BLT Meeting output (Validation) burnin run v1

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Abstract

This document was produced for the purpose of presentation to Laurence and Ronald on 25/04/2022, the second BLT Model Meeting while in Germany. For documentation reasons, this run was made with the version v1 of the model. Here, we analyze the Memory and Foraging aspects of the model. The memory component is assessed through a comparison of empirical data with one run (n = 30 days), but we also differentiate between the whole run (30 days) and the 20 last days, because the step_forget paramater (= working memory) seemed to make the tamarin move more after a "burn-in period" of 10 days. The results show that the burn-in period does not seem to make a difference in the v1 version of the model, but this should be throughly tested. Regarding foraging behavior, tamarins spend too much time foraging in a row.

Obs: for easier visualization/discussion, check xlsx presentation "Presentation-for.Laurence.xlsx"

Contents

The *four* problems with this model are:

1) Regarding DPL and Turning angles, it is the same before and after the burn-in period, but revisitations and routes seem more "natural". Therefore, working memory (step_forget) still has to be throughly tested.
2) Tamarins spend too much time foraging
3) Tamarins are still not properly bouncing at the border of the fragment (while foraging)
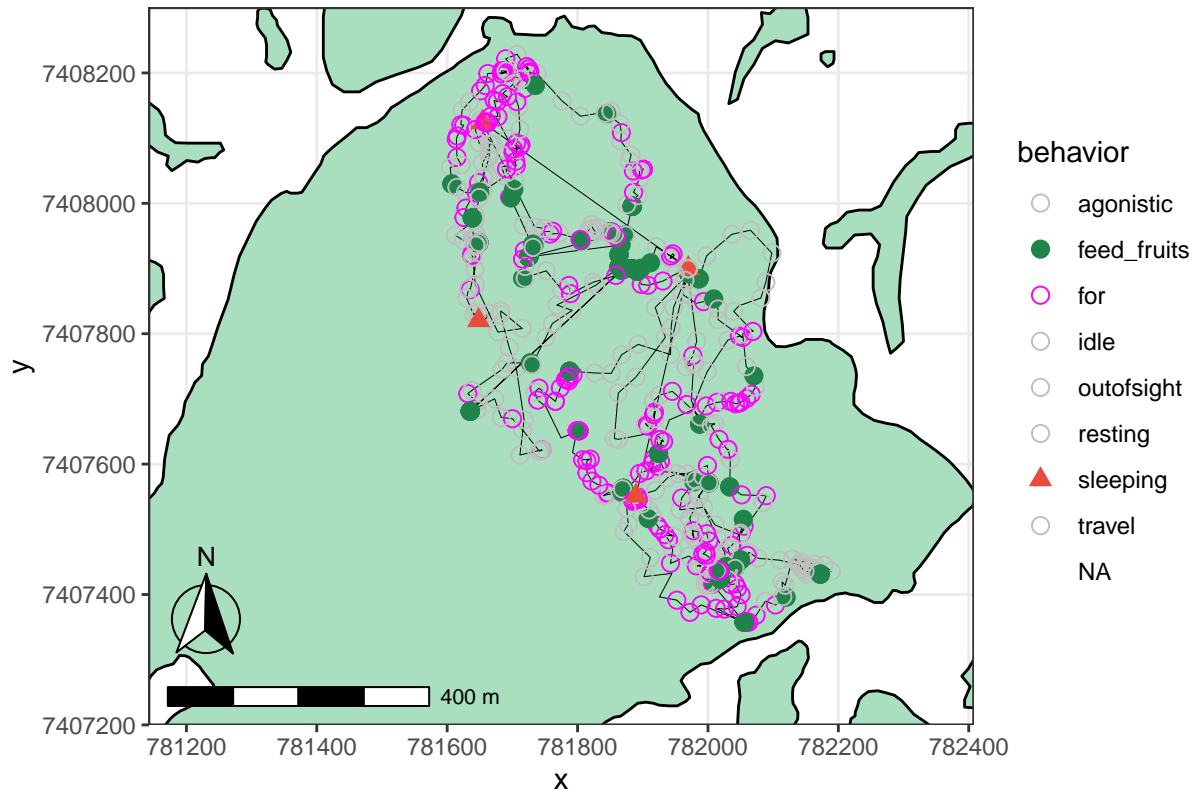4) Foraging occurs for too long
5) Constant step lenght (velocity)

Guareí empirical (all data, 28 days) and July (6 days)

