

# Firesummary

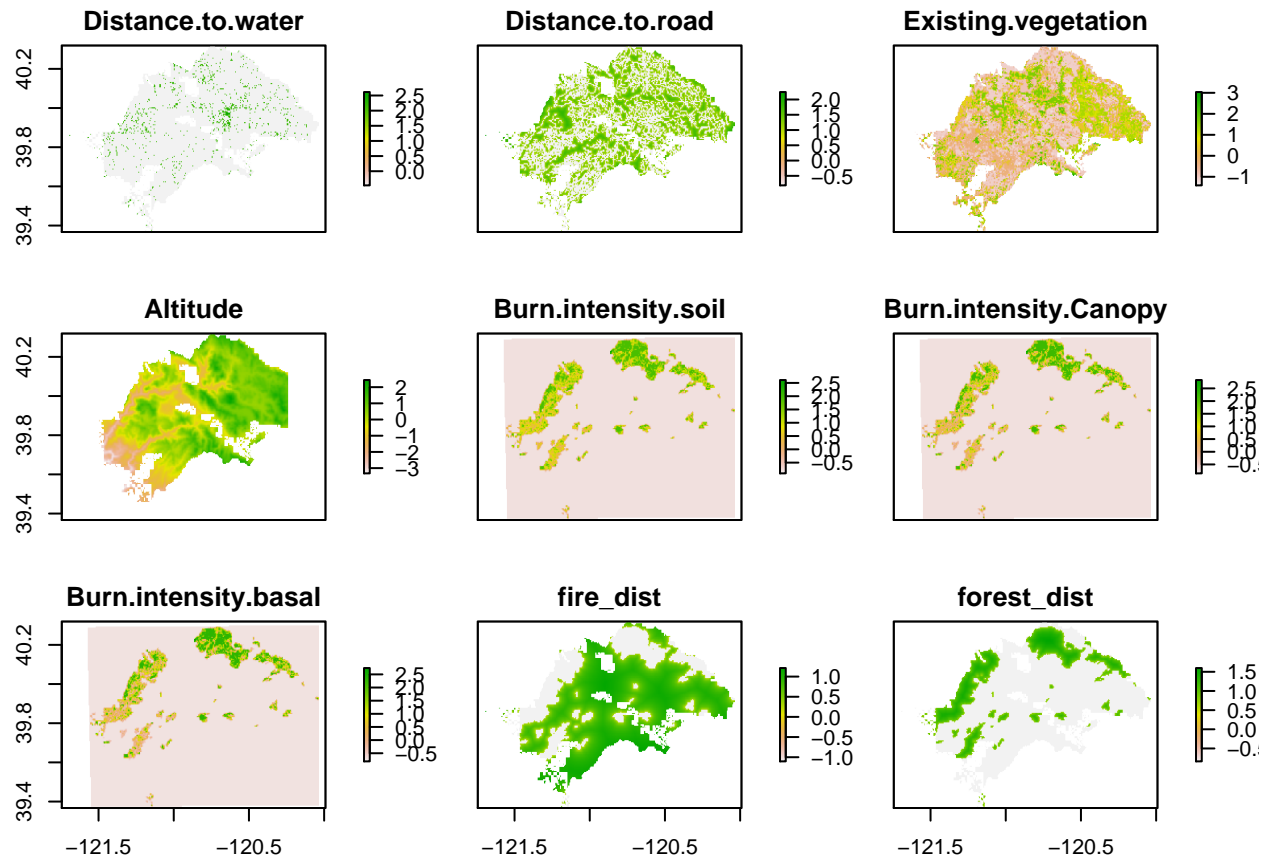
*Derek Corcoran*

*August 25, 2016*

## Abstract

This webpage will show the results of a bat survey study done in the Plumas National Forest in North California. The objective of this study is to determine the distribution of the different species of bats within the park. In order to do that we have performed occupancy models for the species present in the park. The results of this models will be shown as maps showing the probability of occurrence of bats in each point, that is, if you see a value of 1, there is a 100% chance of finding a bat in that point, if there is a value of 0 there is 0% chance of finding that specie in that point, if there is a value of 0.5 there is a 50% chance of finding that specie in that point.

Another result



## Results collected in the field

## Maps showing the sampled Points

## Results of species prescence

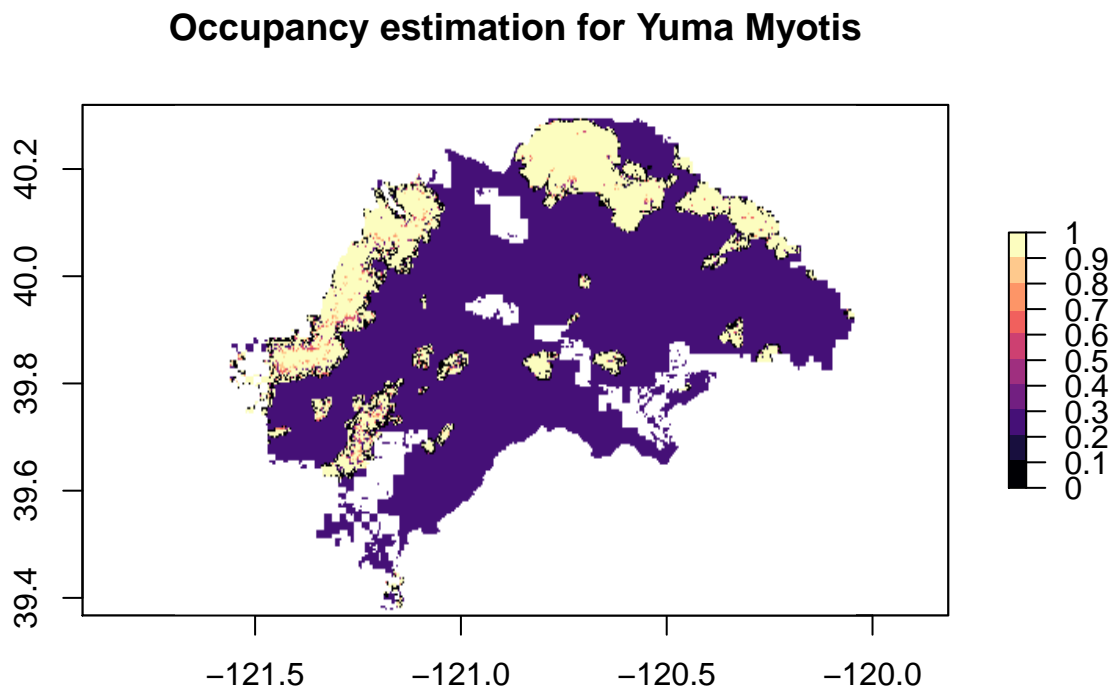
In this area 0 means absence, and 1 means prescence. This table has for each site (ID), every specie and day, so for example if Mylu1=0, that means that for *Myotis lucifugus* (common name Little Brown bat, was detected on day one for that particular site).

## Here is a key for bat species

- *Myotis yumanensis* (Myyu)
- *Myotis californicus* (Myca)
- *Myotis ciliolabrum* (Myci)
- *Myotis volans* (Myvo)
- *Myotis lucifugus* (Mylu)
- *Parastrellus hesperus* (Pahe)
- *Lasiurus blossevillii* (Labo)
- *Myotis evotis* (Myev)
- *Antrozous pallidus* (**Anpa**)
- *Eptesicus fuscus* (Epfu)
- *Lasionycteris noctivagans* (Lano)
- *Myotis thysanodes* (**Myth**)
- *Tadarida brasiliensis* (Tabr)
- *Lasiurus cinereus* (Laci)
- *Corynorhinus townsendii* (**Coto**)
- *Euderma maculatum* (Euma)
- *Eumops perotis* (Eupe)

## Maps predicting the distribution of bats

Yuma myotis (*Myotis yumanensis*)



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

psi(Int)

-25.02

-38.73

121.97

-55.81

-29.91

0.20

(22.07)

(33.95)  
 (166.37)  
 (44.89)  
 (24.24)  
 (1.05)  
 psi(Burn.intensity.basal)  
 -19.12  
 -24.25  
 (19.21)  
 (21.56)  
 psi(I(Burn.intensity.basal^2))  
 59.42  
 131.46  
 189.86  
 70.01  
 (52.91)  
 (116.41)  
 (153.64)  
 (57.36)  
 psi(forest\_\_dist)  
 20.46  
 28.75  
 39.74  
 23.71  
 1.69  
 (18.28)  
 (24.63)  
 (31.89)  
 (19.84)  
 (0.98)  
 p(Int)  
 -1.78\*\*\*  
 -1.82\*\*\*  
 -1.86\*\*\*  
 -1.80\*\*\*  
 -1.75\*\*\*

-1.82\*\*\*  
 (0.28)  
 (0.28)  
 (0.28)  
 (0.28)  
 (0.28)  
 (0.38)  
 p(Meanhum)  
 -0.27  
 -0.27  
 -0.09  
 -0.27  
 -0.28  
 -0.21  
 (0.46)  
 (0.46)  
 (0.44)  
 (0.46)  
 (0.46)  
 (0.46)  
 p(Meantemp)  
 0.92\*\*\*  
 0.91\*\*\*  
 0.84\*\*  
 0.89\*\*\*  
 0.89\*\*\*  
 0.88\*\*  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 p(Minhum)  
 0.47  
 0.54

0.32  
 0.53  
 0.47  
 0.49  
 (0.41)  
 (0.41)  
 (0.40)  
 (0.41)  
 (0.41)  
 (0.42)  
 psi(Burn.intensity.Canopy)  
 116.77  
 (156.73)  
 psi(I(Burn.intensity.Canopy^2))  
 -82.51  
 (113.78)  
 psi(fire\_dist)  
 -1.42  
 -1.16  
 (1.12)  
 (1.03)  
 Log Likelihood  
 -78.44  
 -79.75  
 -80.00  
 -78.84  
 -77.71  
 -81.56  
 AICc  
 174.29  
 174.58  
 175.08  
 175.09  
 175.21  
 175.92  
 Delta

0.00

0.28

0.79

0.80

0.92

1.63

Weight

0.23

0.20

0.16

0.16

0.15

0.10

Num. obs.

