

# Fire\_summary

Derek Corcoran

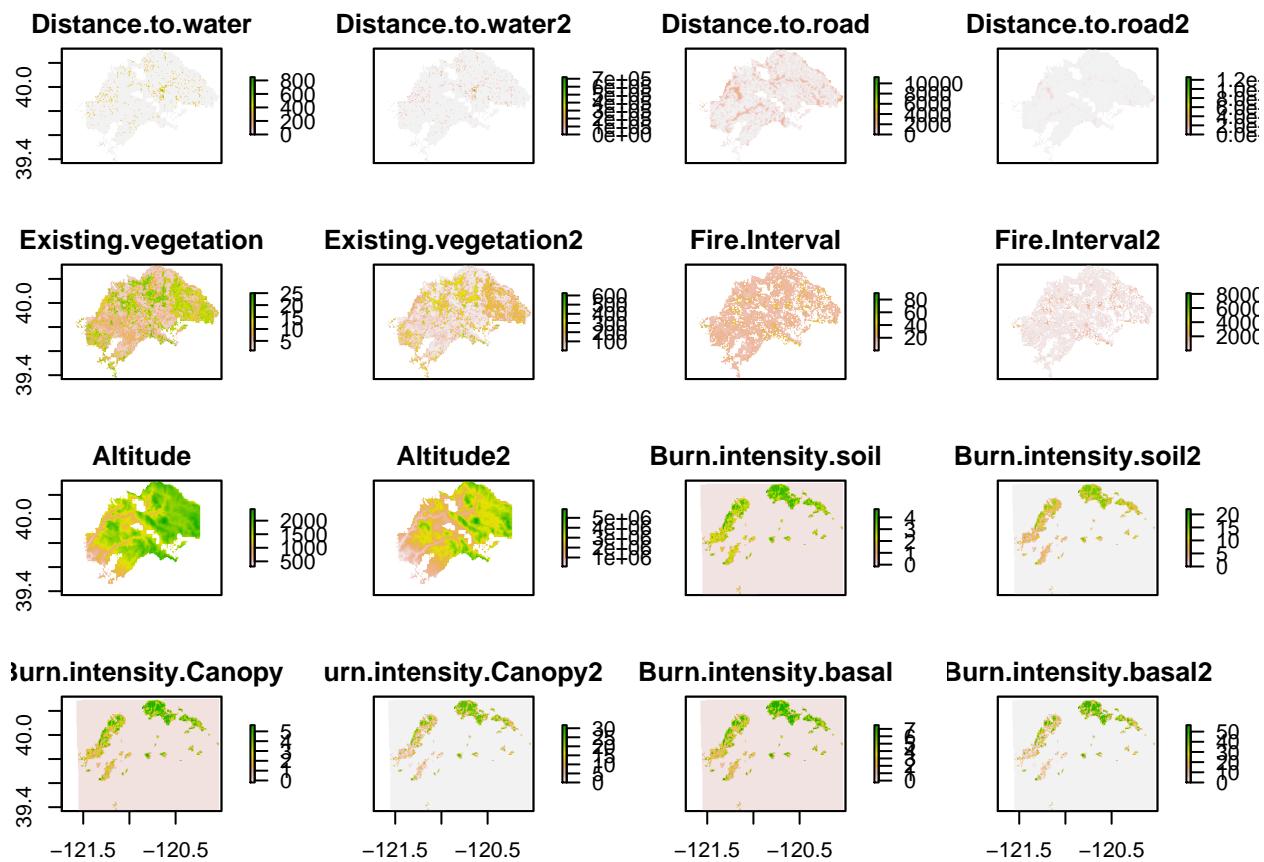
November 9, 2015

## Abstract

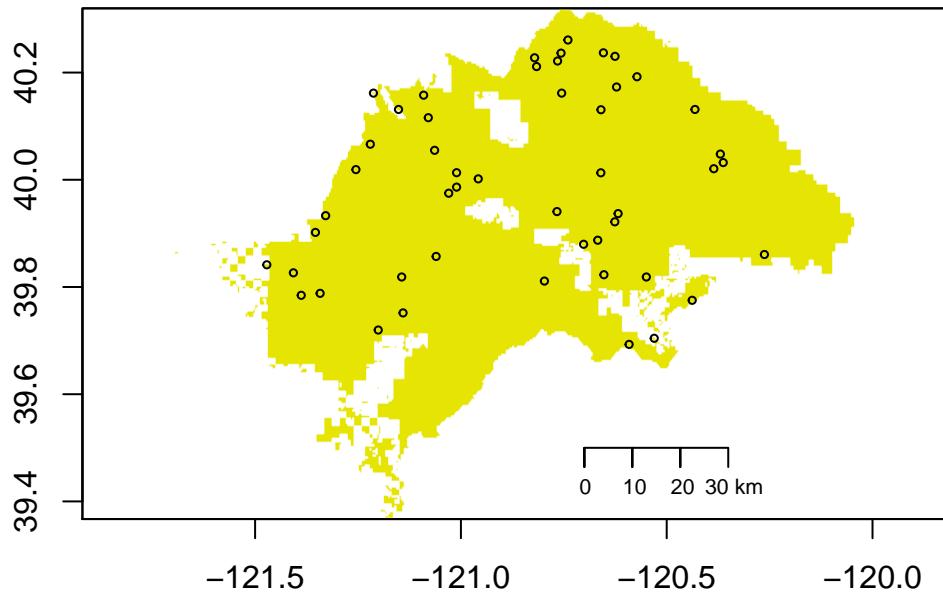
This webpage will show the results of a bat survey study done in the Plumas National Forest in North California. The objective of this study is to determine the distribution of the different species of bats within the park. In order to do that we have performed occupancy models for the species present 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 species in that point, if there is a value of 0.5 there is a 50% chance of finding that species 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

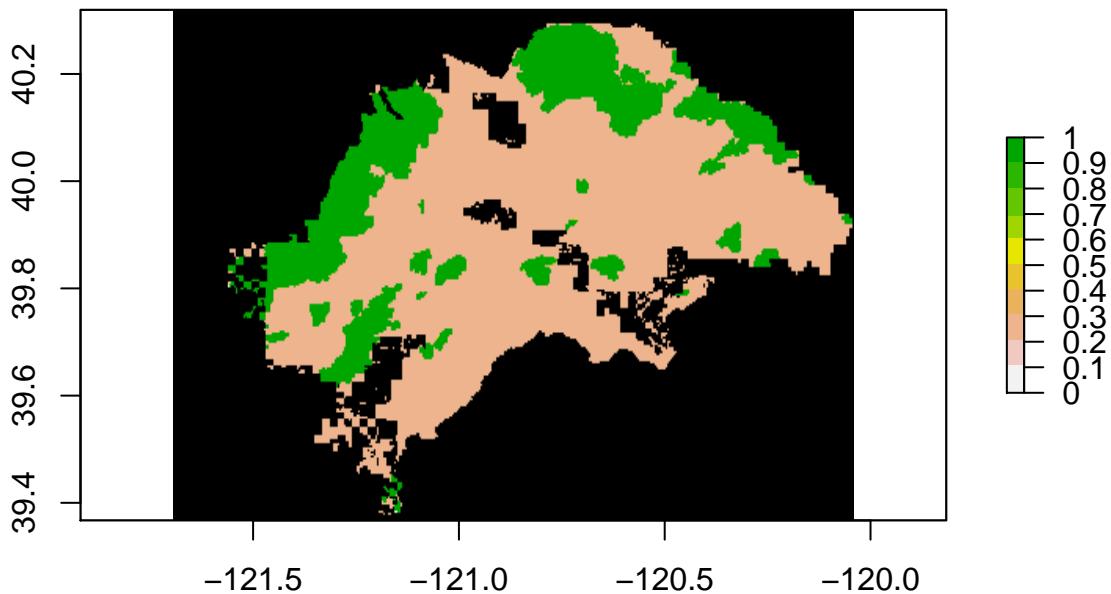
### **Yuma myotis (*Myotis yumanensis*)**

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##   doing row 1000 of 108500
##   doing row 2000 of 108500
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##  doing row 83000 of 108500
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##  doing row 89000 of 108500
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##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
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##  doing row 96000 of 108500
```

```
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
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##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Yuma 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

Model 19

Model 20

Model 21

Model 22

Model 23

Model 24

Model 25

Model 26

psi(Int)

-1.23

-1.45

-1.22

-1.38

-1.32

-1.59

-1.95

-1.35

-1.41

-1.77

-1.95

-1.52

-1.44

-1.59

-1.68

-1.59

-1.81

-1.99  
-1.50  
-1.23  
-1.97  
-1.59  
-1.90  
-1.89  
-1.36  
-1.01  
(1.04)  
(1.02)  
(1.06)  
(1.03)  
(1.06)  
(1.07)  
(1.11)  
(1.03)  
(1.05)  
(1.05)  
(1.12)  
(1.01)  
(1.03)  
(1.09)  
(1.10)  
(1.08)  
(1.12)  
(1.09)  
(1.02)  
(1.04)  
(1.11)  
(1.09)  
(1.11)  
(1.12)  
(1.06)  
(0.98)

psi(Burn.intensity.basal)

151.57  
109.53  
131.95  
223.02  
145.89  
315.91  
131.30  
431.23  
(203.26)  
(198.88)  
(805.89)  
(871.02)  
(198.83)  
(256.18)  
(200.99)  
(1012.87)

p(Int)  
-3.84\*\*\*  
-3.54\*\*  
-4.15\*\*\*  
-3.74\*\*  
-3.93\*\*\*  
-3.70\*\*  
-3.52\*\*  
-3.72\*\*  
-3.48\*  
-3.22\*\*  
-3.61\*\*  
-2.86\*  
-3.66\*\*  
-4.16\*\*\*  
-3.89\*\*\*  
-1.18  
-1.74\*\*  
-2.59  
-2.96\*

-3.23\*  
-2.93\*\*  
-3.75\*\*  
-3.68\*\*  
-3.01\*  
-3.96\*\*  
-4.06\*\*\*  
(1.17)  
(1.21)  
(1.23)  
(1.23)  
(1.19)  
(1.24)  
(1.20)  
(1.23)  
(1.35)  
(1.18)  
(1.23)  
(1.32)  
(1.22)  
(1.24)  
(1.18)  
(0.79)  
(0.54)  
(1.33)  
(1.34)  
(1.32)  
(1.13)  
(1.41)  
(1.21)  
(1.36)  
(1.21)  
(1.22)  
p(Meantemp)  
0.13  
0.12

0.15\*

0.13

0.14

0.13

0.12

0.13

0.16\*

0.11

0.13

0.14

0.13

0.15\*

0.14

0.14

0.15

0.15

0.09

0.19\*

0.13

0.14

0.14

0.14

(0.07)

(0.07)

(0.07)

(0.07)

(0.07)

(0.07)

(0.07)

(0.08)

(0.07)

(0.07)

(0.08)

(0.07)

(0.07)

(0.07)  
(0.08)  
(0.08)  
(0.08)  
(0.07)  
(0.08)  
(0.07)  
(0.08)  
(0.07)  
psi(Burn.intensity.soil)  
120.89  
69.41  
412.18  
91.95  
220.96  
148.39  
79.13  
166.50  
223.75  
353.04  
157.15  
116.72  
196.35  
(194.75)  
(205.06)  
(378.62)  
(94.01)  
(809.16)  
(197.84)  
(204.39)  
(16777.82)  
(218.34)  
(308.79)  
(13836.04)  
(198.86)

(39766.04)  
psi(I(Burn.intensity.soil^2))  
-30.51  
-126.38  
-61.21  
-113.57  
-37.47  
-32.82  
-56.67  
-89.22  
-116.30  
-50.02  
-17.60  
69.41  
(48.81)  
(266.89)  
(59.29)  
(156.38)  
(49.60)  
(74191.83)  
(56.06)  
(82.66)  
(873.30)  
(65.44)  
(24.26)  
(87.75)  
psi(Burn.intensity.Canopy)  
102.87  
216.27  
92.36  
185.56  
121.02  
152.69  
244.95  
167.47  
144.79

(199.23)  
(214.92)  
(198.05)  
(208.82)  
(121.77)  
(16777.81)  
(13845.22)  
(39783.80)  
(201.08)  
psi(I(Burn.intensity.Canopy^2))  
-31.31  
-19.19  
-12.90  
-41.07  
-56.42  
-68.56  
(57.65)  
(41.88)  
(32.73)  
(55.68)  
(50.60)  
(1547.77)  
psi(I(Burn.intensity.basal^2))  
-22.20  
7.11  
-63.86  
(22.00)  
(94.66)  
(81826.50)  
p(sdtemp)  
-0.29  
-0.31  
-0.17  
-0.35  
-0.33  
-0.31

-0.34  
-0.30  
(0.31)  
(0.31)  
(0.24)  
(0.32)  
(0.31)  
(0.31)  
(0.33)  
(0.31)

p(sdhum)

0.00

(0.05)

Log Likelihood

-33.43

-32.18

-33.65

-32.60

-33.87

-32.66

-31.36

-32.70

-32.74

-31.42

-31.44

-31.46

-32.80

-32.82

-32.89

-32.90

-32.92

-30.31

-31.75

-33.08

-31.76

-33.10

-31.77

-31.78

-33.13

-34.42

AICc

75.83

75.87

76.28

76.69

76.73

76.83

76.88

76.91

76.99

76.99

77.04

77.07

77.10

77.15

77.29

77.31

77.35

77.57

77.65

77.66

77.67

77.70

77.70

77.70

77.76

77.82

Delta

0.00

0.04

0.46

0.87

0.90

1.00

1.06

1.08

1.16

1.16

1.21

1.25

1.27

1.32

1.46

1.48

1.52

1.74

1.82

1.84

1.84

1.87

1.87

1.88

1.93

1.99

Weight

0.02

0.02

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

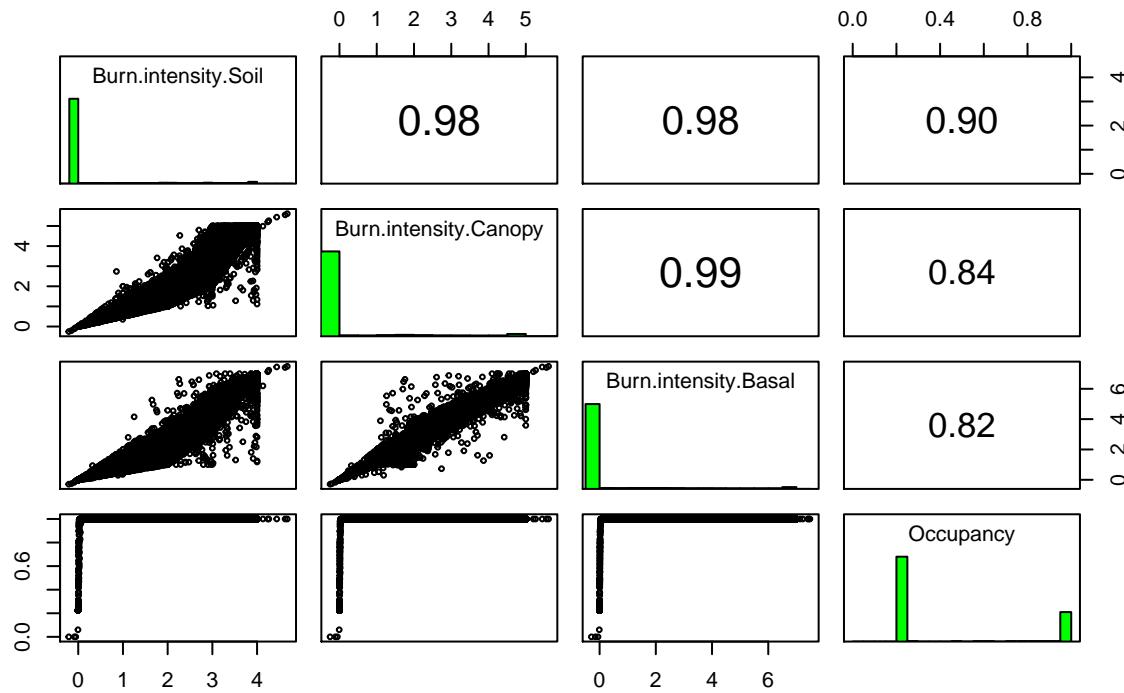
0.01

0.01

Num. obs.

46  
46  
46  
46

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



## California bat (*Myotis californicus*)

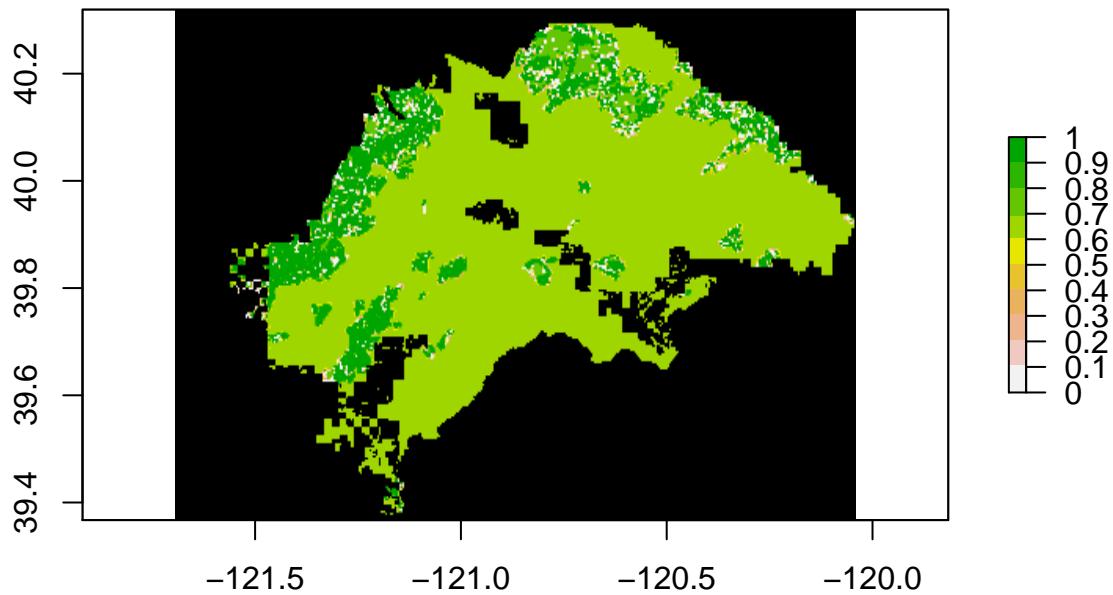
### Total model

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
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##  doing row 8000 of 108500
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##  doing row 14000 of 108500
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##  doing row 41000 of 108500
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##  doing row 68000 of 108500
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##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for California 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

$\psi(\text{Int})$

0.73

0.52	
0.75	
0.72	
0.73	
1.02**	
0.58	
0.72	
0.58	
0.57	
1.02**	
0.65	
0.64	
0.60	
0.65	
(0.47)	
(0.44)	
(0.48)	
(0.47)	
(0.47)	
(0.35)	
(0.47)	
(0.47)	
(0.44)	
(0.43)	
(0.35)	
(0.42)	
(0.42)	
(0.44)	
(0.47)	
psi(Burn.intensity.basal)	
-2.17	
-48.35	
-2.17	
-6.54	
(1.31)	
(44.73)	

(1.30)

(3.86)

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

-2.96

-2.44

-3.68

-2.80

-3.66

-10.73

-2.96

(2.17)

(2.31)

(2.31)

(1.84)

(2.26)

(8.39)

(2.16)

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

5.58

3.84

6.63

5.25

6.59

9.08

5.59

0.10

0.12

0.77

(3.57)

(3.60)

(3.93)

(3.08)

(3.86)

(6.62)

(3.55)

(0.09)

(0.10)
(0.64)
p(Int)
-0.90
-1.03
-0.93
-0.93
2.12**
2.29**
-0.89
0.43
2.30**
3.12**
3.07**
2.30**
3.12**
-0.88
-0.87
(0.77)
(0.79)
(0.78)
(0.78)
(0.73)
(0.77)
(0.78)
(1.46)
(0.77)
(0.98)
(0.98)
(0.77)
(0.98)
(0.82)
(0.77)
p(Meantemp)
0.12*
0.13*

0.12*	
0.12*	
0.12*	
0.08	
0.12*	
0.12*	
(0.05)	
(0.06)	
(0.05)	
(0.05)	
(0.06)	
(0.06)	
(0.05)	
psi(Burn.intensity.soil)	
-3.37	
-3.36	
0.37	
0.41	
0.44	
8.39	
(2.15)	
(2.10)	
(0.27)	
(0.29)	
(0.32)	
(5.25)	
psi(Burn.intensity.Canopy)	
-2.66	
59.83	
(1.70)	
(56.67)	
p(Meanhum)	
-0.02*	
-0.02*	
-0.01	

-0.02\*  
 -0.03\*  
 -0.02\*  
 -0.02\*  
 -0.03\*  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 psi(I(Burn.intensity.basal^2))  
 3.32  
 (3.19)  
 p(sdhum)  
 -0.06  
 -0.06  
 -0.06  
 (0.04)  
 (0.04)  
 (0.04)  
 Log Likelihood  
 -77.95  
 -79.60  
 -78.32  
 -78.33  
 -78.66  
 -82.47  
 -75.83  
 -77.36  
 -81.35  
 -80.11  
 -81.39  
 -81.43

-80.18

-81.53

-78.94

AICc

170.05

170.70

170.80

170.82

171.46

171.52

171.56

171.67

171.68

171.72

171.76

171.84

171.85

172.03

172.04

Delta

0.00

0.66

0.75

0.77

1.42

1.47

1.51

1.62

1.63

1.67

1.72

1.79

1.80

1.98

2.00

Weight

0.02

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

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0.01

0.01

0.01

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0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

0.01

Num. obs.

46

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46

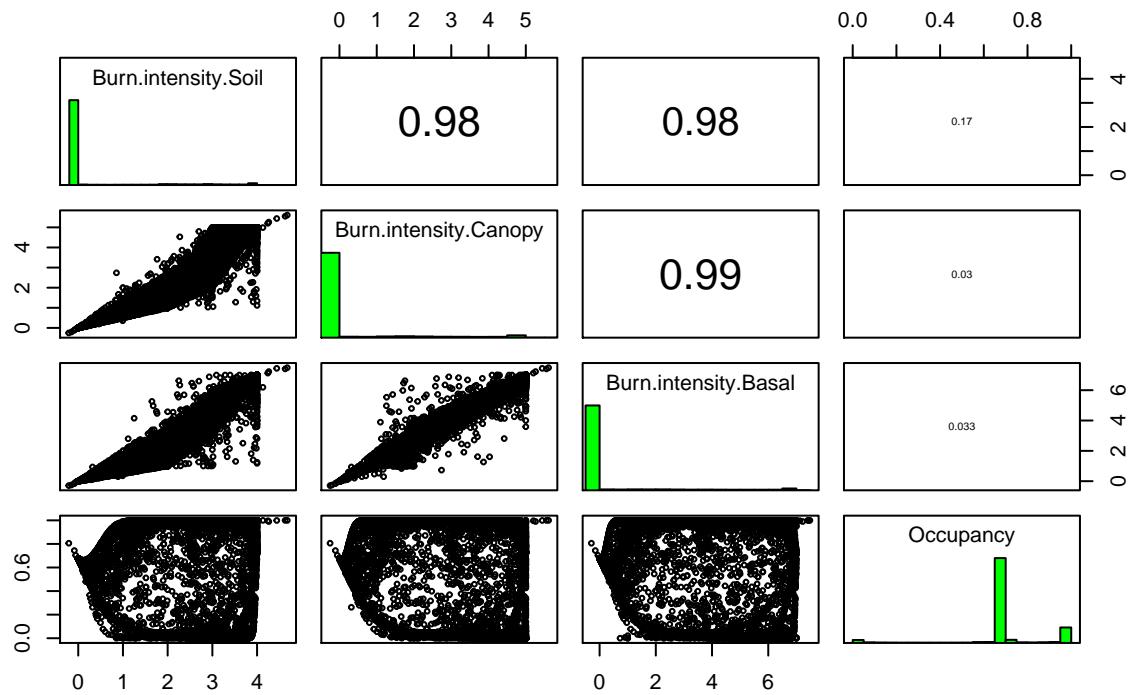
46

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46

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



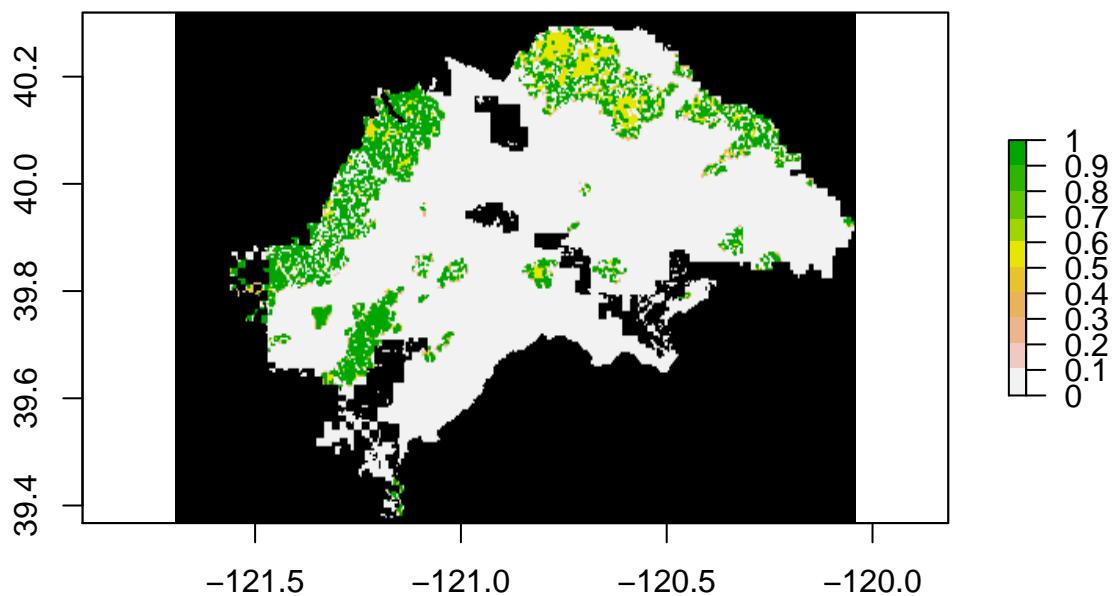
### Western Small Footed Myotis (*Myotis ciliolabrum*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Western Small Footed Myotis



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

$\psi(\text{Int})$

-2.23\*

-2.41\*

-2.36\*

-2.34\*

-2.77\*

-2.74\*

(0.98)

(1.04)

(1.02)

(1.02)

(1.18)

(1.18)

psi(Burn.intensity.basal)

-75.21

-138.72

-95.19

-122.96

-40.72

-39.94

(68.15)

(98.86)

(62.88)

(91.89)

(24.57)

(25.26)

psi(Burn.intensity.Canopy)

121.93

226.24

160.67

200.39

59.41

58.17

(111.94)

(162.46)

(106.52)

(151.00)

(34.08)

(34.96)

psi(Burn.intensity.soil)

-20.25

-39.44

-28.19

-34.72

(20.71)

(30.09)

(19.93)

(27.97)
p(Int)
3.56*
4.34*
3.56*
3.60*
3.50*
3.49*
(1.44)
(1.86)
(1.42)
(1.57)
(1.44)
(1.44)
p(Meantemp)
-0.31**
-0.33**
-0.31**
-0.31**
-0.30**
-0.30**
(0.10)
(0.11)
(0.10)
(0.10)
(0.10)
(0.10)
p(sdhum)
-0.05
(0.08)
psi(I(Burn.intensity.soil^2))
-1.37
-3.23
-2.81
(1.63)
(2.04)

(1.80)  
 $p(\text{sdtemp})$   
 -0.01  
 (0.28)  
 $\text{psi}(\text{I}(\text{Burn.intensity.Canopy}^2))$   
 1.71  
 (1.02)  
 $\text{psi}(\text{I}(\text{Burn.intensity.basal}^2))$   
 0.75  
 (0.45)  
 Log Likelihood  
 -31.97  
 -30.93  
 -31.13  
 -31.29  
 -31.34  
 -31.42  
 AICc  
 78.08  
 78.80  
 79.21  
 79.53  
 79.63  
 79.79  
 Delta  
 0.00  
 0.72  
 1.13  
 1.45  
 1.54  
 1.70  
 Weight  
 0.06  
 0.04  
 0.03  
 0.03

0.03

0.02

Num. obs.

