SUPPLEMENTARY MATERIAL

Nonchalant neighbours: Space use and overlap of the critically endangered Elongated Tortoise

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Supplementary Text S1. Details on R version and R packages used.

We used *R v.3.5.3* (R Core Team, 2019) and *R Studio v.1.2.1335* (R Studio Team, 2019) for analysis and data visualization. We used packages: *dplyr v.0.8.4* (Wickham, François, Henry, & Müller, 2019), *lubridate v.1.7.4* (Grolemund & Wickham, 2011), *raster v.3.0.12* (Hijmans, 2020), *reshape2 v.1.4.3* (Wickham 2007), *rgdal v.1.4.3* (Bivand, Keitt, & Rowlingson, 2019), *tidybayes v.2.1.1* (Kay, 2019), and *zoo v.1.8.8* (Zeileis & Grothendieck, 2005) during data reading and manipulation; *adehabitatHR v.0.4.16* (Calenge, 2006), *amt v.0.0.6* (Signer, Fieberg, & Avgar, 2018), *bestNormalize v.1.6.1* (Peterson & Cavanaugh, 2019), *brms v.2.13.5* (Bürkner, 2018), *move v.3.1.0* (Kranstauber, Smolla, & Scharf, 2016), *performance v.0.4.8* (Lüdecke, Makowski, Waggoner, & Patil, 2020), *rgeos v.0.4.2* (Bivand & Rundel, 2018), *sf v.0.8.2* (Pebesma, 2018), and *wiqid v.0.3.0* (Meredith, 2020) during analysis; *bayesplot v.1.7.2* (Gabry, Simpson, Vehtari, Betancourt, & Gelman, 2019), *cowplot v.0.9.4* (Wilke, 2019), *ggplot2 v.3.2.1* (Wickham 2016), *ggpubr v.0.2* (Kassambara, 2018), *ggridges v.0.5.2* (Wilke, 2018) *ggspatial v.1.0.3* (Dunnington, 2018), *gtable v.0.3.0* (Wickham & Pedersen, 2019), *ggtext v.0.1.0* (Wilke, 2020), *scales v.1.1.0* (Wickham & Seidel, 2019), and *scico v.1.1.0* (Pedersen & Crameri, 2018) for data visualization.

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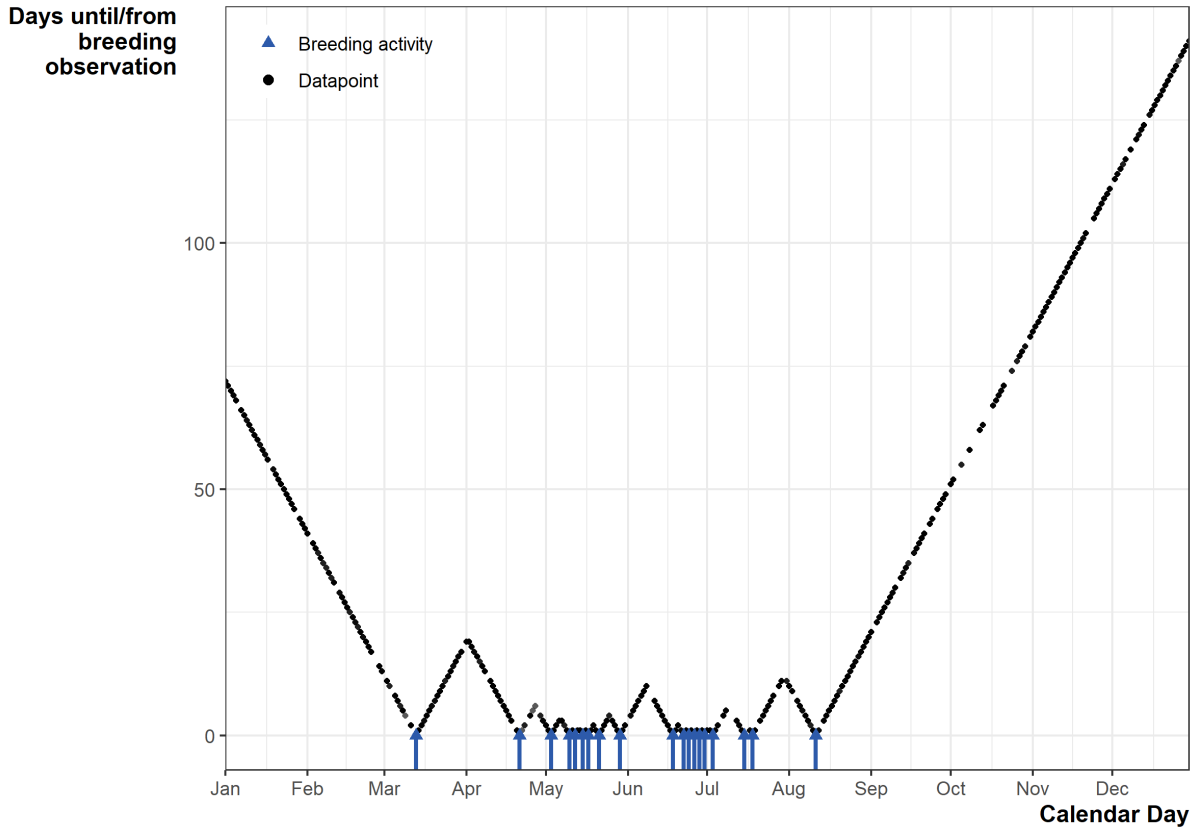