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111

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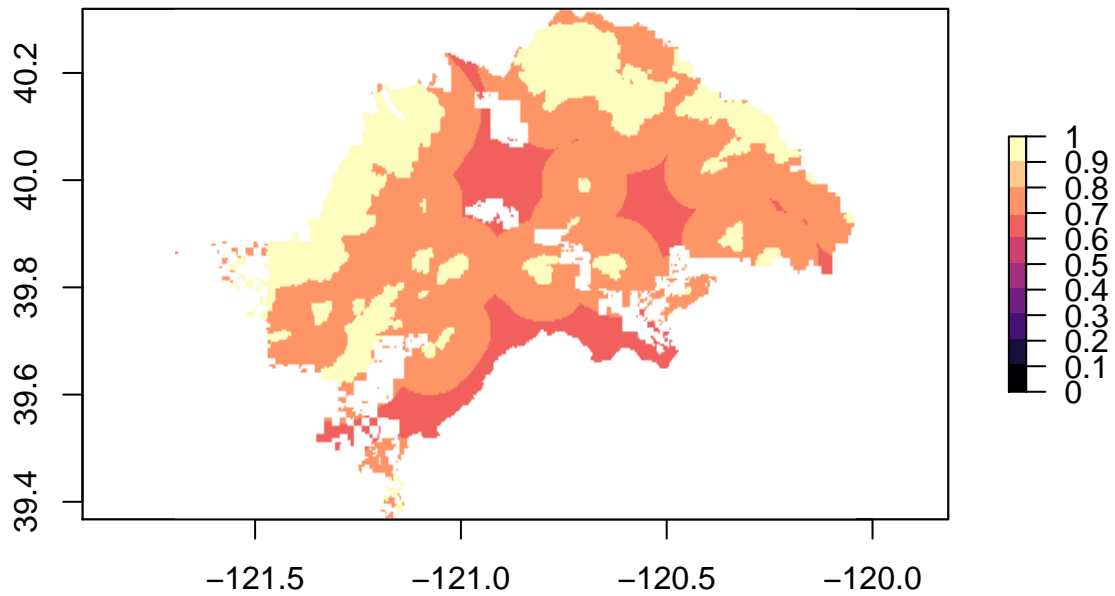
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$p < 0.001, p < 0.01, p < 0.05$

## California bat (*Myotis californicus*)

### Occupancy estimation for California Bat



#### Statistical models

Model 1

Model 2

psi(Int)

1.50\*\*\*

1.50\*\*\*

(0.30)

(0.30)

psi(fire\_dist)

-0.64\*

(0.30)

p(Int)

1.04\*\*\*

1.04\*\*\*

(0.16)

(0.16)



p(Maxhum)
-1.35*
-1.36*
(0.55)
(0.54)
p(Meanhum)
1.07*
1.08*
(0.51)
(0.51)
p(Meantemp)
2.56***
2.59***
(0.71)
(0.71)
p(Mintemp)
-2.41***
-2.43***
(0.71)
(0.71)
psi(forest_dist)
0.64*
(0.32)
Log Likelihood
-193.39
-193.59
AICc
401.86
402.27
Delta
0.00
0.41
Weight
0.55
0.45
Num. obs.

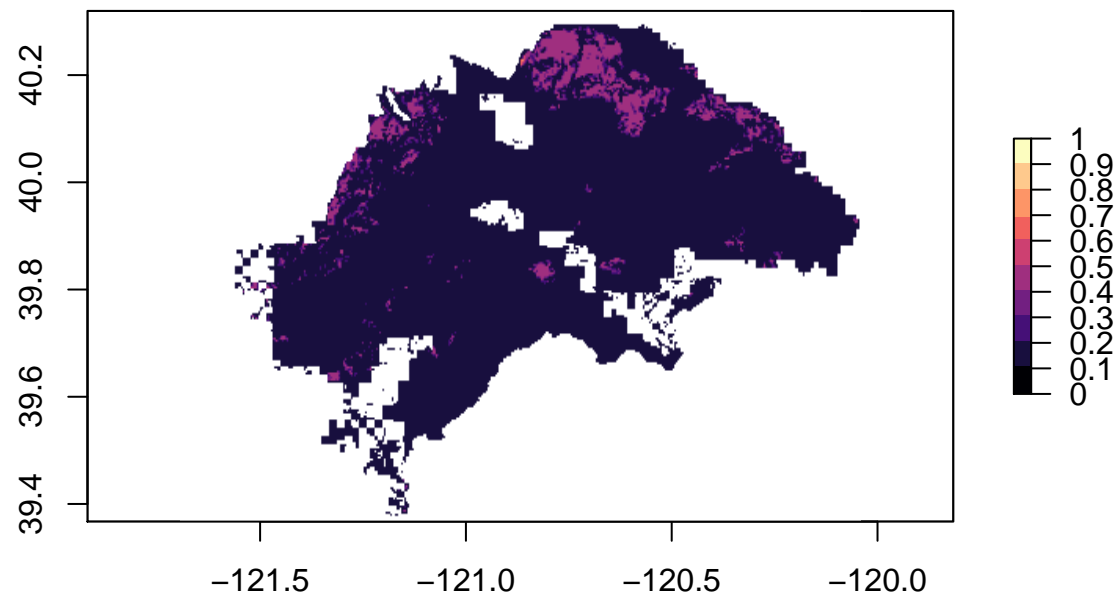
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$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$

Western Small Footed Myotis (*Myotis ciliolabrum*)

Occupancy estimation for Western Small Footed Myotis



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Model 9

Model 10

Model 11

Model 12

Model 13

Model 14

Model 15

Model 16

Model 17

Model 18

psi(Int)

-2.17\*\*\*

-1.76\*\*\*

-2.28\*\*\*

-1.79\*\*\*

-2.13\*\*\*

-1.78\*\*\*

-2.09\*\*\*

-2.23\*\*\*

-1.88\*\*\*

-2.05\*\*\*

-1.87\*\*\*

-1.77\*\*\*

-2.68\*\*\*

-1.79\*\*\*

-2.59\*\*\*

-1.79\*\*\*

-1.79\*\*\*

-2.12\*\*\*

(0.44)

(0.37)

(0.47)

(0.36)

(0.43)

(0.36)

(0.45)

(0.47)

(0.37)

(0.44)

(0.37)

(0.37)

(0.67)

(0.37)

(0.66)

(0.36)

(0.37)

(0.45)

$\text{psi}(I(\text{Burn.intensity.Canopy}^2))$

0.40\*

0.42

0.27

0.87

0.36

(0.19)

(0.23)

(0.21)

(0.54)

(0.23)

$p(\text{Int})$

-0.44

-0.50

-0.41

-0.44

-0.43

-0.44

-0.44

-0.41

-0.40

-0.43

-0.41

-0.49

-0.45

-0.46

-0.44

-0.43

-0.47

-0.44

(0.43)

(0.44)

(0.42)

(0.44)

(0.43)

(0.43)

(0.43)

(0.42)

(0.42)

(0.43)

(0.42)

(0.44)

(0.43)

(0.44)

(0.43)

(0.43)

(0.44)

(0.43)

p(Maxhum)

-5.85\*

-6.20\*\*

-6.03\*\*

-5.92\*

-5.84\*

-5.92\*

-5.92\*

-6.04\*\*

-6.03\*\*

-5.93\*

-6.06\*\*

-6.32\*\*

-6.04\*\*

-6.04\*

-6.02\*

-5.86\*

-6.06\*\*

-5.88\*

(2.33)

(2.34)

(2.31)

(2.33)

(2.33)

(2.33)

(2.34)

(2.32)

(2.32)

(2.34)

(2.32)

(2.33)

(2.34)

(2.35)

(2.34)

(2.33)

(2.35)

(2.33)

p(Meanhum)

5.71\*

6.04\*\*

5.90\*\*

5.78\*

5.71\*

5.77\*

5.76\*

5.90\*\*

5.91\*\*

5.77\*

5.92\*\*

6.17\*\*

5.87\*\*

5.88\*\*

5.85\*\*

5.73\*

5.90\*\*

5.74\*

(2.25)

(2.26)

(2.23)

(2.26)

(2.25)

(2.26)

(2.26)

(2.24)

(2.24)

(2.27)

(2.24)

(2.24)

(2.26)

(2.27)

(2.26)

(2.25)

(2.27)

(2.26)

p(sdhum)

1.77\*

1.92\*

1.81\*

1.80\*

1.77\*

1.81\*

1.80\*

1.82\*

1.81\*

1.81\*

1.83\*

1.95\*

1.85\*

1.85\*

1.85\*  
 1.77\*  
 1.86\*  
 1.78\*  
 (0.82)  
 (0.83)  
 (0.82)  
 (0.82)  
 (0.82)  
 (0.82)  
 (0.83)  
 (0.82)  
 (0.82)  
 (0.83)  
 (0.82)  
 (0.82)  
 (0.83)  
 (0.83)  
 (0.83)  
 (0.82)  
 (0.83)  
 (0.82)  
 psi(fire\_dist)  
 -0.63  
 -1.46\*  
 -0.43  
 -1.45\*  
 -1.32  
 -0.45  
 -1.35  
 -1.28  
 -1.12  
 -0.37  
 -1.03  
 -0.41  
 (0.32)



(0.73)  
 (0.36)  
 (0.73)  
 (0.72)  
 (0.36)  
 (0.72)  
 (0.70)  
 (0.65)  
 (0.49)  
 (0.60)  
 (0.47)  
 psi(forest\_\_dist)  
 -1.24  
 -1.21  
 -1.62  
 -1.52  
 -0.72  
 -0.44  
 0.11  
 (0.77)  
 (0.77)  
 (0.91)  
 (0.89)  
 (0.68)  
 (0.66)  
 (0.38)  
 psi(Burn.intensity.Canopy)  
 0.56\*  
 0.90  
 -1.30  
 0.30  
 0.89  
 (0.27)  
 (0.57)  
 (1.06)  
 (0.43)

```

(0.58)
psi(I(Burn.intensity.basal^2))
0.37*
0.37
0.24
0.79
(0.18)
(0.22)
(0.20)
(0.52)
psi(Burn.intensity.basal)
0.53*
0.79
-1.18
0.26
(0.27)
(0.53)
(1.02)
(0.40)
Log Likelihood
-61.96
-61.98
-59.73
-62.09
-62.18
-62.24
-61.11
-59.95
-60.01
-61.26
-60.21
-61.41
-60.35
-61.72
-60.58
-61.76

```

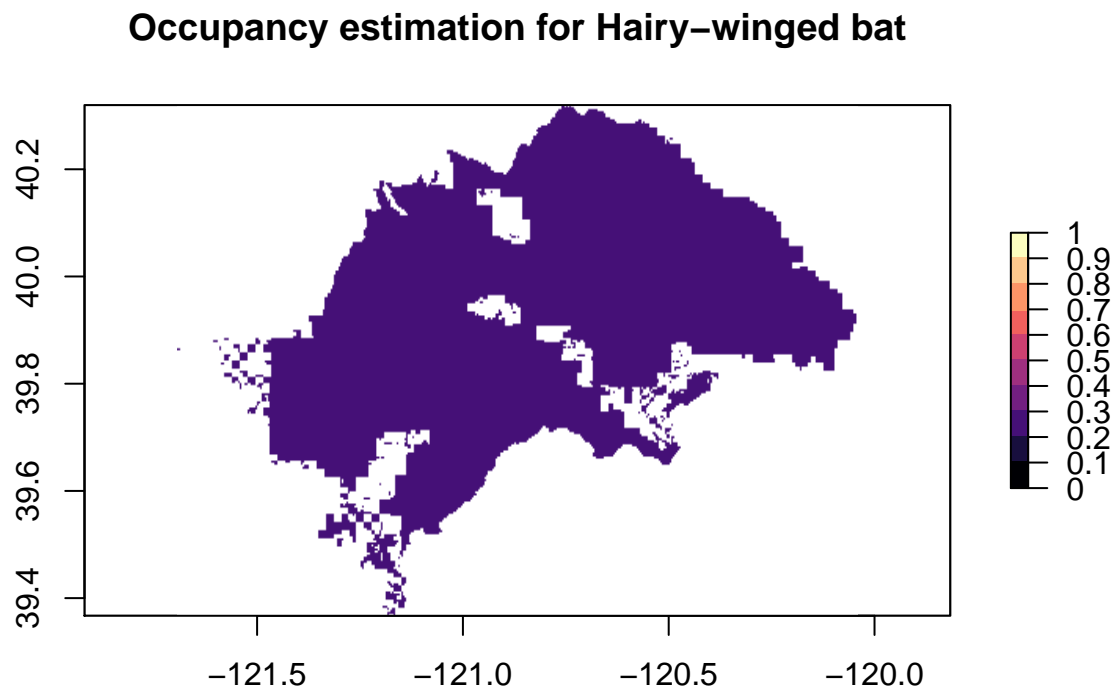
-61.77  
-61.80  
AICc  
136.72  
136.76  
136.88  
136.97  
137.16  
137.28  
137.31  
137.31  
137.43  
137.61  
137.84  
137.91  
138.10  
138.52  
138.57  
138.60  
138.63  
138.69  
Delta  
0.00  
0.04  
0.16  
0.25  
0.43  
0.56  
0.59  
0.59  
0.70  
0.89  
1.11  
1.18  
1.38  
1.80