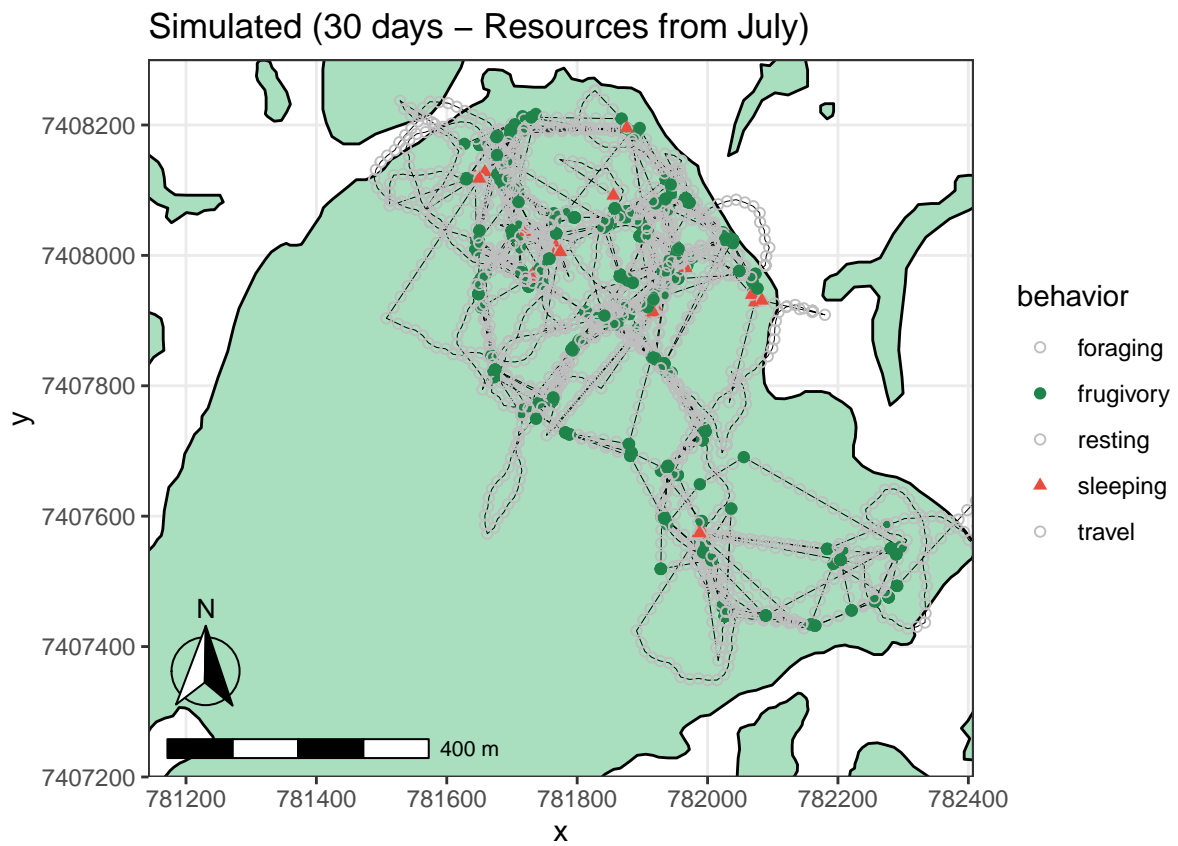## Warning: Removed 276 rows containing missing values (geom_point).
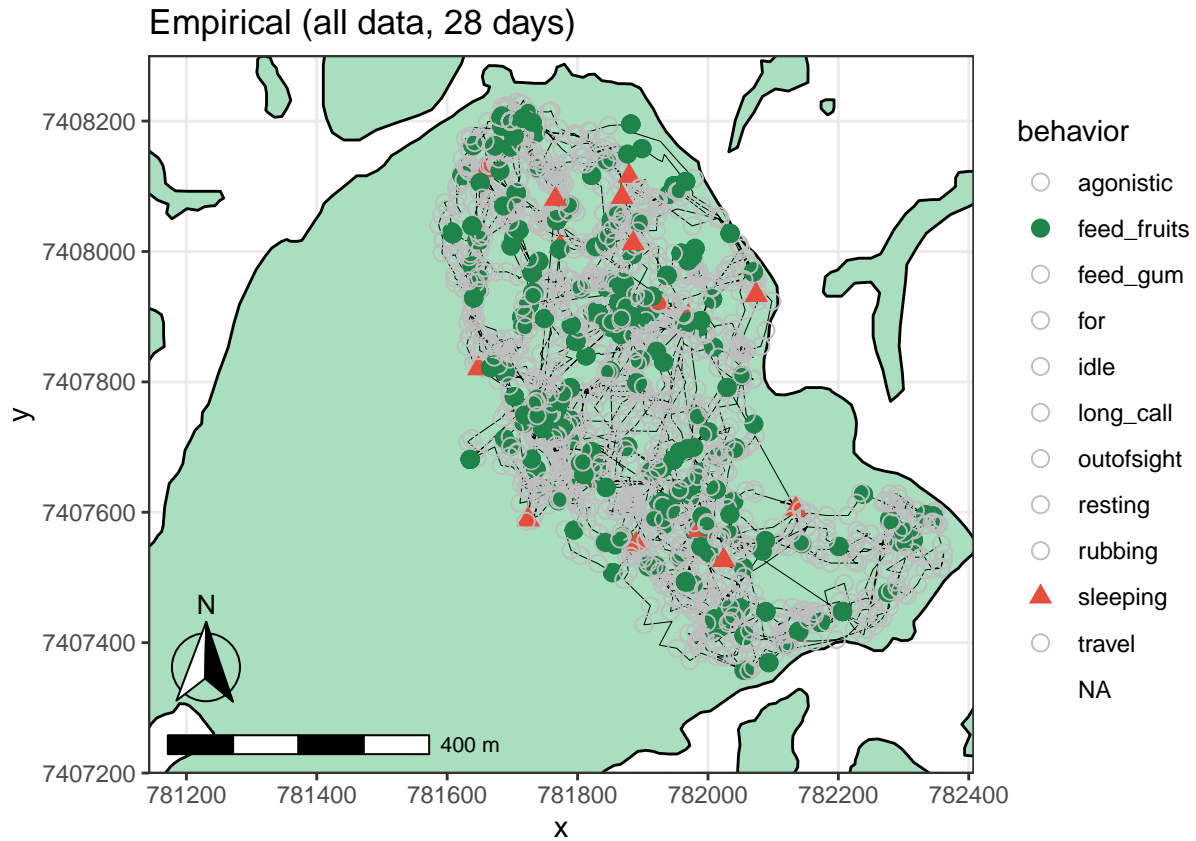