Figure S1. Data point proximity to a calendar date that a breeding activity observation was made across any year. *Black circles are the data point, blue triangles and lines show when activity was observed.*

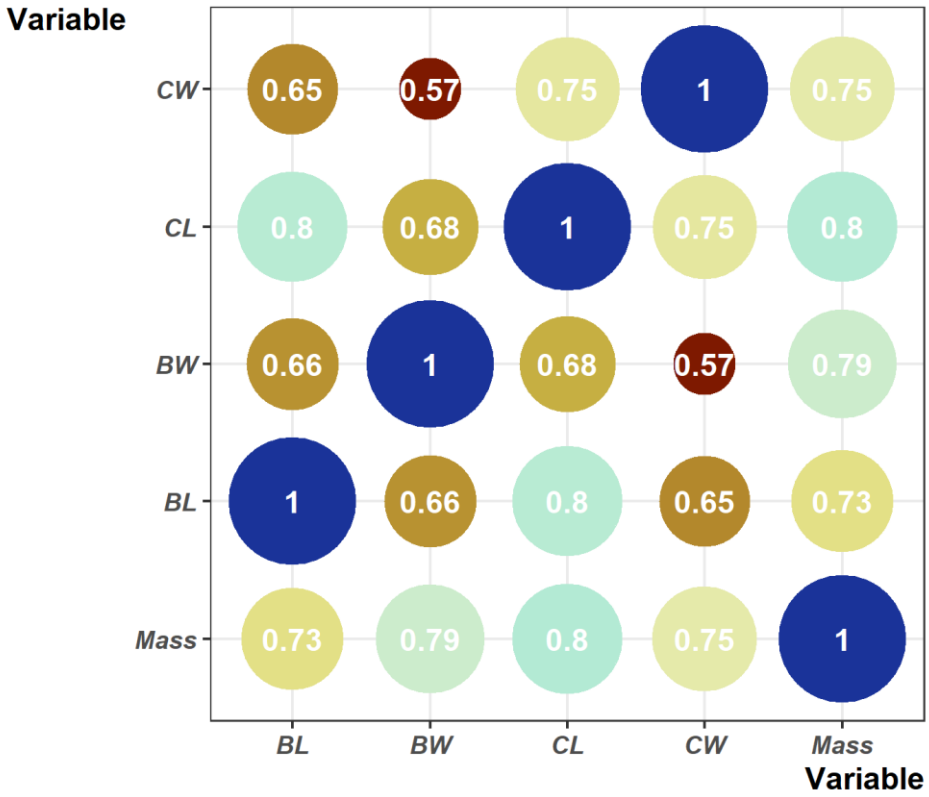

Figure S2. Correlation matrix comparing: mass, carapace width (CW), carapace length (CL), body width (BW), and body length (BL). *Values displayed are Spearman's rho, where size and colour of the circles reflect the strength of correlation.*