1.84
1.87
1.91
1.96
Weight
0.08
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.04
0.03
0.03
0.03
0.03
0.03
Num. obs.
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$p < 0.001, p < 0.01, p < 0.05$

Hairy-winged bat (*Myotis volans*)



Statistical models

- Model 1
- Model 2
- Model 3
- Model 4
- Model 5
- Model 6
- Model 7
- psi(Int)

-1.36\*\*\*

-1.35\*\*\*

-1.42\*\*\*

-1.41\*\*\*

-1.34\*\*

-1.35\*\*\*

-1.27\*\*

(0.39)

(0.40)

(0.40)

(0.40)

(0.41)

(0.40)

(0.44)

p(Int)

-0.83

-0.85

-0.82

-0.82

-0.88\*

-0.83

-0.81

(0.45)

(0.46)

(0.45)

(0.45)

(0.45)

(0.45)

(0.45)

p(Maxhum)

-0.38

-0.40

-0.37

-0.38

-0.43

-0.38

-0.36  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 (0.27)  
 psi(fire\_dist)  
 -0.29  
 -0.75  
 -0.75  
 -1.46  
 (0.31)  
 (0.45)  
 (0.47)  
 (1.33)  
 psi(Burn.intensity.basal)  
 -0.69  
 (0.52)  
 psi(Burn.intensity.Canopy)  
 -0.66  
 (0.52)  
 psi(forest\_dist)  
 -1.26  
 0.12  
 (1.33)  
 (0.31)  
 psi(I(Burn.intensity.basal^2))  
 -0.12  
 (0.27)  
 Log Likelihood  
 -70.51  
 -69.93  
 -68.95  
 -69.06

-69.07

-70.31

-70.40

AICc

147.24

148.23

148.48

148.68

148.70

149.00

149.18

Delta

0.00

0.99

1.24

1.44

1.46

1.76

1.94

Weight

0.26

0.16

0.14

0.12

0.12

0.11

0.10

Num. obs.

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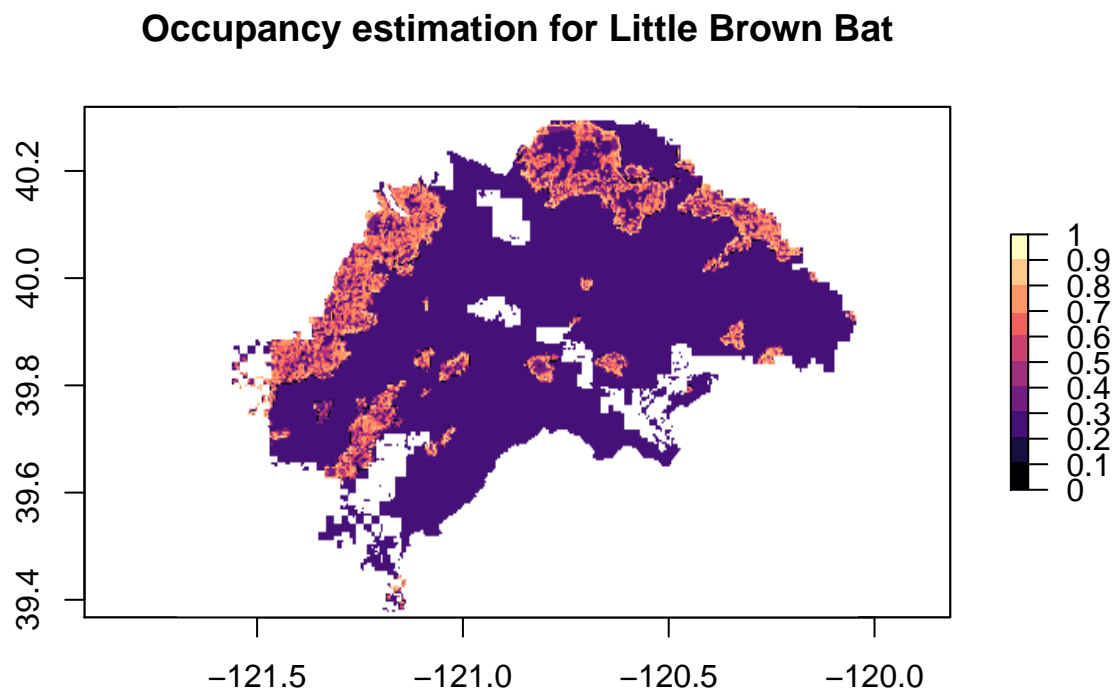
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$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$



Little Brown bat (*Myotis lucifugus*)



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

psi(Int)

0.99

0.84

0.28

-0.49\*

0.32

0.82

0.70

(0.60)  
 (0.61)  
 (0.37)  
 (0.22)  
 (0.38)  
 (0.59)  
 (0.59)  
 psi(Burn.intensity.Canopy)  
 3.30\*  
 2.98\*  
 1.39\*\*\*  
 (1.34)  
 (1.31)  
 (0.40)  
 psi(I(Burn.intensity.Canopy^2))  
 -1.52\*\*  
 -1.37\*  
 -0.80\*\*  
 (0.57)  
 (0.57)  
 (0.29)  
 psi(forest\_\_dist)  
 -1.30  
 -1.78  
 -0.83  
 -1.46  
 (0.84)  
 (0.92)  
 (0.72)  
 (0.85)  
 p(Int)  
 1.01\*\*\*  
 1.01\*\*\*  
 1.00\*\*\*  
 1.00\*\*\*  
 1.00\*\*\*

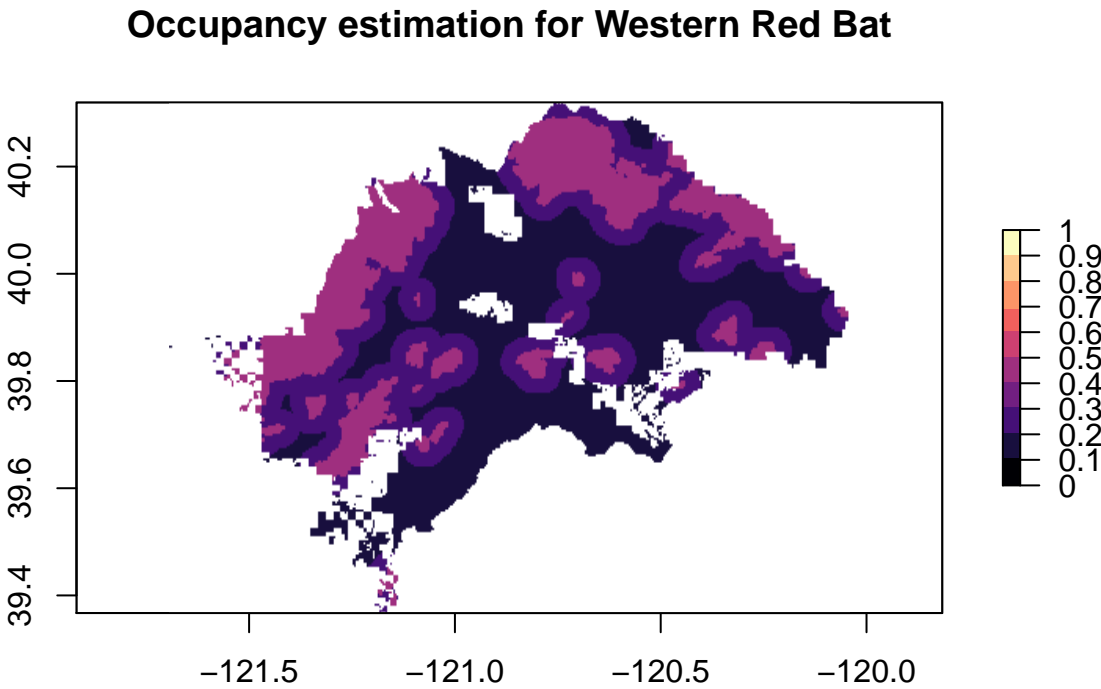
1.00\*\*\*  
 1.01\*\*\*  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 p(sdtemp)  
 1.03\*\*  
 1.04\*\*  
 1.05\*\*  
 1.05\*\*  
 1.05\*\*  
 1.05\*\*  
 1.05\*\*  
 (0.36)  
 (0.36)  
 (0.36)  
 (0.36)  
 (0.36)  
 (0.36)  
 (0.36)  
 (0.36)  
 psi(fire\_dist)  
 -0.73  
 -0.68\*\*  
 -0.81  
 (0.59)  
 (0.21)  
 (0.58)  
 psi(Burn.intensity.basal)  
 1.47\*\*\*  
 2.74\*  
 2.52\*  
 (0.42)

(1.22)  
 (1.20)  
 psi(I(Burn.intensity.basal^2))  
 -0.84\*\*  
 -1.34\*  
 -1.22\*  
 (0.30)  
 (0.55)  
 (0.55)  
 Log Likelihood  
 -130.16  
 -129.34  
 -131.80  
 -132.99  
 -131.90  
 -130.89  
 -129.84  
 AICc  
 273.14  
 273.77  
 274.17  
 274.35  
 274.37  
 274.59  
 274.77  
 Delta  
 0.00  
 0.64  
 1.03  
 1.22  
 1.23  
 1.46  
 1.64  
 Weight  
 0.23  
 0.17

0.14  
0.13  
0.12  
0.11  
0.10  
Num. obs.  
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111

$p < 0.001, p < 0.01, p < 0.05$

Western Red Bat (*Lasiurus blossevillei*)