46

46

46

46

46

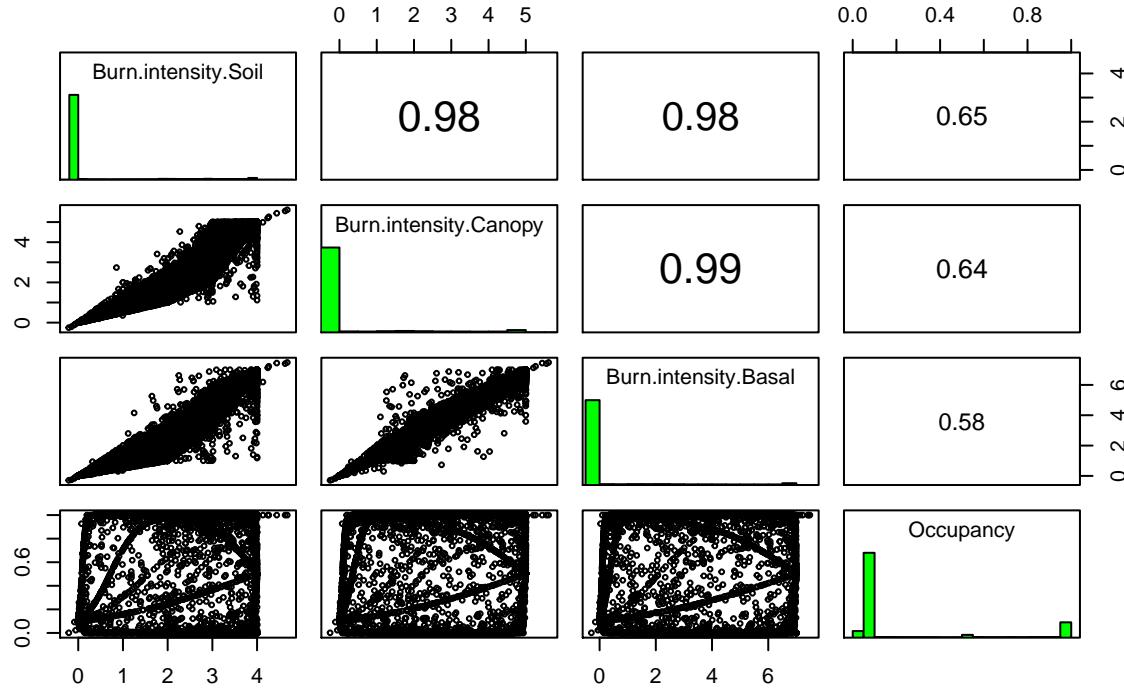
46

46

46

46

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



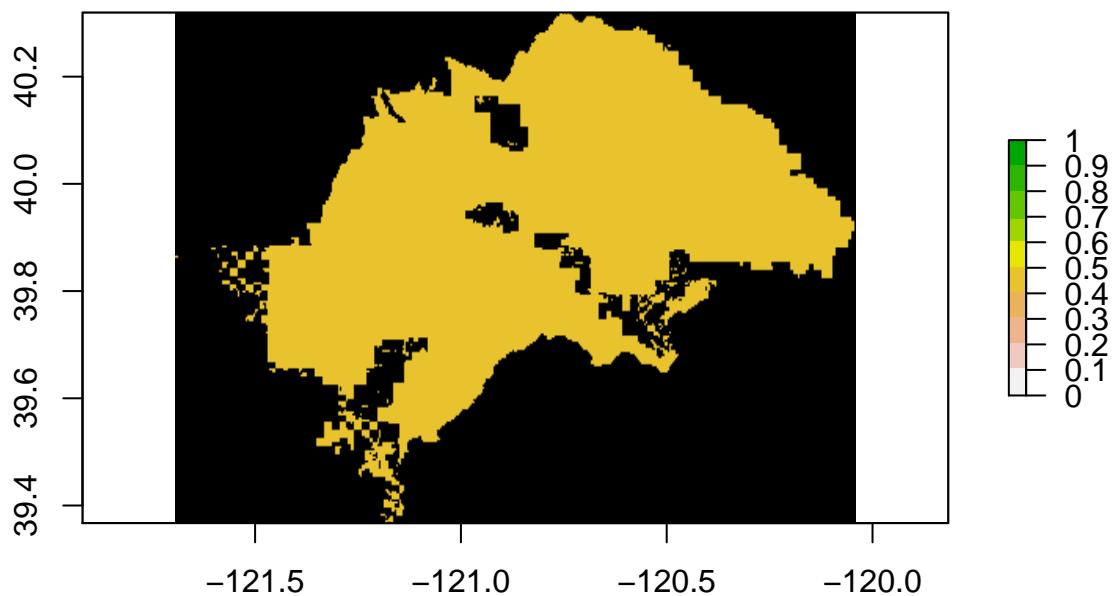
### Hairy-winged bat (*Myotis volans*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
```

```
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
```

```
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Hairy-winged bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

$\psi(\text{Int})$

-0.04

-0.45

-0.73

0.38

0.05

(0.95)

(0.71)

(0.61)

(1.15)

(1.01)

$p(\text{Int})$

4.10  
-0.28  
-2.14  
2.53  
4.92  
(4.32)  
(1.06)  
(1.70)  
(3.89)  
(4.28)  
p(Julian)  
-0.03  
-0.02  
-0.03  
(0.02)  
(0.02)  
(0.02)  
p(Meanhum)  
-0.01  
-0.01  
(0.01)  
(0.01)  
p(Meantemp)  
0.09  
(0.14)  
psi(Burn.intensity.basal)  
-33.38  
(30.21)  
psi(Burn.intensity.Canopy)  
44.81  
(40.52)  
Log Likelihood  
-40.67  
-40.92  
-41.12  
-38.70

-40.21

AICc

87.92

88.42

88.81

88.90

89.40

Delta

0.00

0.50

0.89

0.98

1.47

Weight

0.11

0.08

0.07

0.07

0.05

Num. obs.

46

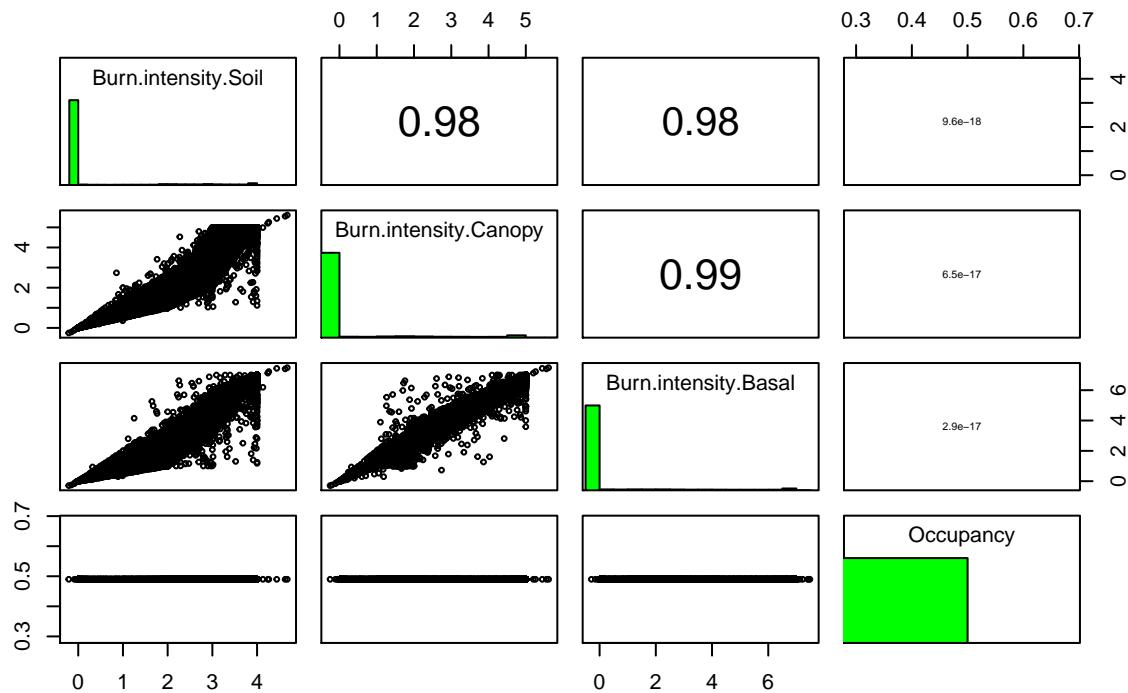
46

46

46

46

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



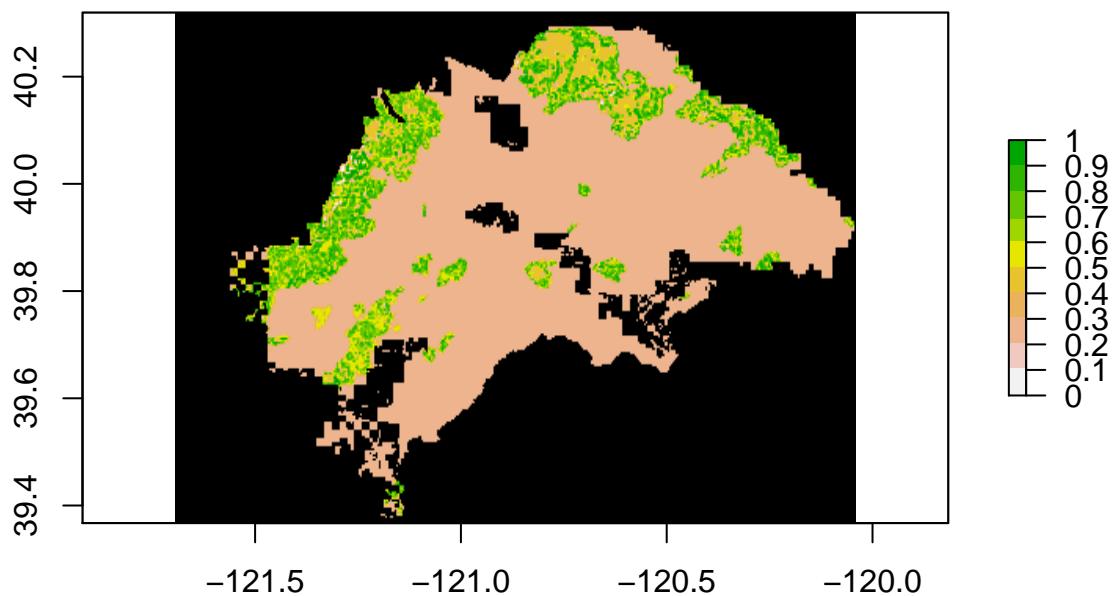
### Little Brown bat (*Myotis lucifugus*)

```
##   doing row 1000 of 108500
##   doing row 2000 of 108500
##   doing row 3000 of 108500
##   doing row 4000 of 108500
##   doing row 5000 of 108500
##   doing row 6000 of 108500
##   doing row 7000 of 108500
##   doing row 8000 of 108500
##   doing row 9000 of 108500
##   doing row 10000 of 108500
##   doing row 11000 of 108500
##   doing row 12000 of 108500
##   doing row 13000 of 108500
##   doing row 14000 of 108500
##   doing row 15000 of 108500
##   doing row 16000 of 108500
##   doing row 17000 of 108500
##   doing row 18000 of 108500
##   doing row 19000 of 108500
##   doing row 20000 of 108500
##   doing row 21000 of 108500
##   doing row 22000 of 108500
##   doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Little Brown 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

Model 19

Model 20

Model 21

Model 22

Model 23

Model 24

Model 25

Model 26

Model 27

Model 28

psi(Int)

-1.19\*

-0.93\*

-0.92\*

-1.03\*

-0.95\*

-1.16\*

-1.14\*

-0.45

-1.14\*

-1.02\*

-1.11\*

-0.98\*

-0.95\*

-0.44

-1.16\*

-0.53

-0.78

-1.07\*

-0.84

-0.93\*

-0.73

-0.73

-0.85

-1.06\*

-1.13\*  
-1.07\*  
-0.81  
-1.08\*  
(0.49)  
(0.45)  
(0.44)  
(0.47)  
(0.46)  
(0.49)  
(0.49)  
(0.34)  
(0.50)  
(0.46)  
(0.49)  
(0.46)  
(0.44)  
(0.35)  
(0.49)  
(0.32)  
(0.43)  
(0.50)  
(0.45)  
(0.43)  
(0.41)  
(0.40)  
(0.46)  
(0.46)  
(0.49)  
(0.50)  
(0.45)  
(0.50)

psi(Burn.intensity.basal)  
1.67  
0.32  
1.17

1.34  
3.22  
1.58  
0.22  
8.12  
1.10  
0.22  
(0.89)  
(0.20)  
(0.65)  
(1.24)  
(1.72)  
(1.04)  
(0.15)  
(5.34)  
(0.63)  
(0.17)

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

-0.42  
-1.07  
-0.27  
-0.65  
-0.41  
0.07  
-0.27  
(0.26)  
(0.79)  
(0.20)  
(0.35)  
(0.31)  
(0.06)  
(0.19)  
p(Int)

6.70  
6.21  
6.33

8.67
6.95
6.30
6.14
5.25
5.87
4.96
5.87
5.28
-3.53*
7.10
5.76
-3.14
6.89
9.44
8.20
-3.57*
5.97
6.17
8.62
-3.62*
6.40
8.59
8.26
8.49
(5.03)
(5.19)
(5.19)
(4.71)
(5.27)
(5.15)
(5.15)
(5.27)
(5.13)
(5.13)
(5.19)

(5.08)  
(1.69)  
(5.25)  
(4.96)  
(1.61)  
(5.46)  
(5.30)  
(5.38)  
(1.70)  
(5.25)  
(5.23)  
(5.54)  
(1.63)  
(4.99)  
(5.32)  
(5.40)  
(5.35)

p(Julian)

-0.06\*

-0.06\*

-0.06\*

-0.07\*\*

-0.06\*

-0.06\*

-0.05\*

-0.05

-0.05

-0.05

-0.05

-0.05

-0.05\*

-0.06

-0.06\*

-0.05

-0.05

-0.05  
-0.06  
-0.06\*  
-0.06  
-0.05  
-0.06  
(0.03)  
(0.03)  
(0.03)  
(0.02)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
(0.03)  
p(Meantemp)  
0.23\*  
0.22\*  
0.22\*  
0.18  
0.22\*

0.21

0.21

0.19

0.20

0.21\*

0.20

0.23\*

0.20

0.23\*

0.18

0.21\*

0.20

0.21

0.22\*

0.20

0.23\*

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)

(0.11)  
p(sdtemp)  
0.64  
0.57  
0.59  
0.71\*  
0.58  
0.62  
0.61  
0.56  
0.67  
0.59  
0.59  
0.60  
0.56\*  
0.73  
0.65\*  
0.56  
0.55  
0.87\*  
0.74\*  
0.57\*  
0.56  
0.56  
0.75\*  
0.58\*  
0.64\*  
0.82\*  
0.75\*  
0.81\*  
(0.33)  
(0.32)  
(0.32)  
(0.36)  
(0.32)  
(0.33)

(0.33)  
(0.33)  
(0.36)  
(0.32)  
(0.33)  
(0.32)  
(0.27)  
(0.37)  
(0.33)  
(0.29)  
(0.32)  
(0.36)  
(0.36)  
(0.27)  
(0.32)  
(0.32)  
(0.36)  
(0.28)  
(0.33)  
(0.37)  
(0.37)  
psi(Burn.intensity.Canopy)  
0.42  
1.55  
1.58  
1.17  
0.31  
0.31  
1.68  
-7.45  
1.46  
(0.25)  
(0.88)  
(1.23)  
(0.68)

(0.20)  
(0.22)  
(1.20)  
(5.57)  
(0.87)

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

1.70

-0.42

-0.40

-0.46

0.11

-0.45

(1.19)

(0.32)

(0.41)

(0.55)

(0.09)

(0.39)

psi(Burn.intensity.soil)

0.48

1.91

-1.31

0.35

(0.29)

(1.18)

(1.20)

(0.26)

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

-0.15

-0.10

0.04

-0.38

-0.15

(0.11)

(0.08)

(0.04)

(0.22)  
(0.10)

Log Likelihood

-47.36

-48.87

-48.89

-47.52

-48.96

-47.81

-47.83

-50.73

-48.05

-48.08

-48.15

-48.15

-50.88

-52.15

-46.69

-52.15

-49.59

-49.62

-50.95

-50.96

-49.68

-49.68

-51.02

-49.70

-46.84

-49.72

-51.04

-49.74

AICc

111.67

111.90

111.94

111.98

112.08

112.57

112.61

112.97

113.05

113.10

113.25

113.26

113.26

113.27

113.28

113.28

113.34

113.38

113.39

113.42

113.51

113.51

113.53

113.54

113.58

113.58

113.59

113.63

Delta

0.00

0.23

0.27

0.31

0.41

0.90

0.94

1.30

1.38

1.43

1.58

1.59  
1.59  
1.60  
1.61  
1.61  
1.67  
1.72  
1.73  
1.75  
1.84  
1.85  
1.87  
1.88  
1.91  
1.92  
1.92  
1.97

### Weight

0.01

0.01

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

Num. obs.

46

46

46

46

46

46

46

46

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46

46

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46

46

46

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46

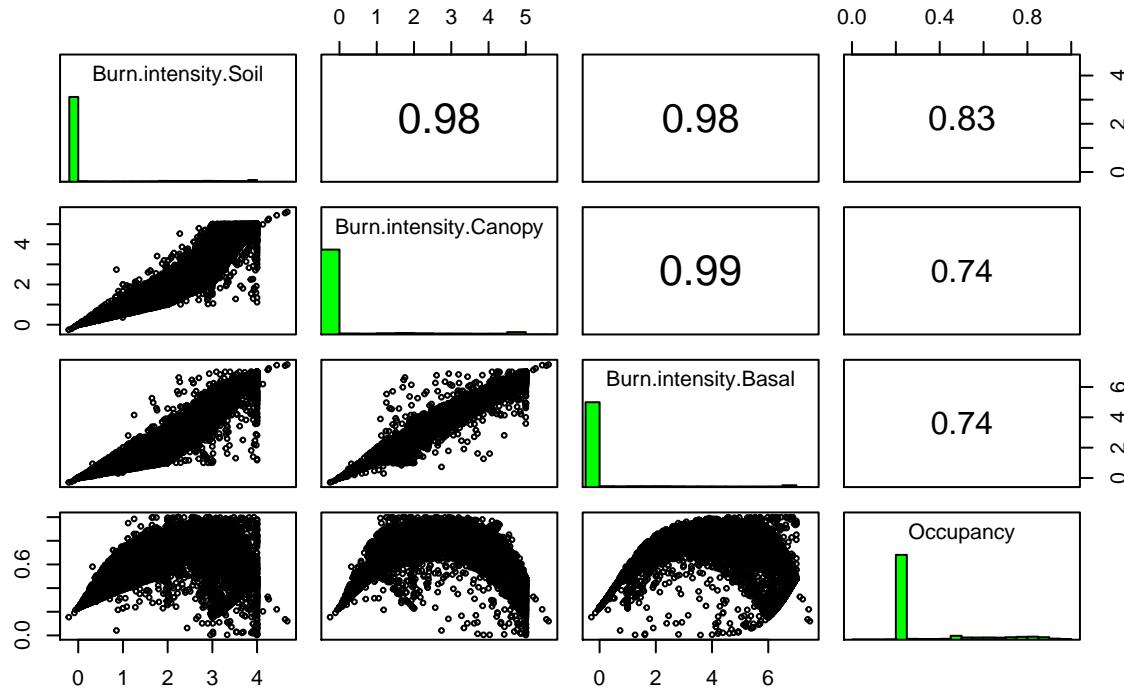
46

46

46

46

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



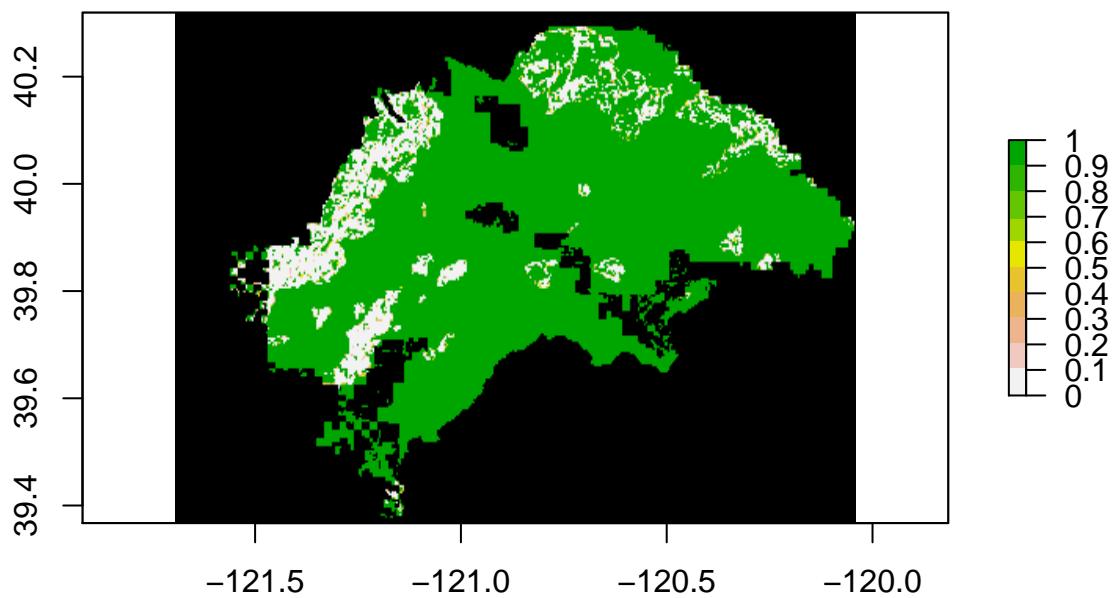
### Western Red Bat (*Lasiurus blossevillii*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
```

```
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
```

```
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Western Red 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

$\psi(\text{Int})$

17.38

14.35  
24.59  
7.96  
15.90  
17.93  
15.67  
3.62  
10.43  
23.34  
34.98  
30.25  
34.20  
25.78  
14.48  
(18.04)  
(13.92)  
(30.93)  
(8.78)  
(17.53)  
(13.04)  
(14.84)  
(12.36)  
(9.81)  
(29.40)  
(42.22)  
(29.43)  
(34.27)  
(23.15)  
(14.75)  
 $\text{psi}(\text{I}(\text{Burn.intensity.Canopy}^2))$   
2.71  
6.40  
3.63  
4.77  
2.93  
3.78

(3.01)  
(6.90)  
(3.81)  
(4.76)  
(5.39)  
(4.29)

psi(Burn.intensity.soil)

-17.81

-30.91

-17.23

-12.79

(19.23)

(42.86)

(21.20)

(29.19)

p(Int)

6.02

5.70

6.20

5.46

5.82

5.17

6.13

7.34

6.81

6.32

6.08

6.07

5.94

6.03

5.59

(4.05)

(3.98)

(3.96)

(4.01)

(4.04)

(3.90)  
(4.02)  
(4.13)  
(4.08)  
(4.23)  
(3.98)  
(4.00)  
(3.97)  
(3.98)  
(4.21)  
p(Julian)  
-0.04  
-0.04  
-0.05\*  
-0.04  
-0.04  
-0.04  
-0.04  
-0.05\*  
-0.05\*  
-0.05\*  
-0.06\*  
-0.05\*  
-0.05\*  
-0.04\*  
-0.04\*  
-0.05\*  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.03)

(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
psi(Burn.intensity.basal)  
-16.24  
-17.10  
-27.17  
(18.53)  
(16.83)  
(79.51)  
psi(I(Burn.intensity.basal^2))  
2.44  
1.47  
1.53  
3.21  
5.98  
4.97  
5.75  
2.27  
(2.82)  
(1.85)  
(1.69)  
(3.61)  
(8.37)  
(5.25)  
(6.28)  
(3.71)  
psi(I(Burn.intensity.soil^2))  
6.90  
-9.49  
(9.89)  
(10.27)  
psi(Burn.intensity.Canopy)  
-19.21

-13.85
-29.46
-17.13
-44.58
-40.59
-35.59
-19.05
(19.46)
(15.14)
(33.79)
(58.99)
(46.58)
(48.50)
(33.30)
(21.67)
p(Meantemp)
0.12
0.10
(0.11)
(0.11)
p(sdhum)
0.04
(0.06)
Log Likelihood
-32.49
-32.62
-32.63
-32.77
-32.79
-32.81
-32.89
-35.47
-33.15
-31.98
-32.00
-32.08

-32.08

-32.09

-32.13

AICc

76.48

76.74

76.77

77.04

77.08

77.13

77.28

77.51

77.81

78.11

78.15

78.31

78.31

78.33

78.41

Delta

0.00

0.27

0.29

0.56

0.60

0.65

0.80

1.04

1.33

1.64

1.68

1.84

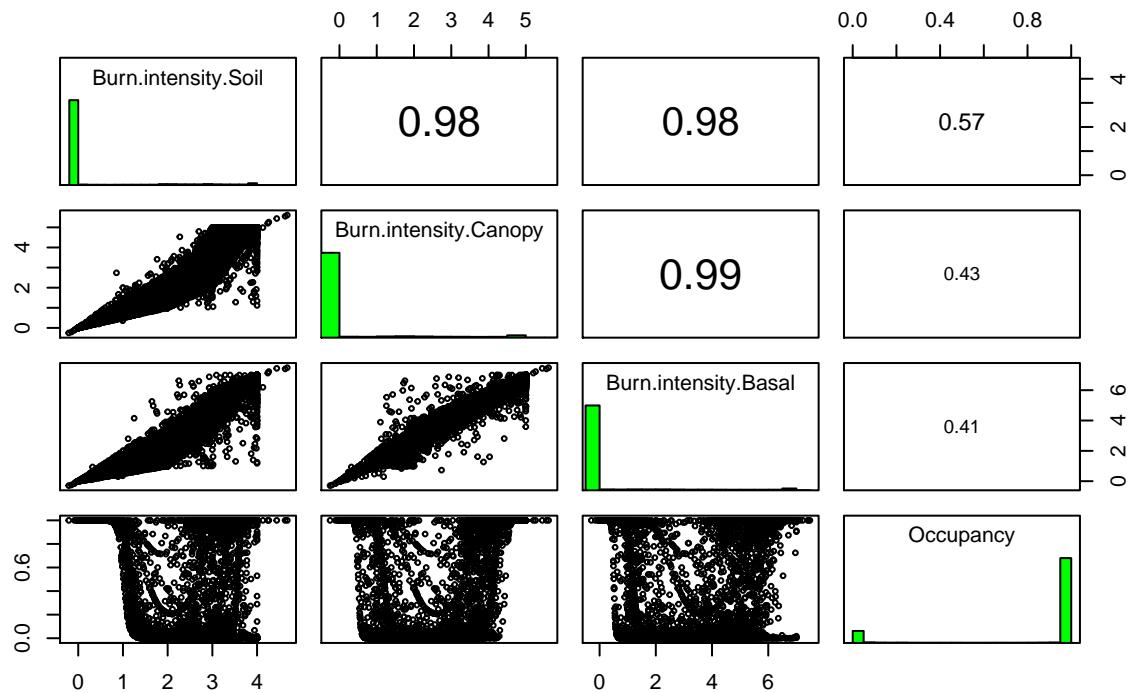
1.84

1.85

1.94

Weight





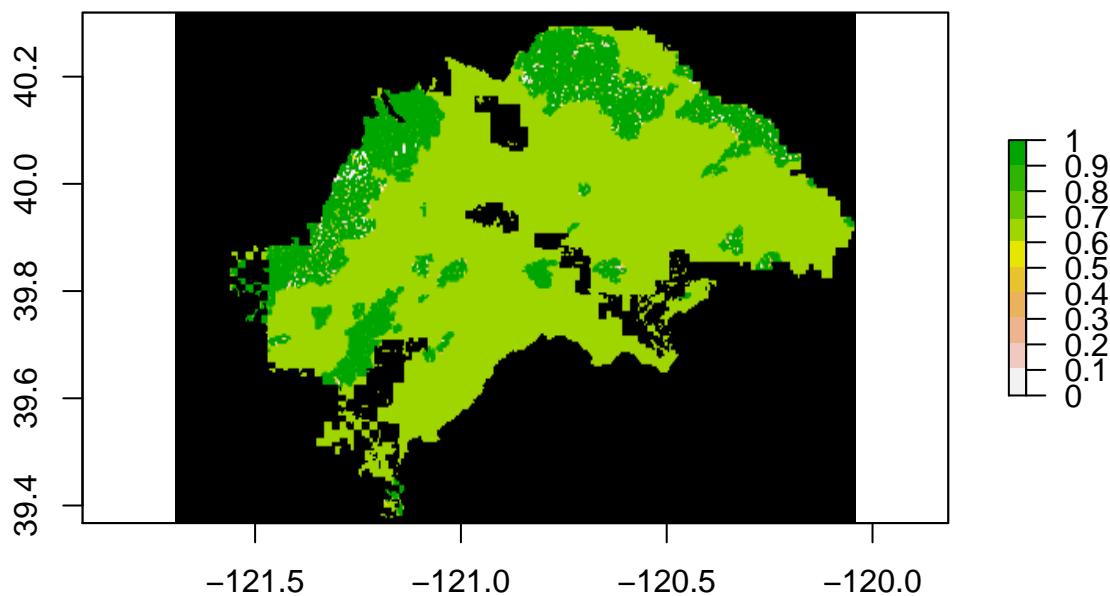
### Long-eared Bat (*Myotis evotis*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Long Eared Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

$\psi(\text{Int})$

0.68

0.71

0.75

1.31\*\*

(0.51)

(0.49)

(0.54)

(0.45)

$\psi(\text{Burn.intensity.basal})$

-8.76

-28.35

(10.44)

(52.78)  
 psi(Burn.intensity.Canopy)  
 13.29  
 44.74  
 (16.49)  
 (85.78)  
 p(Int)  
 1.22\*  
 1.25\*  
 2.60\*  
 1.13  
 (0.61)  
 (0.62)  
 (1.24)  
 (0.63)  
 p(Meanhum)  
 -0.01  
 -0.01  
 -0.02\*  
 -0.01  
 (0.01)  
 (0.01)  
 (0.01)  
 (0.01)  
 psi(Burn.intensity.soil)  
 0.70  
 (0.56)  
 p(Meantemp)  
 -0.07  
 (0.05)  
 Log Likelihood  
 -85.66  
 -87.18  
 -84.87  
 -89.00  
 AICc

182.81

183.33

183.90

184.57

Delta

0.00

0.52

1.09

1.76

Weight

0.13

0.10

0.07

0.05

Num. obs.

46

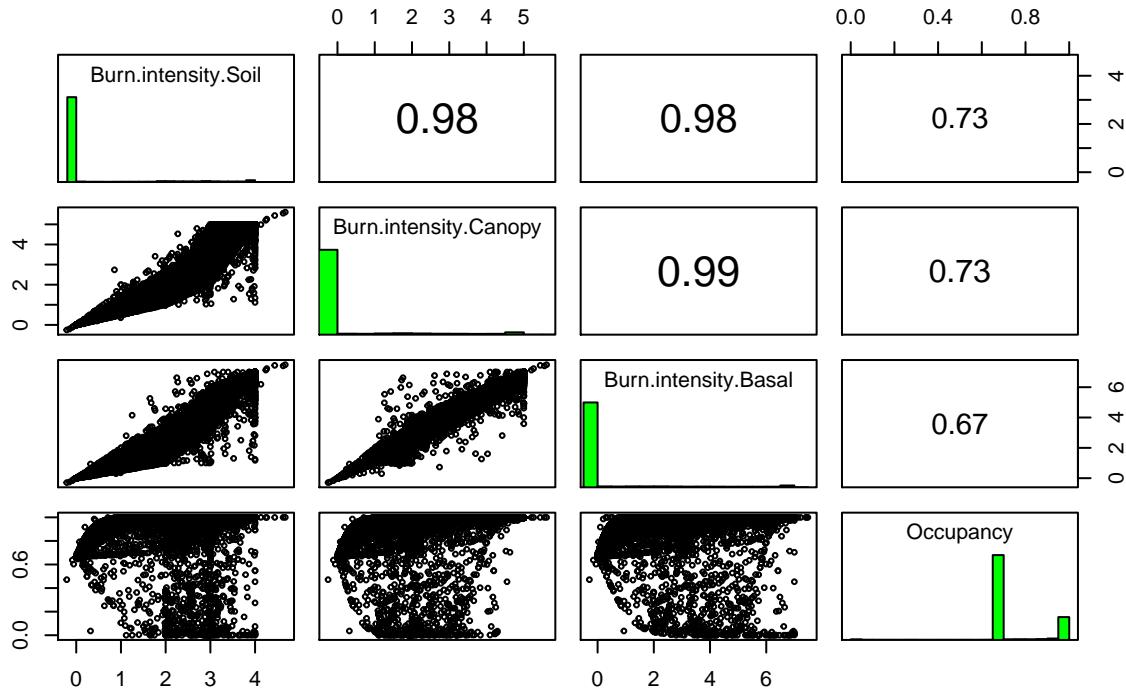
46

46

46

46

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



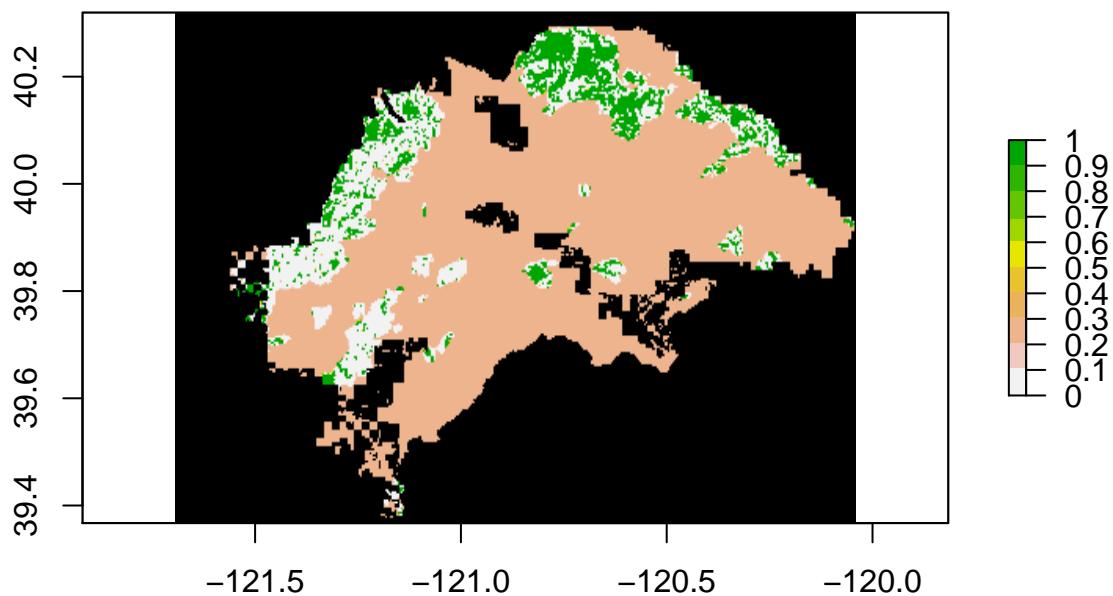
## Pallid Bat (*Antrozous pallidus*)