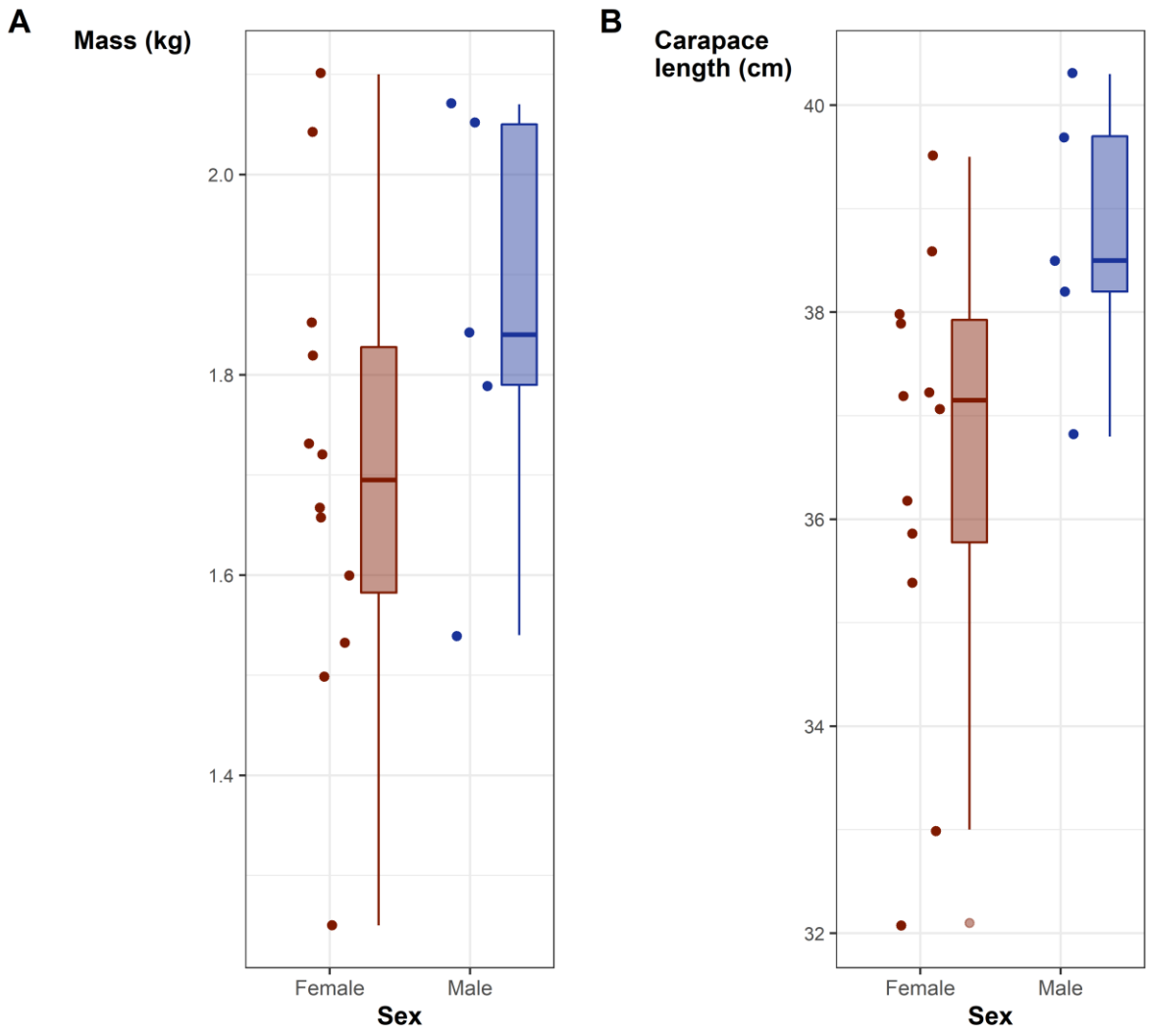

Figure S3. Boxplots alongside jittered points illustrating the values of female and male, A) mass (kg), and B) curved carapace length (cm).