Statistical models  
Model 1

Model 2  
 Model 3  
 Model 4  
 Model 5  
 Model 6  
 Model 7  
 psi(Int)  
 -0.94  
 -0.92  
 -1.05\*  
 -2.69\*  
 -0.92  
 -0.97  
 -0.97  
 (0.55)  
 (0.53)  
 (0.49)  
 (1.22)  
 (0.54)  
 (0.54)  
 (0.54)  
 psi(fire\_\_dist)  
 -0.54  
 -1.27  
 -2.03  
 -0.74  
 -0.73  
 (0.34)  
 (0.78)  
 (1.09)  
 (0.49)  
 (0.50)  
 p(Int)  
 -1.38\*\*  
 -1.36\*\*  
 -1.28\*\*

-1.61\*\*\*  
 -1.37\*\*  
 -1.36\*\*  
 -1.35\*\*  
 (0.50)  
 (0.51)  
 (0.47)  
 (0.39)  
 (0.51)  
 (0.50)  
 (0.50)  
 p(sdtemp)  
 -0.48  
 -0.43  
 -0.52  
 -0.53  
 -0.45  
 -0.45  
 -0.46  
 (0.42)  
 (0.42)  
 (0.43)  
 (0.36)  
 (0.42)  
 (0.42)  
 (0.42)  
 psi(forest\_dist)  
 -0.83  
 0.30  
 (0.77)  
 (0.33)  
 psi(Burn.intensity.Canopy)  
 -3.05  
 -0.27  
 (1.89)  
 (0.50)

psi(I(Burn.intensity.Canopy^2))

2.25

(1.56)

psi(Burn.intensity.basal)

-0.29

(0.49)

Log Likelihood

-70.68

-72.18

-70.02

-69.16

-71.60

-70.51

-70.54

AICc

149.74

150.59

150.62

151.13

151.58

151.59

151.65

Delta

0.00

0.85

0.88

1.39

1.85

1.86

1.91

Weight

0.25

0.16

0.16

0.13

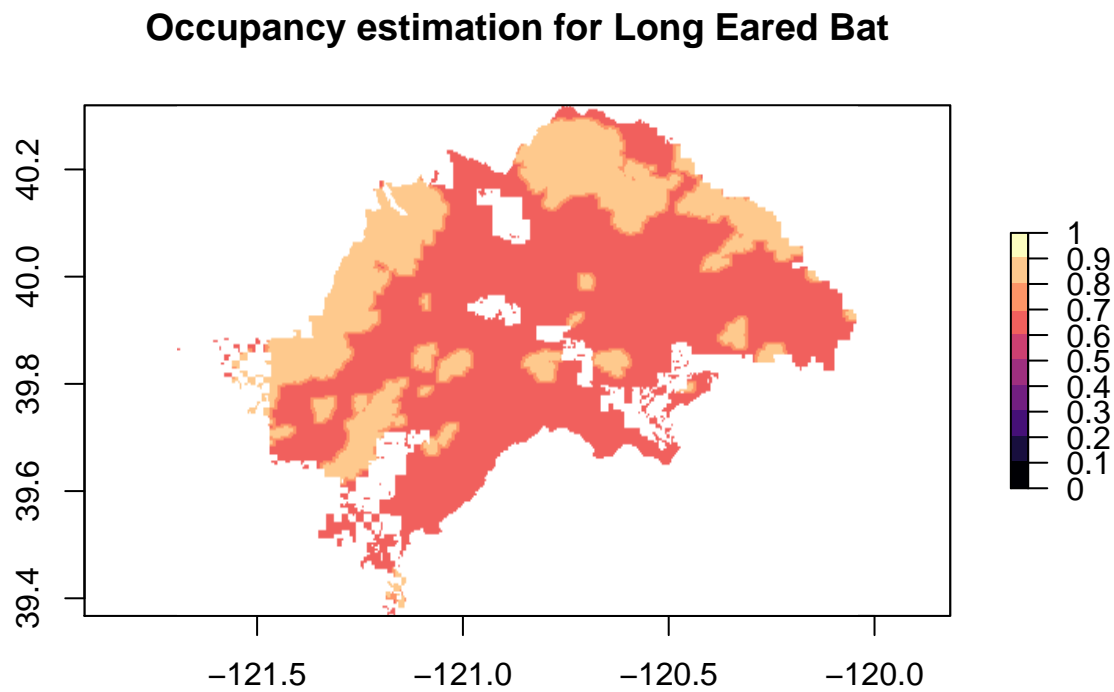
0.10



0.10  
0.10  
Num. obs.  
111  
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111

$p < 0.001, p < 0.01, p < 0.05$

Long-eared Bat (*Myotis evotis*)



Statistical models  
Model 1  
Model 2  
Model 3  
Model 4

Model 5  
 Model 6  
 Model 7  
 Model 8  
 psi(Int)  
 1.15\*\*\*  
 0.83  
 0.83  
 1.15\*\*\*  
 1.11\*\*\*  
 1.20\*\*\*  
 0.99\*  
 1.21\*\*  
 (0.31)  
 (0.61)  
 (0.56)  
 (0.33)  
 (0.29)  
 (0.36)  
 (0.50)  
 (0.39)  
 psi(fire\_\_dist)  
 -0.61\*  
 -0.56  
 -0.52  
 -1.09  
 -0.36  
 -0.56  
 (0.31)  
 (0.33)  
 (0.32)  
 (0.90)  
 (0.51)  
 (0.32)  
 p(Int)  
 0.59\*\*\*

0.57\*\*\*  
 0.58\*\*\*  
 0.59\*\*\*  
 0.61\*\*\*  
 0.58\*\*\*  
 0.58\*\*\*  
 0.57\*\*\*  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.17)  
 (0.16)  
 (0.16)  
 (0.17)  
 (0.17)  
 p(Maxhum)  
 -0.43\*\*  
 -0.47\*\*  
 -0.46\*\*  
 -0.44\*\*  
 -0.41\*  
 -0.45\*\*  
 -0.46\*\*  
 -0.46\*\*  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.16)  
 (0.18)  
 (0.16)  
 psi(I(Burn.intensity.Canopy^2))  
 0.56  
 (1.18)  
 psi(I(Burn.intensity.soil^2))

0.42
(0.74)
psi(forest_dist)
0.55
-0.58
(0.36)
(0.97)
psi(Burn.intensity.soil)
0.37
0.77
(0.66)
(0.47)
psi(I(Burn.intensity.basal^2))
0.26
(0.81)
Log Likelihood
-201.63
-201.35
-201.37
-202.48
-201.43
-201.46
-201.50
-202.61
AICc
411.63
413.27
413.31
413.34
413.43
413.49
413.58
413.60
Delta
0.00
1.64

1.68

1.71

1.80

1.86

1.95

1.97

Weight

0.26

0.11

0.11

0.11

0.11

0.10

0.10

0.10

Num. obs.

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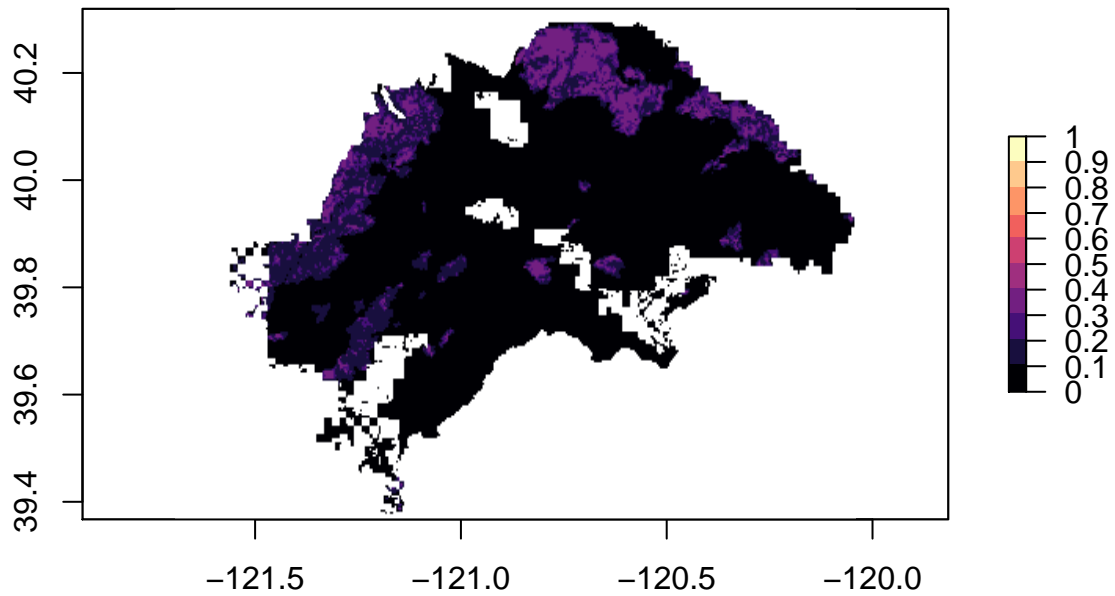
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$p < 0.001, p < 0.01, p < 0.05$

## Pallid Bat (*Antrozous pallidus*)

### Occupancy estimation for Pallid Bat



#### Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Model 9

Model 10

Model 11

Model 12

psi(Int)

-2.11\*\*\*

-2.51\*\*\*

-2.11\*\*\*

-2.09\*\*\*

-2.44\*\*\*

-2.40\*\*\*

-2.00\*\*\*

-2.07\*\*\*

-2.33\*\*\*

-2.17\*\*\*

-2.43\*\*\*

-2.12\*\*\*

(0.49)

(0.56)

(0.50)

(0.49)

(0.55)

(0.57)

(0.45)

(0.48)

(0.56)

(0.52)

(0.56)

(0.50)

psi(Burn.intensity.Canopy)

0.64

0.45

(0.34)

(0.64)

p(Int)

-0.80

-0.81

-0.79

-0.80

-0.80

-0.81

-0.75

-0.77

-0.81  
-0.79  
-0.82  
-0.80  
(0.57)  
(0.58)  
(0.57)  
(0.57)  
(0.58)  
(0.58)  
(0.56)  
(0.57)  
(0.57)  
(0.57)  
(0.58)  
(0.57)  
p(Julian)  
-0.51  
-0.51  
-0.51  
-0.52  
-0.51  
-0.52  
-0.47  
-0.49  
-0.52  
-0.51  
-0.52  
-0.52  
(0.38)  
(0.39)  
(0.38)  
(0.38)  
(0.38)  
(0.39)  
(0.38)



(0.38)  
 (0.39)  
 (0.39)  
 (0.39)  
 (0.38)  
 psi(I(Burn.intensity.Canopy^2))  
 0.44  
 0.29  
 0.36  
 (0.25)  
 (0.28)  
 (0.27)  
 psi(forest\_dist)  
 0.64  
 0.42  
 0.46  
 1.88  
 0.23  
 (0.38)  
 (0.45)  
 (0.44)  
 (1.71)  
 (0.71)  
 psi(Burn.intensity.basal)  
 0.60  
 (0.34)  
 psi(I(Burn.intensity.basal^2))  
 0.39  
 0.23  
 (0.24)  
 (0.27)  
 psi(fire\_dist)  
 -0.51  
 1.30  
 -0.27  
 (0.38)

(1.73)

(0.44)

Log Likelihood

-45.48

-45.57

-45.62

-45.69

-45.87

-45.06

-47.26

-46.21

-45.25

-45.26

-45.29

-45.36

AICc

99.33

99.51

99.62

99.76

100.12

100.69

100.75

100.79

101.07

101.09

101.15

101.30

Delta

0.00

0.17

0.29

0.42

0.79

1.35

1.42

1.46

1.73

1.76

1.82

1.97

Weight

0.14

0.12

0.12

0.11

0.09

0.07

0.07

0.07

0.06

0.06

0.05

0.05

Num. obs.