```
## doing row 1000 of 108500
## doing row 2000 of 108500
## doing row 3000 of 108500
## doing row 4000 of 108500
## doing row 5000 of 108500
## doing row 6000 of 108500
## doing row 7000 of 108500
## doing row 8000 of 108500
## doing row 9000 of 108500
## doing row 10000 of 108500
## doing row 11000 of 108500
## doing row 12000 of 108500
## doing row 13000 of 108500
## doing row 14000 of 108500
## doing row 15000 of 108500
## doing row 16000 of 108500
## doing row 17000 of 108500
## doing row 18000 of 108500
## doing row 19000 of 108500
## doing row 20000 of 108500
## doing row 21000 of 108500
## doing row 22000 of 108500
## doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Pallid Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

$\psi(\text{Int})$

-0.86

-1.21

-0.83

-1.09

-1.14

-1.05

-1.11

-0.78

(0.80)  
 (0.73)  
 (0.84)  
 (0.76)  
 (0.74)  
 (0.78)  
 (0.73)  
 (0.84)  
 $\text{psi}(\text{I}(\text{Burn.intensity.Canopy}^2))$   
 22.37  
 26.15  
 23.81  
 47.78  
 (23.95)  
 (32.07)  
 (26.83)  
 (80.98)  
 $\text{psi}(\text{I}(\text{Burn.intensity.soil}^2))$   
 -31.93  
 -37.31  
 -33.96  
 -43.40  
 -68.47  
 (34.43)  
 (46.14)  
 (38.60)  
 (47.23)  
 (116.50)  
 $p(\text{Int})$   
 13.94\*  
 8.29  
 13.69\*  
 8.63  
 7.91  
 8.69  
 9.87\*

14.05*	
(6.19)	
(4.66)	
(6.07)	
(5.05)	
(4.67)	
(5.05)	
(4.81)	
(6.60)	
p(Julian)	
-0.07*	
-0.05*	
-0.07*	
-0.06*	
-0.05	
-0.06*	
-0.06*	
-0.08*	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
(0.03)	
p(Meantemp)	
-0.20	
-0.20	
-0.18	
(0.12)	
(0.12)	
(0.14)	
psi(Burn.intensity.Canopy)	
72.60	
18.52	

30.46  
 (130.37)  
 (13.35)  
 (40.77)  
 $\text{psi}(\text{Burn.intensity.soil})$   
 -86.32  
 -21.35  
 -35.65  
 (156.22)  
 (15.76)  
 (48.94)  
 $p(\text{Meanhum})$   
 0.02  
 0.02  
 0.01  
 (0.02)  
 (0.02)  
 (0.02)  
 $\text{psi}(\text{I}(\text{Burn.intensity.basal}^2))$   
 17.82  
 (19.29)  
 Log Likelihood  
 -25.70  
 -27.07  
 -25.76  
 -26.06  
 -27.54  
 -26.35  
 -27.72  
 -25.29  
 AICc  
 65.55  
 65.64  
 65.68  
 66.28  
 66.57

66.85

66.93

67.52

Delta

0.00

0.09

0.13

0.73

1.02

1.30

1.38

1.97

Weight

0.04

0.04

0.04

0.03

0.02

0.02

0.02

0.01

Num. obs.

46

46

46

46

46

46

46

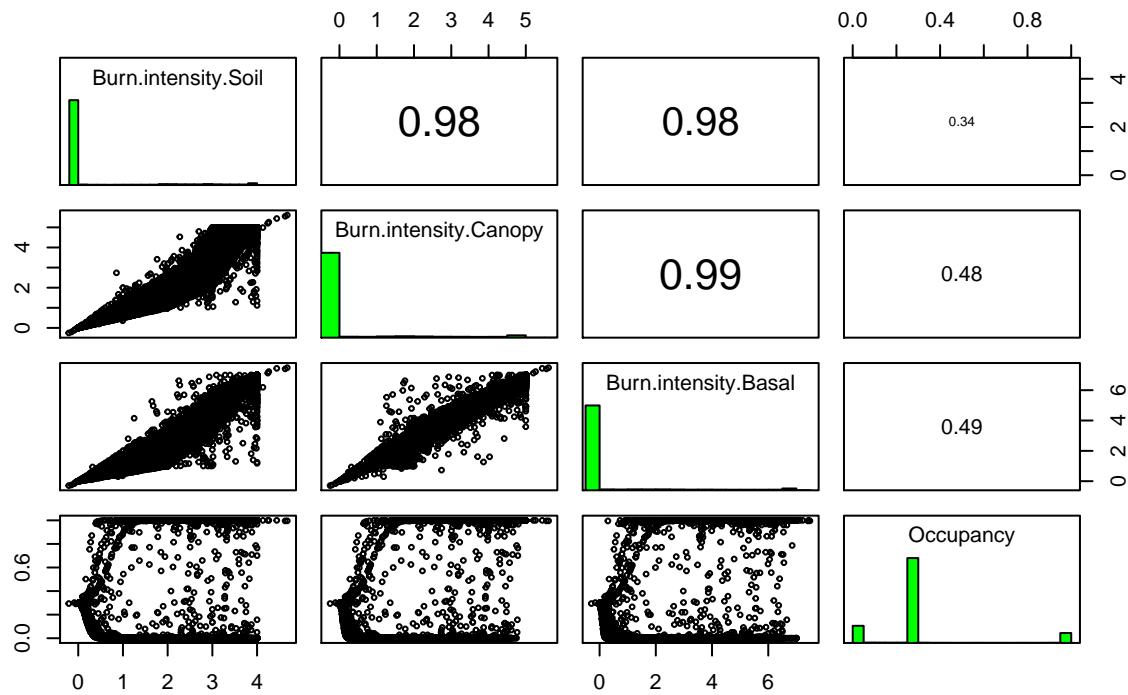
46

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46

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



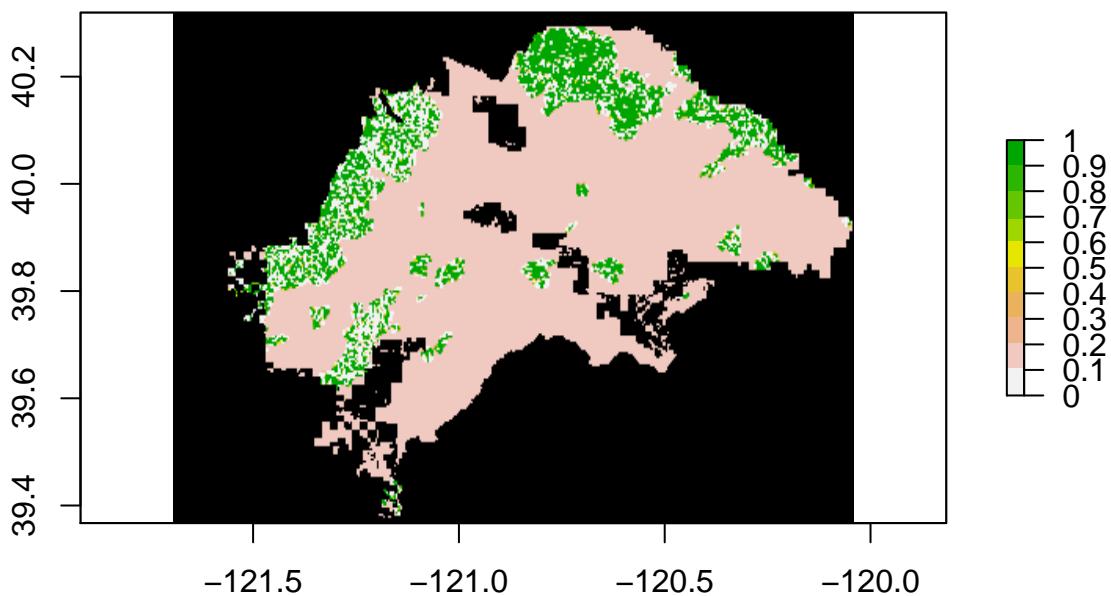
### Fringed Bat (*Myotis thysanoides*)

```
##   doing row 1000 of 108500
##   doing row 2000 of 108500
##   doing row 3000 of 108500
##   doing row 4000 of 108500
##   doing row 5000 of 108500
##   doing row 6000 of 108500
##   doing row 7000 of 108500
##   doing row 8000 of 108500
##   doing row 9000 of 108500
##   doing row 10000 of 108500
##   doing row 11000 of 108500
##   doing row 12000 of 108500
##   doing row 13000 of 108500
##   doing row 14000 of 108500
##   doing row 15000 of 108500
##   doing row 16000 of 108500
##   doing row 17000 of 108500
##   doing row 18000 of 108500
##   doing row 19000 of 108500
##   doing row 20000 of 108500
##   doing row 21000 of 108500
##   doing row 22000 of 108500
##   doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Fringed Bat



Statistical models

Model 1

Model 2

Model 3

psi(Int)

-1.93\*

-1.98\*

-1.99\*

(0.79)

(0.78)

(0.79)

psi(Burn.intensity.basal)

42.88

50.65

(29.30)

(35.10)

psi(Burn.intensity.Canopy)

-78.13

-92.09  
 (51.58)  
 (62.19)  
 psi(Burn.intensity.soil)  
 24.28  
 28.39  
 (14.59)  
 (17.88)  
 p(Int)  
 -5.56\*\*  
 -6.36\*\*  
 -6.56\*\*  
 (1.76)  
 (2.14)  
 (2.20)  
 p(Meantemp)  
 0.32\*  
 0.34\*\*  
 0.35\*\*  
 (0.13)  
 (0.13)  
 (0.13)  
 psi(I(Burn.intensity.basal^2))  
 28.27  
 (28.74)  
 psi(I(Burn.intensity.Canopy^2))  
 -64.84  
 (64.91)  
 psi(I(Burn.intensity.soil^2))  
 18.86  
 (18.11)  
 p(sdttemp)  
 0.21  
 0.22  
 (0.27)  
 (0.27)

Log Likelihood

-26.59

-25.71

-26.17

AICc

67.34

68.36

69.29

Delta

0.00

1.02

1.95

Weight

0.05

0.03

0.02

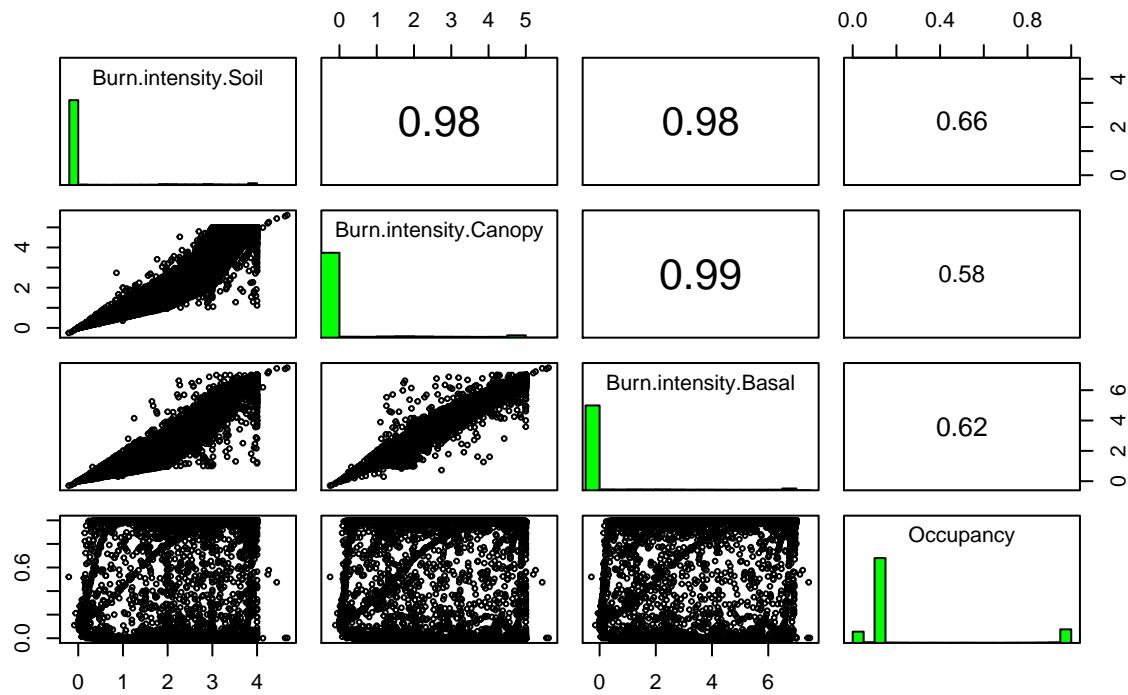
Num. obs.

46

46

46

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



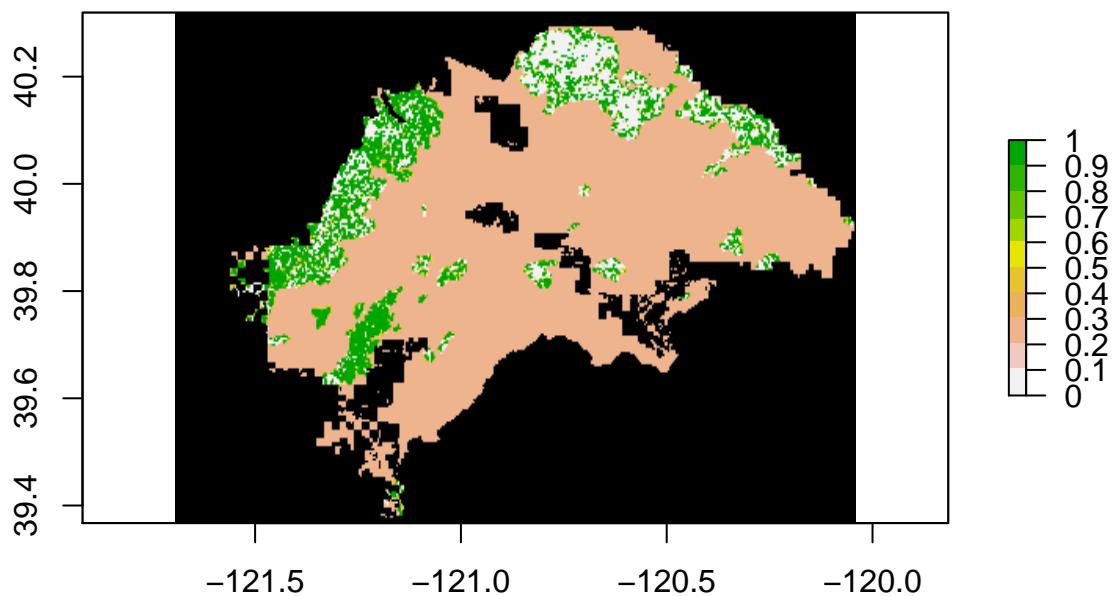
### Townsend's Long-eared Bat (*Corynorhinus townsendii*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
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##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Townsend big eared 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

Model 19

Model 20

Model 21

Model 22

Model 23

Model 24

Model 25

Model 26

Model 27

Model 28

Model 29

Model 30

psi(Int)

-1.17

-0.92

-0.27

-1.83

0.27

-0.85

-1.31

-1.67

-1.18

-1.14

-0.62

-0.63

-0.98

-0.85

-1.13

-1.18

-0.89

-0.77

-1.57

-1.79

0.06

-2.08

-0.65  
-1.08  
-1.09  
-1.11  
-0.67  
-1.63  
-2.08  
-0.73  
(1.22)  
(1.35)  
(1.61)  
(1.21)  
(2.14)  
(1.07)  
(1.16)  
(1.22)  
(1.15)  
(1.45)  
(1.31)  
(1.38)  
(1.42)  
(1.25)  
(1.46)  
(1.08)  
(1.22)  
(1.24)  
(1.24)  
(1.21)  
(1.88)  
(1.15)  
(1.26)  
(1.46)  
(1.32)  
(1.07)  
(1.30)  
(1.24)

(1.20)

(1.36)

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

-3.94

-3.92

-9.46

-7.72

-4.87

-6.39

0.42

-3.30

(5.28)

(6.16)

(10.98)

(9.70)

(5.32)

(5.98)

(0.73)

(5.42)

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

7.43

-12.23

7.41

19.67

15.95

-40.43

9.17

13.00

0.44

-3.73

1.40

(9.77)

(12.68)

(11.40)

(22.64)

(19.70)

(42.59)

(9.87)

(12.37)

(0.55)

(3.46)

(1.90)

p(Int)

-5.01\*\*

-4.73\*\*

-4.38\*

8.27

-8.63\*

6.23

5.17

7.38

-8.58\*

-3.77\*

-5.31\*\*

-5.30\*\*

-4.03\*

-4.82\*\*

-4.39\*

2.93

-5.08\*\*

-9.28\*\*

4.98

9.19

0.46

9.77

-9.32\*\*

-4.26\*

-4.67\*\*

-2.19

-9.33\*\*

5.54

9.83

-9.13\*\*

(1.77)

(1.77)

(2.13)

(6.30)

(3.76)

(7.28)

(7.13)

(5.99)

(3.76)

(1.81)

(1.80)

(1.82)

(1.70)

(1.72)

(1.74)

(7.29)

(1.77)

(3.55)

(6.09)

(6.18)

(6.52)

(7.26)

(3.52)

(1.73)

(1.75)

(1.76)

(3.52)

(5.77)

(7.24)

(3.54)

p(Meanhum)

0.04

0.03

0.03

0.05

0.03  
0.06\*  
0.02  
0.05\*  
0.05\*  
0.02  
0.04  
0.03  
0.04  
0.04\*  
0.05  
0.03  
0.05  
0.03  
0.03  
0.05  
0.05  
(0.02)  
(0.02)  
(0.02)  
(0.03)  
(0.02)  
(0.03)  
(0.02)  
(0.02)  
(0.02)  
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(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)

(0.03)

(0.03)

psi(Burn.intensity.basal)

-51.10

45.34

-51.32

39.25

-5.15

-48.88

-23.85

49.22

-70.91

-18.75

92.68

(48.85)

(42.00)

(41.90)

(40.16)

(6.92)

(46.18)

(31.11)

(43.84)

(65.35)

(20.57)

(123.93)

psi(Burn.intensity.Canopy)

70.07

70.52

51.73

-5.34

56.84

-34.60

91.61

0.91

(66.72)

(57.35)

(59.46)  
(7.10)  
(53.09)  
(37.55)  
(82.76)  
(1.11)  
psi(I(Burn.intensity.soil^2))  
-19.24  
-16.50  
60.32  
3.46  
-4.51  
-20.93  
0.41  
-34.07  
(18.15)  
(19.18)  
(63.44)  
(4.01)  
(4.00)  
(18.95)  
(0.52)  
(43.72)  
p(Julian)  
-0.06  
-0.04  
-0.05  
-0.05  
-0.04  
-0.04  
-0.06  
-0.03  
-0.07  
-0.04  
-0.07  
(0.03)

(0.04)	
(0.04)	
(0.03)	
(0.04)	
(0.03)	
(0.03)	
(0.03)	
(0.04)	
(0.03)	
(0.04)	
p(Meantemp)	
0.16	
0.14	
0.20	
0.11	
0.20	
0.05	
0.20	
0.19	
(0.11)	
(0.12)	
(0.11)	
(0.09)	
(0.11)	
(0.10)	
(0.11)	
(0.11)	
psi(Burn.intensity.soil)	
40.49	
-3.82	
16.97	
20.31	
42.88	
31.99	
(51.88)	
(4.75)	

(14.71)

(18.26)

(46.24)

(34.12)

Log Likelihood

-20.31

-20.41

-22.90

-20.59

-21.91

-23.18

-19.48

-20.88

-19.58

-20.99

-19.67

-19.69

-21.02

-19.72

-21.05

-19.76

-19.77

-21.10

-21.15

-21.16

-22.43

-19.85

-21.19

-21.20

-19.88

-23.70

-21.24

-21.25

-19.94

-21.31

AICc

52.12

52.31

52.37

52.68

52.80

52.93

53.11

53.27

53.32

53.49

53.49

53.53

53.53

53.58

53.59

53.66

53.70

53.70

53.81

53.82

53.84

53.86

53.88

53.90

53.91

53.98

53.99

54.01

54.04

54.12

Delta

0.00

0.19

0.25

0.56

0.67

0.81  
0.99  
1.14  
1.20  
1.37  
1.37  
1.41  
1.41  
1.46  
1.47  
1.54  
1.58  
1.58  
1.68  
1.70  
1.72  
1.74  
1.76  
1.78  
1.79  
1.86  
1.86  
1.88  
1.91  
2.00

Weight

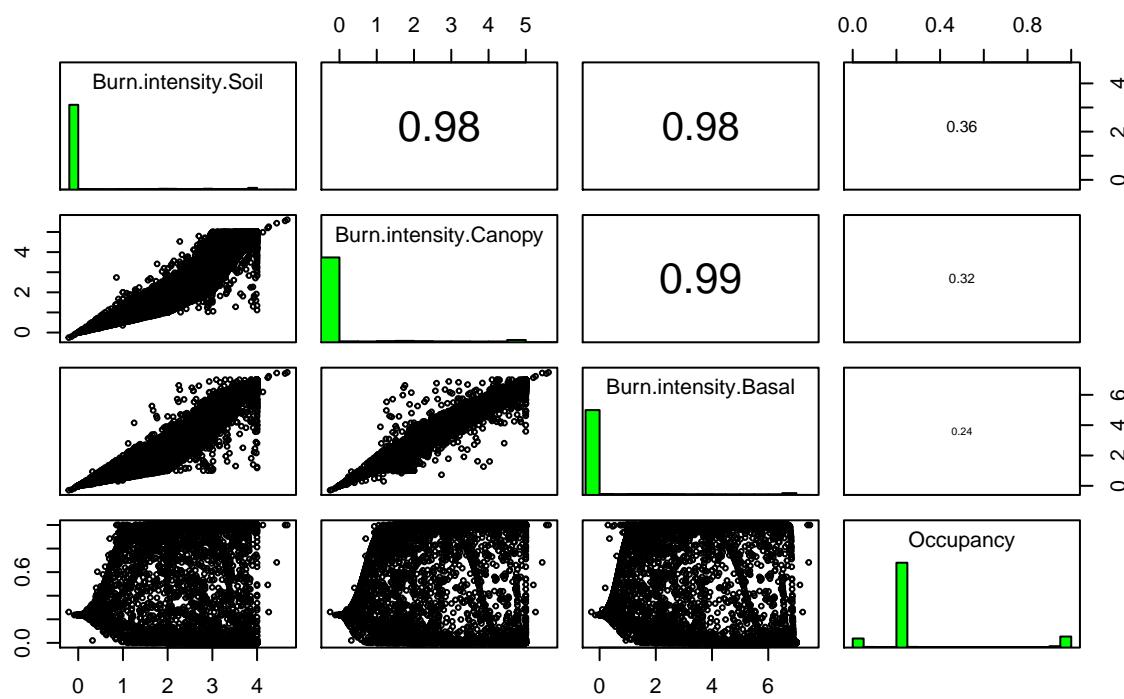
0.02  
0.02  
0.02  
0.01  
0.01  
0.01  
0.01  
0.01  
0.01  
0.01

Num. obs.

46

46  
46  
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46

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



The western pipistrelle (*Parastrellus hesperus*)

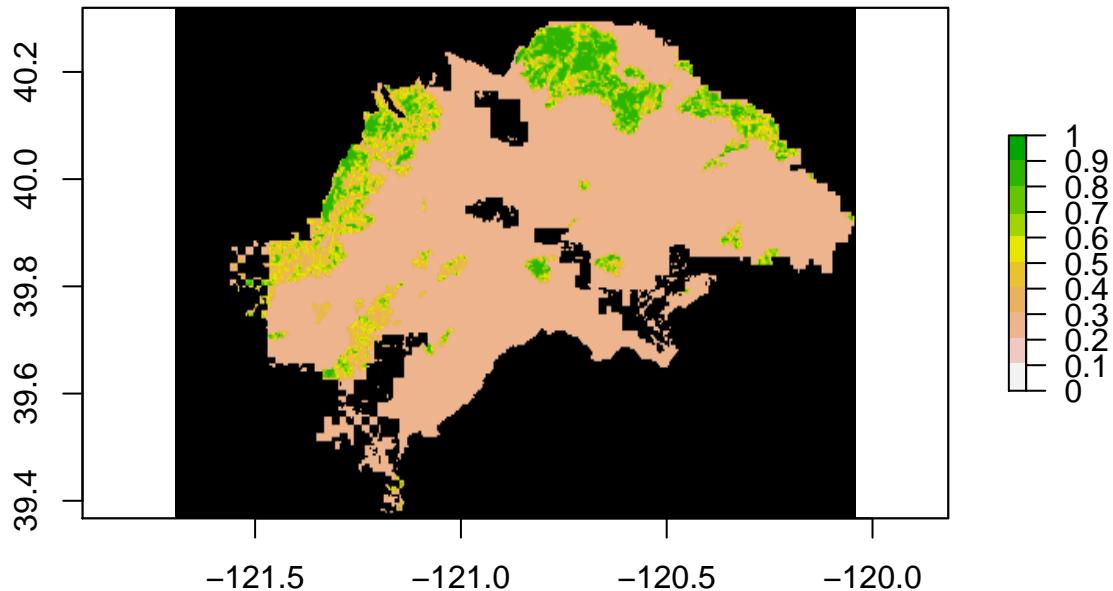
big brown bat (*Eptesicus fuscus*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
```

```
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
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##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
```

```
##   doing row 105000 of 108500
##   doing row 106000 of 108500
##   doing row 107000 of 108500
##   doing row 108000 of 108500
```