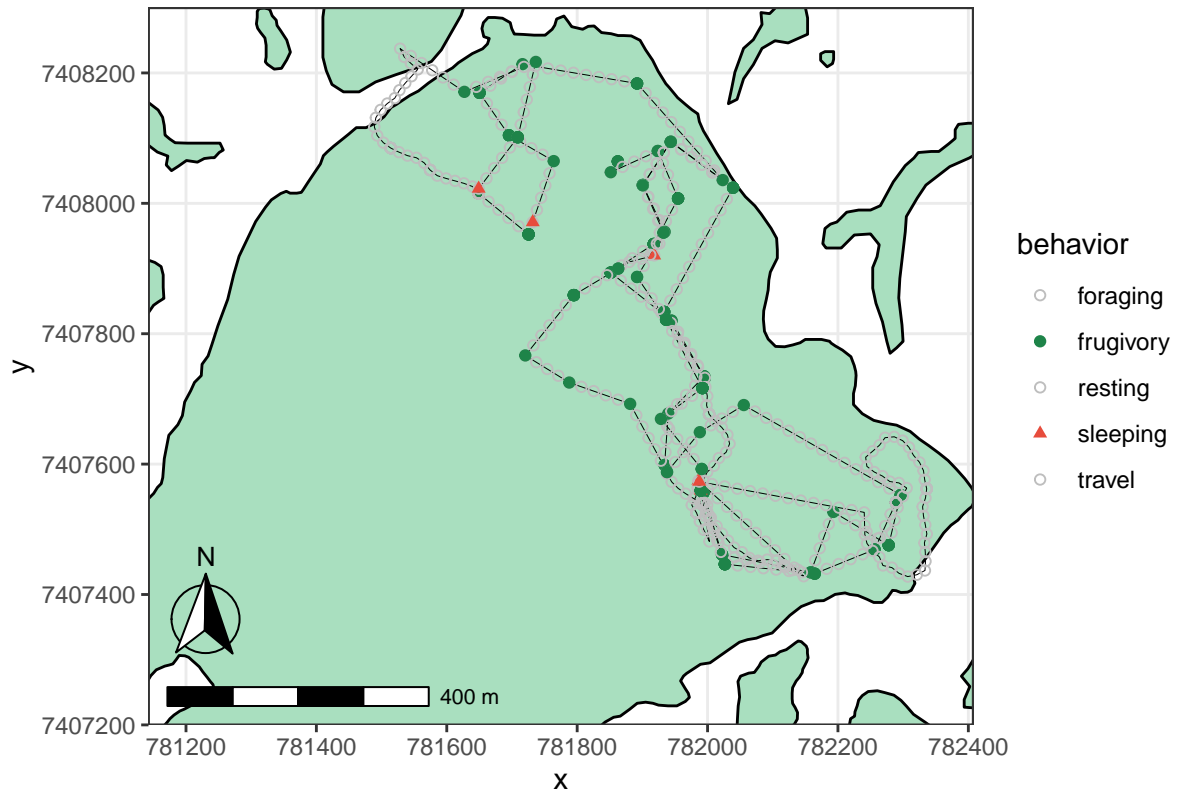## Warning: Removed 26 rows containing missing values (geom_point).
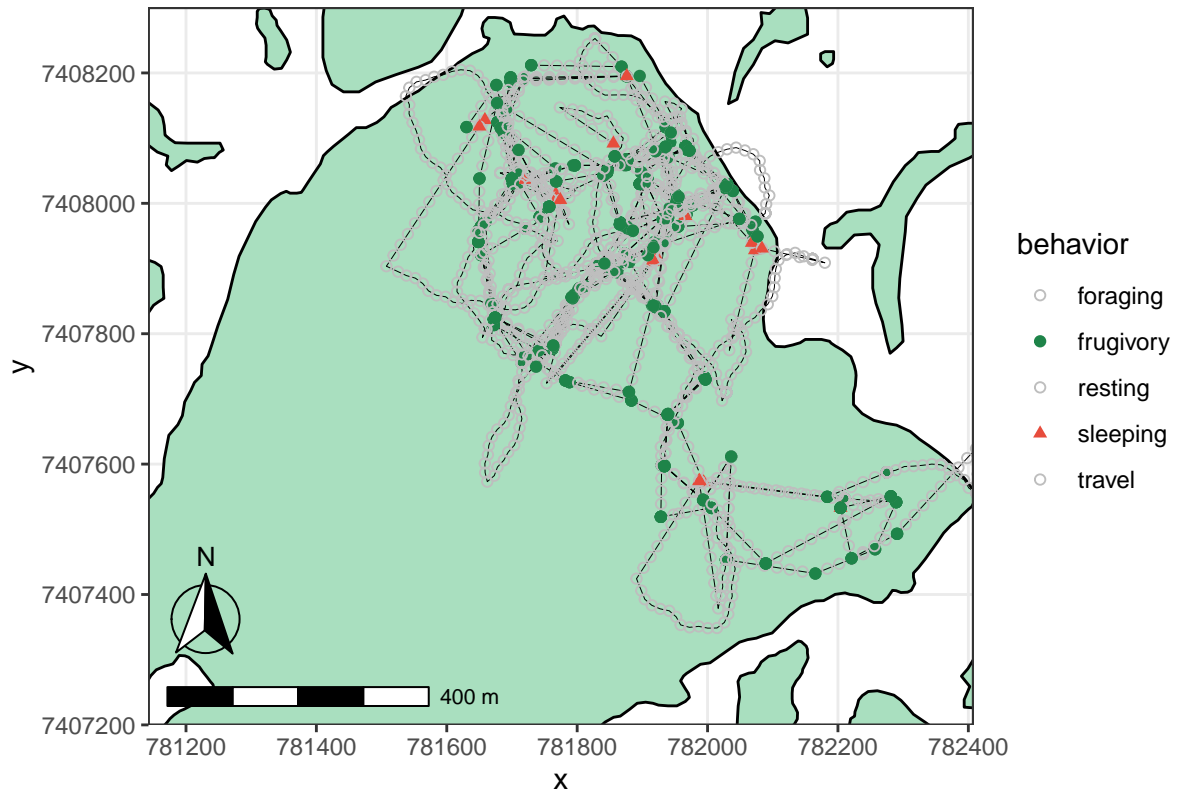
Empirical (July only, 6 days)