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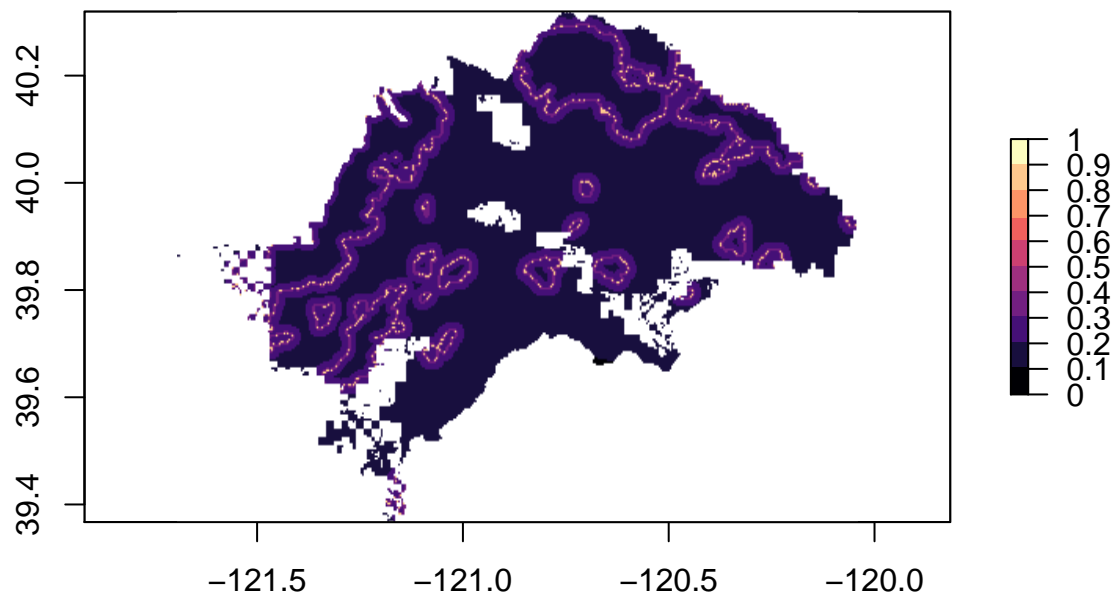
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$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$

Fringed Bat (*Myotis thysanoides*)

Occupancy estimation for Fringed Bat



Statistical models

Model 1

Model 2

Model 3

psi(Int)

-1.51\*\*\*

-1.40\*\*\*

-1.40\*\*

(0.42)

(0.42)

(0.43)

psi(fire\_dist)

-1.56

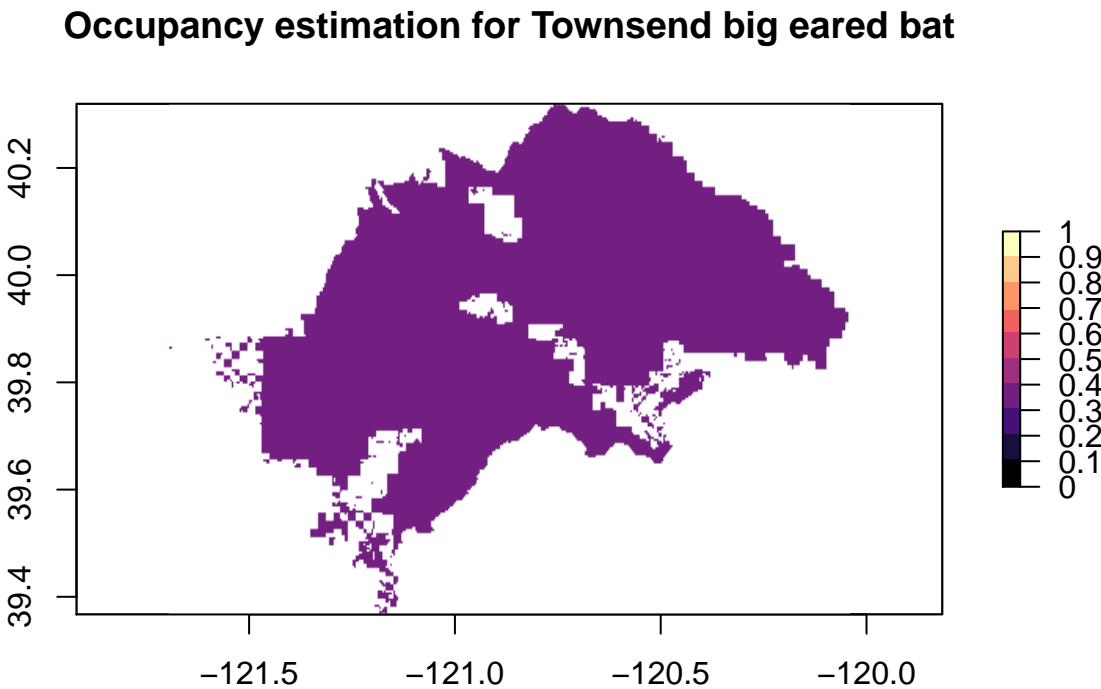
-0.33

(0.93)

(0.32)

psi(forest_dist)
-1.42
(0.94)
p(Int)
-0.85
-0.92
-0.93
(0.46)
(0.48)
(0.48)
p(Meanhum)
-0.20
-0.25
-0.28
(0.30)
(0.29)
(0.29)
Log Likelihood
-64.42
-66.92
-66.24
AICc
139.41
140.06
140.86
Delta
0.00
0.65
1.45
Weight
0.45
0.33
0.22
Num. obs.
111
111
111
<i>p</i> < 0.001, <i>p</i> < 0.01, <i>p</i> < 0.05

Townsend’s Long-eared Bat (*Corynorhinus townsendii*)



Statistical models

- Model 1
- Model 2
- Model 3
- Model 4
- Model 5
- Model 6
- psi(Int)
- 0.63
- 0.80
- 0.70
- 0.66
- 0.66
- 0.77
- (0.75)
- (0.76)

(0.75)

(0.76)

(0.76)

(0.78)

p(Int)

-2.44\*\*\*

-2.33\*\*\*

-2.38\*\*\*

-2.41\*\*\*

-2.41\*\*\*

-2.44\*\*\*

(0.68)

(0.69)

(0.69)

(0.69)

(0.69)

(0.70)

p(Meanhum)

1.37\*\*

1.28\*\*

1.32\*\*

1.34\*\*

1.34\*\*

1.36\*\*

(0.46)

(0.46)

(0.46)

(0.46)

(0.46)

(0.46)

p(Mintemp)

0.76\*

0.72

0.74\*

0.79\*

0.79\*

0.80\*  
 (0.38)  
 (0.37)  
 (0.38)  
 (0.38)  
 (0.38)  
 (0.38)  
 p(sdhum)  
 0.81\*  
 0.76  
 0.78  
 0.76  
 0.77  
 0.77  
 (0.40)  
 (0.41)  
 (0.41)  
 (0.41)  
 (0.41)  
 (0.40)  
 psi(fire\_dist)  
 -0.46  
 (0.44)  
 psi(forest\_dist)  
 0.25  
 (0.40)  
 psi(Burn.intensity.Canopy)  
 0.26  
 (0.45)  
 psi(Burn.intensity.basal)  
 0.23  
 (0.43)  
 psi(I(Burn.intensity.basal^2))  
 0.16  
 (0.33)  
 Log Likelihood



-52.02

-51.28

-51.67

-51.83

-51.87

-51.88

AICc

114.61

115.36

116.14

116.46

116.55

116.57

Delta

0.00

0.75

1.53

1.85

1.93

1.96

Weight

0.30

0.21

0.14

0.12

0.12

0.11

Num. obs.

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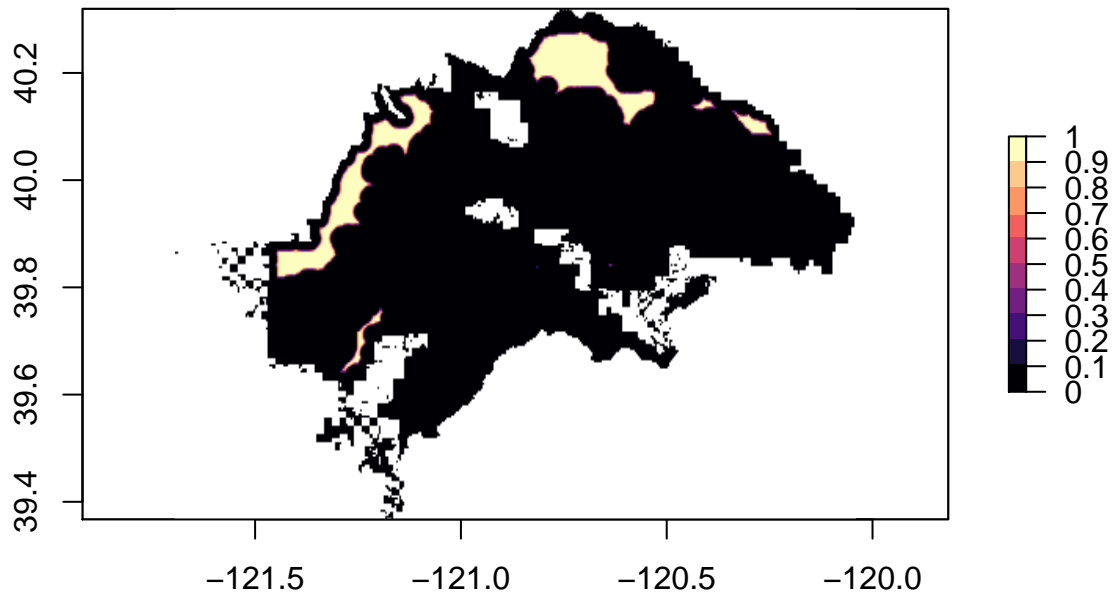
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$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$

## The western pipistrelle (*Parastrellus hesperus*)

### Occupancy estimation for Pipistrel



#### Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

psi(Int)

-93.62

-3.09\*\*\*

-28.58

-42.89

-189.26

-250.89

(136.68)

(0.70)