### Occupancy estimation for Big Brown 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

psi(Int)

-1.02\*

-0.88\*  
 -0.86\*  
 -1.07\*  
 -0.92  
 -1.03\*  
 -0.97\*  
 -0.97\*  
 -0.95\*  
 -0.93\*  
 -0.90  
 (0.45)  
 (0.42)  
 (0.42)  
 (0.49)  
 (0.48)  
 (0.45)  
 (0.46)  
 (0.47)  
 (0.46)  
 (0.47)  
 (0.48)  
 psi(I(Burn.intensity.soil^2))  
 0.16\*  
 0.16\*  
 0.16\*  
 0.16\*  
 0.39  
 0.37  
 (0.07)  
 (0.07)  
 (0.07)  
 (0.07)  
 (0.36)  
 (0.34)  
 p(Int)  
 2.07\*

2.05*	
2.06*	
2.02*	
3.85	
1.65	
2.03*	
-2.17	
2.04*	
2.07*	
2.08*	
(1.01)	
(1.01)	
(1.01)	
(1.01)	
(2.02)	
(1.07)	
(1.01)	
(4.72)	
(1.01)	
(1.00)	
(0.99)	
p(Meanhum)	
-0.03*	
-0.03*	
-0.03*	
-0.03*	
-0.04*	
-0.03*	
-0.03*	
-0.03*	
-0.03*	
-0.03*	
-0.03*	
-0.03*	
(0.01)	
(0.01)	
(0.01)	

(0.01)
(0.02)
(0.01)
(0.01)
(0.01)
(0.01)
(0.01)
(0.01)
psi(I(Burn.intensity.Canopy^2))
0.11*
(0.05)
psi(I(Burn.intensity.basal^2))
0.06*
(0.03)
psi(Burn.intensity.soil)
0.53*
(0.24)
p(Meantemp)
-0.10
(0.10)
p(sdhum)
0.05
(0.06)
psi(Burn.intensity.Canopy)
0.45*
-0.69
(0.21)
(1.04)
p(Julian)
0.02
(0.02)
psi(Burn.intensity.basal)
0.33*
-0.55
(0.16)
(0.81)

Log Likelihood

-57.00

-57.38

-57.40

-57.63

-56.48

-56.55

-57.84

-56.58

-57.91

-56.68

-56.71

AICc

122.98

123.74

123.77

124.25

124.46

124.59

124.66

124.67

124.79

124.85

124.92

Delta

0.00

0.75

0.79

1.26

1.48

1.61

1.67

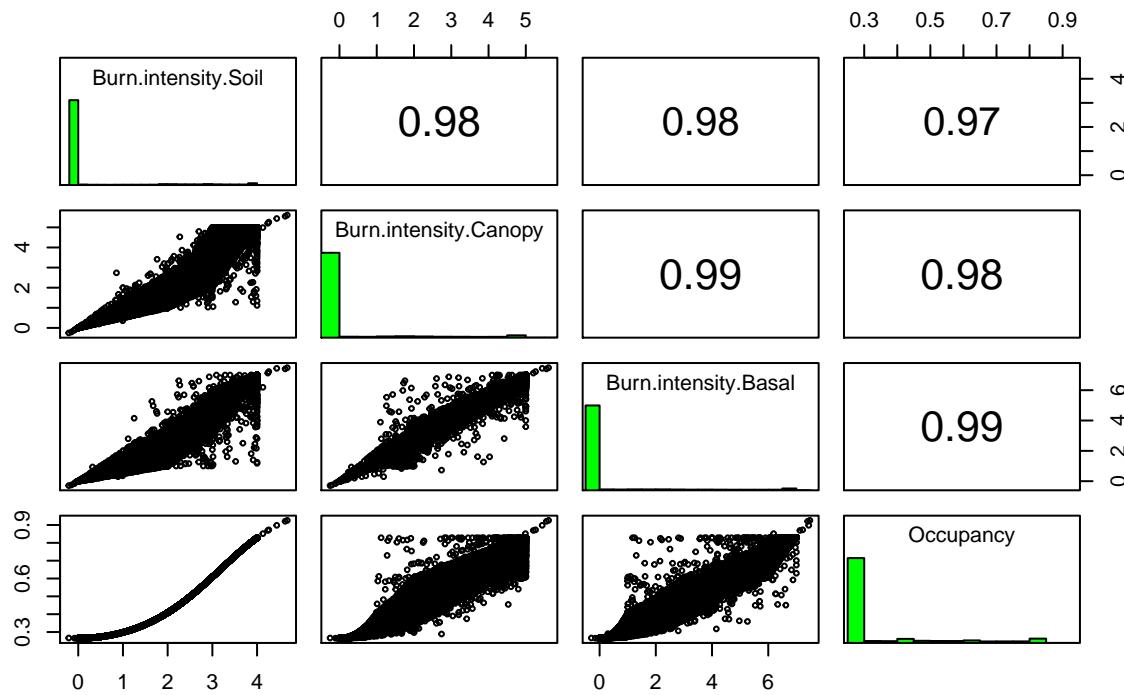
1.68

1.81

1.87

1.93





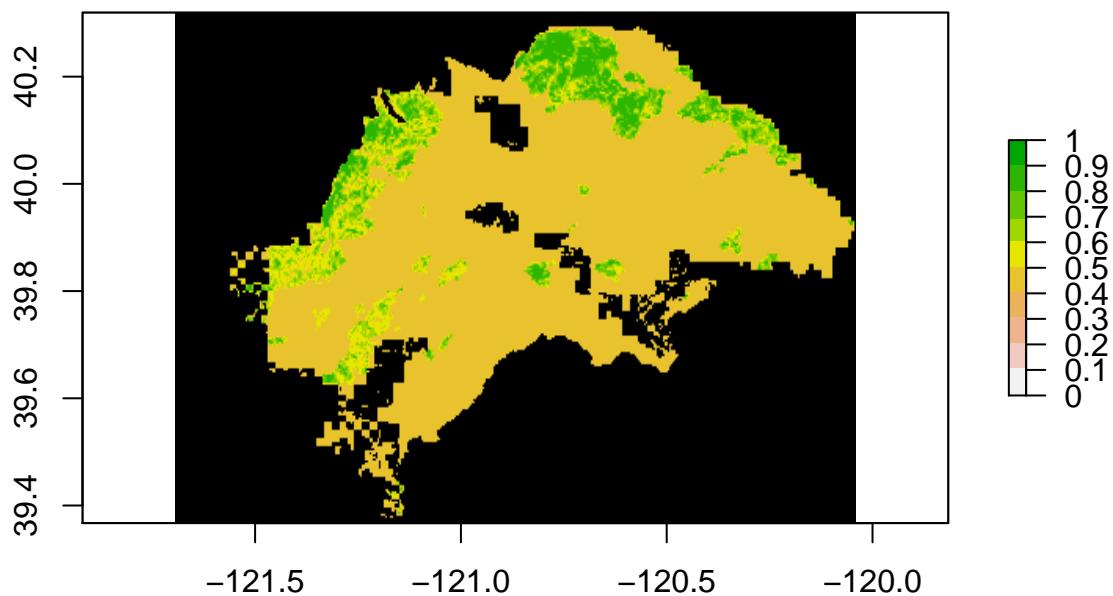
### silver-haired bat (*Lasionycteris noctivagans*)

```
##   doing row 1000 of 108500
##   doing row 2000 of 108500
##   doing row 3000 of 108500
##   doing row 4000 of 108500
##   doing row 5000 of 108500
##   doing row 6000 of 108500
##   doing row 7000 of 108500
##   doing row 8000 of 108500
##   doing row 9000 of 108500
##   doing row 10000 of 108500
##   doing row 11000 of 108500
##   doing row 12000 of 108500
##   doing row 13000 of 108500
##   doing row 14000 of 108500
##   doing row 15000 of 108500
##   doing row 16000 of 108500
##   doing row 17000 of 108500
##   doing row 18000 of 108500
##   doing row 19000 of 108500
##   doing row 20000 of 108500
##   doing row 21000 of 108500
##   doing row 22000 of 108500
##   doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## 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

Model 19

Model 20

Model 21

Model 22

Model 23

Model 24

Model 25

Model 26

Model 27

Model 28

Model 29

Model 30

psi(Int)

-0.28

-0.29

-0.30

-0.34

-0.22

-0.05

-0.29

-0.26

-0.23

-0.27

-0.22

-0.18

-0.30

-0.31

-0.35

-0.28

-0.32

-0.27

-0.27

-0.11

-0.28

-0.33

-0.29  
-0.19  
-0.16  
0.28  
0.19  
-0.17  
0.20  
0.16  
(0.40)  
(0.41)  
(0.41)  
(0.42)  
(0.42)  
(0.56)  
(0.39)  
(0.40)  
(0.44)  
(0.45)  
(0.43)  
(0.38)  
(0.40)  
(0.41)  
(0.42)  
(0.41)  
(0.43)  
(0.41)  
(0.40)  
(0.41)  
(0.41)  
(0.42)  
(0.41)  
(0.37)  
(0.38)  
(0.37)  
(0.32)  
(0.38)

(0.32)  
(0.31)  
psi(I(Burn.intensity.soil^2))  
0.12  
0.11  
0.11  
0.11  
0.12  
(0.07)  
(0.07)  
(0.06)  
(0.07)  
(0.07)  
p(Int)  
0.91  
0.91  
0.91  
0.91  
1.23  
6.30\*  
1.02  
0.19  
1.31  
1.28  
1.25  
0.91  
1.02  
1.02  
1.02  
0.19  
0.20  
0.19  
0.99  
1.28  
0.95  
0.93

0.91  
1.01  
0.18  
1.45  
0.89  
0.98  
0.14  
1.04  
(0.48)  
(0.48)  
(0.48)  
(0.48)  
(1.03)  
(3.07)  
(0.79)  
(0.72)  
(1.04)  
(1.04)  
(1.04)  
(0.48)  
(0.79)  
(0.79)  
(0.79)  
(0.72)  
(0.72)  
(0.72)  
(3.14)  
(1.04)  
(3.12)  
(3.12)  
(3.11)  
(0.79)  
(0.72)  
(1.04)  
(0.49)  
(3.14)

(0.74)

(0.79)

p(sdhum)

-0.04

-0.04

-0.04

-0.04

-0.04

-0.03

(0.04)

(0.04)

(0.04)

(0.04)

(0.04)

(0.04)

(0.04)

psi(Burn.intensity.basal)

0.27

-72.83

0.25

0.25

0.25

0.26

(0.16)

(85.88)

(0.15)

(0.15)

(0.15)

(0.15)

psi(Burn.intensity.Canopy)

0.36

102.16

0.35

0.34

0.34

0.35

(0.21)

(120.18)  
(0.21)  
(0.20)  
(0.21)  
(0.21)

psi(Burn.intensity.soil)

0.39

0.38

0.38

0.38

0.39

(0.22)

(0.23)

(0.22)

(0.22)

(0.22)

p(Meantemp)

-0.05

-0.15\*\*

-0.06

-0.06

-0.06

-0.06

-0.07

(0.08)

(0.06)

(0.08)

(0.08)

(0.08)

(0.08)

(0.08)

(0.08)

(0.08)

p(Julian)

-0.02

-0.00

-0.00

-0.00

-0.00  
-0.00  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
(0.02)  
p(sdtemp)  
-0.11  
-0.11  
-0.11  
-0.11  
-0.11  
-0.12  
(0.18)  
(0.18)  
(0.18)  
(0.18)  
(0.18)  
(0.18)  
p(Meanhum)  
0.01  
0.01  
0.01  
0.01  
0.01  
0.01  
(0.01)  
(0.01)  
(0.01)  
(0.01)  
(0.01)  
(0.01)  
psi(I(Burn.intensity.Canopy^2))  
0.08

0.07  
0.07  
0.07  
0.08  
(0.06)  
(0.05)  
(0.05)  
(0.05)  
(0.05)

Log Likelihood

-72.91

-73.03

-73.04

-73.06

-73.09

-70.50

-73.14

-73.16

-73.18

-73.20

-73.22

-73.24

-73.27

-73.27

-73.28

-73.29

-73.30

-73.30

-73.31

-73.41

-73.44

-73.44

-73.45

-73.49

-73.51

-74.78

-74.82

-73.65

-74.97

-74.97

AICc

154.80

155.03

155.05

155.10

155.15

155.16

155.26

155.30

155.34

155.37

155.41

155.45

155.52

155.52

155.53

155.56

155.57

155.57

155.59

155.79

155.86

155.86

155.87

155.96

155.99

156.13

156.21

156.29

156.51

156.51

Delta

0.00  
0.23  
0.25  
0.30  
0.36  
0.36  
0.46  
0.51  
0.54  
0.57  
0.61  
0.66  
0.72  
0.73  
0.73  
0.77  
0.77  
0.77  
0.79  
0.99  
1.06  
1.07  
1.07  
1.16  
1.19  
1.34  
1.41  
1.49  
1.71  
1.71

Weight  
0.01  
0.01  
0.01  
0.01  
0.01

Num. obs.

46

46

46

46

46

46

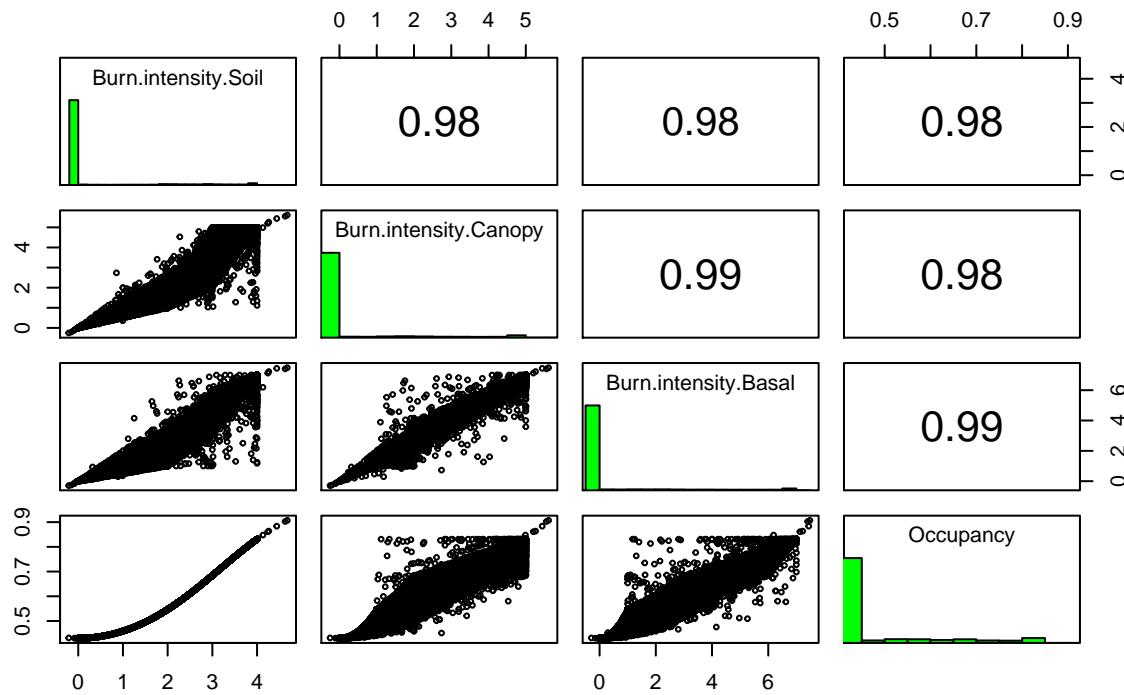
46

46

46

46





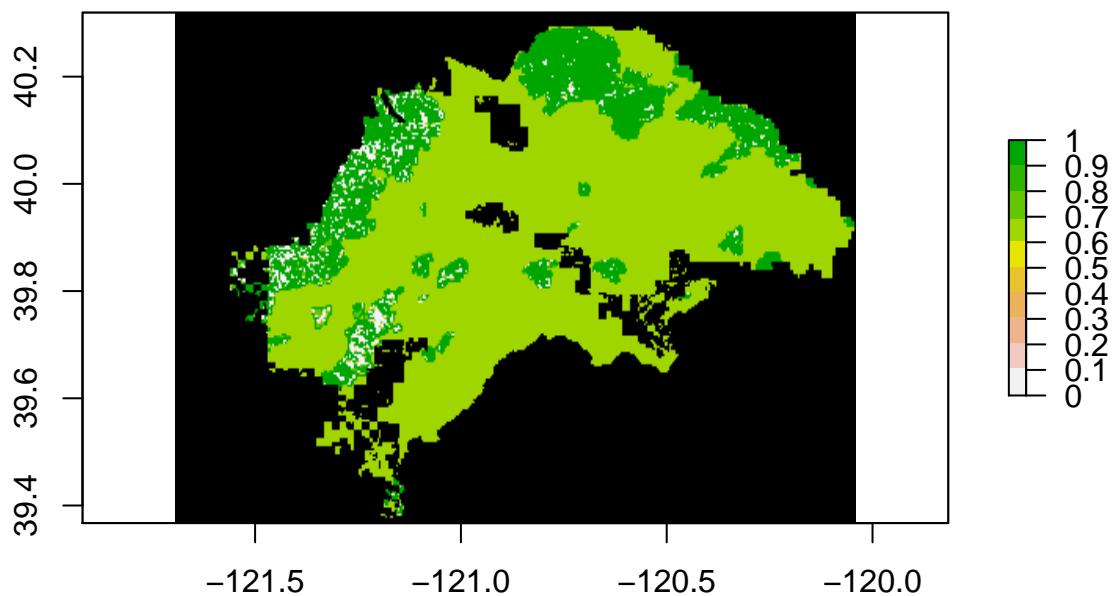
### Brazilian free-tailed bat (*Tadarida brasiliensis*)

```
##   doing row 1000 of 108500
##   doing row 2000 of 108500
##   doing row 3000 of 108500
##   doing row 4000 of 108500
##   doing row 5000 of 108500
##   doing row 6000 of 108500
##   doing row 7000 of 108500
##   doing row 8000 of 108500
##   doing row 9000 of 108500
##   doing row 10000 of 108500
##   doing row 11000 of 108500
##   doing row 12000 of 108500
##   doing row 13000 of 108500
##   doing row 14000 of 108500
##   doing row 15000 of 108500
##   doing row 16000 of 108500
##   doing row 17000 of 108500
##   doing row 18000 of 108500
##   doing row 19000 of 108500
##   doing row 20000 of 108500
##   doing row 21000 of 108500
##   doing row 22000 of 108500
##   doing row 23000 of 108500
```

```
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
```

```
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Brazilian free-tailed bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

$\psi(\text{Int})$

0.67

0.66

0.65

0.58

0.63

0.63

0.65

0.65

(0.52)  
(0.52)  
(0.51)  
(0.50)  
(0.50)  
(0.51)  
(0.50)  
(0.53)

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

49.86

36.53

43.11

37.50

52.44

125.52

31.07

104.32

(55.40)

(40.20)

(44.06)

(40.93)

(61.19)

(121.57)

(31.39)

(546.06)

psi(Burn.intensity.Canopy)

27.36

23.63

29.11

-5.58

(32.65)

(25.17)

(36.51)

(3513.16)

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

-77.04

-59.20

-66.55

-60.75

-81.24

-207.99

-50.31

-174.69

(86.92)

(66.55)

(68.39)

(67.07)

(96.48)

(202.05)

(51.07)

(363.88)

p(Int)

0.96

0.98

0.24

0.24

3.87

0.23

3.77

0.97

(0.72)

(0.72)

(0.62)

(0.62)

(2.69)

(0.62)

(2.69)

(0.72)

p(Meantemp)

-0.04

-0.04

-0.04

(0.05)

(0.05)

(0.05)

psi(Burn.intensity.basal)

22.70

23.45

102.91

19.30

77.29

(27.31)

(27.12)

(106.67)

(20.35)

(3731.70)

p(Meanhum)

0.00

0.00

0.00

0.00

0.00

(0.01)

(0.01)

(0.01)

(0.01)

(0.01)

p(Julian)

-0.02

-0.02

(0.01)

(0.01)

psi(Burn.intensity.soil)

-10.90

(16.17)

Log Likelihood

-81.47

-81.62

-81.75

-81.79

-80.52

-80.81

-80.82

-80.86

AICc

177.09

177.39

177.66

177.73

177.99

178.56

178.58

178.67

Delta

0.00

0.30

0.57

0.64

0.90

1.47

1.49

1.58

Weight

0.07

0.06

0.05

0.05

0.05

0.03

0.03

0.03

Num. obs.

