Appendix 1: R-code for running with INLA all hierarchical models presented in the paper.

```
###################
# 1. Load the Data #
###################
# replace your_path by the path where the data have been saved
datacaribou <-read.table("your_path/data_caribou.txt", sep='', header=TRUE)
str(datacaribou)
head(datacaribou)

################################################
# 2. Non-spatial logistic model fitted with INLA #
################################################
require(INLA)
formula_logistic = y ~ wildfire + logging + lichwood + openlich + deciduous +
                       water + wetland + meanelev
model_logistic = inla(formula = formula_logistic, data = datacaribou,
                      family ="binomial",
                      Ntrials = Ntrials,
                      control.compute = list(dic = TRUE),
                      control.fixed = list(prec.intercept = 0.001),
                      verbose = F)
summary(model_logistic)

#######################################
# 3. Bayesian CAR model fitted with INLA #
#######################################
require(INLA)
hyperpar_CAR = list(initial = -1, param = c(24.47,0.001))
formula_CAR = y ~ wildfire + logging + lichwood + openlich + deciduous + water +
                  wetland + meanelev +
                  f(node_CAR, model = "besag", graph.file =
                    "your_path/graph_8neighbors.txt",
                    hyper = list(theta = hyperpar_CAR))
model_CAR = inla(formula = formula_CAR, data = datacaribou,
                 family ="binomial",
                 Ntrials = Ntrials,
                 control.compute = list(dic = TRUE),
                 control.fixed = list(prec.intercept = 0.001),
                 verbose = F)
summary(model_CAR)

###########################################
# 4. Bayesian Matérn model fitted with INLA #
###########################################
require(INLA)
nrow.larger = 51
ncol.larger = 44
log.range = list(initial = log(5), fixed=TRUE)
hyperpar_matern = list(initial = -3, param=c(23.36,0.001))
formula_matern = y ~ wildfire + logging + lichwood + openlich + deciduous +
                     water + wetland + meanelev +
                     f(node_matern, model = "matern2d", nrow = nrow.larger,
                       ncol = ncol.larger, hyper = list(range = log.range, prec
                       = hyperpar_matern))
model_matern = inla(formula = formula_matern, data = datacaribou,
                    family = "binomial",
                    Ntrials = Ntrials,
                    control.compute = list(dic = TRUE),
                    control.fixed = list(prec.intercept = 0.001),
```

```
                        verbose = F)
summary(model_matern)
```

Appendix 2: Effect of shape parameter on coefficients of regression (± 95% CI). White dot represents the posterior mean of the non-spatial logistic model and black dots represent the posterior mean of the CAR model.