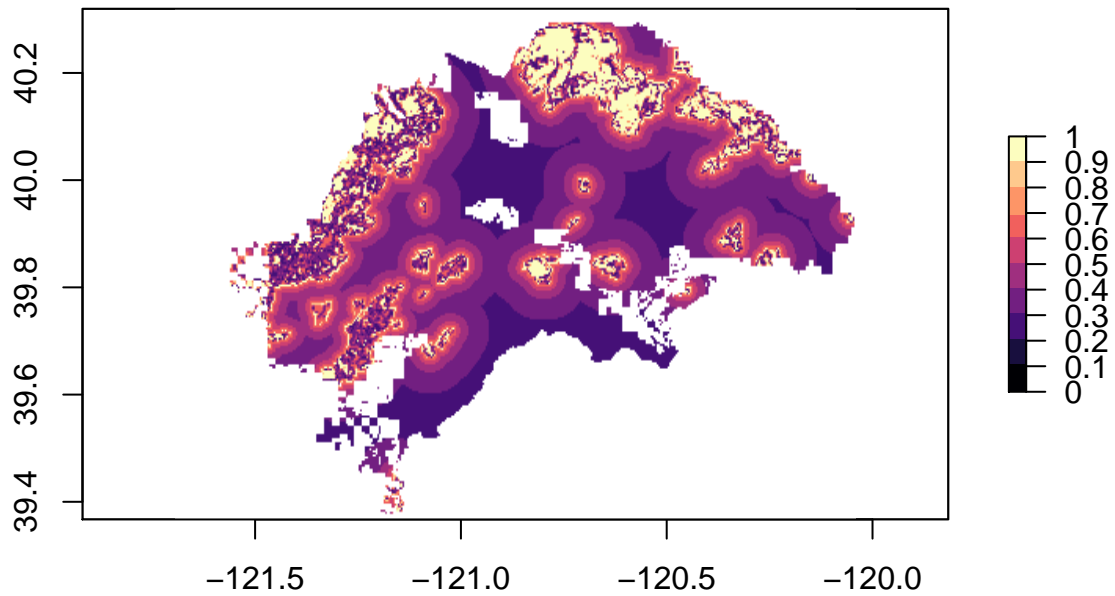
(74.25)  
 (355.75)  
 (422.99)  
 psi(forest\_dist)  
 74.45  
 80.48  
 (107.08)  
 (206.51)  
 p(Int)  
 -3.54\*\*  
 -33.28  
 -4.43\*\*\*  
 -4.26\*\*\*  
 -1.30  
 -3.57\*\*  
 (1.32)  
 (321.59)  
 (1.11)  
 (0.99)  
 (0.66)  
 (1.14)  
 p(Julian)  
 -1.03  
 -275.99  
 -0.98  
 -0.72  
 0.26  
 -0.66  
 (0.99)  
 (632.21)  
 (1.11)  
 (0.84)  
 (0.65)  
 (1.03)  
 p(Maxhum)  
 -0.09

-67.51  
 0.50  
 0.55  
 -0.94  
 0.48  
 (1.31)  
 (123.49)  
 (0.83)  
 (0.83)  
 (1.33)  
 (1.06)  
 p(Mintemp)  
 1.01  
 -38.16  
 1.28  
 1.21  
 0.36  
 1.04  
 (0.75)  
 (89.49)  
 (0.70)  
 (0.68)  
 (0.69)  
 (0.72)  
 psi(Burn.intensity.basal)  
 77.87  
 (194.72)  
 psi(Burn.intensity.Canopy)  
 68.68  
 190.92  
 546.62  
 (157.08)  
 (866.61)  
 psi(I(Burn.intensity.Canopy^2))  
 -91.04  
 -244.01

(64.46)
(267.06)
Log Likelihood
-6.86
-8.53
-7.63
-7.66
-5.39
-6.66
AICc
26.52
27.62
28.06
28.13
28.20
28.40
Delta
0.00
1.10
1.54
1.61
1.68
1.88
Weight
0.30
0.17
0.14
0.14
0.13
0.12
Num. obs.
111
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111
$p < 0.001, p < 0.01, p < 0.05$

big brown bat (*Eptesicus fuscus*)

### Occupancy estimation for Big Brown Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

psi(Int)

-2.27

-0.74

-2.06\*

-0.70

-1.57

-1.41

(1.21)

(0.40)

(0.85)  
 (0.39)  
 (1.07)  
 (0.97)  
 psi(Burn.intensity.Canopy)  
 -3.12  
 -1.56  
 (1.87)  
 (1.83)  
 psi(I(Burn.intensity.Canopy^2))  
 2.66  
 0.60  
 1.40  
 (1.94)  
 (0.32)  
 (1.23)  
 psi(fire\_dist)  
 -2.08  
 -2.04  
 -1.69\*  
 -2.03  
 -2.21  
 -2.12\*  
 (1.15)  
 (1.05)  
 (0.79)  
 (1.04)  
 (1.16)  
 (1.06)  
 p(Int)  
 -0.37  
 -0.26  
 -0.34  
 -0.28  
 -0.31  
 -0.29

(0.28)  
 (0.28)  
 (0.27)  
 (0.28)  
 (0.29)  
 (0.29)  
 p(Julian)  
 0.41  
 0.37  
 0.40  
 0.38  
 0.40  
 0.39  
 (0.23)  
 (0.25)  
 (0.23)  
 (0.25)  
 (0.24)  
 (0.25)  
 p(Meanhum)  
 -0.64\*\*  
 -0.66\*\*  
 -0.65\*\*  
 -0.67\*\*  
 -0.64\*\*  
 -0.66\*\*  
 (0.22)  
 (0.23)  
 (0.22)  
 (0.23)  
 (0.23)  
 (0.23)  
 p(Meantemp)  
 -0.61\*  
 -0.65\*  
 -0.59\*



```

-0.69*
-0.58*
-0.64*
(0.28)
(0.31)
(0.28)
(0.31)
(0.29)
(0.31)
psi(I(Burn.intensity.basal^2))
0.63
2.35
1.71
(0.37)
(1.24)
(1.52)
psi(forest_dist)
-1.92
-1.88
-1.21
-1.03
(1.10)
(1.09)
(1.34)
(1.39)
psi(Burn.intensity.basal)
-2.68
-1.59
(1.37)
(1.82)
Log Likelihood
-134.07
-134.19
-134.22
-134.32
-133.78

```

-133.83

AICc

285.54

285.80

285.86

286.06

287.33

287.44

Delta

0.00

0.25

0.32

0.51

1.79

1.89

Weight

0.23

0.20

0.20

0.18

0.09

0.09

Num. obs.

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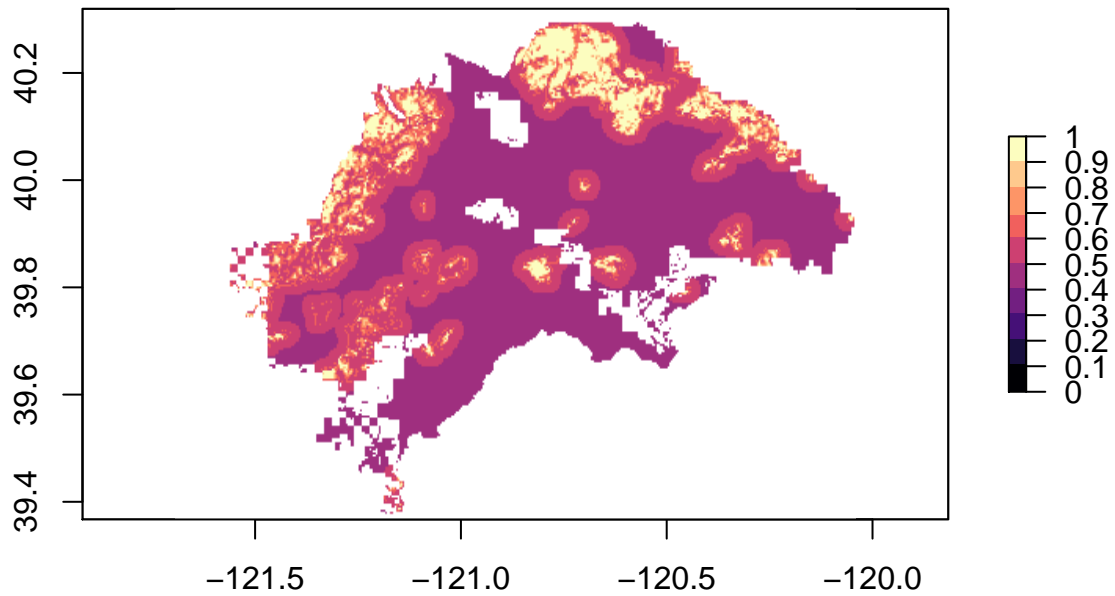
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$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$

silver-haired bat (*Lasionycteris noctivagans*)

### Occupancy estimation for Silver Haired Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Model 9

Model 10

Model 11

Model 12

Model 13

Model 14

Model 15

Model 16

Model 17

Model 18

psi(Int)

-0.05

0.39

0.43

0.01

0.38

0.40

0.44

-0.07

-0.20

0.42

0.41

-0.02

-0.15

0.42

-0.12

0.41

-0.06

0.14

(0.36)

(0.26)

(0.27)

(0.32)

(0.25)

(0.26)

(0.27)

(0.35)

(0.33)

(0.26)

(0.25)

(0.32)

(0.29)

(0.26)

(0.38)  
 (0.26)  
 (0.33)  
 (0.43)  
 psi(I(Burn.intensity.Canopy^2))  
 0.55  
 0.56  
 0.65  
 0.64  
 0.30  
 (0.47)  
 (0.44)  
 (0.42)  
 (0.53)  
 (0.46)  
 psi(fire\_dist)  
 -0.32  
 -0.32  
 -0.69  
 -0.04  
 -0.08  
 -0.51\*  
 -0.79  
 -0.71  
 -0.77  
 (0.24)  
 (0.24)  
 (0.62)  
 (0.36)  
 (0.34)  
 (0.23)  
 (0.63)  
 (0.62)  
 (0.62)  
 p(Int)  
 0.63\*\*

0.65\*\*  
0.65\*\*  
0.66\*\*  
0.66\*\*  
0.67\*\*  
0.65\*\*  
0.64\*\*  
0.65\*\*  
0.64\*\*  
0.65\*\*  
0.66\*\*  
0.68\*\*  
0.62\*\*  
0.64\*\*  
0.67\*\*  
0.66\*\*  
0.65\*\*  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
(0.22)  
p(Maxhum)

-0.41

-0.40

-0.40

-0.40

-0.40

-0.39

-0.39

-0.41

-0.39

-0.41

-0.40

-0.39

-0.37

-0.41

-0.41

-0.39

-0.39

-0.40

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.23)

(0.24)

(0.23)

(0.23)

(0.23)

(0.24)

(0.23)

p(Meantemp)

-0.75\*\*

-0.75\*\*

-0.74\*

-0.72\*

-0.72\*

-0.71\*

-0.73\*

-0.74\*\*

-0.71\*

-0.76\*\*

-0.74\*

-0.72\*

-0.68\*

-0.79\*\*

-0.74\*\*

-0.70\*

-0.71\*

-0.74\*

(0.28)

(0.29)

(0.29)

(0.29)

(0.29)

(0.30)

(0.29)

(0.29)

(0.29)

(0.29)

(0.29)

(0.30)

(0.30)

(0.29)

(0.28)

(0.30)

(0.30)



(0.29)  
 psi(Burn.intensity.Canopy)  
 0.69\*  
 1.14  
 1.17  
 0.64  
 0.47  
 (0.28)  
 (0.61)  
 (0.60)  
 (0.42)  
 (0.41)  
 psi(forest\_dist)  
 -0.45  
 -0.31  
 -1.14  
 0.22  
 0.22  
 -0.55  
 -1.02  
 -0.53  
 (0.48)  
 (0.43)  
 (0.79)  
 (0.25)  
 (0.25)  
 (0.66)  
 (0.76)  
 (0.66)  
 psi(I(Burn.intensity.basal^2))  
 0.45  
 0.46  
 0.55  
 0.51  
 (0.32)  
 (0.32)

(0.30)  
 (0.34)  
 psi(Burn.intensity.basal)  
 0.68\*  
 0.97  
 0.59  
 1.00  
 (0.27)  
 (0.53)  
 (0.40)  
 (0.52)  
 Log Likelihood  
 -170.67  
 -171.91  
 -170.80  
 -170.84  
 -172.02  
 -171.10  
 -170.08  
 -171.22  
 -172.36  
 -171.25  
 -171.34  
 -171.38  
 -172.51  
 -172.53  
 -170.28  
 -170.33  
 -170.48  
 -171.65  
 AICc  
 354.14  
 354.38  
 354.42  
 354.49  
 354.60

355.01

355.24

355.25

355.29

355.31

355.48

355.58

355.59

355.63

355.66

355.75

356.04

356.10

Delta

0.00

0.24

0.28

0.35

0.47

0.88

1.10

1.11

1.15

1.17

1.34

1.44

1.46

1.49

1.52

1.61

1.91

1.97

Weight

0.09

0.08

0.08

0.08

0.07

0.06

0.05

0.05

0.05

0.05

0.05

0.04

0.04

0.04

0.04

0.04

0.04

0.03

Num. obs.