46

46

46

46

46

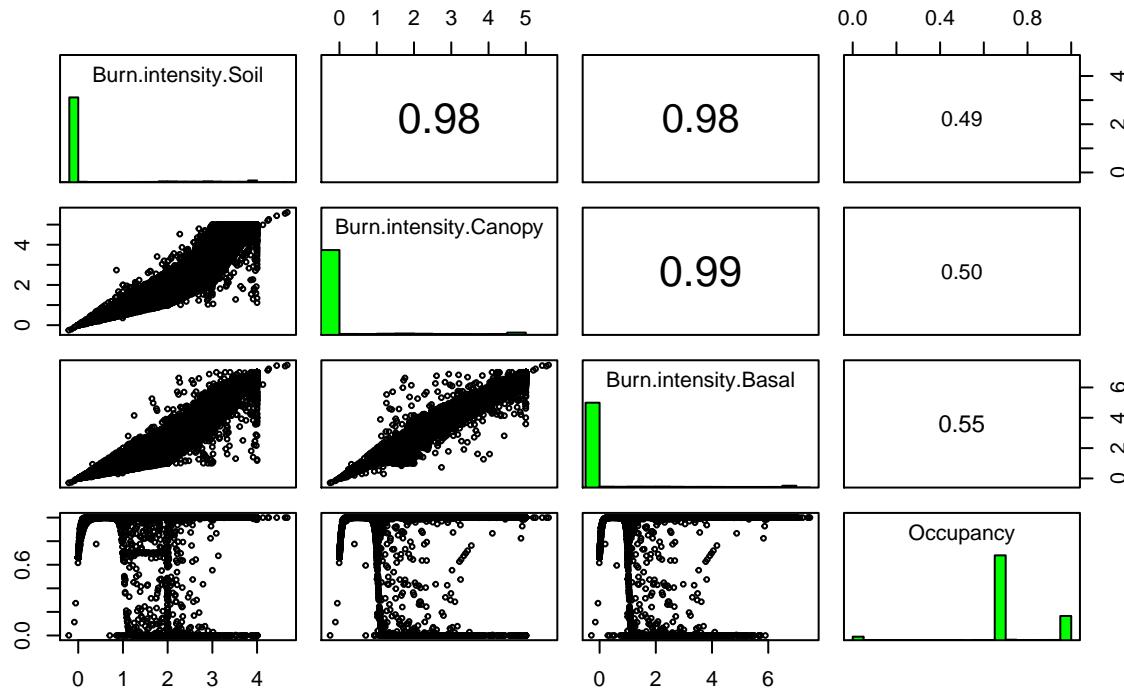
46

46

46

46

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



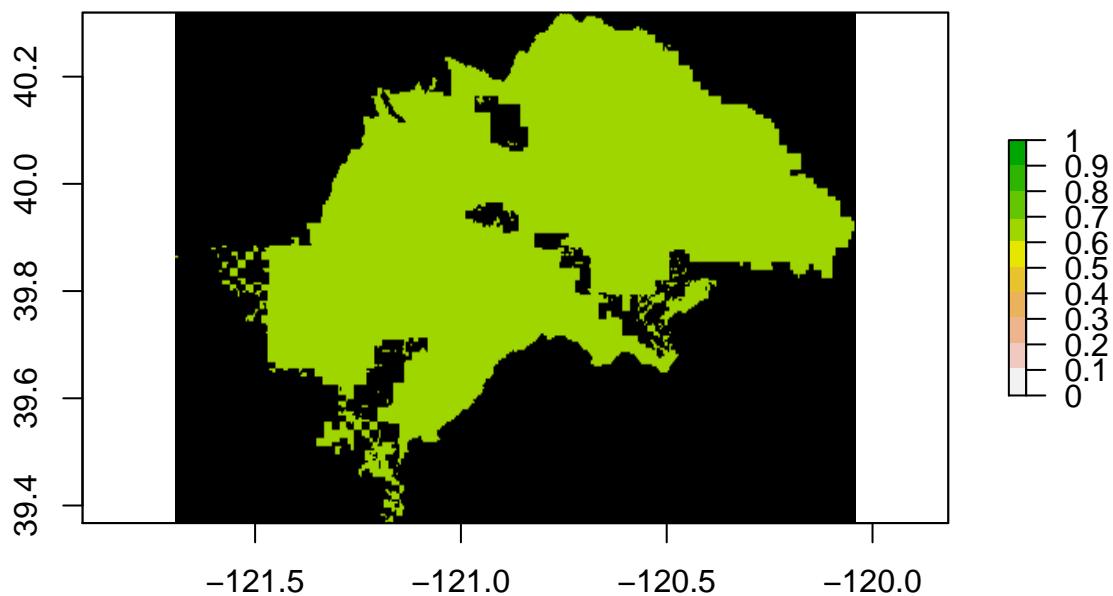
### hoary bat (*Lasiurus cinereus*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
```

```
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
```

```
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Hoary Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

$\psi(\text{Int})$

0.76

0.94

0.85

1.10

0.84

(0.47)

(0.66)

(0.52)

(0.75)

(0.63)

$p(\text{Int})$

5.86
6.44*
5.03
5.30
6.63*
(3.00)
(2.66)
(3.04)
(2.76)
(2.67)
p(Julian)
-0.03
-0.04*
-0.03
-0.03*
-0.04*
(0.02)
(0.01)
(0.02)
(0.01)
(0.01)
psi(Burn.intensity.basal)
45.01
55.57
45.56
(31.73)
(42.64)
(34.26)
psi(I(Burn.intensity.basal^2))
-1.46
-1.82
-1.17
(1.16)
(1.57)
(1.01)
psi(Burn.intensity.Canopy)

-47.16  
-58.12  
-52.69  
(32.68)  
(43.85)  
(40.19)  
 $p(\text{Meanhum})$   
0.01  
0.01  
(0.01)  
(0.01)  
 $\psi(\text{Burn.intensity.soil})$   
3.31  
(4.73)  
Log Likelihood  
-78.56  
-75.13  
-77.89  
-74.27  
-74.29  
AICc  
163.68  
164.41  
164.75  
165.49  
165.53  
Delta  
0.00  
0.73  
1.07  
1.81  
1.85  
Weight  
0.04  
0.03  
0.02

0.02

0.02

Num. obs.

46

46

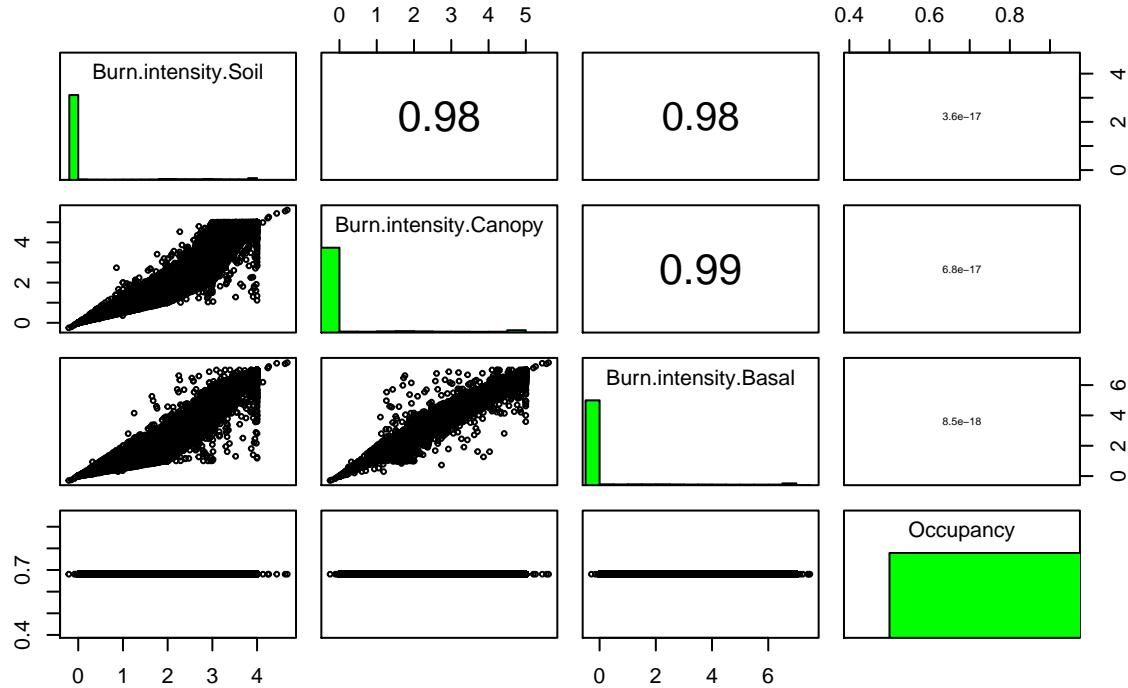
46

46

46

46

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



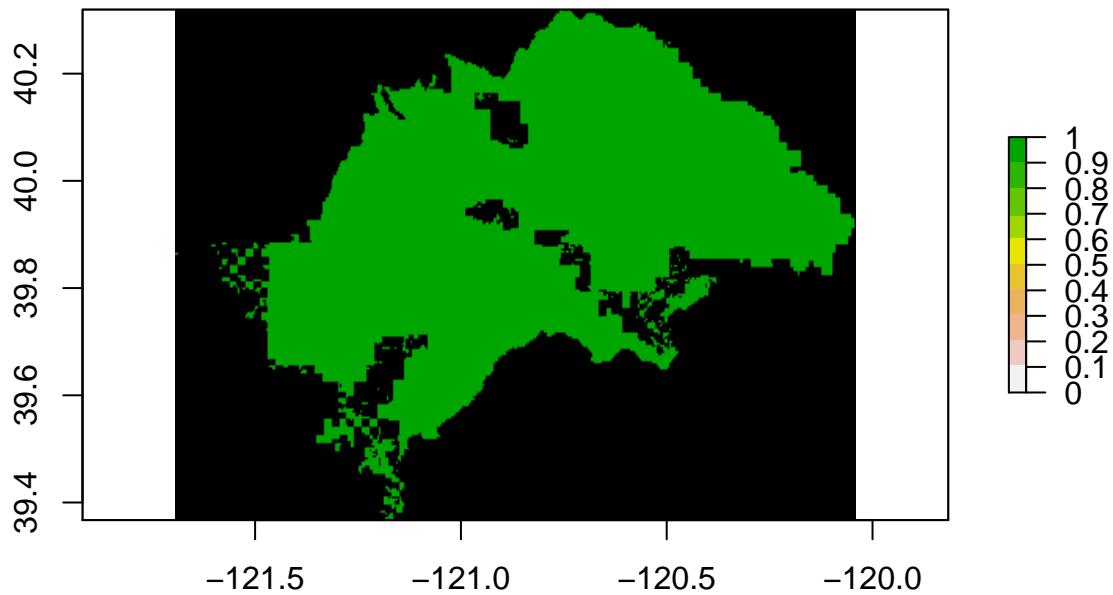
### Spotted bat (*Euderma maculatum*)

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
```

```
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
```

```
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
##  doing row 107000 of 108500
##  doing row 108000 of 108500
```

## Occupancy estimation for Spotted Bat



Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Model 9

$\psi(\text{Int})$

8.31

7.98

-0.90

-0.82

-0.45

-0.08

-0.36

5.89	
-0.28	
(89.85)	
(65.83)	
(1.92)	
(1.99)	
(2.28)	
(1.17)	
(2.35)	
(21.66)	
(2.28)	
p(Int)	
1.33	
-0.23	
1.69	
1.70	
1.59	
4.76	
1.58	
5.63	
1.57	
(2.14)	
(2.60)	
(2.12)	
(2.15)	
(2.14)	
(4.55)	
(2.15)	
(6.45)	
(2.16)	
p(Meanhum)	
-0.11	
-0.14	
-0.10	
-0.10	
-0.10	

-0.27  
-0.11  
-0.11  
-0.11  
(0.06)  
(0.07)  
(0.06)  
(0.06)  
(0.06)  
(0.19)  
(0.06)  
(0.06)  
(0.06)  
p(sdtemp)  
0.62  
(0.50)  
psi(I(Burn.intensity.basal^2))  
0.19  
(0.22)  
psi(I(Burn.intensity.Canopy^2))  
0.30  
(0.36)  
psi(Burn.intensity.basal)  
0.68  
(0.90)  
p(sdhum)  
0.35  
(0.28)  
psi(Burn.intensity.Canopy)  
0.87  
(1.24)  
p(Julian)  
-0.02  
(0.03)  
psi(I(Burn.intensity.soil^2))  
0.36

(0.59)

Log Likelihood

-10.76

-9.89

-10.31

-10.36

-10.50

-10.50

-10.52

-10.52

-10.52

AICc

28.09

28.75

29.60

29.69

29.97

29.98

30.02

30.02

30.02

Delta

0.00

0.66

1.51

1.60

1.88

1.89

1.93

1.93

1.93

Weight

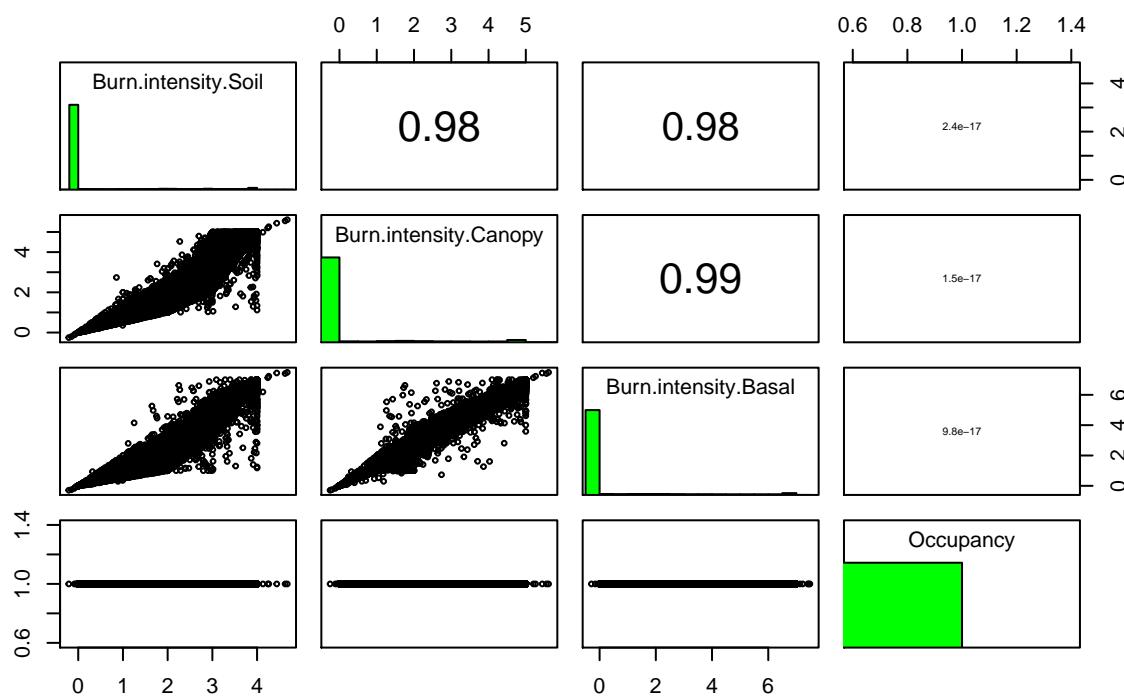
0.03

0.02

0.01

0.01

0.01  
0.01  
0.01  
0.01  
0.01  
Num. obs.  
46  
46  
46  
46  
46  
46  
46  
46  
46  
46  
*p < 0.001, p < 0.01, p < 0.05*



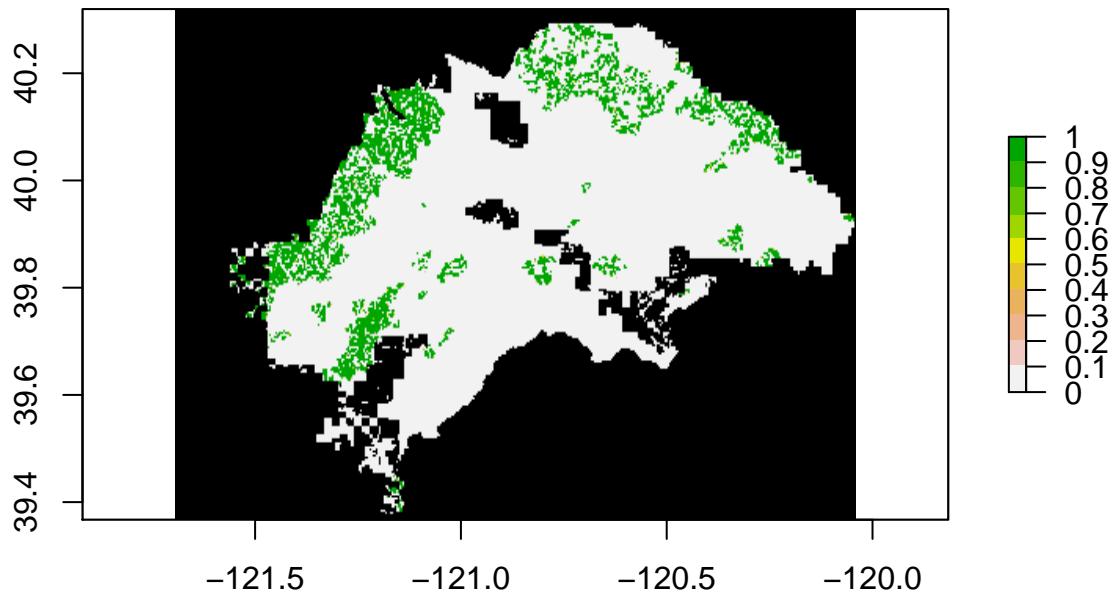
### **western mastiff bat (*Eumops perotis*)**

```
##  doing row 1000 of 108500
##  doing row 2000 of 108500
##  doing row 3000 of 108500
##  doing row 4000 of 108500
##  doing row 5000 of 108500
##  doing row 6000 of 108500
##  doing row 7000 of 108500
##  doing row 8000 of 108500
##  doing row 9000 of 108500
##  doing row 10000 of 108500
##  doing row 11000 of 108500
##  doing row 12000 of 108500
##  doing row 13000 of 108500
##  doing row 14000 of 108500
##  doing row 15000 of 108500
##  doing row 16000 of 108500
##  doing row 17000 of 108500
##  doing row 18000 of 108500
##  doing row 19000 of 108500
##  doing row 20000 of 108500
##  doing row 21000 of 108500
##  doing row 22000 of 108500
##  doing row 23000 of 108500
##  doing row 24000 of 108500
##  doing row 25000 of 108500
##  doing row 26000 of 108500
##  doing row 27000 of 108500
##  doing row 28000 of 108500
##  doing row 29000 of 108500
##  doing row 30000 of 108500
##  doing row 31000 of 108500
##  doing row 32000 of 108500
##  doing row 33000 of 108500
##  doing row 34000 of 108500
##  doing row 35000 of 108500
##  doing row 36000 of 108500
##  doing row 37000 of 108500
##  doing row 38000 of 108500
##  doing row 39000 of 108500
##  doing row 40000 of 108500
##  doing row 41000 of 108500
##  doing row 42000 of 108500
##  doing row 43000 of 108500
##  doing row 44000 of 108500
##  doing row 45000 of 108500
##  doing row 46000 of 108500
##  doing row 47000 of 108500
##  doing row 48000 of 108500
##  doing row 49000 of 108500
##  doing row 50000 of 108500
##  doing row 51000 of 108500
##  doing row 52000 of 108500
```

```
##  doing row 53000 of 108500
##  doing row 54000 of 108500
##  doing row 55000 of 108500
##  doing row 56000 of 108500
##  doing row 57000 of 108500
##  doing row 58000 of 108500
##  doing row 59000 of 108500
##  doing row 60000 of 108500
##  doing row 61000 of 108500
##  doing row 62000 of 108500
##  doing row 63000 of 108500
##  doing row 64000 of 108500
##  doing row 65000 of 108500
##  doing row 66000 of 108500
##  doing row 67000 of 108500
##  doing row 68000 of 108500
##  doing row 69000 of 108500
##  doing row 70000 of 108500
##  doing row 71000 of 108500
##  doing row 72000 of 108500
##  doing row 73000 of 108500
##  doing row 74000 of 108500
##  doing row 75000 of 108500
##  doing row 76000 of 108500
##  doing row 77000 of 108500
##  doing row 78000 of 108500
##  doing row 79000 of 108500
##  doing row 80000 of 108500
##  doing row 81000 of 108500
##  doing row 82000 of 108500
##  doing row 83000 of 108500
##  doing row 84000 of 108500
##  doing row 85000 of 108500
##  doing row 86000 of 108500
##  doing row 87000 of 108500
##  doing row 88000 of 108500
##  doing row 89000 of 108500
##  doing row 90000 of 108500
##  doing row 91000 of 108500
##  doing row 92000 of 108500
##  doing row 93000 of 108500
##  doing row 94000 of 108500
##  doing row 95000 of 108500
##  doing row 96000 of 108500
##  doing row 97000 of 108500
##  doing row 98000 of 108500
##  doing row 99000 of 108500
##  doing row 100000 of 108500
##  doing row 101000 of 108500
##  doing row 102000 of 108500
##  doing row 103000 of 108500
##  doing row 104000 of 108500
##  doing row 105000 of 108500
##  doing row 106000 of 108500
```

