789  -1.7105   3.1254
##    5    -67.976  -3.7029   4.9398
##    6    -65.067  -2.4761   3.8226
##    7    -65.067  -2.4761   3.8226
##    8    -65.067  -2.4761   3.8226
##    9    -64.858  -2.2066   3.7025
##   10    -64.858  -2.2066   3.7025
##   11    -64.858  -2.2066   3.7025
##   12    -64.850  -2.1349   3.6661
##   13    -64.850  -2.1349   3.6661
##   14    -64.850  -2.1349   3.6661
##   15    -64.849  -2.1361   3.6816
##   16    -64.849  -2.1361   3.6816
##   17    -64.849  -2.1361   3.6816
##   18    -64.849  -2.1318   3.6884
##   19    -64.849  -2.1318   3.6884
##   20    -64.849  -2.1318   3.6884
##   21    -64.849  -2.1303   3.6891
##   22    -64.849  -2.1303   3.6891
##   23    -64.849  -2.1303   3.6891
##   24    -64.849  -2.1302   3.6891
##   25    -64.849  -2.1302   3.6891
##   26    -64.849  -2.1302   3.6891
##   27    -64.849  -2.1302   3.6891
##   28    -64.849  -2.1302   3.6891
##   29    -64.849  -2.1302   3.6891
##   30    -64.849  -2.1301   3.6891
##   31    -64.849  -2.1302   3.6895
##   32    -64.849  -2.1300   3.6891
##   33    -64.849  -2.1301   3.6895
##   34    -64.849  -2.1302   3.6898
## Completed in 0.35 seconds at 00:46:31 25 Apr 2020
```

Home range results (sigma estimate, lcl = lowe95%CI; ucl = upper95%CI):

	link	estimate	SE.estimate	lcl	ucl
g0	logit	0.1061979	0.0605183	0.0329328	0.2930616
sigma	log	40.0084301	29.1860902	11.1208464	143.9345912

Density results (D estimate, lcl = lowe95%CI; ucl = upper95%CI):

	estimate	SE.estimate	lcl	ucl	CVn	CVa	CVD
esa	3.680493	NA	NA	NA	NA	NA	NA
D	2.173622	2.641974	0.3360785	14.05812	0.3535534	1.162915	1.215471

RESULTS

For Santa Barbara 1, we have **65** rats/ha (CI95%: 12-358), with home range of **16.75m** (CI95%: 3.66-76.82).

For Santa Barbara 2, we have **2.17** rats/ha (CI95%: 0.34-14), with home range of **40m** (CI95%: 11.12-143.93).

Obs.: In my opinion, the deviation is really too big. We need to collect more data (ie. trapping for longer time and probably with a bigger grid...) ~TM

Siriba 1

```
## Preparing: capture3.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: capture3.txt already present

## Preparing: detector3.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector3.txt already present

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    25
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 80 m
##
## Counts by occasion
##                     1  2  3  4  5 Total
## n                  15 20 19 23 23   100
## u                  15 18 14  8  6    61
## f                  34 17  8  2  0    61
## M(t+1)             15 33 47 55 61    61
## losses              0  0  0  0  0     0
## detections         15 20 19 23 23   100
## detectors visited 15 19 18 20 22    94
## detectors used    25 25 25 25 25   125

## Preparing detection design matrices
## Finding initial parameter values...
## Initial values  D = 72.54427, g0 = 0.30285, sigma = 7.72608
## Maximizing likelihood...
## Eval     Loglik       g0    sigma
##    1   -228.983  -0.8338   2.0446
##    2   -228.983  -0.8338   2.0446
##    3   -228.983  -0.8337   2.0446
##    4   -228.983  -0.8338   2.0446
##    5  -9723.108   1.7346   7.6640
```