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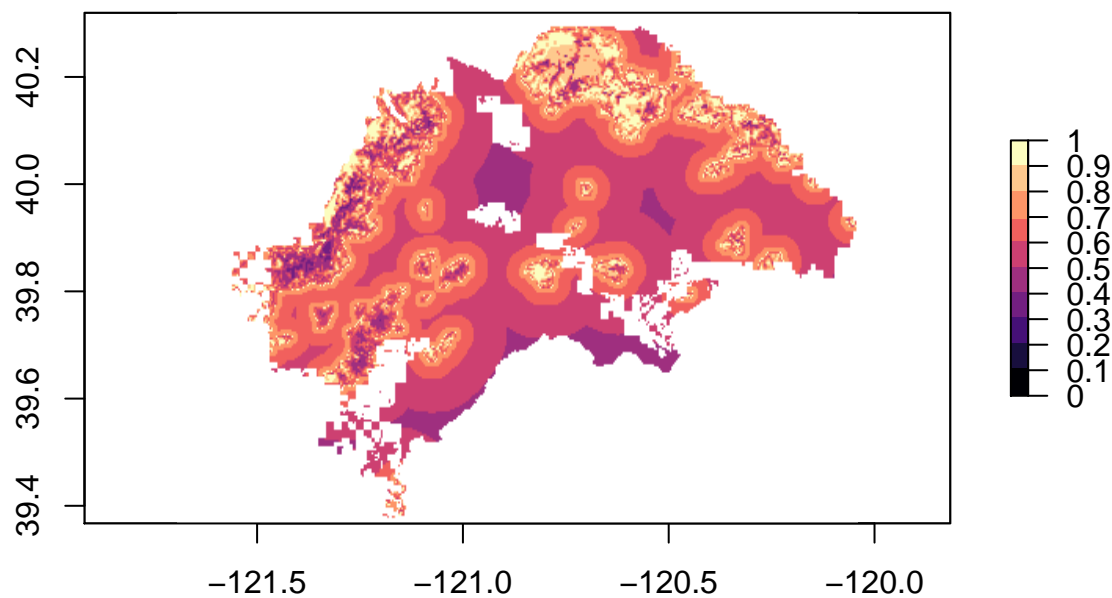
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$p < 0.001, p < 0.01, p < 0.05$

Brazilian free-tailed bat (*Tadarida brasiliensis*)

Occupancy estimation for Brazilian free-tailed bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

psi(Int)

-0.05

-0.78

0.68\*\*

0.68\*\*

0.25

0.24

-0.40

(0.37)  
 (0.63)  
 (0.24)  
 (0.24)  
 (0.29)  
 (0.30)  
 (0.68)  
 psi(I(Burn.intensity.soil^2))  
 0.74\*  
 1.50\*  
 1.12  
 (0.35)  
 (0.69)  
 (0.72)  
 psi(fire\_\_dist)  
 -1.64  
 -1.26  
 -1.51  
 -1.47  
 -1.52  
 -1.50  
 -1.72  
 (0.94)  
 (0.75)  
 (0.93)  
 (0.92)  
 (0.92)  
 (0.91)  
 (0.94)  
 psi(forest\_\_dist)  
 -1.68  
 -1.99  
 -1.99  
 -1.47  
 -1.44  
 -1.22

(0.99)  
 (1.05)  
 (1.05)  
 (0.96)  
 (0.94)  
 (1.21)  
 p(Int)  
 0.64\*\*\*  
 0.63\*\*\*  
 0.64\*\*\*  
 0.64\*\*\*  
 0.64\*\*\*  
 0.64\*\*\*  
 0.64\*\*\*  
 (0.17)  
 (0.17)  
 (0.17)  
 (0.17)  
 (0.17)  
 (0.17)  
 (0.17)  
 p(Meanhum)  
 1.59\*  
 1.57\*  
 1.59\*  
 1.60\*  
 1.58\*  
 1.59\*  
 1.58\*  
 (0.64)  
 (0.64)  
 (0.64)  
 (0.64)  
 (0.64)  
 (0.64)  
 (0.64)

p(Minhum)

-1.74\*

-1.72\*

-1.74\*

-1.74\*

-1.73\*

-1.73\*

-1.73\*

(0.70)

(0.70)

(0.71)

(0.71)

(0.71)

(0.71)

(0.70)

p(sdhum)

-0.78\*

-0.78\*

-0.78\*

-0.78\*

-0.78\*

-0.78\*

-0.78\*

(0.38)

(0.38)

(0.39)

(0.39)

(0.38)

(0.38)

(0.38)

psi(Burn.intensity.soil)

-1.77

-0.79

(1.07)

(1.30)

psi(Burn.intensity.basal)

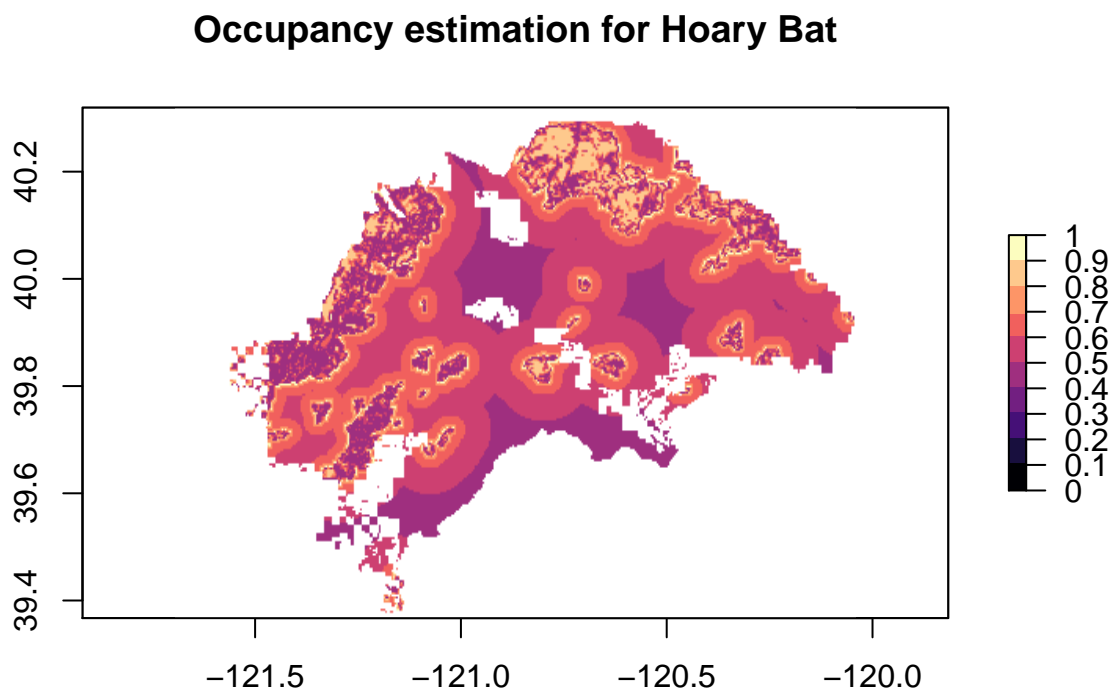


0.98*
(0.47)
psi(Burn.intensity.Canopy)
1.00*
(0.50)
psi(I(Burn.intensity.basal^2))
0.45
(0.25)
psi(I(Burn.intensity.Canopy^2))
0.46
(0.25)
Log Likelihood
-188.97
-189.34
-189.34
-189.51
-189.64
-189.67
-188.77
AICc
395.35
396.09
396.10
396.43
396.69
396.74
397.31
Delta
0.00
0.75
0.75
1.09
1.35
1.40
1.97
Weight

0.23  
 0.16  
 0.16  
 0.13  
 0.12  
 0.11  
 0.09  
 Num. obs.  
 111  
 111  
 111  
 111  
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 111

$p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$

hoary bat (*Lasiurus cinereus*)



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Model 9

psi(Int)

-1.02

-1.14

0.40

-0.64

0.38

-1.11

0.40

0.03

-1.24

(0.65)

(0.77)

(0.29)

(0.55)

(0.28)

(0.82)

(0.29)

(0.37)

(0.77)

psi(Burn.intensity.soil)

-2.17

-2.33

(1.17)

(1.22)

psi(I(Burn.intensity.soil<sup>2</sup>))

1.41\*

1.57\*  
 1.52  
 0.34  
 2.16  
 (0.65)  
 (0.80)  
 (0.84)  
 (0.27)  
 (1.52)  
 psi(fire\_dist)  
 -1.42  
 -1.14  
 -0.24  
 -1.13  
 -0.96  
 -1.51  
 (0.83)  
 (0.69)  
 (0.25)  
 (0.72)  
 (0.62)  
 (0.85)  
 p(Int)  
 -0.18  
 -0.20  
 -0.23  
 -0.21  
 -0.23  
 -0.20  
 -0.23  
 -0.22  
 -0.18  
 (0.20)  
 (0.20)  
 (0.20)  
 (0.20)

(0.21)  
 (0.20)  
 (0.20)  
 (0.20)  
 (0.20)  
 p(Julian)  
 -0.48\*  
 -0.52\*\*  
 -0.52\*\*  
 -0.49\*  
 -0.50\*\*  
 -0.50\*\*  
 -0.52\*\*  
 -0.51\*\*  
 -0.49\*  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 p(Meantemp)  
 0.33  
 0.32  
 0.32  
 0.33  
 0.34  
 0.31  
 0.33  
 0.35  
 0.32  
 (0.20)  
 (0.20)

(0.20)  
 (0.20)  
 (0.20)  
 (0.20)  
 (0.20)  
 (0.20)  
 p(Minhum)  
 0.44\*  
 0.42\*  
 0.43\*  
 0.44\*  
 0.45\*  
 0.42\*  
 0.44\*  
 0.44\*  
 0.43\*  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 (0.19)  
 p(sdtemp)  
 0.80\*\*  
 0.81\*\*\*  
 0.82\*\*\*  
 0.82\*\*\*  
 0.83\*\*\*  
 0.79\*\*  
 0.83\*\*\*  
 0.81\*\*\*  
 0.80\*\*\*

(0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 (0.24)  
 psi(Burn.intensity.Canopy)  
 -2.03  
 (1.14)  
 psi(Burn.intensity.basal)  
 -1.95  
 -1.84  
 (1.18)  
 (1.12)  
 psi(I(Burn.intensity.basal^2))  
 1.09  
 (0.57)  
 psi(forest\_\_dist)  
 0.14  
 (0.25)  
 psi(I(Burn.intensity.Canopy^2))  
 -0.52  
 (0.90)  
 Log Likelihood  
 -162.04  
 -162.40  
 -164.98  
 -162.65  
 -166.22  
 -162.78  
 -165.29  
 -165.30  
 -161.78

AICc

343.85

344.59

345.05

345.08

345.24

345.34

345.67

345.68

345.77

Delta

0.00

0.74

1.20

1.23

1.38

1.49

1.81

1.83

1.91

Weight

0.20

0.14

0.11

0.11

0.10

0.10

0.08

0.08

0.08

Num. obs.

