Fithian et al. (2014) NSW

```
library(maptools)
#> Loading required package: sp
#> Checking rgeos availability: FALSE
#>      Note: when rgeos is not available, polygon geometry     computations in maptools depend on gpcl
#>      which has a restricted licence. It is disabled by default;
#>      to enable gpclib, type gpclibPermit()
library(ppjsdm)
library(raster)
library(sf)
#> Linking to GEOS 3.6.2, GDAL 2.2.3, PROJ 4.9.3
library(spatstat)
#> Loading required package: spatstat.data
#> Loading required package: nlme
#>
#> Attaching package: 'nlme'
#> The following object is masked from 'package:raster':
#>
#>     getData
#> Loading required package: rpart
#>
#> spatstat 1.62-2       (nickname: 'Shape-shifting lizard')
#> For an introduction to spatstat, type 'beginner'
#>
#> Attaching package: 'spatstat'
#> The following objects are masked from 'package:raster':
#>
#>     area, rotate, shift
remove(list = ls())

source("../R/get_nsw.R")

set.seed(1)
```

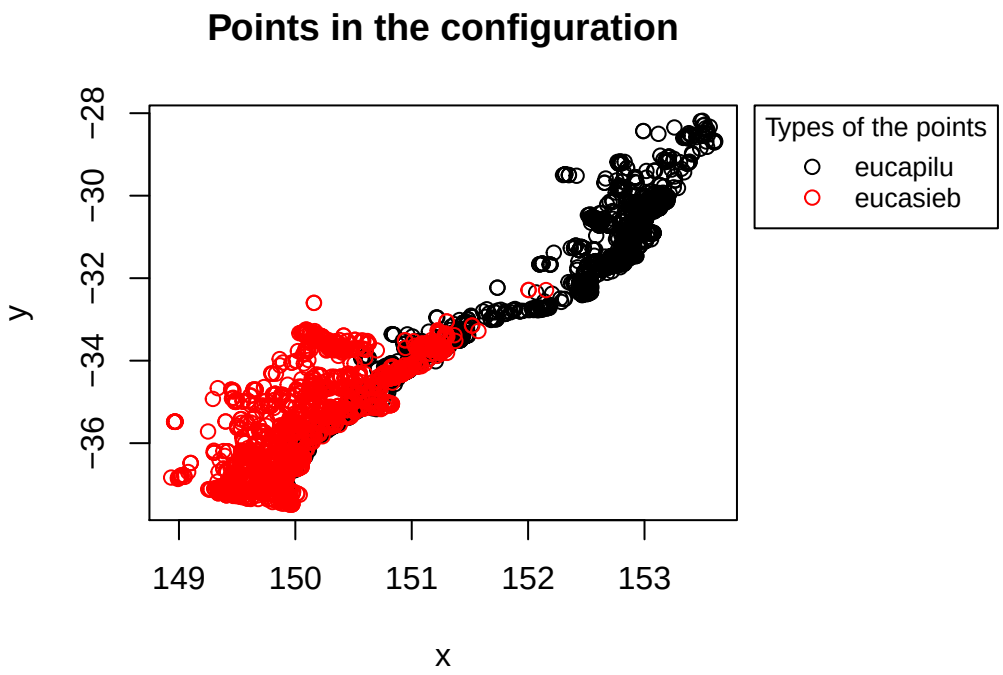
This vignette explains how to use the `ppjsdm` package with the NSW dataset from Fithian et al. (2014). We begin by loading the data with only the most prevalent species.

```
number_of_species <- 2 # Includes the most prevalent species from the plot

nsw <- get_nsw(prevalent = number_of_species)
configuration <- nsw$configuration
window <- nsw$window
covariates <- nsw$covariates
```

The point configuration is plotted below.

```
par(mar = c(5, 4, 4, 13) + 0.1)
plot(configuration, window = window)
```



The matrix `radii` defined below models interaction radii within a species (on the diagonal), and between species (outside the diagonal).

```
radii <- matrix(0.1, number_of_species, number_of_species)
```