```
##    6   -268.875  -0.5769   2.6065
##    7   -229.051  -0.8081   2.1008
##    8   -228.902  -0.8229   2.0684
##    9   -228.902  -0.8229   2.0684
##   10   -228.902  -0.8229   2.0684
##   11   -228.894  -0.8170   2.0672
##   12   -228.894  -0.8170   2.0672
##   13   -228.894  -0.8170   2.0672
##   14   -228.841  -0.7352   2.0494
##   15   -228.841  -0.7352   2.0494
##   16   -228.841  -0.7352   2.0494
##   17   -228.841  -0.7346   2.0496
##   18   -228.841  -0.7346   2.0496
##   19   -228.841  -0.7346   2.0496
##   20   -228.841  -0.7346   2.0496
##   21   -228.841  -0.7346   2.0496
##   22   -228.841  -0.7346   2.0496
##   23   -228.841  -0.7345   2.0496
##   24   -228.841  -0.7346   2.0498
##   25   -228.841  -0.7344   2.0496
##   26   -228.841  -0.7345   2.0498
##   27   -228.841  -0.7346   2.0500
## Completed in 0.5 seconds at 00:46:31 25 Apr 2020
```

Home range results (sigma estimate, lcl = lowe95%CI; ucl = upper95%CI):

	link	estimate	SE.estimate	lcl	ucl
g0	logit	0.3241807	0.0560964	0.2250519	0.4420653
sigma	log	7.7644985	0.6159060	6.6481239	9.0683383

Density results (D estimate, lcl = lowe95%CI; ucl = upper95%CI):

	estimate	SE.estimate	lcl	ucl	CVn	CVa	CVD
esa	0.8789661	NA	NA	NA	NA	NA	NA
D	69.3997218	10.47928	51.7072	93.14604	0.1280369	0.080045	0.1509988

RESULTS

For Siriba 1, we have **69** rats/ha (CI95%: 52-93), with home range of **7.76m** (CI95%: 6.64-9.07).

Abrolhos 2020

Santa Barbara 1

```
## Preparing: capture4.txt
```

```
## Checking local files...
```

```
## Finished checking local files.
```

```
##   Skipping download: capture4.txt already present

## Preparing: detector4.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector4.txt already present

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    25
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 80 m
##
## Counts by occasion
##                    1  2  3  4  5 Total
## n                  1  4  5  4  4    18
## u                  1  4  4  2  1    12
## f                  7  4  1  0  0    12
## M(t+1)             1  5  9 11 12    12
## losses             0  0  0  0  0     0
## detections         1  4  5  4  4    18
## detectors visited  1  4  5  4  4    18
## detectors used    25 25 25 25 25   125

## Preparing detection design matrices
## Finding initial parameter values...

## Warning in autoini(ch, msk, binomN = tempbinomN, adjustg0 = details$binomN[1]
## == : 'dbar' close to zero; using detector spacing instead

## Warning in secr.fit(SB1.4, model = list(g0 ~ 1, sigma ~ 1), CL = TRUE, verify
## = FALSE, : 'secr.fit' failed because initial values not found (data sparse?);
## specify transformed values in 'start'
```

RESULTS

Data sparse, model fitting failed (i.e. potentially because not all individuals were marked)

Santa Barbara 2

```
## Preparing: capture5.txt

## Checking local files...
```

```
## Finished checking local files.

##   Skipping download: capture5.txt already present

## Preparing: detector5.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector5.txt already present

## Warning in make.capthist(capt, trps, fmt = fmt, noccasions = noccasions, :
## dropping repeat detections within occasions at exclusive detectors (traps)

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    25
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 80 m
##
## Counts by occasion
##                     1  2  3  4  5 Total
## n                  12 11 18 12 14    67
## u                  12  5  5  4  3    29
## f                  11  5  7  5  1    29
## M(t+1)             12 17 22 26 29    29
## losses              0  0  0  0  0     0
## detections         12 11 18 12 14    67
## detectors visited 12 10 17 12 13    64
## detectors used    25 25 25 25 25   125

## Preparing detection design matrices
## Finding initial parameter values...
## Initial values  D = 13.85339, g0 = 0.1934, sigma = 19.07327
## Maximizing likelihood...
## Eval     Loglik       g0    sigma
##    1   -209.845  -1.4281   2.9483
##    2   -209.845  -1.4281   2.9483
##    3   -209.845  -1.4281   2.9483
##    4   -209.845  -1.4281   2.9483
##    5  -3222.741   1.3613   7.8479
##    6   -217.697  -1.1491   3.4383
##    7   -209.829  -1.3810   3.0310
##    8   -209.829  -1.3810   3.0310
##    9   -209.829  -1.3810   3.0310
##   10   -209.698  -1.3917   2.9892
##   11   -209.698  -1.3917   2.9892
##   12   -209.698  -1.3917   2.9892
```