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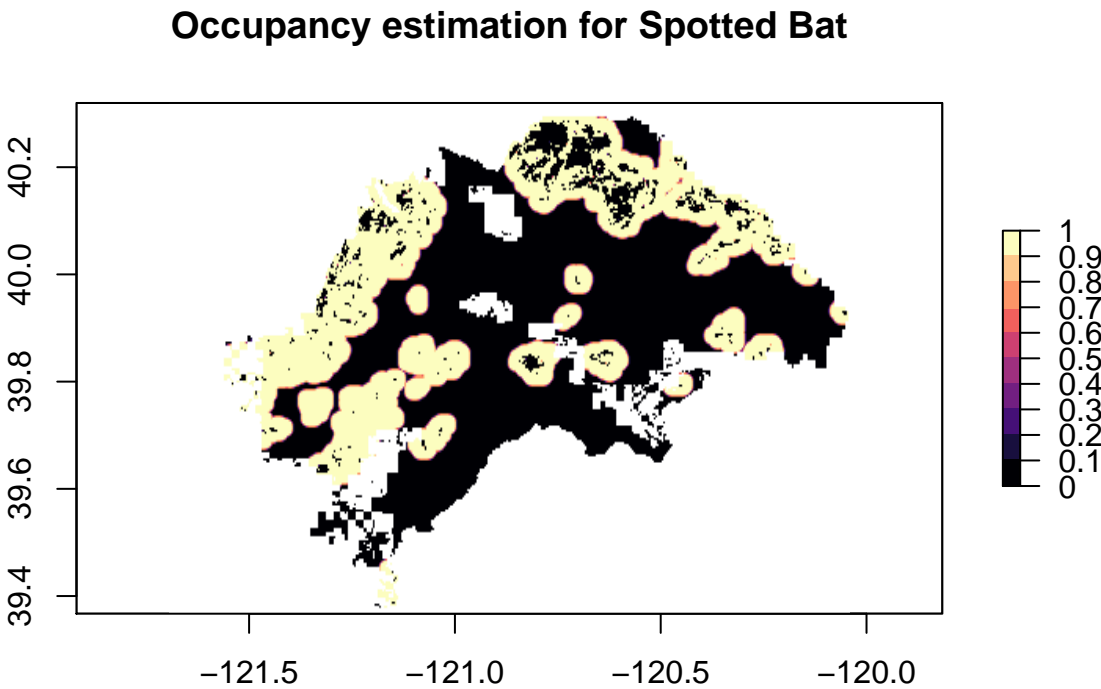
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111  
111

$p < 0.001, p < 0.01, p < 0.05$

Spotted bat (*Euderma maculatum*)



Statistical models

Model 1  
Model 2  
Model 3  
Model 4  
Model 5  
Model 6  
psi(Int)  
68.36  
22.30  
14.62

57.80  
 26.73  
 -2.12  
 (104.86)  
 (36.88)  
 (17.62)  
 (77.33)  
 (34.00)  
 (7.13)  
 psi(I(Burn.intensity.basal^2))  
 -40.21  
 (67.78)  
 psi(fire\_dist)  
 -73.46  
 -102.46  
 -69.00  
 -62.93  
 -38.83  
 -83.87  
 (114.03)  
 (166.35)  
 (85.50)  
 (85.33)  
 (50.44)  
 (113.44)  
 p(Int)  
 -5.08\*\*\*  
 -5.09\*\*\*  
 -5.07\*\*\*  
 -5.11\*\*\*  
 -5.25\*\*\*  
 -4.99\*\*\*  
 (1.19)  
 (1.18)  
 (1.18)  
 (1.18)

(1.16)

(1.17)

p(Maxhum)

-2.08\*\*

-2.09\*\*

-2.07\*\*

-2.09\*\*

-2.07\*\*

-1.91\*\*

(0.73)

(0.73)

(0.73)

(0.73)

(0.72)

(0.73)

p(Maxtemp)

1.89\*

1.90\*

1.88\*

1.90\*

1.61\*

1.62

(0.83)

(0.82)

(0.82)

(0.82)

(0.79)

(0.89)

p(Meantemp)

-3.04\*\*

-3.05\*\*

-3.03\*\*

-3.05\*\*

-2.75\*

-2.64\*

(1.17)

(1.17)  
 (1.17)  
 (1.17)  
 (1.14)  
 (1.12)  
 psi(Burn.intensity.Canopy)  
 -66.63  
 (108.63)  
 psi(Burn.intensity.basal)  
 -46.79  
 (58.83)  
 psi(I(Burn.intensity.Canopy^2))  
 -30.63  
 (40.76)  
 psi(forest\_\_dist)  
 -70.28  
 (95.10)  
 Log Likelihood  
 -11.73  
 -11.74  
 -11.75  
 -11.77  
 -13.08  
 -12.60  
 AICc  
 38.54  
 38.57  
 38.60  
 38.64  
 38.96  
 40.30  
 Delta  
 0.00  
 0.03  
 0.06  
 0.09

0.42

1.75

Weight

0.19

0.19

0.19

0.19

0.16

0.08

Num. obs.

111

111

111

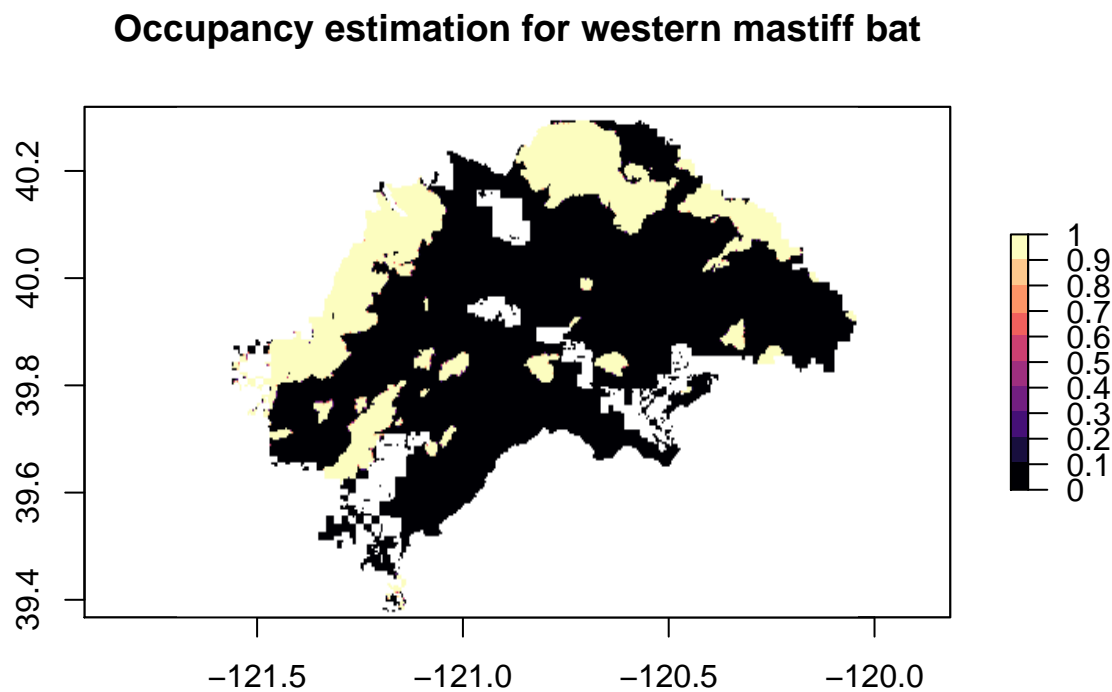
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111

$p < 0.001, p < 0.01, p < 0.05$

western mastiff bat (*Eumops perotis*)



Statistical models

Model 1

Model 2

Model 3

Model 4

psi(Int)

11.73

10.27

-3.48

-4.67

(13.32)

(12.49)

(246.73)

(108.44)

psi(Burn.intensity.basal)

27.86

(32.02)  
 p(Int)  
 -3.62\*\*\*  
 -3.64\*\*\*  
 -3.65\*\*\*  
 -3.67\*\*\*  
 (0.68)  
 (0.69)  
 (0.67)  
 (0.67)  
 p(Maxhum)  
 -11.52\*  
 -11.55\*  
 -11.34\*  
 -11.11\*  
 (4.62)  
 (4.63)  
 (4.56)  
 (4.52)  
 p(Meanhum)  
 5.87\*  
 6.01\*  
 6.06\*  
 5.60\*  
 (2.93)  
 (2.94)  
 (2.92)  
 (2.80)  
 p(Minhum)  
 5.65  
 5.53  
 5.20  
 5.41  
 (2.99)  
 (2.95)  
 (2.83)

(2.81)  
 p(sdhum)  
 5.83\*  
 5.76\*  
 5.58\*  
 5.64\*  
 (2.70)  
 (2.68)  
 (2.60)  
 (2.60)  
 psi(Burn.intensity.Canopy)  
 26.14  
 (33.97)  
 psi(forest\_dist)  
 15.05  
 (408.59)  
 psi(fire\_dist)  
 -10.85  
 (106.02)  
 Log Likelihood  
 -25.33  
 -25.42  
 -25.70  
 -26.26  
 AICc  
 65.74  
 65.91  
 66.49  
 67.61  
 Delta  
 0.00  
 0.17  
 0.75  
 1.87  
 Weight  
 0.33



0.31

0.23

0.13

Num. obs.

111

111

111

111

$p < 0.001, p < 0.01, p < 0.05$

## Relationships between different species of Bats

### Fire bats