behavior
- ○ agonistic
- ● feed_fruits
- ○ for
- ○ idle
- ○ outofsight
- ○ resting
- ▲ sleeping
- ○ travel
- NA

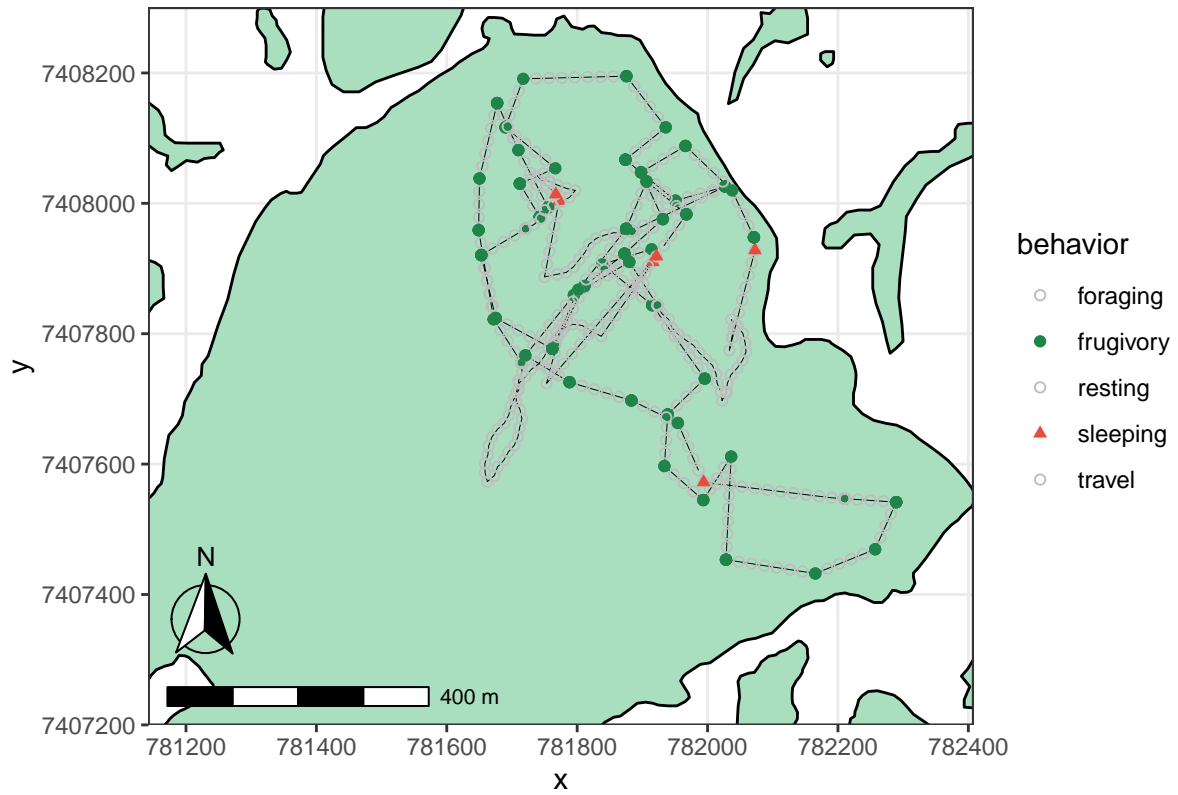## Simulated (30 days – Resources from July)

Simulated (first 6 days – Resources from July)

Simulated (20 days after burn in of 10 days – Resources from July)