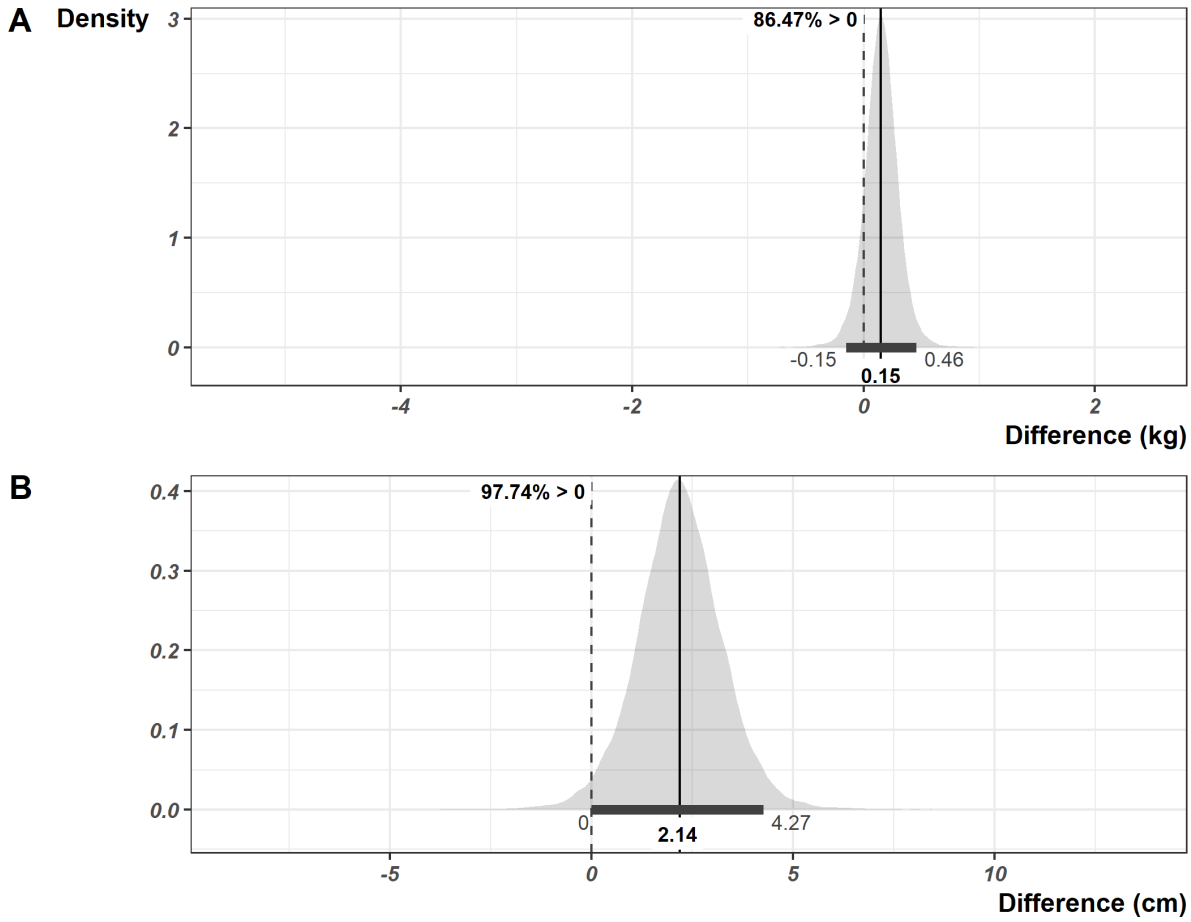

Figure S4. Distribution of the difference between male and female A) mass and B) curved carapace length. *Thick line shows the 95% Highest Density Interval, with values either end showing the extent. Central label indicates the overall estimated mean difference. Top label shows the probability that the difference was larger than zero.*