```
##   doing row 107000 of 108500  
##   doing row 108000 of 108500
```

### Occupancy estimation for western mastiff bat



#### Statistical models

Model 1

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

psi(Int)

-14.29

-24.26

-19.30

-6.08

-6.26

-9.75

-9.16

(15.09)  
 (22.68)  
 (17.06)  
 (5.35)  
 (5.92)  
 (41.78)  
 (9.44)  
 $\text{psi}(\text{I}(\text{Burn.intensity.basal}^2))$   
 -56.81  
 -8.15  
 -40.39  
 -44.75  
 -49.31  
 -81.40  
 -28.02  
 (57.02)  
 (6.27)  
 (32.69)  
 (36.20)  
 (39.86)  
 (138.86)  
 (23.57)  
 $\text{psi}(\text{I}(\text{Burn.intensity.Canopy}^2))$   
 124.07  
 71.22  
 80.41  
 88.54  
 175.33  
 49.78  
 (125.00)  
 (58.11)  
 (64.97)  
 (71.54)  
 (304.89)  
 (42.15)  
 $\text{psi}(\text{I}(\text{Burn.intensity.soil}^2))$

-19.71	
15.34	
-20.09	
(20.27)	
(11.71)	
(54.40)	
p(Int)	
1.41	
-1.11*	
1.67	
0.68	
-0.38	
1.61	
1.51	
(1.55)	
(0.47)	
(1.53)	
(1.49)	
(1.73)	
(1.53)	
(1.54)	
p(Meantemp)	
-0.19	
-0.20	
-0.16	
-0.23	
-0.20	
-0.19	
(0.10)	
(0.10)	
(0.11)	
(0.12)	
(0.10)	
(0.10)	
psi(Burn.intensity.Canopy)	
103.76	

46.67  
(79.75)  
(36.27)

psi(Burn.intensity.soil)

-96.42

-36.89

-20.24

-22.64

(72.99)

(28.44)

(46.22)

(18.42)

p(sdttemp)

0.60

(0.42)

psi(Burn.intensity.basal)

20.16

(16.76)

Log Likelihood

-13.56

-13.71

-12.64

-15.45

-14.32

-12.95

-12.96

AICc

41.26

41.43

42.23

42.41

42.80

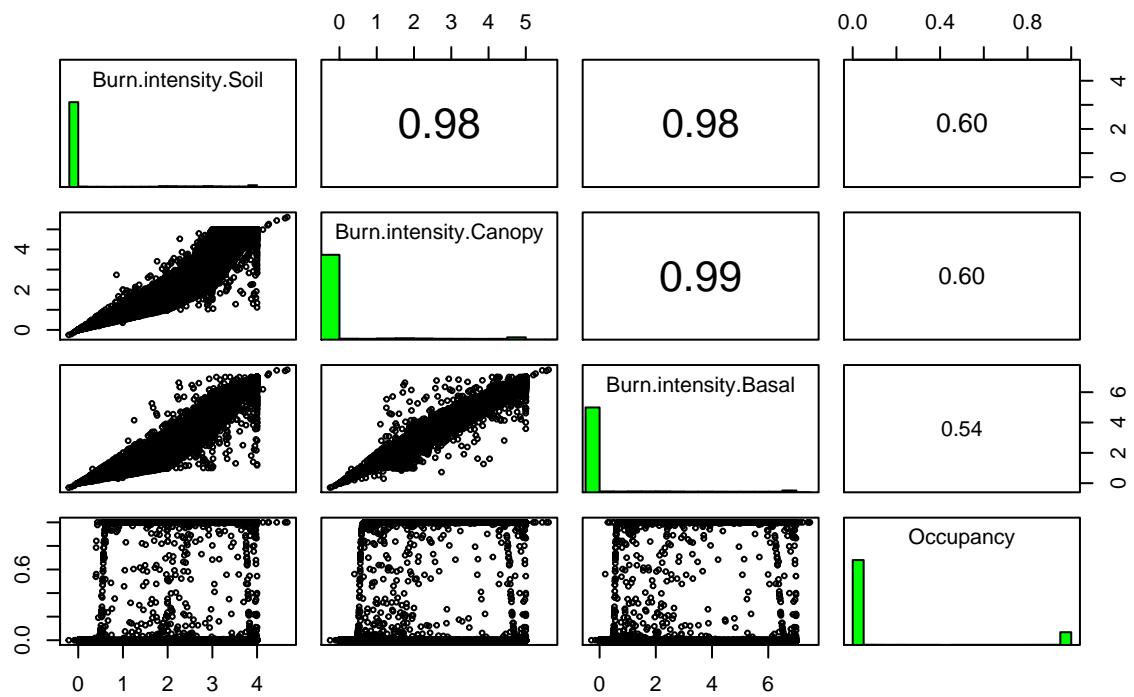
42.86

42.87

Delta

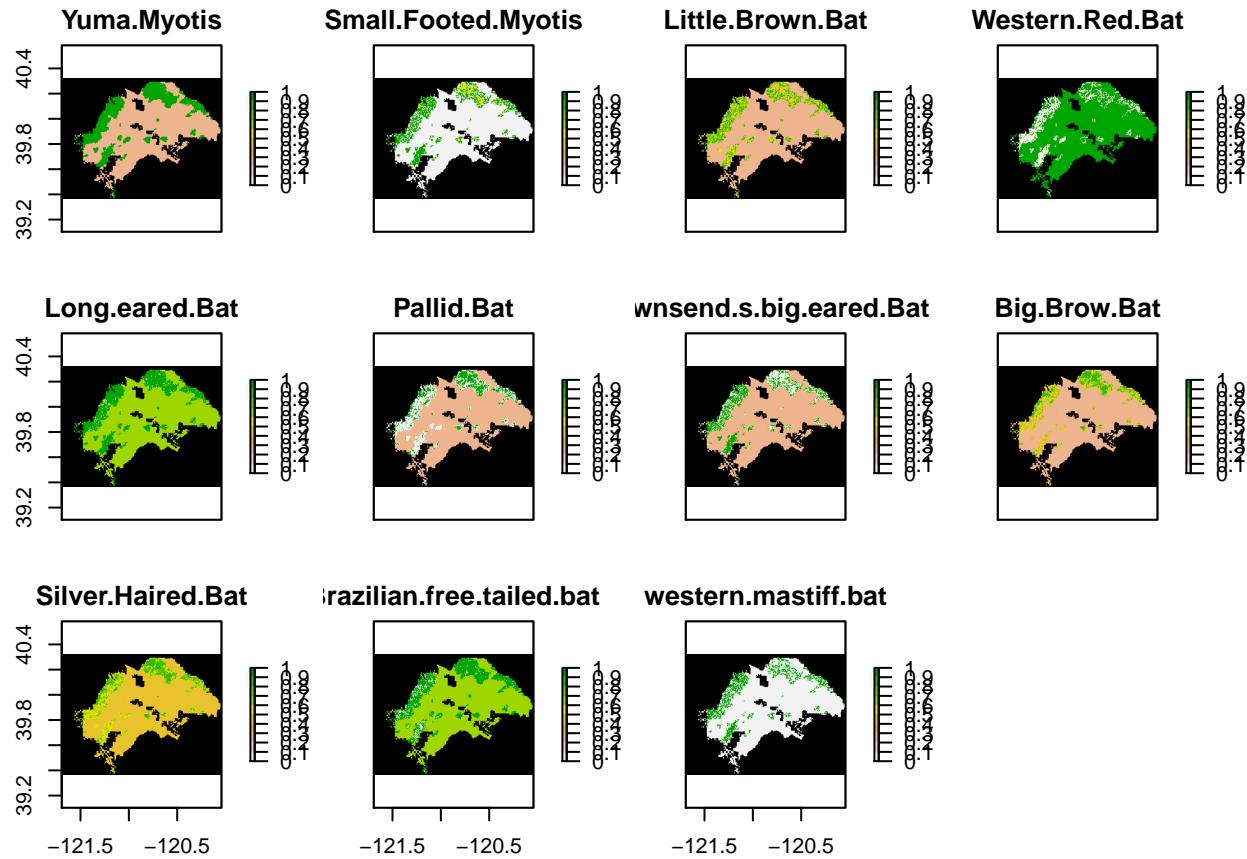
0.00

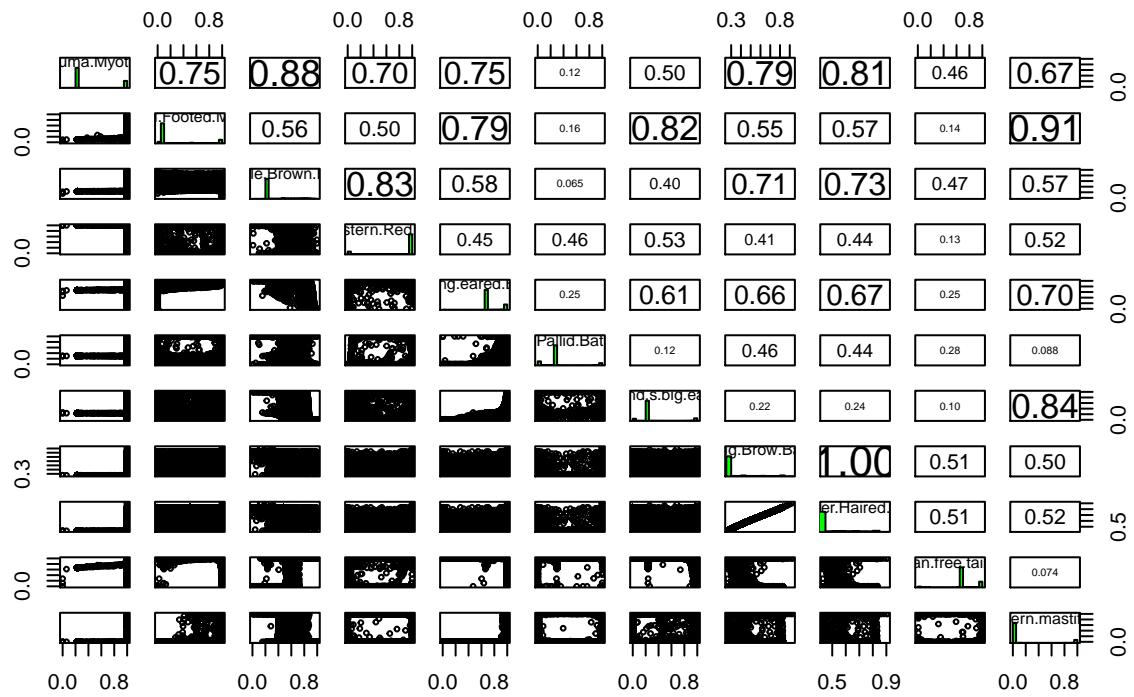
0.17
0.97
1.14
1.53
1.59
1.60
Weight
0.04
0.03
0.02
0.02
0.02
0.02
0.02
Num. obs.
46
46
46
46
46
46
46
$p < 0.001, p < 0.01, p < 0.05$

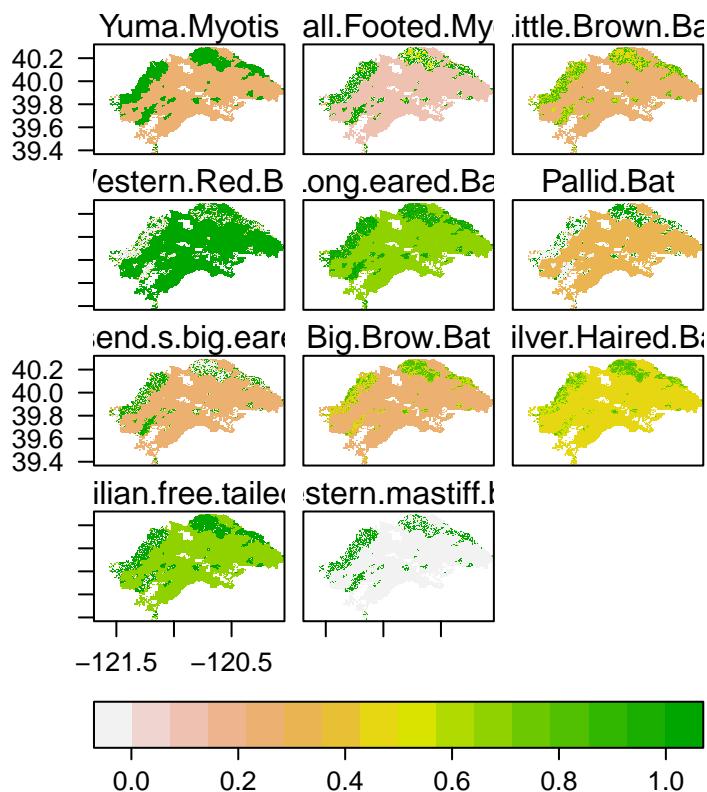


## Relationships between different species of Bats

### Fire bats

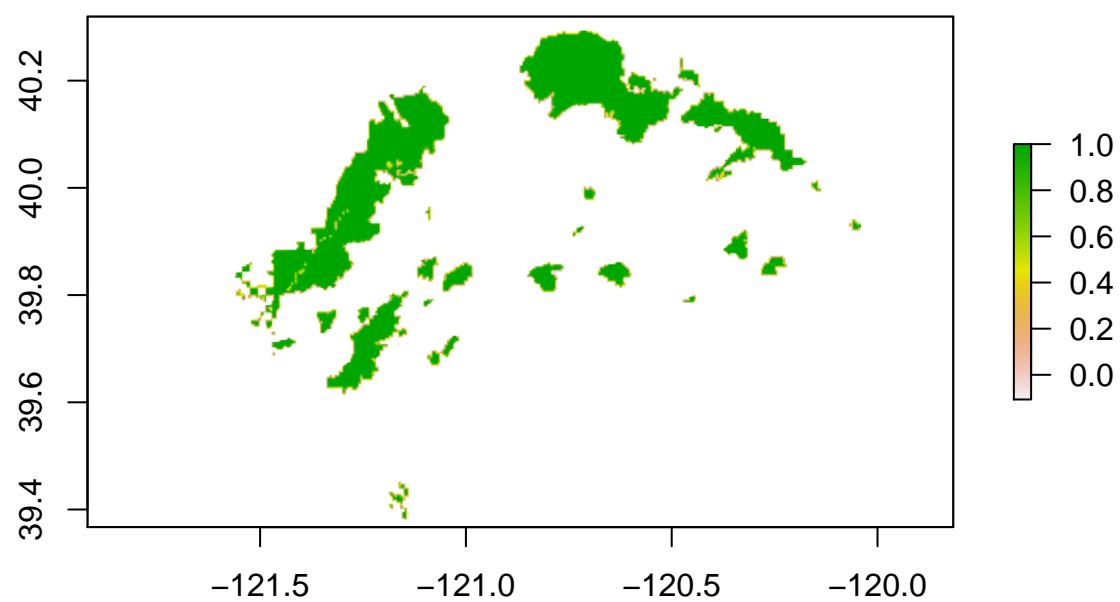


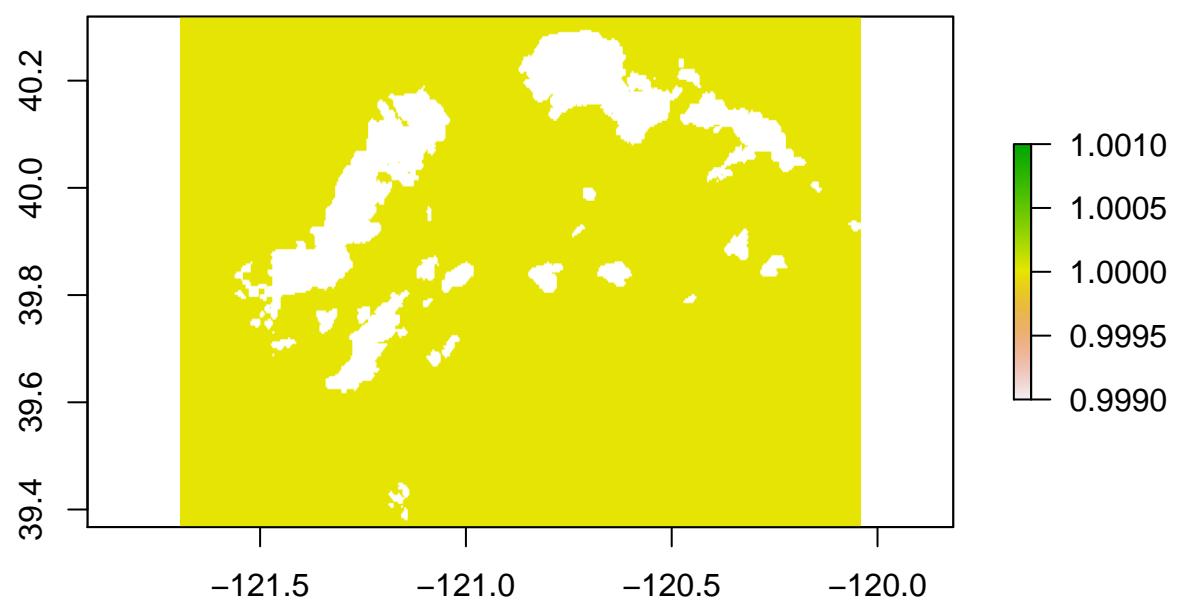




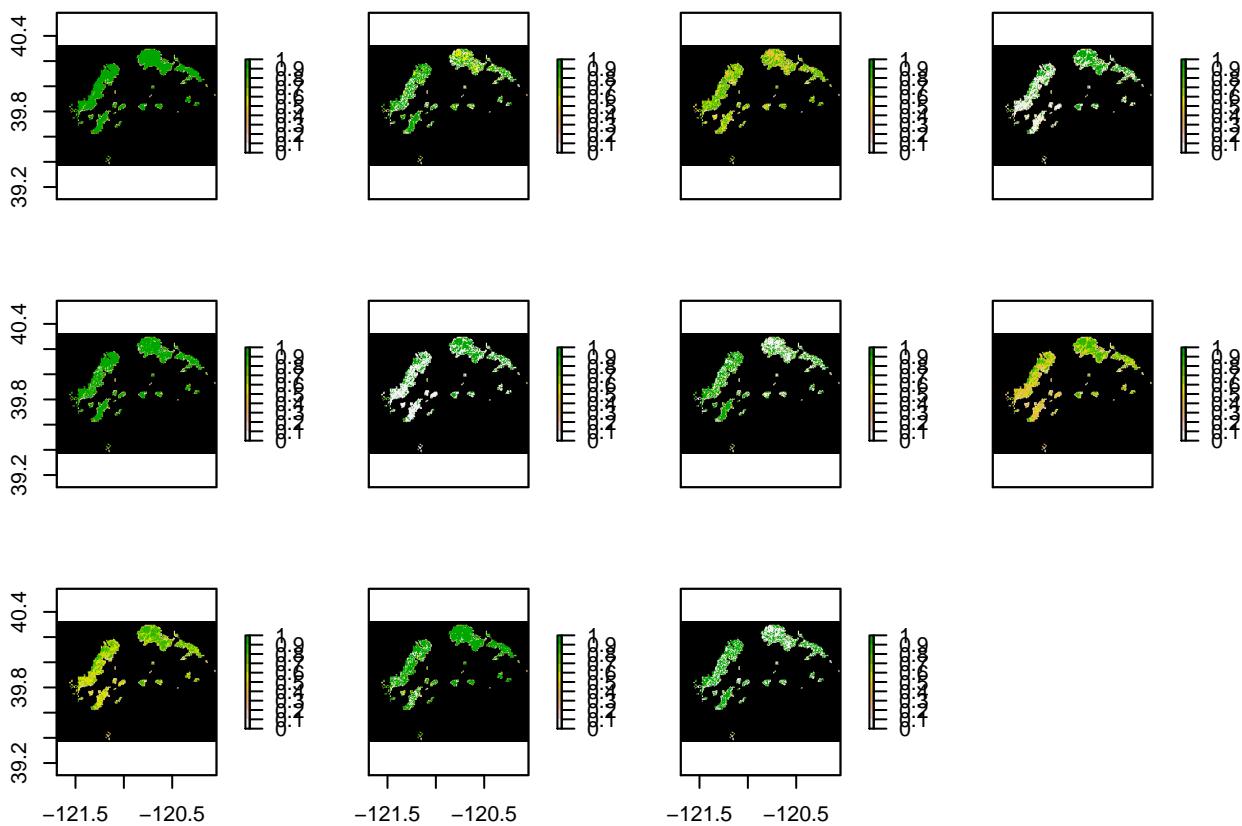
```
## ~/new_bats/Rnew_bats/Bats_data_products/fire.asc has GDAL driver AAIGrid
## and has 250 rows and 434 columns
```

```
## ~/new_bats/Rnew_bats/Bats_data_products/not_fire.asc has GDAL driver AAIGrid
## and has 250 rows and 434 columns
```

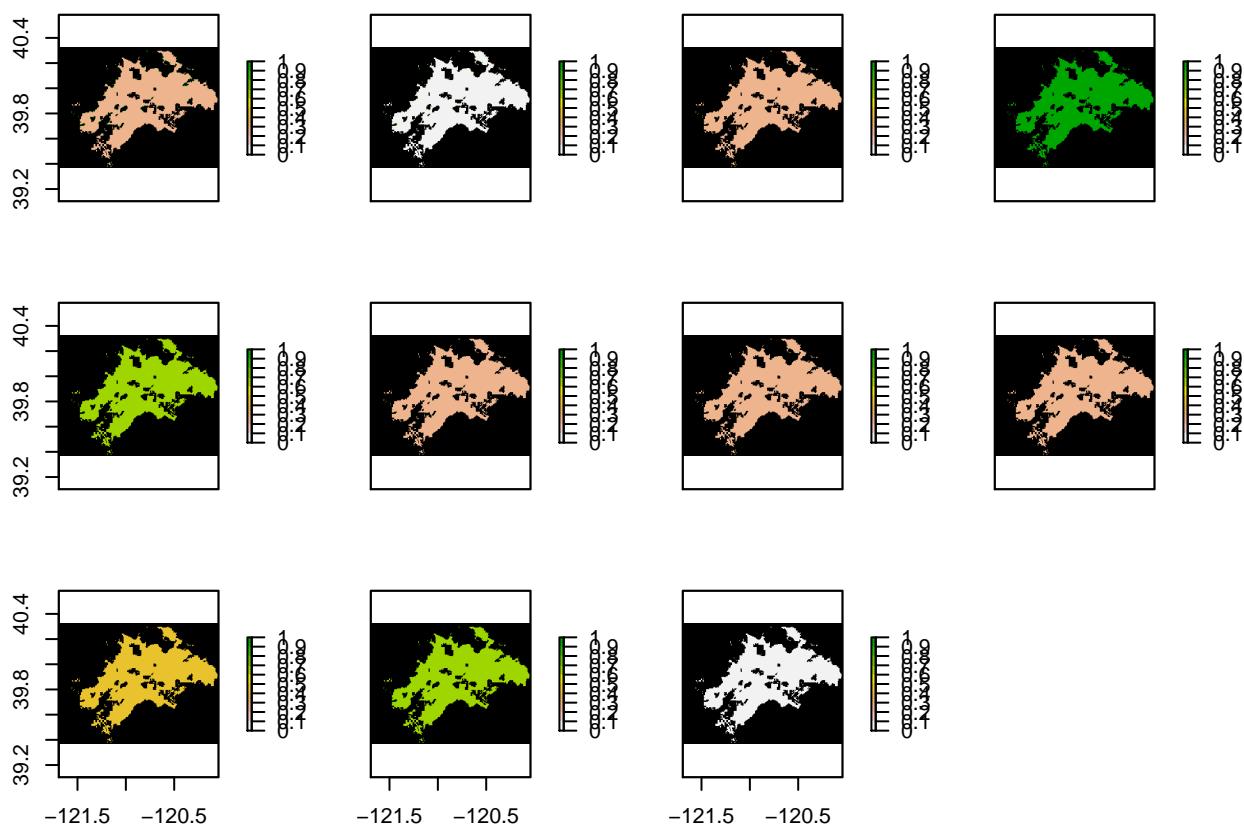


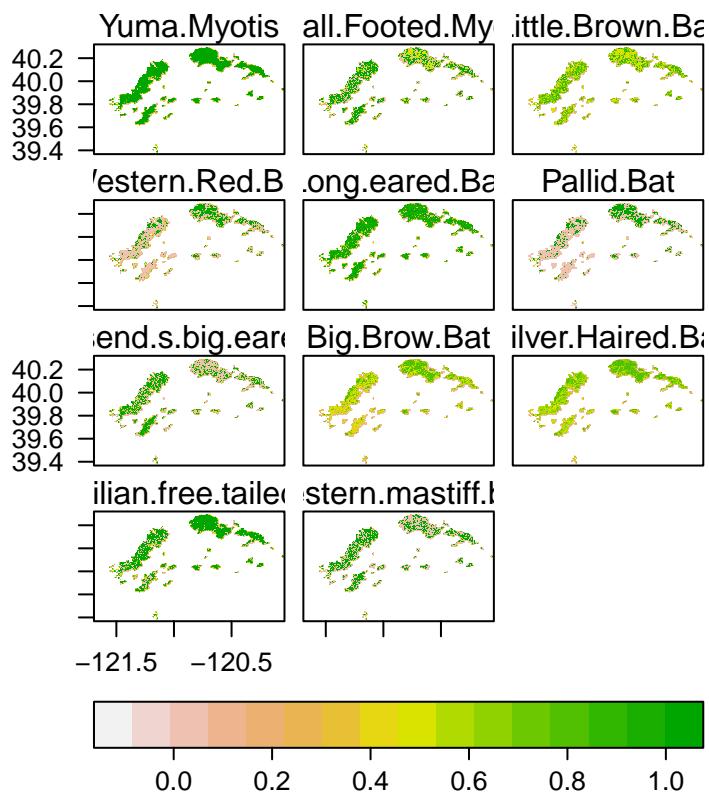


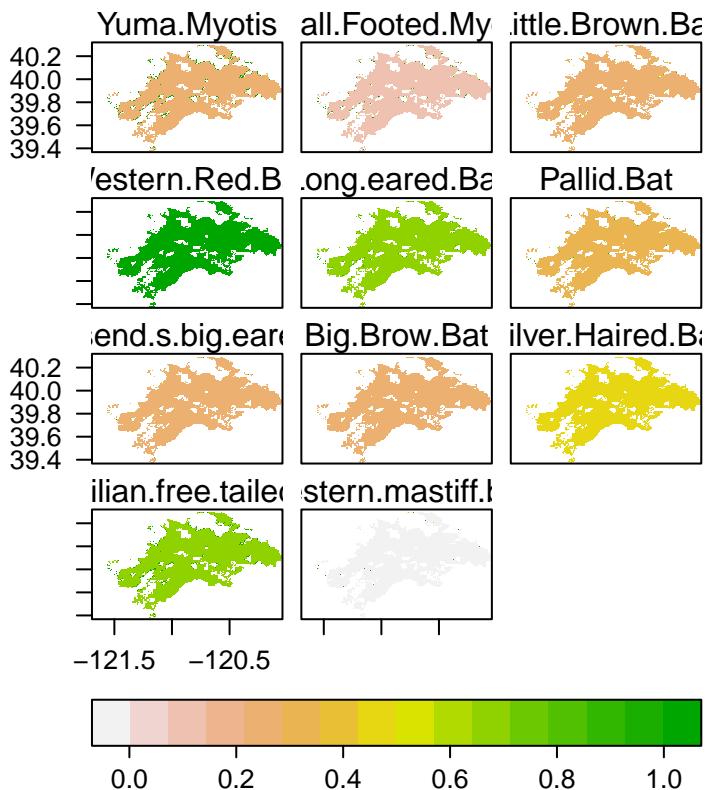
**Fire**



**Not Fire**







	with.fire1	without.fire1	with.fire.sd1
Yuma.Myotis	0.88	0.24	0.26
Small.Footed.Myotis	0.58	0.10	0.42
Little.Brown.Bat	0.58	0.24	0.24
Western.Red.Bat	0.37	1.00	0.44
Long.eared.Bat	0.82	0.66	0.31
Pallid.Bat	0.33	0.30	0.46
Townsend.s.big.eared.Bat	0.49	0.24	0.45
Big.Brow.Bat	0.51	0.27	0.24
Silver.Haired.Bat	0.58	0.43	0.22
Brazilian.free.taile	0.75	0.67	0.38
western.mastiff.bat	0.49	0.00	0.48

```
##
## One Sample t-test
##
## data: myyu
## t = 253.5, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.2397871
## 95 percent confidence interval:
##  0.8725485 0.8824104
## sample estimates:
## mean of x
## 0.8774795
```

```

##  

##  One Sample t-test  

##  

## data: myci  

## t = 118.8, df = 10955, p-value < 2.2e-16  

## alternative hypothesis: true mean is not equal to 0.1033723  

## 95 percent confidence interval:  

##  0.5752952 0.5911300  

## sample estimates:  

## mean of x  

## 0.5832126

##  

##  One Sample t-test  

##  

## data: mylu  

## t = 148.19, df = 10955, p-value < 2.2e-16  

## alternative hypothesis: true mean is not equal to 0.2356016  

## 95 percent confidence interval:  

##  0.5756692 0.5847865  

## sample estimates:  

## mean of x  

## 0.5802279

##  

##  One Sample t-test  

##  

## data: labl  

## t = -150.7, df = 10955, p-value < 2.2e-16  

## alternative hypothesis: true mean is not equal to 0.9997946  

## 95 percent confidence interval:  

##  0.3610113 0.3774160  

## sample estimates:  

## mean of x  

## 0.3692137

##  

##  One Sample t-test  

##  

## data: myev  

## t = 51.977, df = 10955, p-value < 2.2e-16  

## alternative hypothesis: true mean is not equal to 0.6649493  

## 95 percent confidence interval:  

##  0.8130864 0.8246974  

## sample estimates:  

## mean of x  

## 0.8188919

##  

##  One Sample t-test  

##  

## data: anpa  

## t = 8.0984, df = 10955, p-value = 6.161e-16

```

```

## alternative hypothesis: true mean is not equal to 0.2968227
## 95 percent confidence interval:
##  0.3236638 0.3408068
## sample estimates:
## mean of x
## 0.3322353

##
## One Sample t-test
##
## data: coto
## t = 57.729, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.2372795
## 95 percent confidence interval:
##  0.4771470 0.4940088
## sample estimates:
## mean of x
## 0.4855779

##
## One Sample t-test
##
## data: epfu
## t = 105.91, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.2654047
## 95 percent confidence interval:
##  0.5020413 0.5109656
## sample estimates:
## mean of x
## 0.5065034

##
## One Sample t-test
##
## data: lano
## t = 70.243, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.430335
## 95 percent confidence interval:
##  0.5755415 0.5838783
## sample estimates:
## mean of x
## 0.5797099