Simulated (6 days after burn in of 10 days – Resources from July)
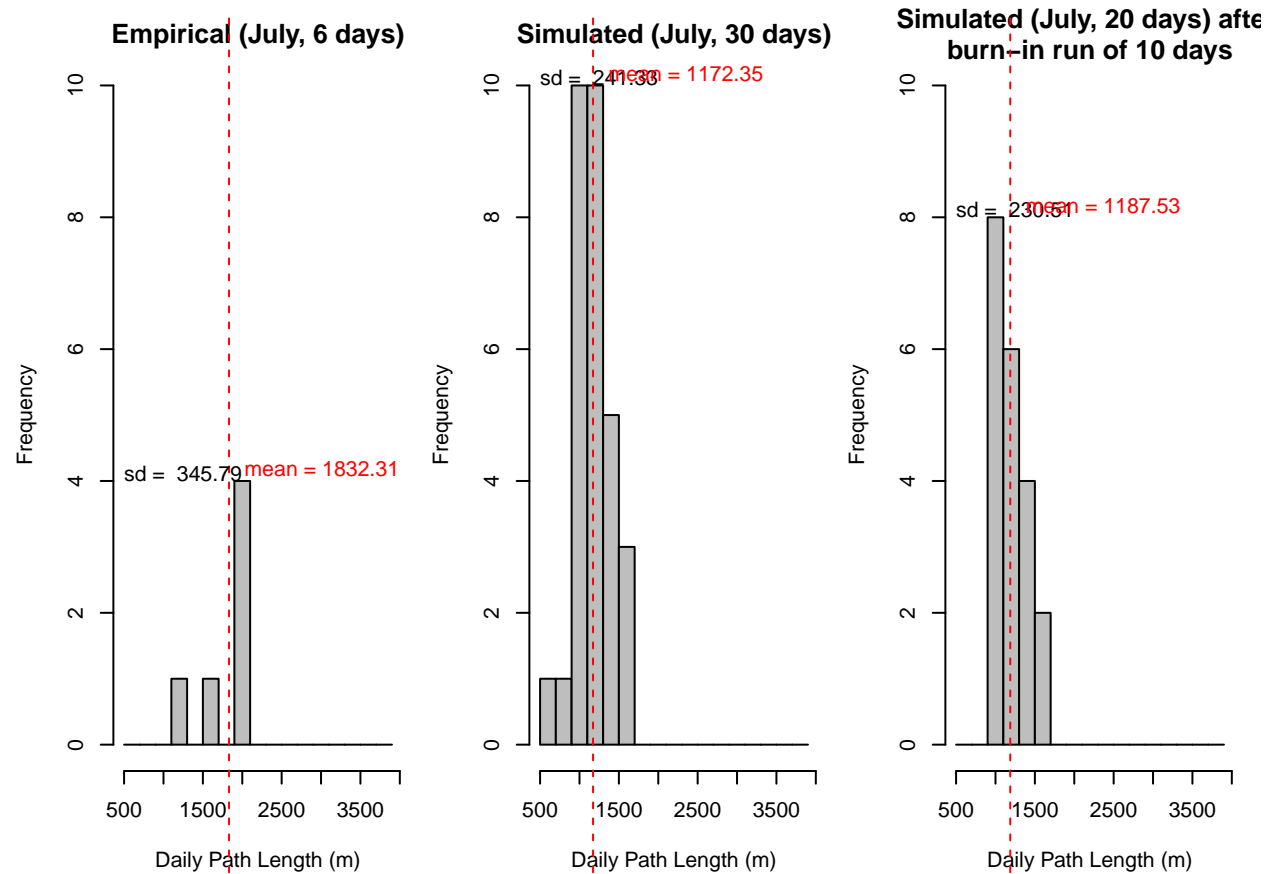
Validation Patterns

We are not checking seed dispersal patterns now, just movement and ranging patterns.

Dayly Path Lenght (DPL)

Calculate and plot DPL

Home Range

Still to be done Comparison between methods: https://doi.org/10.1111/2041-210X.13786