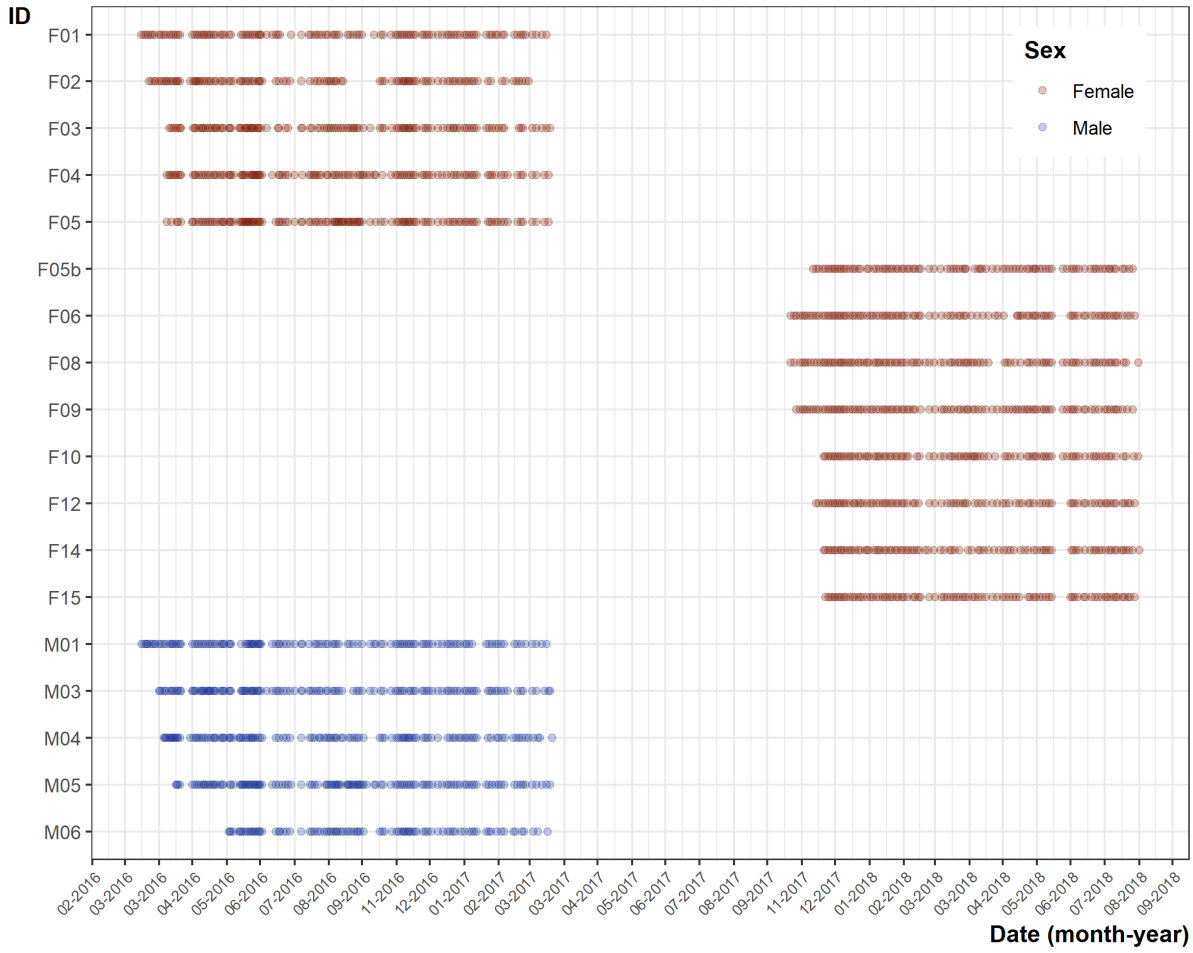

Figure S5. Dates on which a datapoint was recorded, split across all tracked individuals. *Red points are females, blue points are males.*

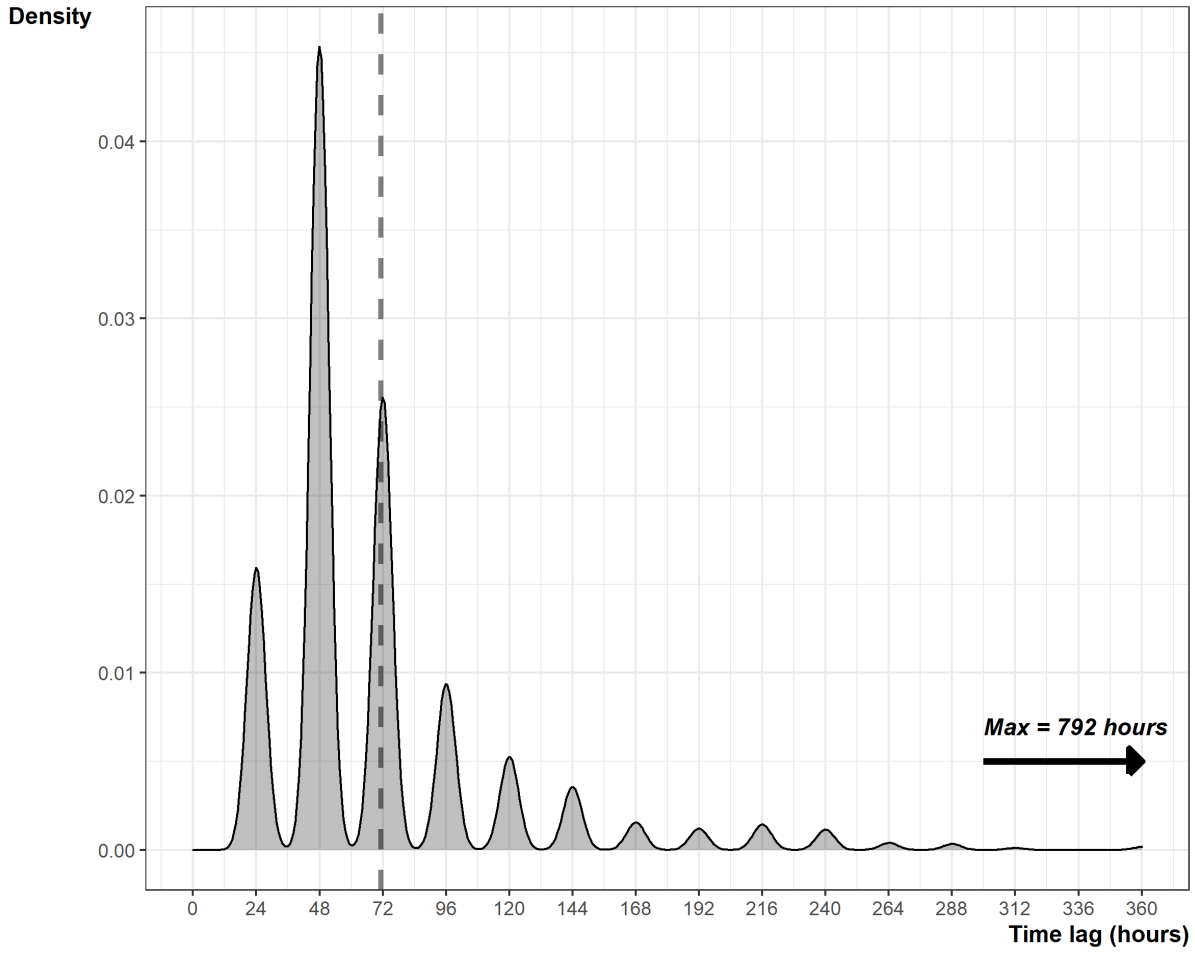

Figure S6. Distribution of the time lag between subsequent tracks. *The dashed line indicates the mean time lag. The x axis has been truncated at 360 hours to aid with visualisation.*