```
##   13   -209.685  -1.3823   2.9804
##   14   -209.685  -1.3823   2.9804
##   15   -209.685  -1.3823   2.9804
##   16   -209.661  -1.3462   2.9647
##   17   -209.661  -1.3462   2.9647
##   18   -209.661  -1.3462   2.9647
##   19   -209.654  -1.3226   2.9615
##   20   -209.654  -1.3226   2.9615
##   21   -209.654  -1.3226   2.9615
##   22   -209.653  -1.3168   2.9631
##   23   -209.653  -1.3168   2.9631
##   24   -209.653  -1.3168   2.9631
##   25   -209.653  -1.3170   2.9637
##   26   -209.653  -1.3170   2.9637
##   27   -209.653  -1.3170   2.9637
##   28   -209.653  -1.3171   2.9637
##   29   -209.653  -1.3171   2.9637
##   30   -209.653  -1.3171   2.9637
##   31   -209.653  -1.3170   2.9637
##   32   -209.653  -1.3171   2.9640
##   33   -209.653  -1.3169   2.9637
##   34   -209.653  -1.3170   2.9640
##   35   -209.653  -1.3171   2.9643
## Completed in 0.71 seconds at 00:46:32 25 Apr 2020
```

Home range results (sigma estimate, lcl = lowe95%CI; ucl = upper95%CI):

	link	estimate	SE.estimate	lcl	ucl
g0	logit	0.2113001	0.043130	0.1389128	0.3079195
sigma	log	19.3701160	2.147168	15.5978554	24.0546784

Density results (D estimate, lcl = lowe95%CI; ucl = upper95%CI):

	estimate	SE.estimate	lcl	ucl	CVn	CVa	CVD
esa	1.942794	NA	NA	NA	NA	NA	NA
D	14.926959	3.191436	9.863051	22.59079	0.1856953	0.1059678	0.2138035

RESULTS

Data sparse, model fitting failed (i.e. potentially because not all individuals were marked) For Santa Barbara 2 (2020), we have **14** rats/ha (CI95%: 10-23), with home range of **19m** (CI95%: 16-24).

Redonda 1

```
## Preparing: capture6.txt
```

```
## Checking local files...
```

```
## Finished checking local files.
```

```
##   Skipping download: capture6.txt already present

## Preparing: detector6.txt

## Checking local files...

## Finished checking local files.

##   Skipping download: detector6.txt already present

## No errors found :-)

## Object class       capthist
## Detector type      multi
## Detector number    25
## Average spacing    20 m
## x-range            0 80 m
## y-range            0 80 m
##
## Counts by occasion
##                     1  2  3  4  5 Total
## n                  19 21 16 14  4    74
## u                  19 11  6  2  0    38
## f                  16 11  8  3  0    38
## M(t+1)             19 30 36 38 38    38
## losses              0  0  0  0  0     0
## detections         19 21 16 14  4    74
## detectors visited 19 19 16 14  4    72
## detectors used    25 25 25 25 25   125

## Preparing detection design matrices
## Finding initial parameter values...
## Initial values  D = 29.27869, g0 = 0.20228, sigma = 15.91645
## Maximizing likelihood...
## Eval     Loglik       g0    sigma
##    1   -223.950  -1.3721   2.7674
##    2   -223.950  -1.3721   2.7674
##    3   -223.950  -1.3721   2.7674
##    4   -223.950  -1.3721   2.7674
##    5         NA  -6.8181  -5.6196
##    6   -314.051  -1.9167   1.9287
##    7   -239.563  -1.6444   2.3480
##    8   -223.488  -1.4142   2.7026
##    9   -223.488  -1.4142   2.7026
##   10   -223.488  -1.4142   2.7026
##   11   -223.434  -1.4359   2.7063
##   12   -223.434  -1.4359   2.7063
##   13   -223.434  -1.4359   2.7063
##   14   -223.247  -1.5836   2.7519
##   15   -223.247  -1.5836   2.7519
##   16   -223.247  -1.5836   2.7519
##   17   -223.247  -1.5862   2.7552
```

```
##   18   -223.247  -1.5862   2.7552
##   19   -223.247  -1.5862   2.7552
##   20   -223.247  -1.5862   2.7557
##   21   -223.247  -1.5862   2.7557
##   22   -223.247  -1.5862   2.7557
##   23   -223.247  -1.5862   2.7557
##   24   -223.247  -1.5862   2.7557
##   25   -223.247  -1.5862   2.7557
##   26   -223.247  -1.5861   2.7557
##   27   -223.247  -1.5862   2.7560
##   28   -223.247  -1.5860   2.7557
##   29   -223.247  -1.5861   2.7560
##   30   -223.247  -1.5862   2.7563
## Completed in 0.57 seconds at 00:46:33 25 Apr 2020
```

Home range results (sigma estimate, lcl = lowe95%CI; ucl = upper95%CI):

	link	estimate	SE.estimate	lcl	ucl
g0	logit	0.1699138	0.0352538	0.1114384	0.2504254
sigma	log	15.7324201	1.7313715	12.6882458	19.5069553

Density results (D estimate, lcl = lowe95%CI; ucl = upper95%CI):

	estimate	SE.estimate	lcl	ucl	CVn	CVa	CVD
esa	1.430697	NA	NA	NA	NA	NA	NA
D	26.560474	5.00622	18.41604	38.30676	0.1622214	0.0959707	0.1884838

RESULTS

For Redonda 1 (2020), we have *27* rats/ha (CI95%: 18-38), with home range of *16m* (CI95%: 13-19).