Turning Angles and Step Lenghts

```
## [1] "Empirical (July, 6 d) Mean Relative Angle (degrees) =  0.06"

## [1] "Simulated (July, 30 d) Mean Relative Angle (degrees) 0.01"

## [1] "Simulated (July, 20 d, after burn-in run of 10 days) Mean Relative Angle (degree

## [1] "Mean Relative Angle (degrees) : 3.60006621892628"

## [1] "Mean Relative Angle (degrees) : 0.386297408087265"

## [1] "Mean Relative Angle (degrees) : -0.119157674256658"

## [1] "Mean Step lenght (meters) : 16.88761495443"

## [1] "Mean Step lenght (meters) : 10.2508063826726"

## [1] "Mean Step lenght (meters) : 10.3488574898088"
```
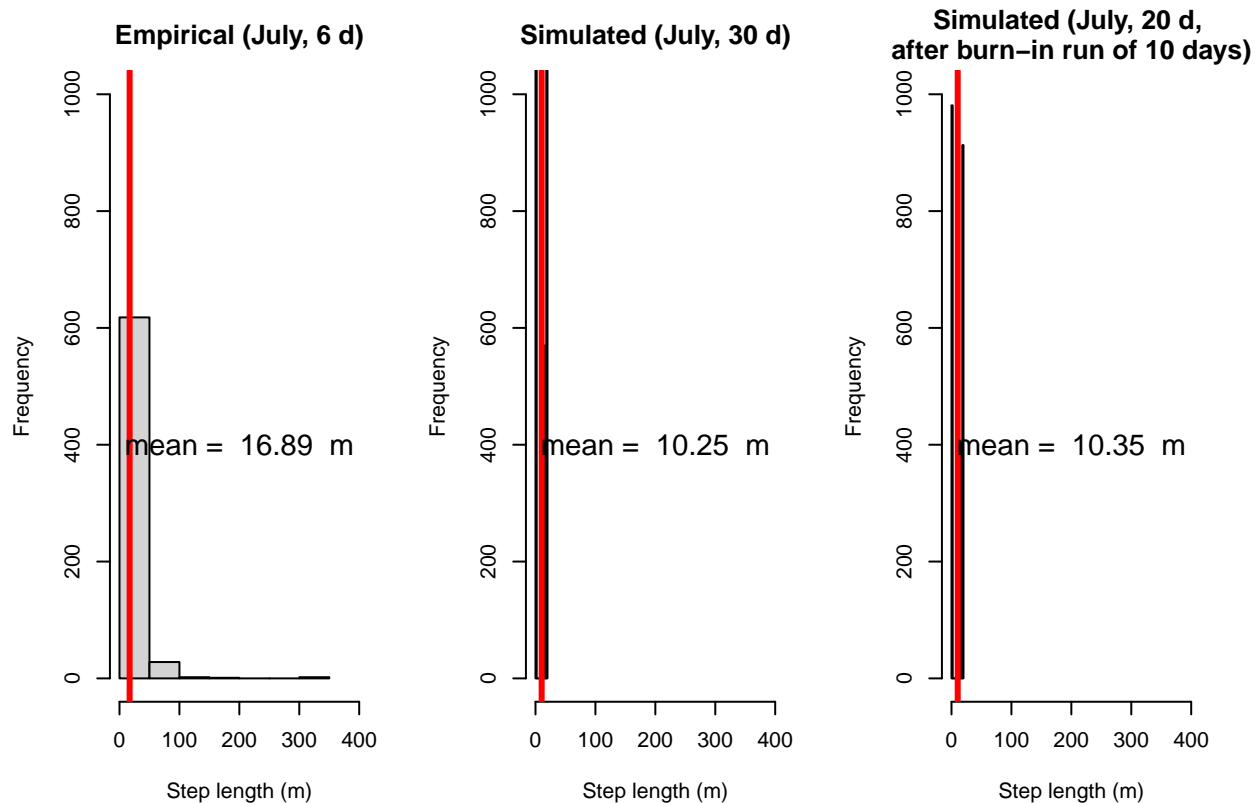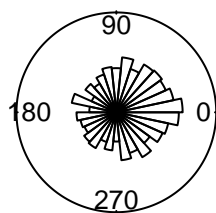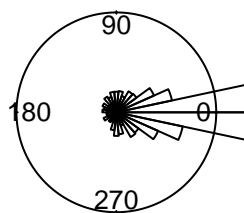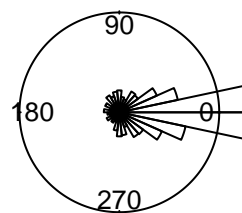
Empirical (July, 6 d)   **Simulated (July, 30 d)**   **Simulated (July, 20 d,
after burn–in run of 10 days)**

Revisitations (coming soon)

Foraging in empirical data and simulated runs

```
gua.plot <- gua.sf +
  geom_path(data = dat.gua.orig.jul,
            aes(x = x, y = y, group = day_month),
            size = 0.15) +
  geom_point(data = dat.gua.orig.jul,
             aes(x = x, y = y, group = behavior,
                 color = behavior,
                 shape = behavior),
             size = 2.7) +
  ggtitle("Empirical (July only, 6 days)") +
  scale_shape_manual(values = c(1, 19, 1, 1, 1, 1, 17, 1, 1)) +
  scale_color_manual(values = c("grey", "#1E8449", "grey", "magenta", "grey", "grey", "#

gua.plot
```

Warning: Removed 26 rows containing missing values (geom_point).