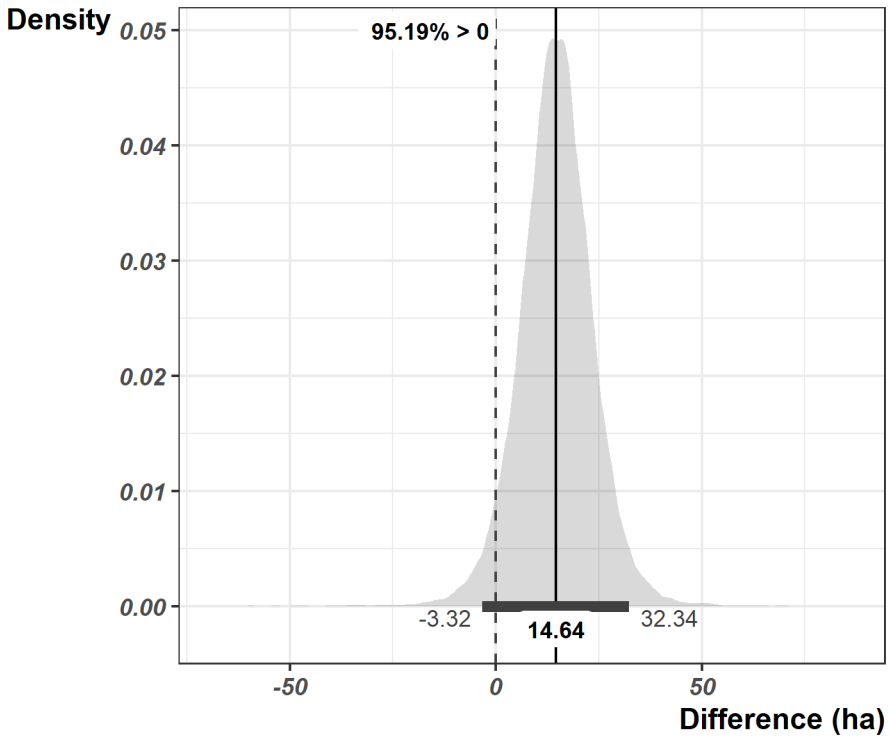

Figure S7. Distribution of the difference between male and female space-use estimates. *Thick line shows the 95% Highest Density Interval, with values either end showing the extent. Central label indicates the overall estimated mean difference. Top label shows the probability that the difference was larger than zero.*