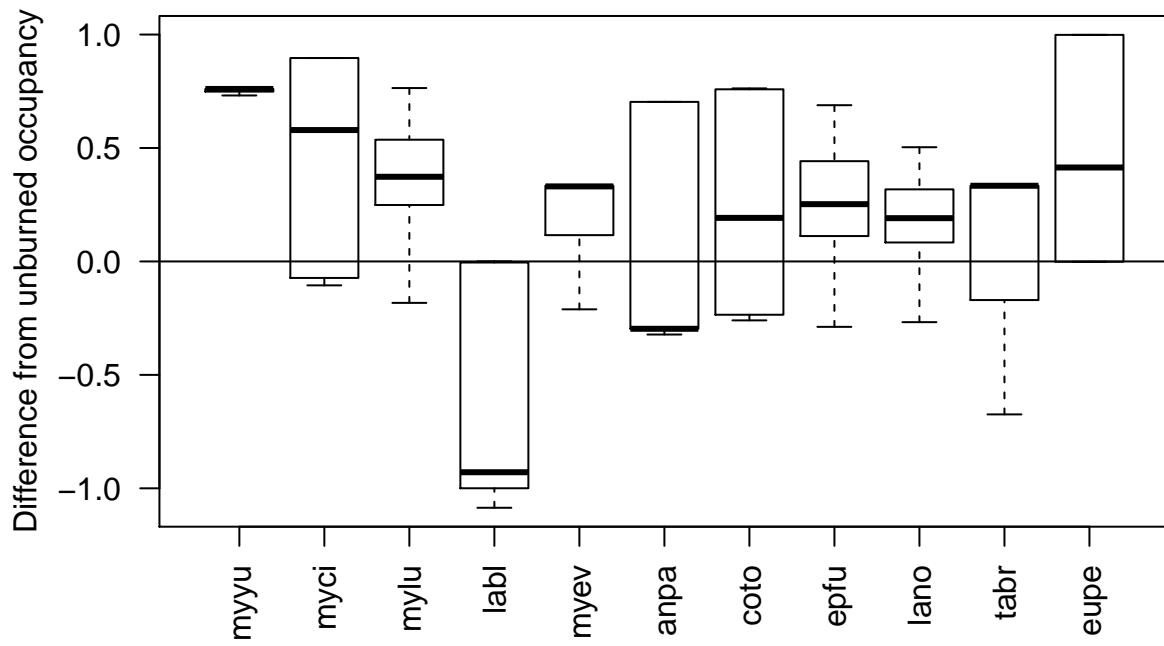
##
## One Sample t-test
##
## data: tabr
## t = 21.512, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.6663598
## 95 percent confidence interval:
##  0.7380181 0.7523864
## sample estimates:
## mean of x
## 0.7452022

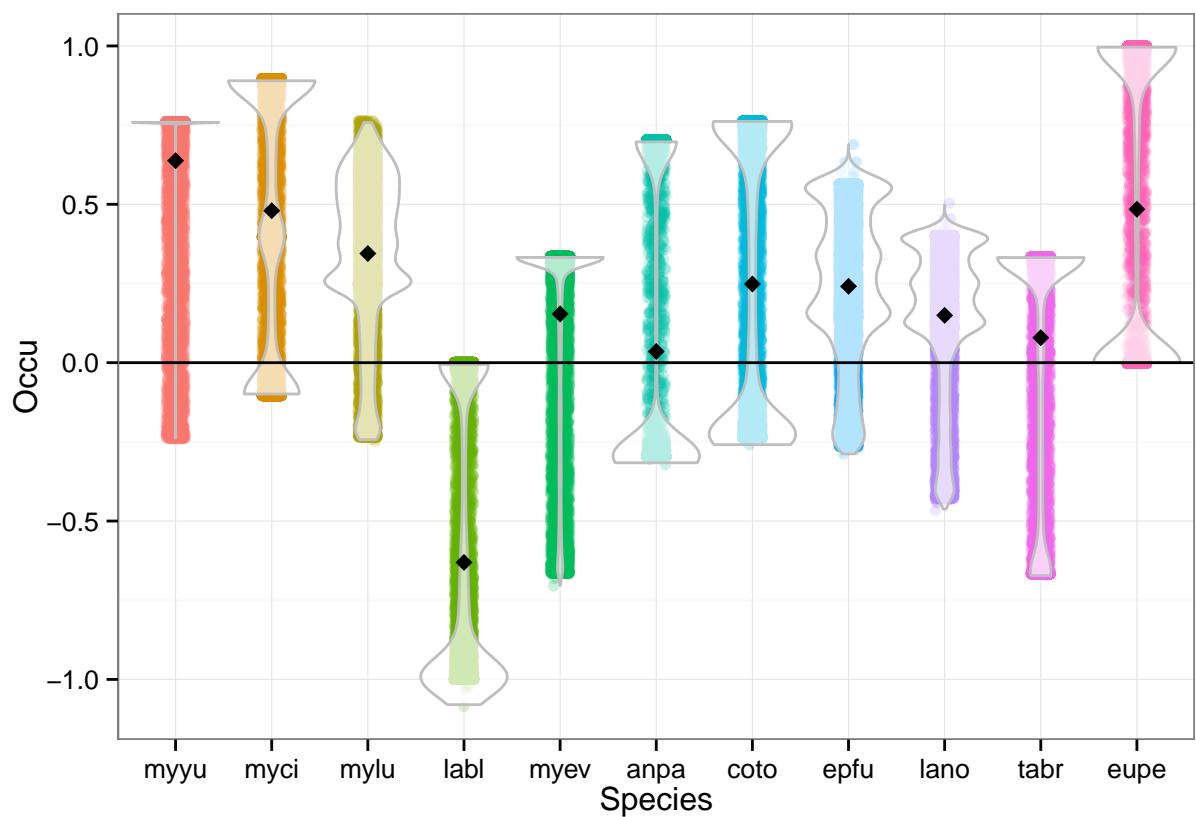
```

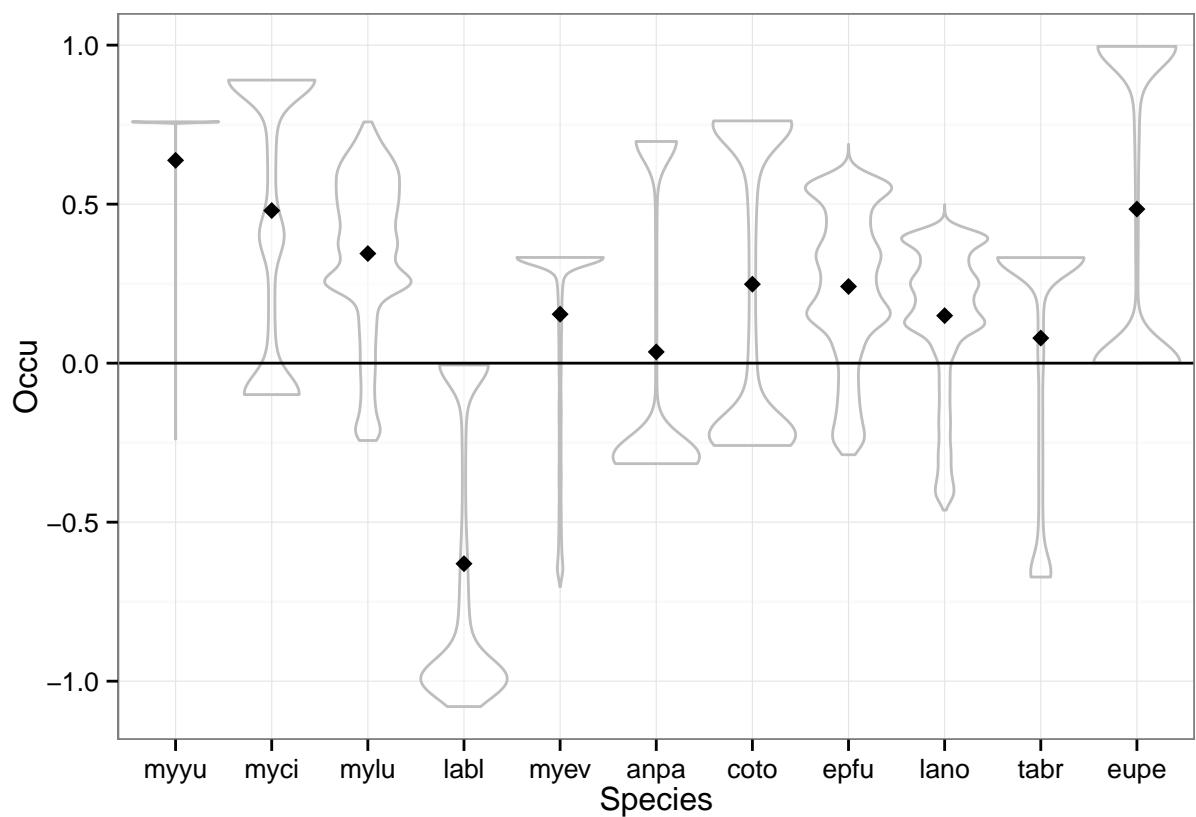
```

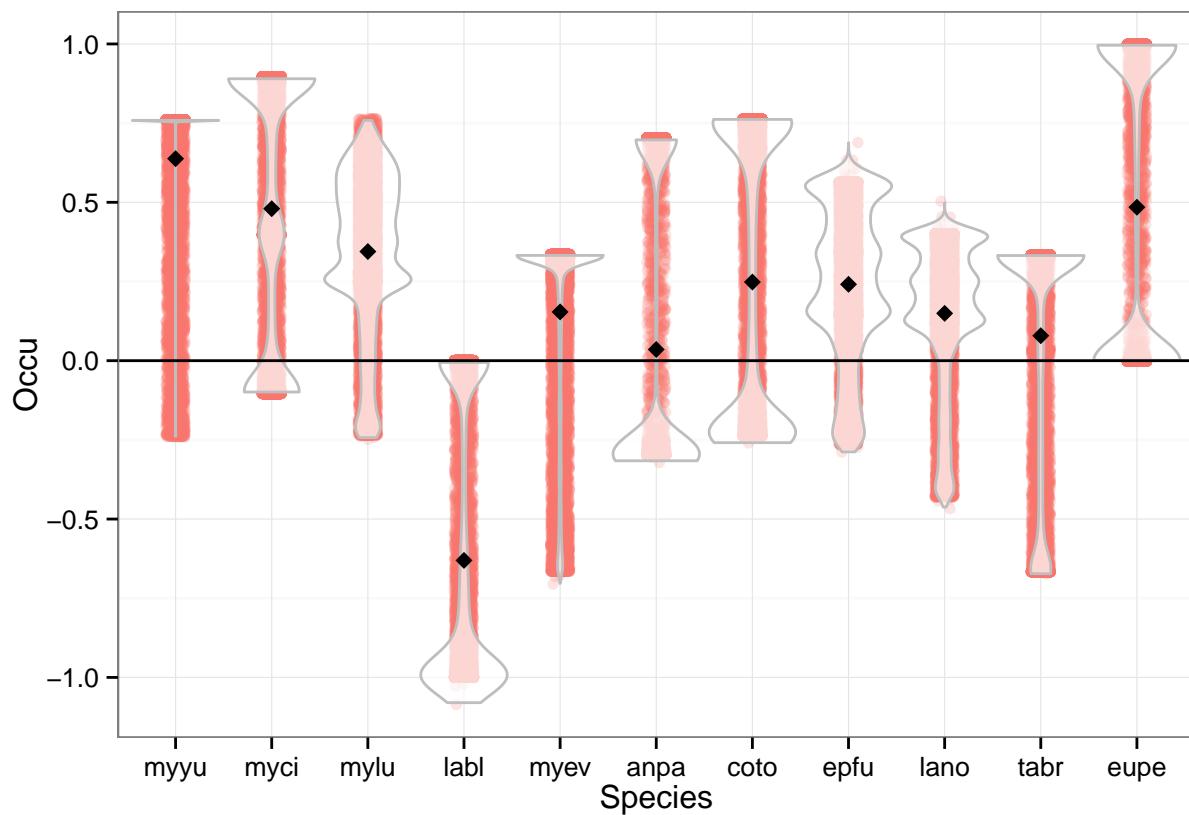
## 
##  One Sample t-test
## 
## data: eupe
## t = 105.44, df = 10955, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0.001436687
## 95 percent confidence interval:
##  0.4769165 0.4949296
## sample estimates:
## mean of x
## 0.4859231

```





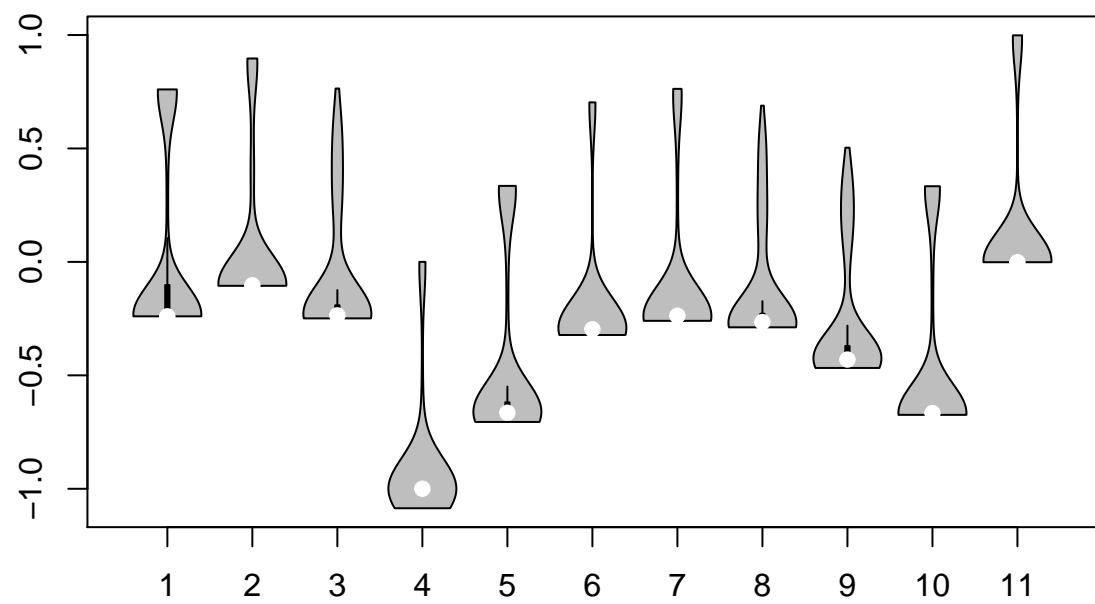




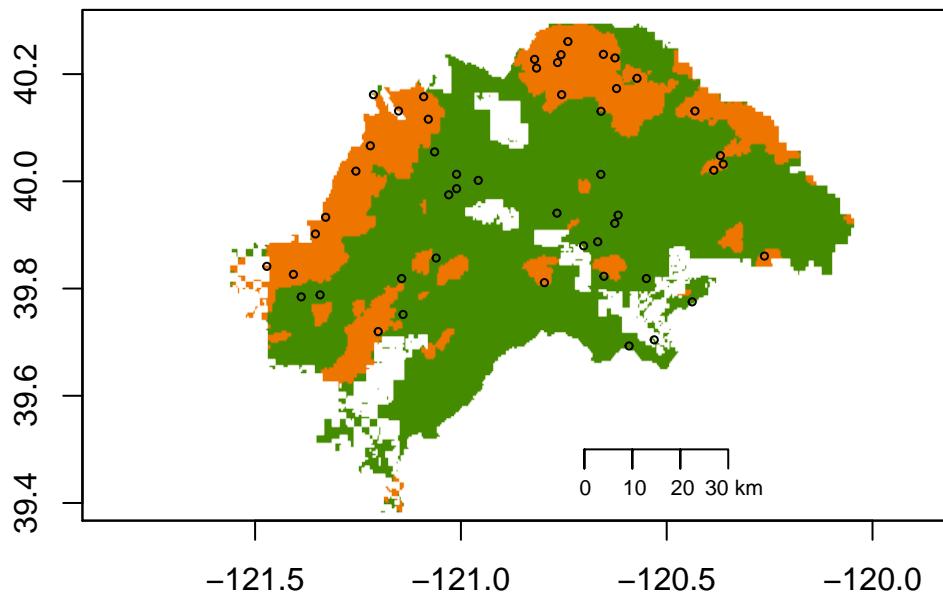
```
library(vioplot)
```

```
## Loading required package: sm
## Package 'sm', version 2.2-5.4: type help(sm) for summary information
```

```
vioplot(myyu,myci, mylu, labl, myev, anpa, coto, epfu, lano, tabr, eupe, col="grey")
```



## The End



```
#valuetable <- getValues(AllLayers2)
#km1 <- kmeans(na.omit(valuetable), centers = 5, iter.max = 100, nstart = 10)
# create a blank raster with default values of 0
#rNA <- setValues(raster(AllLayers2), 0)
#for(i in 1:nlayers(AllLayers2)){
#  #rNA[is.na(AllLayers2[[i]])] <- 1
#}
# convert rNA to an integer vector
#rNA <- getValues(rNA)
# convert valuetable to a data.frame
#valuetable <- as.data.frame(valuetable)
# if rNA is a 0, assign the cluster value at that position
#valuetable$class[rNA==0] <- km1$cluster
# if rNA is a 1, assign an NA at that position
#valuetable$class[rNA==1] <- NA
# create a blank raster
#classes1 <- raster(AllLayers2)
# assign values from the 'class' column of valuetable
#classes1 <- setValues(classes1, valuetable$class)
#plot(classes1, legend=TRUE, colNA="black")
#More info on how to do this clasification in *https://geoscripting-wur.github.io/AdvancedRasterAnalysis
```

## Power Analysis

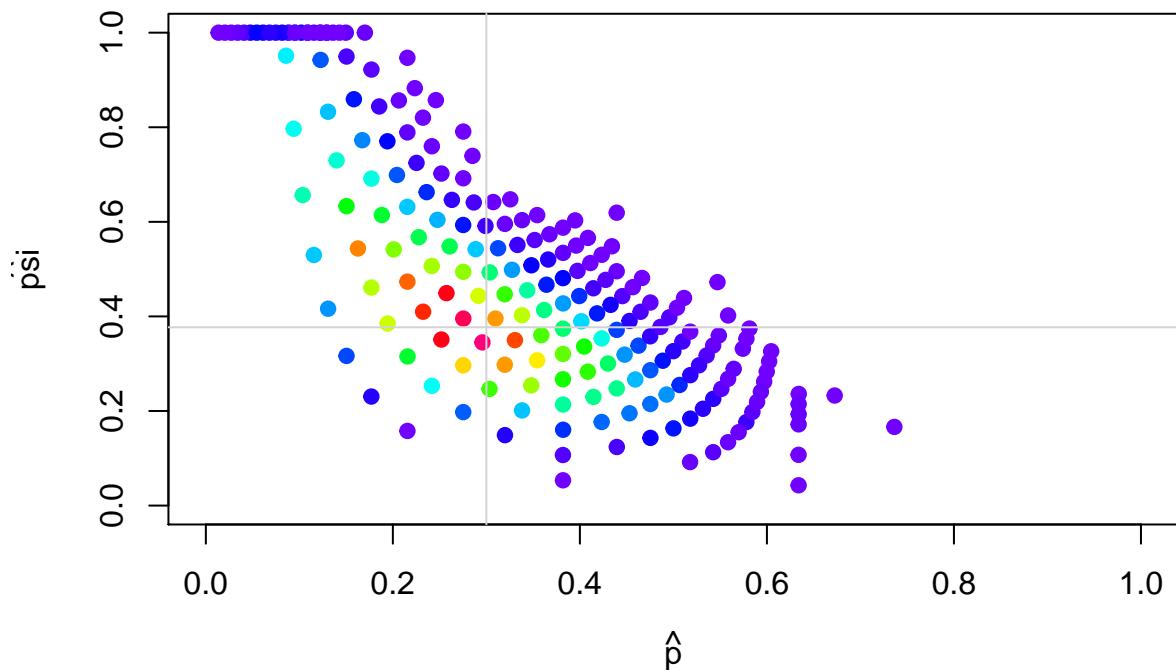
```
##  
## Call:  
## occu(formula = ~Julian + 1 ~ 1, data = SimOccuMyVo2)  
##  
## Occupancy:  
##   Estimate      SE      z P(>|z|)  
##   -0.0404  0.948 -0.0427  0.966  
##  
## Detection:  
##               Estimate      SE      z P(>|z|)  
## (Intercept)  4.1018  4.3196  0.95  0.342  
## Julian      -0.0302  0.0245 -1.23  0.218  
##  
## AIC: 87.34946  
  
##               0.025      0.975  
## p(Int)     -4.36438089 12.5680782  
## p(Julian)  -0.07831246  0.0178378  
  
## Profiling parameter 1 of 2 ... done.  
## Profiling parameter 2 of 2 ... done.  
  
##               0.025      0.975  
## p(Int)     -5.23016538 12.79401481  
## p(Julian) -0.07861223  0.02438732  
  
## Backtransformed linear combination(s) of Detection estimate(s)  
##  
##   Estimate      SE LinComb (Intercept) Julian  
##   0.983  0.07    4.09             1     0.5  
##  
## Transformation: logistic  
  
##               Length          Class           Mode  
##                   1 unmarkedBackTrans          S4  
  
##               0.05      0.95  
##  0.04749894 0.9999859  
  
## Warning: Some observations have been discarded because corresponding  
## covariates were missing.  
  
## Warning: 3 sites have been discarded because of missing data.  
  
## Warning: Some observations have been discarded because corresponding  
## covariates were missing.  
  
## Warning: 3 sites have been discarded because of missing data.
```

```

## [1] 10

##
## -----
## Evaluation of design K = 3 S = 49 (TS = 147)
## -----
## estimator performance (excl empty histories)
## psi: bias = +0.0632 var = +0.0353 MSE = +0.0392
## p: bias = -0.0085 var = +0.0117 MSE = +0.0117
## covar = -0.0152 critA = +0.0510 critD = +2.311e-04
## estimator performance (excl also histories leading to boundary estimates)
## psi: bias = +0.0423 var = +0.0244 MSE = +0.0262
## p: bias = -0.0008 var = +0.0104 MSE = +0.0104
## covar = -0.0113 critA = +0.0367 critD = +1.468e-04
## empty histories = 0.0%
## boundary estimates = 3.6%
## this took 0.73 seconds
## -----

```



```

## $dist
##      [,1] [,2] [,3]      [,4]      [,5]
## [1,]    7   11 0.0048 0.17673690 0.42328313
## [2,]   13   15 0.0090 0.72988153 0.13981563
## [3,]   12   16 0.0263 0.39532090 0.27533463
## [4,]    7   10 0.0068 0.20119696 0.33817827

```

```

## [5,] 10 14 0.0212 0.29777285 0.31971995
## [6,] 12 19 0.0114 0.30044165 0.43007064
## [7,] 13 16 0.0163 0.54174266 0.20094181
## [8,] 17 23 0.0069 0.54212925 0.28859256
## [9,] 9 14 0.0106 0.22982544 0.41446722
## [10,] 14 21 0.0112 0.37399443 0.38200218
## [11,] 7 9 0.0082 0.25316523 0.24176005
## [12,] 10 13 0.0251 0.35109925 0.25189666
## [13,] 12 18 0.0156 0.32055105 0.38194264
## [14,] 11 15 0.0271 0.34500942 0.29579243
## [15,] 15 17 0.0045 0.94237288 0.12272783
## [16,] 14 18 0.0172 0.50670132 0.24164842
## [17,] 12 17 0.0230 0.34982687 0.33054615
## [18,] 10 17 0.0057 0.23471724 0.49273263
## [19,] 15 20 0.0166 0.49431299 0.27529165
## [20,] 16 23 0.0100 0.45527103 0.34369932
## [21,] 17 21 0.0044 0.69904321 0.20438190
## [22,] 9 13 0.0169 0.25413268 0.34800739
## [23,] 10 15 0.0140 0.26708435 0.38194793
## [24,] 14 17 0.0125 0.61442433 0.18822027
## [25,] 12 15 0.0224 0.47347399 0.21553945
## [26,] 8 9 0.0069 0.52989321 0.11552011
## [27,] 15 22 0.0107 0.41357320 0.36176977
## [28,] 10 16 0.0106 0.24767900 0.43942454
## [29,] 15 24 0.0040 0.37153943 0.43937189
## [30,] 9 11 0.0180 0.38498189 0.19442396
## [31,] 15 21 0.0147 0.44675975 0.31970007
## [32,] 13 19 0.0152 0.36037074 0.35874277
## [33,] 13 18 0.0213 0.39542083 0.30974884
## [34,] 17 20 0.0029 0.85934362 0.15833633
## [35,] 15 19 0.0118 0.56741802 0.22775140
## [36,] 12 13 0.0069 1.00000000 0.08843537
## [37,] 16 24 0.0059 0.42747490 0.38205232
## [38,] 10 12 0.0174 0.46099107 0.17703964
## [39,] 16 26 0.0016 0.39039191 0.45311980
## [40,] 15 23 0.0073 0.38969182 0.40156562
## [41,] 13 17 0.0251 0.44926932 0.25735822
## [42,] 7 8 0.0057 0.41625361 0.13075569
## [43,] 8 10 0.0125 0.31530354 0.21573104
## [44,] 14 22 0.0088 0.35344323 0.42335241
## [45,] 11 17 0.0145 0.28312021 0.40849561
## [46,] 18 28 0.0012 0.45952787 0.41441119
## [47,] 14 19 0.0181 0.44346156 0.29154825
## [48,] 19 24 0.0014 0.72465965 0.22528063
## [49,] 18 25 0.0041 0.54415254 0.31251336
## [50,] 11 14 0.0237 0.40996546 0.23235433
## [51,] 9 12 0.0199 0.29651944 0.27524302
## [52,] 13 21 0.0057 0.31908962 0.44784856
## [53,] 15 18 0.0088 0.69143215 0.17707380
## [54,] 17 22 0.0065 0.60426827 0.24767176
## [55,] 6 10 0.0024 0.14310806 0.47543937
## [56,] 8 15 0.0014 0.17654133 0.57805584
## [57,] 8 11 0.0149 0.24663827 0.30335567
## [58,] 17 29 0.0008 0.39805399 0.49567623

```

```

## [59,] 11 16 0.0195 0.30715071 0.35428327
## [60,] 13 20 0.0139 0.33625771 0.40460551
## [61,] 16 20 0.0070 0.63165842 0.21542925
## [62,] 14 15 0.0024 1.00000000 0.10204082
## [63,] 14 20 0.0176 0.40249258 0.33809285
## [64,] 19 25 0.0015 0.64642225 0.26309961
## [65,] 9 9 0.0021 1.00000000 0.06122449
## [66,] 11 12 0.0078 0.95130890 0.08579263
## [67,] 19 27 0.0014 0.55114245 0.33323616
## [68,] 9 15 0.0049 0.21475477 0.47532571
## [69,] 9 10 0.0097 0.65657736 0.10360274
## [70,] 18 26 0.0025 0.50806133 0.34815681
## [71,] 11 13 0.0217 0.54367262 0.16264530
## [72,] 20 24 0.0007 0.92199092 0.17709309
## [73,] 14 23 0.0042 0.33820297 0.46270913
## [74,] 16 19 0.0055 0.77259437 0.16729487
## [75,] 17 19 0.0012 1.00000000 0.12925170
## [76,] 11 19 0.0034 0.25506578 0.50661431
## [77,] 6 7 0.0041 0.31651711 0.15043213
## [78,] 15 25 0.0015 0.35788124 0.47519401
## [79,] 16 25 0.0031 0.40642944 0.41836993
## [80,] 8 12 0.0103 0.21368967 0.38201646
## [81,] 13 22 0.0029 0.30627870 0.48866258
## [82,] 19 28 0.0018 0.52027473 0.36608796
## [83,] 16 21 0.0118 0.54799182 0.26073682
## [84,] 15 16 0.0012 1.00000000 0.10884354
## [85,] 17 25 0.0032 0.46701394 0.36427162
## [86,] 13 13 0.0005 1.00000000 0.08843537
## [87,] 22 28 0.0001 0.82030590 0.23219020
## [88,] 18 29 0.0008 0.44292710 0.44543177
## [89,] 10 11 0.0084 0.79675849 0.09395336
## [90,] 11 18 0.0066 0.26664977 0.45924584
## [91,] 7 7 0.0021 1.00000000 0.04761905
## [92,] 23 31 0.0001 0.73951304 0.28514032
## [93,] 6 9 0.0036 0.16030272 0.38207428
## [94,] 6 6 0.0009 1.00000000 0.04081633
## [95,] 5 7 0.0018 0.14888459 0.31988994
## [96,] 6 8 0.0047 0.19765816 0.27524513
## [97,] 18 23 0.0034 0.66282250 0.23609787
## [98,] 12 14 0.0134 0.63314989 0.15044315
## [99,] 17 24 0.0059 0.49861284 0.32743880
## [100,] 20 32 0.0003 0.49548051 0.43938455
## [101,] 9 16 0.0016 0.20467499 0.53163590
## [102,] 16 22 0.0111 0.49303255 0.30358927
## [103,] 20 29 0.0006 0.56153661 0.35161586
## [104,] 15 27 0.0003 0.33851018 0.54251341
## [105,] 17 27 0.0021 0.42442977 0.43285481
## [106,] 12 21 0.0016 0.27576810 0.51807203
## [107,] 15 26 0.0011 0.34693051 0.50969637
## [108,] 8 14 0.0022 0.18379915 0.51806079
## [109,] 14 16 0.0067 0.83276203 0.13066311
## [110,] 22 32 0.0002 0.61427036 0.35433150
## [111,] 14 25 0.0009 0.31753079 0.53561895
## [112,] 13 14 0.0049 1.00000000 0.09523810

```