Empirical (July only, 6 days)
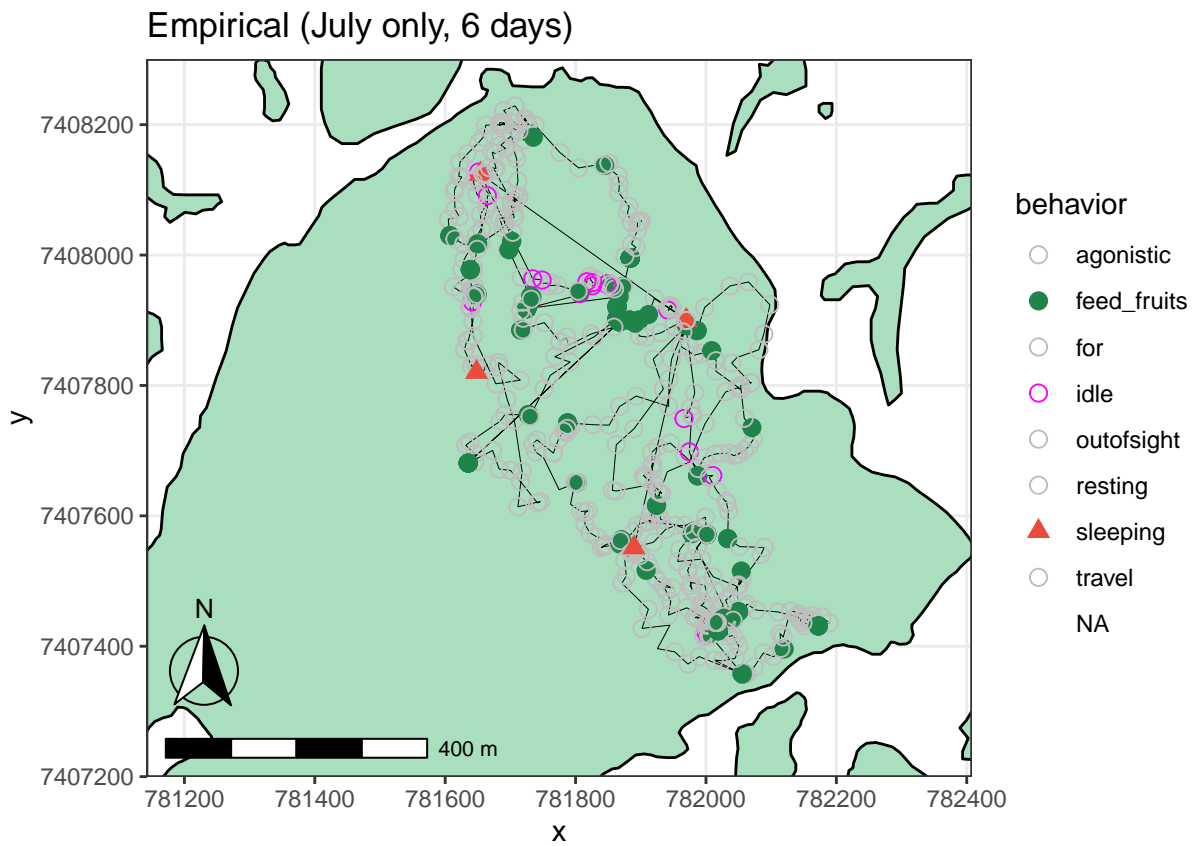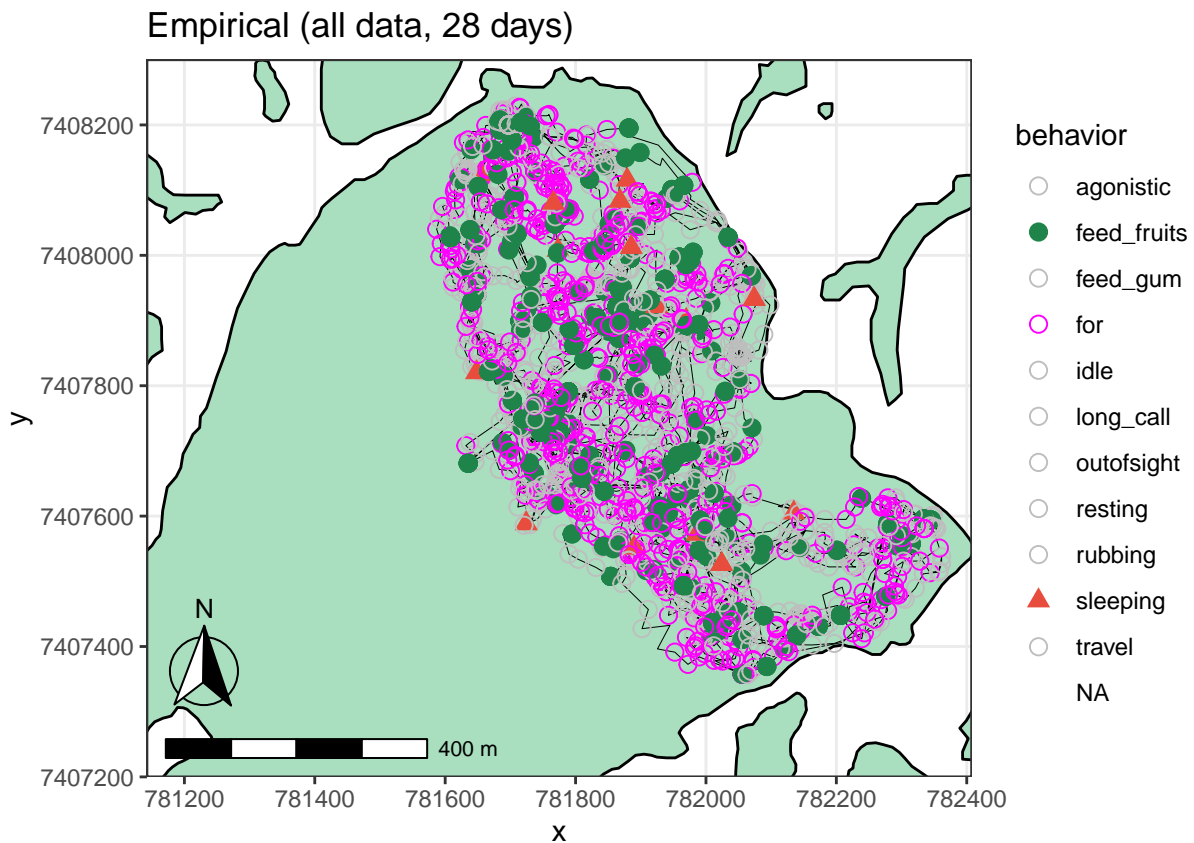
```
dat.gua.orig <- dat.gua.orig %>%
  mutate(day = lubridate::day(datetime)) %>%
  mutate(month = lubridate::month(datetime)) %>%
  mutate(day_month = paste0(dat.gua.orig$day, "-", dat.gua.orig$month))

gua.plot <- gua.sf +
  geom_path(data = dat.gua.orig,
            aes(x = x, y = y, group = day_month),
            size = 0.15) +
  geom_point(data = dat.gua.orig,
             aes(x = x, y = y, group = behavior,
                 color = behavior,
                 shape = behavior),
             size = 2.7) +
  ggtitle("Empirical (all data, 28 days)") +
  scale_shape_manual(values = c(1, 19, 1, 1, 1, 1, 1, 1, 1, 17, 1, 1)) +
  scale_color_manual(values = c("grey", "#1E8449", "grey", "magenta", "grey", "grey", "g

gua.plot
```

```
## Warning: Removed 276 rows containing missing values (geom_point).
```