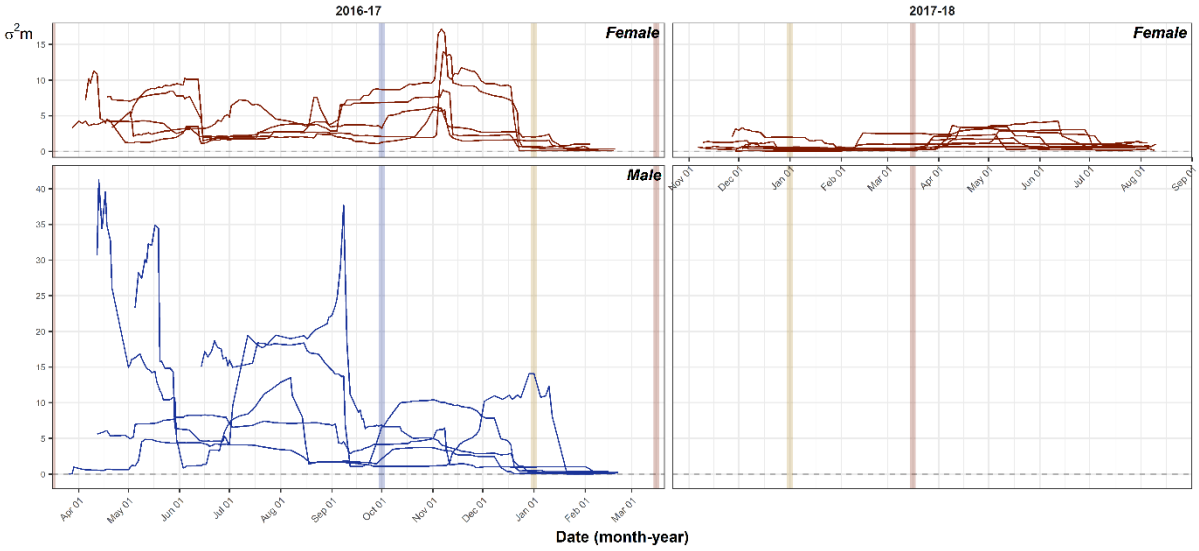

Figure S8. Motion variance over time, split between sexes and cohorts. *Red, blue and yellow vertical lines indicate the beginning of hot, wet, and dry seasons respectively.*

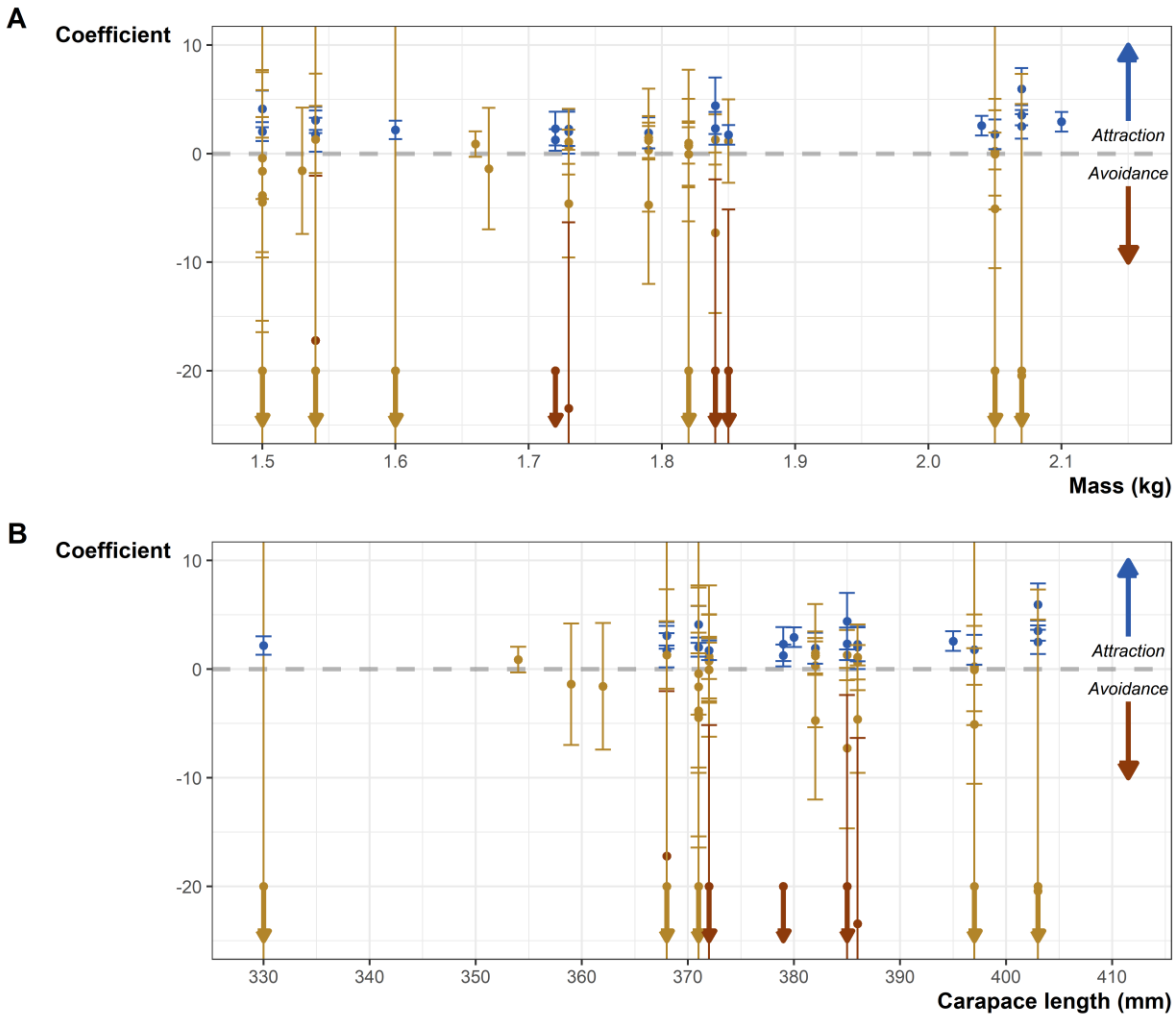

Figure S9. Step-selection model coefficients plotted against tortoise size. A) *mass (kg).* ***B)*** *carapace length (mm). Error bars represent the standard error on the coefficient estimate. Point and error bar colours indicate the direction of the effect and whether the confidence intervals overlap zero: blue = positive with no overlap, yellow = overlap therefore no clear direction, red = negative with no overlap. Coloured arrows bottom left indicate instances where point estimates are extremely low and plotting would have obscured overall patterns (excluded range = -395808 – -41).*