Fitting the model to the dataset is then quite easy.

```
fit <- ppjsdm::gibbsm(configuration,
                      window = window,
                      covariates = covariates,
                      model = "Geyer",
                      radius = radii,
                      use_glmnet = FALSE)
#>          log_lambda_1          log_lambda_2             alpha_1_1
#>          6.141854e+00          1.600987e+01          2.462212e+00
#>             alpha_1_2             alpha_2_2  unnamed_covariate1_1
#>          1.782363e-01          3.007252e+00         -3.653586e-01
#>  unnamed_covariate1_2  unnamed_covariate2_1  unnamed_covariate2_2
#>          1.340770e-01         -1.431973e+00         -9.327638e-01
#>  unnamed_covariate3_1  unnamed_covariate3_2  unnamed_covariate4_1
#>         -6.614881e-02         -1.846672e-01          4.371350e-03
#>  unnamed_covariate4_2  unnamed_covariate5_1  unnamed_covariate5_2
#>         -1.628112e-03          1.241468e-01         -1.730611e-01
#>  unnamed_covariate6_1  unnamed_covariate6_2  unnamed_covariate7_1
#>          1.081237e-01         -3.138805e-01          1.347198e+00
#>  unnamed_covariate7_2  unnamed_covariate8_1  unnamed_covariate8_2
#>          5.839515e-01          4.502081e-01          1.049417e+01
#>  unnamed_covariate9_1  unnamed_covariate9_2 unnamed_covariate10_1
#>         -5.950067e-02         -1.052719e-01         -2.725301e-02
#> unnamed_covariate10_2 unnamed_covariate11_1 unnamed_covariate11_2
```

```
#>         -7.960943e-03         -1.405343e+00         -5.144668e+00
#> unnamed_covariate12_1 unnamed_covariate12_2 unnamed_covariate13_1
#>         -1.757386e-02         -3.172272e-03         -3.300810e-02
#> unnamed_covariate13_2 unnamed_covariate14_1 unnamed_covariate14_2
#>          2.283882e-02         -9.260790e-05         -1.948034e-04
#> unnamed_covariate15_1 unnamed_covariate15_2
#>         -1.672047e-05         -6.903599e-05
summary(fit)
#>
#> Call:
#> NULL
#>
#> Deviance Residuals:
#>     Min       1Q   Median       3Q      Max
#> -2.3029  -0.0907  -0.0420  -0.0152   4.0224
#>
#> Coefficients:
#>                          Estimate Std. Error z value Pr(>|z|)
#> log_lambda_1           6.142e+00  3.356e+00   1.830 0.067200 .
#> log_lambda_2           1.601e+01  3.315e+00   4.829 1.37e-06 ***
#> alpha_1_1              2.462e+00  1.248e-01  19.722  < 2e-16 ***
#> alpha_1_2              1.782e-01  4.194e-02   4.250 2.14e-05 ***
#> alpha_2_2              3.007e+00  1.298e-01  23.175  < 2e-16 ***
#> unnamed_covariate1_1  -3.654e-01  9.221e-02  -3.962 7.42e-05 ***
#> unnamed_covariate1_2   1.341e-01  8.991e-02   1.491 0.135905
#> unnamed_covariate2_1  -1.432e+00  7.339e-01  -1.951 0.051048 .
#> unnamed_covariate2_2  -9.328e-01  6.061e-01  -1.539 0.123837
#> unnamed_covariate3_1  -6.615e-02  4.183e-02  -1.582 0.113753
#> unnamed_covariate3_2  -1.847e-01  4.725e-02  -3.908 9.29e-05 ***
#> unnamed_covariate4_1   4.371e-03  7.235e-04   6.042 1.52e-09 ***
#> unnamed_covariate4_2  -1.628e-03  1.116e-03  -1.459 0.144593
#> unnamed_covariate5_1   1.241e-01  4.003e-02   3.101 0.001928 **
#> unnamed_covariate5_2  -1.731e-01  3.231e-02  -5.356 8.52e-08 ***
#> unnamed_covariate6_1   1.081e-01  1.347e-01   0.803 0.422080
#> unnamed_covariate6_2  -3.139e-01  1.438e-01  -2.183 0.029058 *
#> unnamed_covariate7_1   1.347e+00  9.677e-01   1.392 0.163855
#> unnamed_covariate7_2   5.840e-01  8.638e-01   0.676 0.499003
#> unnamed_covariate8_1   4.502e-01  7.229e-01   0.623 0.533445
#> unnamed_covariate8_2   1.049e+01  1.248e+00   8.408  < 2e-16 ***
#> unnamed_covariate9_1  -5.950e-02  1.672e-02  -3.559 0.000372 ***
#> unnamed_covariate9_2  -1.053e-01  2.812e-02  -3.743 0.000182 ***
#> unnamed_covariate10_1 -2.725e-02  3.939e-03  -6.919 4.55e-12 ***
#> unnamed_covariate10_2 -7.961e-03  4.082e-03  -1.950 0.051149 .
#> unnamed_covariate11_1 -1.405e+00  5.655e-01  -2.485 0.012947 *
#> unnamed_covariate11_2 -5.145e+00  7.208e-01  -7.137 9.52e-13 ***
#> unnamed_covariate12_1 -1.757e-02  2.087e-03  -8.421  < 2e-16 ***
#> unnamed_covariate12_2 -3.172e-03  1.425e-03  -2.226 0.025998 *
#> unnamed_covariate13_1 -3.301e-02  1.316e-02  -2.509 0.012117 *
#> unnamed_covariate13_2  2.284e-02  1.443e-02   1.583 0.113372
#> unnamed_covariate14_1 -9.261e-05  3.400e-05  -2.724 0.006452 **
#> unnamed_covariate14_2 -1.948e-04  3.855e-05  -5.054 4.33e-07 ***
#> unnamed_covariate15_1 -1.672e-05  1.357e-05  -1.232 0.217826
#> unnamed_covariate15_2 -6.904e-05  1.419e-05  -4.866 1.14e-06 ***
```

```
#> ---
#> Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#>
#> (Dispersion parameter for binomial family taken to be 1)
#>
#>     Null deviance: 62010  on 24600  degrees of freedom
#> Residual deviance: 11123  on 24565  degrees of freedom
#> AIC: 11193
#>
#> Number of Fisher Scoring iterations: 8
```