Empirical (all data, 28 days)

```
gua.plot <- gua.sf +
  geom_path(data = loc_tam %>% filter(day <= 6),
            aes(x = x, y = y, group = day),
            size = 0.15) +
  geom_point(data = loc_tam %>% filter(day <= 6),
             aes(x = x, y = y, group = behavior,
                 color = behavior,
                 shape = behavior)) +
  ggtitle("Simulated (first 6 days - Resources from July)") +
  scale_shape_manual(values = simulated_shapes) +
  scale_color_manual(values = simulated_colors)

gua.plot
```
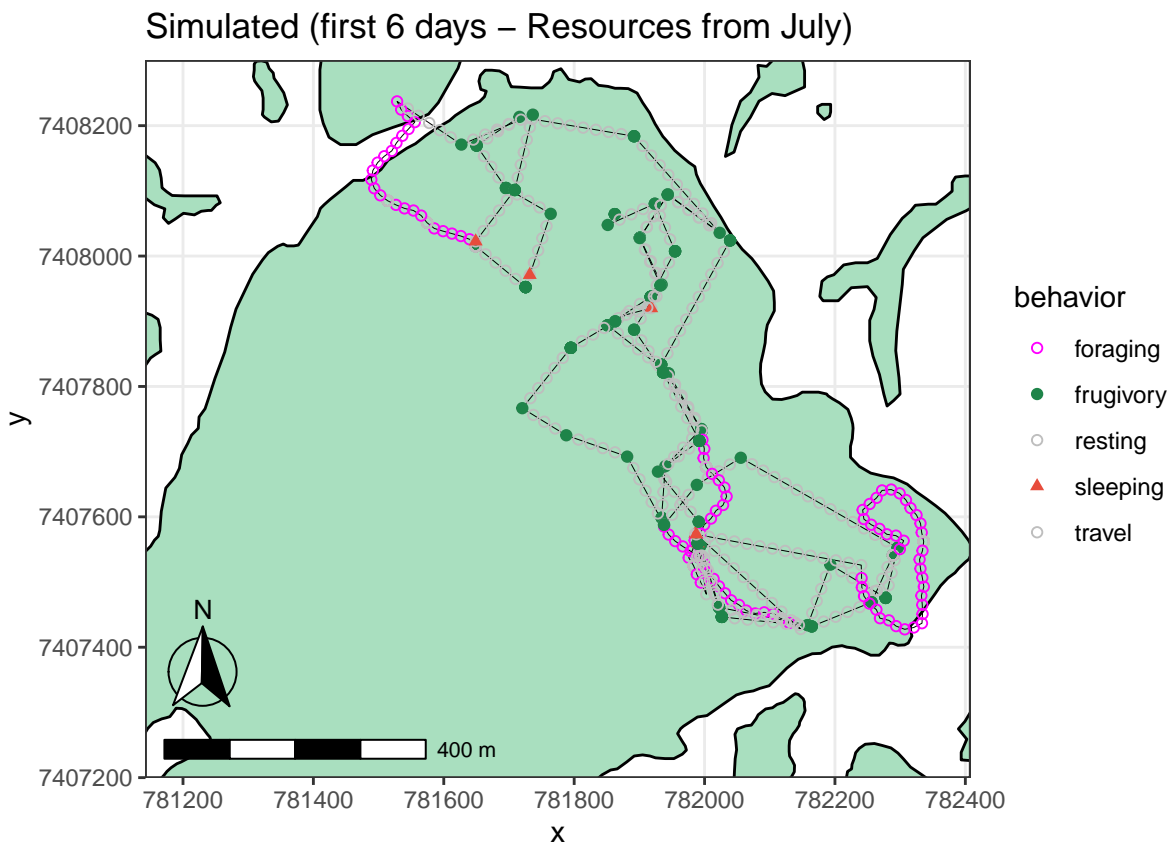

Simulated (first 6 days – Resources from July)

```
gua.plot <- gua.sf +
  geom_path(data = loc_tam %>% filter(day > 10 & day < 17),
            aes(x = x, y = y, group = day),
            size = 0.15) +
  geom_point(data = loc_tam %>% filter(day > 10 & day < 17),
             aes(x = x, y = y, group = behavior,
```

```
                color = behavior,
                shape = behavior)) +
  ggtitle("Simulated (6 days after burn in of 10 days - Resources from July)") +
  scale_shape_manual(values = simulated_shapes) +
  scale_color_manual(values = simulated_colors)

gua.plot
```


Simulated (6 days after burn in of 10 days – Resources from July)