```

## [113,] 14 24 0.0016 0.32651856 0.49997086
## [114,] 18 22 0.0026 0.77030636 0.19417234
## [115,] 21 31 0.0003 0.57370286 0.36754066
## [116,] 12 20 0.0045 0.28620409 0.47533948
## [117,] 18 24 0.0029 0.59330084 0.27521242
## [118,] 21 27 0.0004 0.75985047 0.24173088
## [119,] 18 27 0.0026 0.48095347 0.38191883
## [120,] 11 11 0.0018 1.00000000 0.07482993
## [121,] 5 6 0.0018 0.23057472 0.17698334
## [122,] 8 13 0.0051 0.19521996 0.45307226
## [123,] 5 9 0.0007 0.11285671 0.54251299
## [124,] 16 17 0.0007 1.00000000 0.11564626
## [125,] 7 12 0.0029 0.16325010 0.50007592
## [126,] 17 28 0.0010 0.40978153 0.46493614
## [127,] 6 11 0.0004 0.13396965 0.55848701
## [128,] 18 20 0.0005 1.00000000 0.13605442
## [129,] 16 28 0.0002 0.36775234 0.51798348
## [130,] 4 6 0.0008 0.10687443 0.38187788
## [131,] 9 17 0.0007 0.19790215 0.58449243
## [132,] 18 21 0.0010 0.94956628 0.15042945
## [133,] 23 29 0.0001 0.88268871 0.22348134
## [134,] 5 8 0.0010 0.12386379 0.43950693
## [135,] 5 5 0.0005 1.00000000 0.03401361
## [136,] 21 25 0.0004 1.00000000 0.17006803
## [137,] 16 27 0.0008 0.37772833 0.48619305
## [138,] 16 18 0.0018 1.00000000 0.12244898
## [139,] 12 12 0.0020 1.00000000 0.08163265
## [140,] 15 28 0.0003 0.33168350 0.57429261
## [141,] 8 8 0.0025 1.00000000 0.05442177
## [142,] 10 10 0.0016 1.00000000 0.06802721
## [143,] 12 23 0.0002 0.26206083 0.59707316
## [144,] 16 29 0.0003 0.35966896 0.54859172
## [145,] 8 16 0.0004 0.17174337 0.63392296
## [146,] 21 30 0.0004 0.60355132 0.33814463
## [147,] 11 21 0.0004 0.24058403 0.59359691
## [148,] 13 23 0.0014 0.29663315 0.52746030
## [149,] 10 19 0.0004 0.21919322 0.58948088
## [150,] 7 13 0.0004 0.15517775 0.56980360
## [151,] 10 18 0.0017 0.22571543 0.54264567
## [152,] 11 22 0.0001 0.23606924 0.63405645
## [153,] 19 23 0.0012 0.84391240 0.18539093
## [154,] 13 25 0.0002 0.28340103 0.59985998
## [155,] 20 27 0.0010 0.64098322 0.28653593
## [156,] 17 26 0.0037 0.44301835 0.39931860
## [157,] 11 20 0.0007 0.24673883 0.55131565
## [158,] 24 31 0.0001 0.85734749 0.24600735
## [159,] 14 14 0.0003 1.00000000 0.09523810
## [160,] 19 29 0.0007 0.49625248 0.39748491
## [161,] 22 31 0.0002 0.64754712 0.32560949
## [162,] 20 25 0.0005 0.78912285 0.21551653
## [163,] 18 30 0.0005 0.42935955 0.47538561
## [164,] 19 26 0.0011 0.59134681 0.29908096
## [165,] 18 31 0.0001 0.41837276 0.50385641
## [166,] 11 23 0.0001 0.23271644 0.67247549

```

```

## [167,] 20 33 0.0001 0.48128696 0.46645361
## [168,] 23 35 0.0001 0.60302988 0.39491678
## [169,] 16 16 0.0001 1.00000000 0.10884354
## [170,] 21 29 0.0003 0.64184030 0.30733434
## [171,] 2 2 0.0002 1.00000000 0.01360544
## [172,] 20 30 0.0005 0.53439328 0.38195816
## [173,] 8 18 0.0001 0.16633220 0.73630279
## [174,] 15 29 0.0001 0.32630863 0.60457687
## [175,] 22 34 0.0001 0.56604138 0.40857807
## [176,] 21 26 0.0003 0.85671670 0.20645559
## [177,] 9 18 0.0003 0.19310669 0.63396655
## [178,] 20 26 0.0005 0.70211510 0.25191813
## [179,] 19 22 0.0005 1.00000000 0.14965986
## [180,] 21 32 0.0002 0.54976522 0.39601811
## [181,] 4 4 0.0003 1.00000000 0.02721088
## [182,] 2 4 0.0001 0.04291309 0.63391633
## [183,] 12 22 0.0004 0.26799979 0.55852707
## [184,] 21 28 0.0002 0.69204455 0.27528511
## [185,] 17 32 0.0001 0.37437485 0.58135411
## [186,] 22 33 0.0002 0.58767767 0.38193445
## [187,] 19 30 0.0006 0.47726862 0.42754473
## [188,] 5 10 0.0001 0.10729568 0.63385007
## [189,] 21 33 0.0002 0.53029776 0.42337053
## [190,] 4 7 0.0004 0.09194188 0.51786490
## [191,] 16 30 0.0001 0.35307321 0.57806593
## [192,] 20 28 0.0004 0.59563879 0.31979951
## [193,] 22 35 0.0001 0.54826828 0.43426121
## [194,] 19 33 0.0001 0.43903889 0.51138677
## [195,] 18 19 0.0002 1.00000000 0.12925170
## [196,] 2 3 0.0001 0.05345628 0.38192588
## [197,] 14 27 0.0001 0.30492228 0.60238418
## [198,] 3 3 0.0001 1.00000000 0.02040816
## [199,] 4 5 0.0001 0.15782473 0.21557133
## [200,] 13 24 0.0005 0.28917717 0.56449756
## [201,] 10 20 0.0003 0.21464395 0.63395812
## [202,] 25 40 0.0001 0.61934008 0.43940290
## [203,] 20 31 0.0001 0.51280679 0.41121158
## [204,] 21 38 0.0001 0.47249602 0.54716496
## [205,] 17 18 0.0002 1.00000000 0.12244898
## [206,] 18 33 0.0001 0.40198780 0.55849571
## [207,] 19 31 0.0002 0.46181758 0.45662196
## [208,] 19 21 0.0001 1.00000000 0.14285714
## [209,] 24 30 0.0001 0.94689950 0.21553276
## [210,] 24 32 0.0001 0.79083987 0.27528203
##
## $biaspsi
## [1] 0.06318554
##
## $varpsi
## [1] 0.03525166
##
## $MSEpsi
## [1] 0.03924408
##

```

```

## $biasp
## [1] -0.00847324
##
## $varp
## [1] 0.01166847
##
## $MSEp
## [1] 0.01174027
##
## $covar
## [1] -0.01515282
##
## $critA
## [1] 0.05098434
##
## $critD
## [1] 0.0002311281
##
## $biaspsi_B
## [1] 0.04227961
##
## $varpsi_B
## [1] 0.02442761
##
## $MSEpsi_B
## [1] 0.02621518
##
## $biasp_B
## [1] -0.0008084669
##
## $varp_B
## [1] 0.01044383
##
## $MSEp_B
## [1] 0.01044448
##
## $covar_B
## [1] -0.0112676
##
## $critA_B
## [1] 0.03665966
##
## $critD_B
## [1] 0.0001468451
##
## $pempty
## [1] 0
##
## $pbounds
## [1] 3.6

```

## Predictors

```
## class      : RasterStack
```

```

## dimensions : 250, 434, 108500, 16 (nrow, ncol, ncell, nlayers)
## resolution : 0.003810748, 0.003810748 (x, y)
## extent : -121.6945, -120.0407, 39.36708, 40.31977 (xmin, xmax, ymin, ymax)
## coord. ref. : NA
## names : Distance.to.water, Distance.to.water2, Distance.to.road, Distance.to.road2, Existing.veg
## min values : 0.000000e+00, 0.000000e+00, 0.000000e+00, 0.000000e+00, 1.000000e+00
## max values : 9.752505e+02, 9.511136e+05, 1.122052e+04, 1.259000e+08, 2.580000e+00

summary(sampling.cov2)

## Distance.to.water Distance.to.road Existing.vegetation Fire.Interval
## Min. : 0.00 Min. : 0.0 Min. : 3.000 Min. :11.00
## 1st Qu.: 0.00 1st Qu.: 0.0 1st Qu.: 4.204 1st Qu.:11.76
## Median : 0.00 Median : 0.0 Median : 6.825 Median :14.62
## Mean : 53.07 Mean : 245.5 Mean : 8.970 Mean :14.97
## 3rd Qu.: 0.00 3rd Qu.: 325.7 3rd Qu.:14.225 3rd Qu.:16.00
## Max. :325.83 Max. :2308.6 Max. :18.876 Max. :37.92
## NA's :1

## Altitude Burn.intensity.soil Burn.intensity.Canopy
## Min. : 648.5 Min. :0.0000 Min. :0.0000
## 1st Qu.:1325.5 1st Qu.:0.0000 1st Qu.:0.0000
## Median :1601.5 Median :0.5292 Median :0.6589
## Mean :1539.4 Mean :1.4178 Mean :1.5108
## 3rd Qu.:1839.8 3rd Qu.:2.9182 3rd Qu.:2.5249
## Max. :2098.4 Max. :4.0000 Max. :5.0000
## 

## Burn.intensity.basal Canopy.cover Woody Herbaceous
## Min. :0.0000 Min. : 0.00 Min. : 3.50 Min. : 0.000
## 1st Qu.:0.0000 1st Qu.:24.96 1st Qu.:10.00 1st Qu.: 1.000
## Median :0.8086 Median :48.67 Median :14.00 Median : 2.500
## Mean :2.0149 Mean :46.09 Mean :21.22 Mean : 5.357
## 3rd Qu.:3.7068 3rd Qu.:69.47 3rd Qu.:33.00 3rd Qu.: 8.500
## Max. :7.0000 Max. :89.65 Max. :90.50 Max. :24.000
## 

## Grass Naked.Soil Rocky Down.Wood
## Min. : 0.000 Min. : 0.500 Min. : 0.00 Min. : 0.0
## 1st Qu.: 0.000 1st Qu.: 3.000 1st Qu.: 0.00 1st Qu.: 9.5
## Median : 1.000 Median : 7.500 Median : 3.50 Median :16.5
## Mean : 6.878 Mean : 9.765 Mean :11.57 Mean :19.2
## 3rd Qu.: 7.000 3rd Qu.:13.500 3rd Qu.:14.50 3rd Qu.:26.5
## Max. :55.500 Max. :40.500 Max. :64.50 Max. :60.0
## 

## Leaf.Litter Basal.Area Burn.intensity.soil2
## Min. : 0.00 Min. : 0.000 Min. : 0.000
## 1st Qu.: 8.50 1st Qu.: 6.062 1st Qu.: 0.000
## Median :27.50 Median :19.753 Median : 0.280
## Mean :25.58 Mean : 26.955 Mean : 4.426
## 3rd Qu.:39.50 3rd Qu.: 41.479 3rd Qu.: 8.516
## Max. :67.50 Max. :101.212 Max. :16.000
## 

## Burn.intensity.Canopy2 Burn.intensity.basal2
## Min. : 0.0000 Min. : 0.0000
## 1st Qu.: 0.0000 1st Qu.: 0.0000
## Median : 0.4342 Median : 0.6539

```

```

##  Mean : 5.5035      Mean : 10.1716
## 3rd Qu.: 6.3754    3rd Qu.: 13.7400
## Max.   :25.0000    Max.   :49.0000
##

```

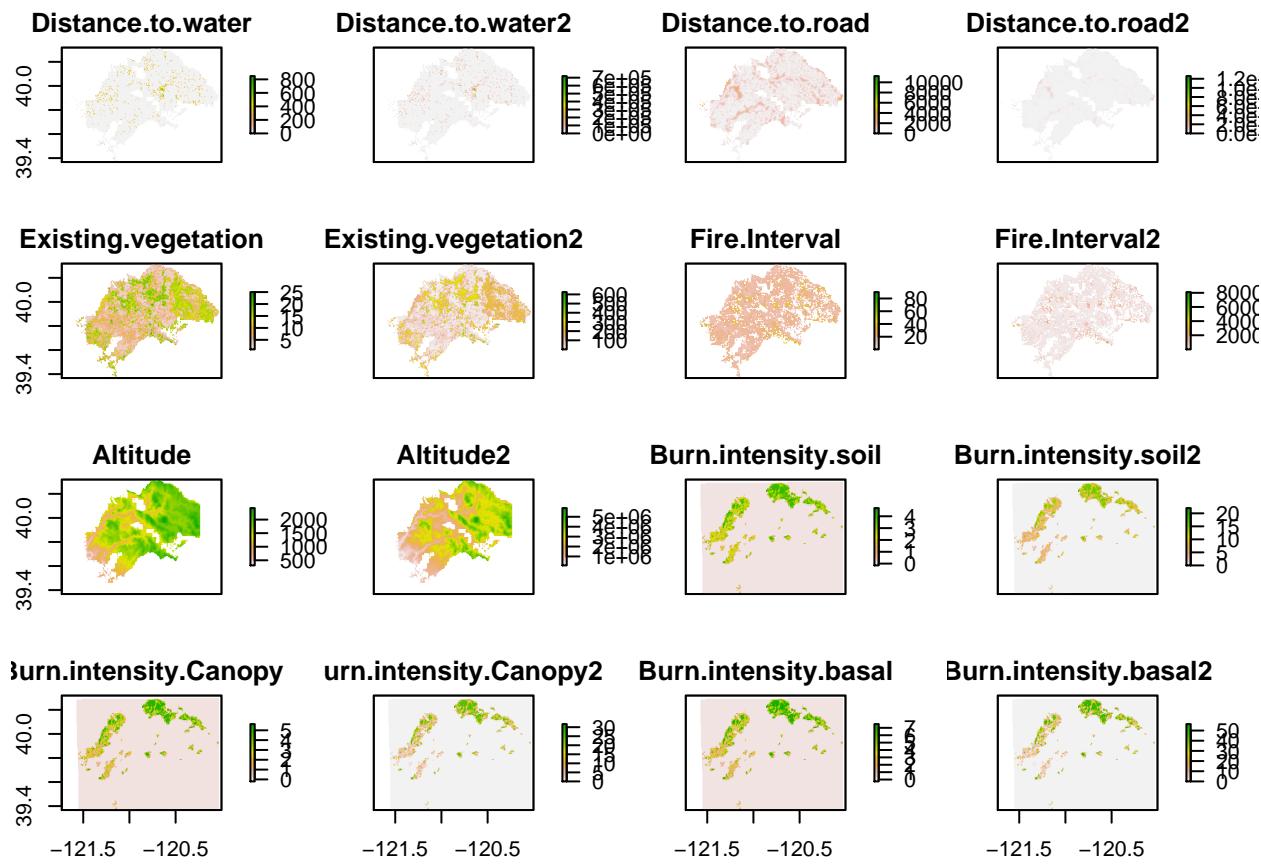
```
Occu1.layer.MyLu2$layer.1
```

```

## class      : RasterLayer
## dimensions : 250, 434, 108500 (nrow, ncol, ncell)
## resolution : 0.003810748, 0.003810748 (x, y)
## extent     : -121.6945, -120.0407, 39.36708, 40.31977 (xmin, xmax, ymin, ymax)
## coord. ref. : NA
## data source : in memory
## names       : layer.1
## values      : 0.003199792, 0.9998045 (min, max)

```

```
plot(Predictors)
```



```
names(Predictors)
```

```

## [1] "Distance.to.water"      "Distance.to.water2"
## [3] "Distance.to.road"       "Distance.to.road2"
## [5] "Existing.vegetation"    "Existing.vegetation2"
## [7] "Fire.Interval"          "Fire.Interval2"

```

```

## [9] "Altitude"                  "Altitude2"
## [11] "Burn.intensity.soil"      "Burn.intensity.soil2"
## [13] "Burn.intensity.Canopy"    "Burn.intensity.Canopy2"
## [15] "Burn.intensity.basal"     "Burn.intensity.basal2"

soil.fire.vector<-as.vector(subset(Predictors,11))
canopy.fire.vector<-as.vector(subset(Predictors,13))
basal.fire.vector<-as.vector(subset(Predictors,15))

occu.vector<-as.vector(Occu1.layer.MyLu2$layer.1)

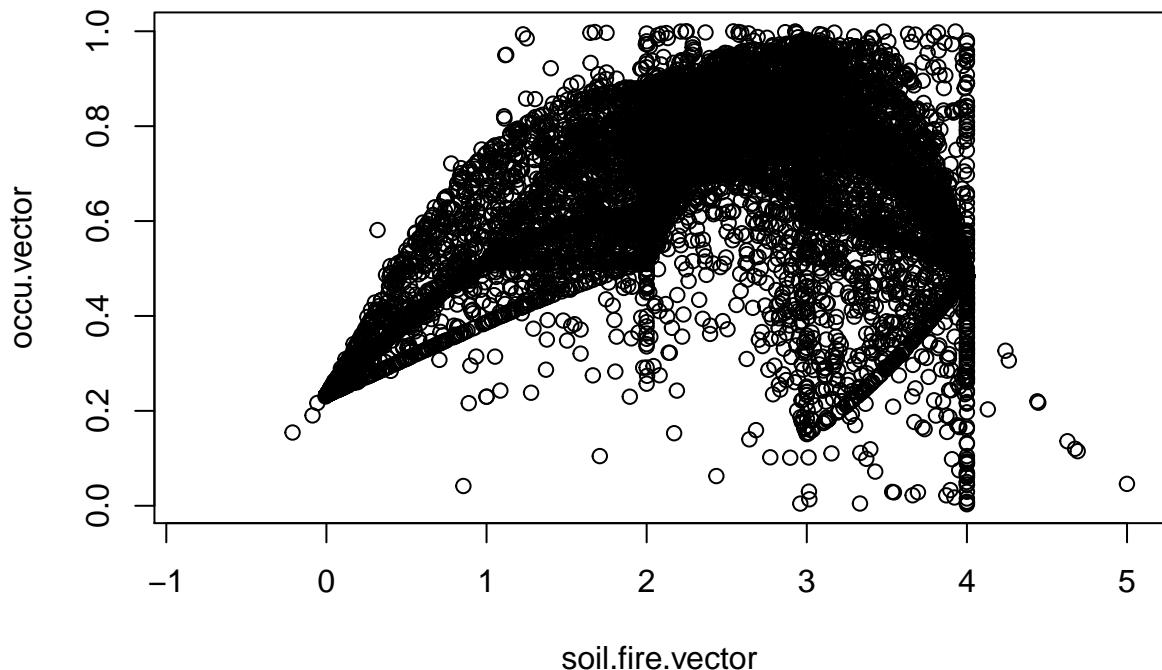
fire.response.df <- data.frame(cbind(soil.fire.vector, basal.fire.vector, canopy.fire.vector, occu.vector))

summary(fire.response.df)

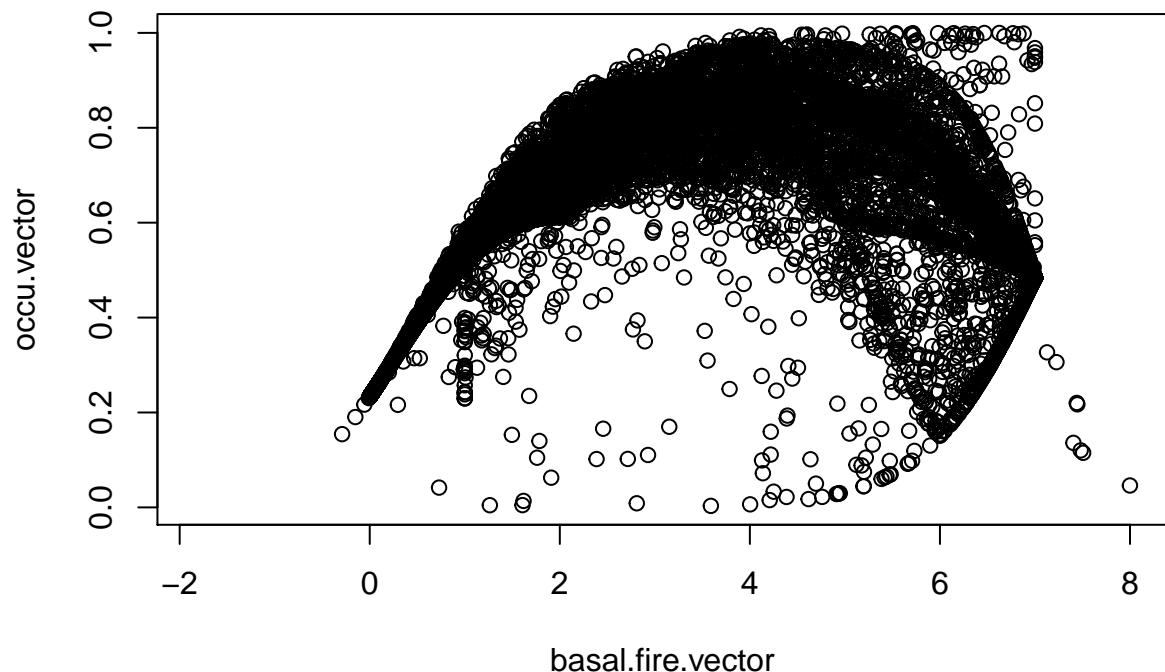
##   soil.fire.vector basal.fire.vector canopy.fire.vector   occu.vector
## Min.   :-0.840   Min.   :-1.840   Min.   :-1.174   Min.   :0.00
## 1st Qu.: 0.000   1st Qu.: 0.000   1st Qu.: 0.000   1st Qu.:0.23
## Median : 0.000   Median : 0.000   Median : 0.000   Median :0.23
## Mean   : 0.293   Mean   : 0.428   Mean   : 0.322   Mean   :0.34
## 3rd Qu.: 0.000   3rd Qu.: 0.000   3rd Qu.: 0.000   3rd Qu.:0.27
## Max.   : 5.000   Max.   : 8.000   Max.   : 6.000   Max.   :1.00
## NA's   :12775    NA's   :12775    NA's   :12775    NA's   :66621

plot(occu.vector~soil.fire.vector)

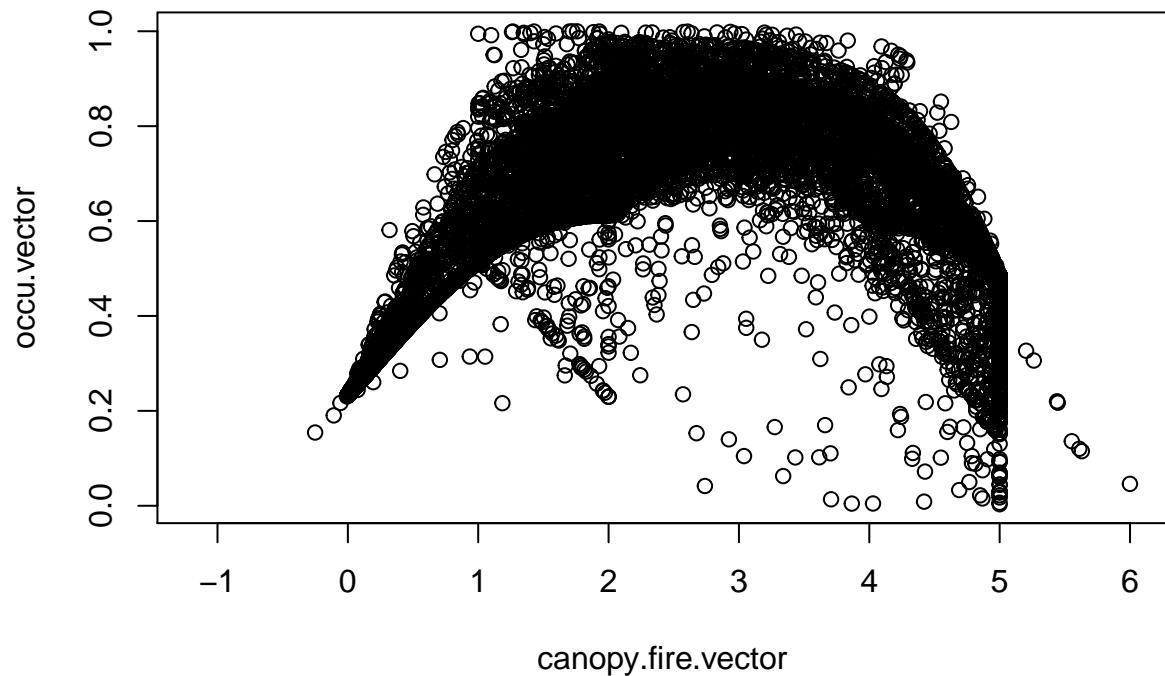
```



```
plot(occu.vector~basal.fire.vector)
```



```
plot(occu.vector~canopy.fire.vector)
```



```

ggplot(fire.response.df, aes(canopy.fire.vector, occu.vector)) + geom_point() + ggtitle('Occupancy of Little')

## geom_smooth: method="auto" and size of largest group is >=1000, so using gam with formula: y ~ s(x, k=3)

## Warning: Removed 66621 rows containing missing values (stat_smooth).

## Warning: Removed 66621 rows containing missing values (geom_point).

```

### Occupancy of Little Brown Bat