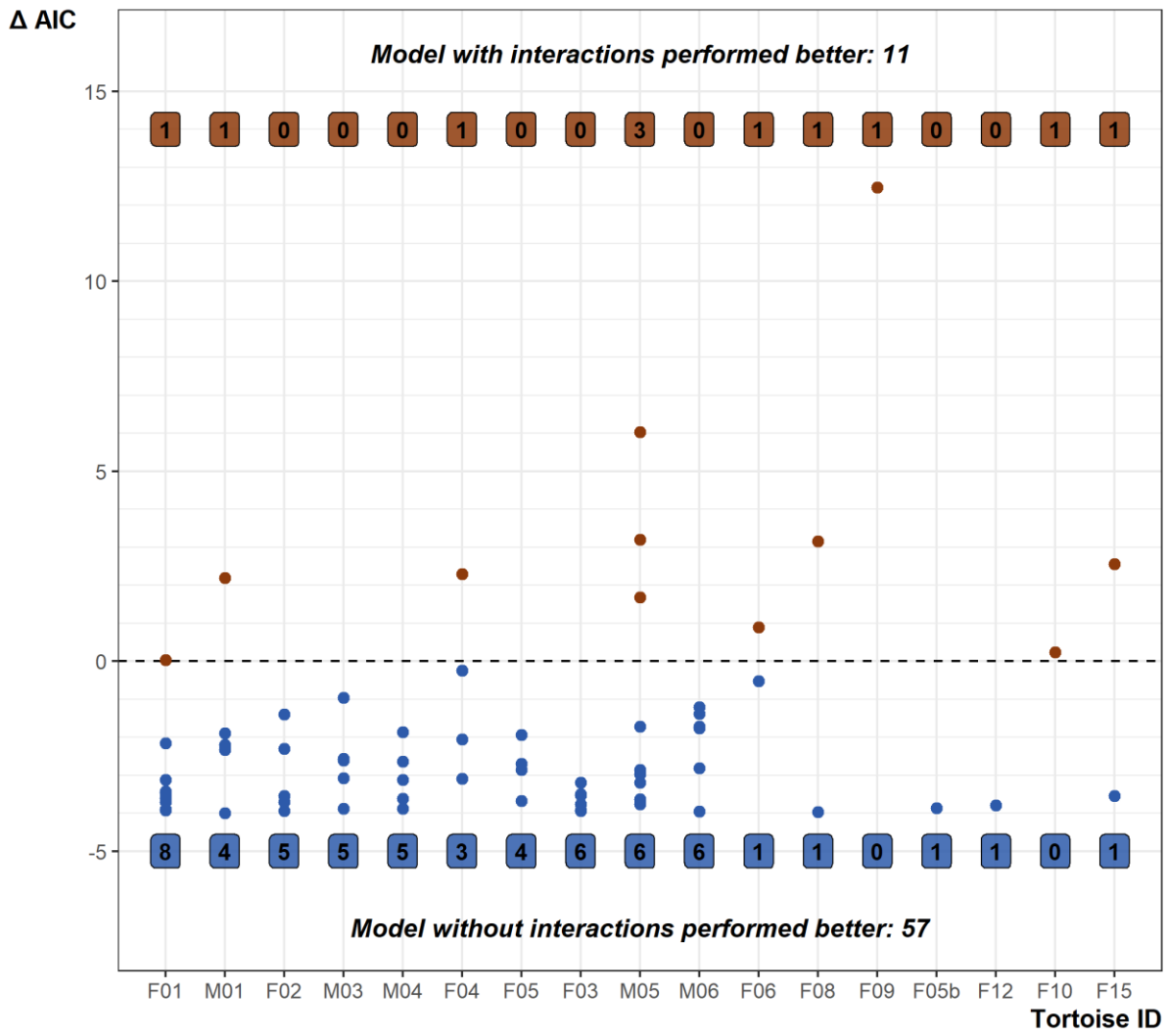

Figure S10. Delta AIC values between models excluding interactive effects and those including interactive effects. *Blue points indicate models where the simpler non-interactive model had lower AIC values, whereas red points show when models with interactive effects performed better. Coloured labels show the counts of which model set performed better per individual tortoise ID. Text labels provide the overall count.*

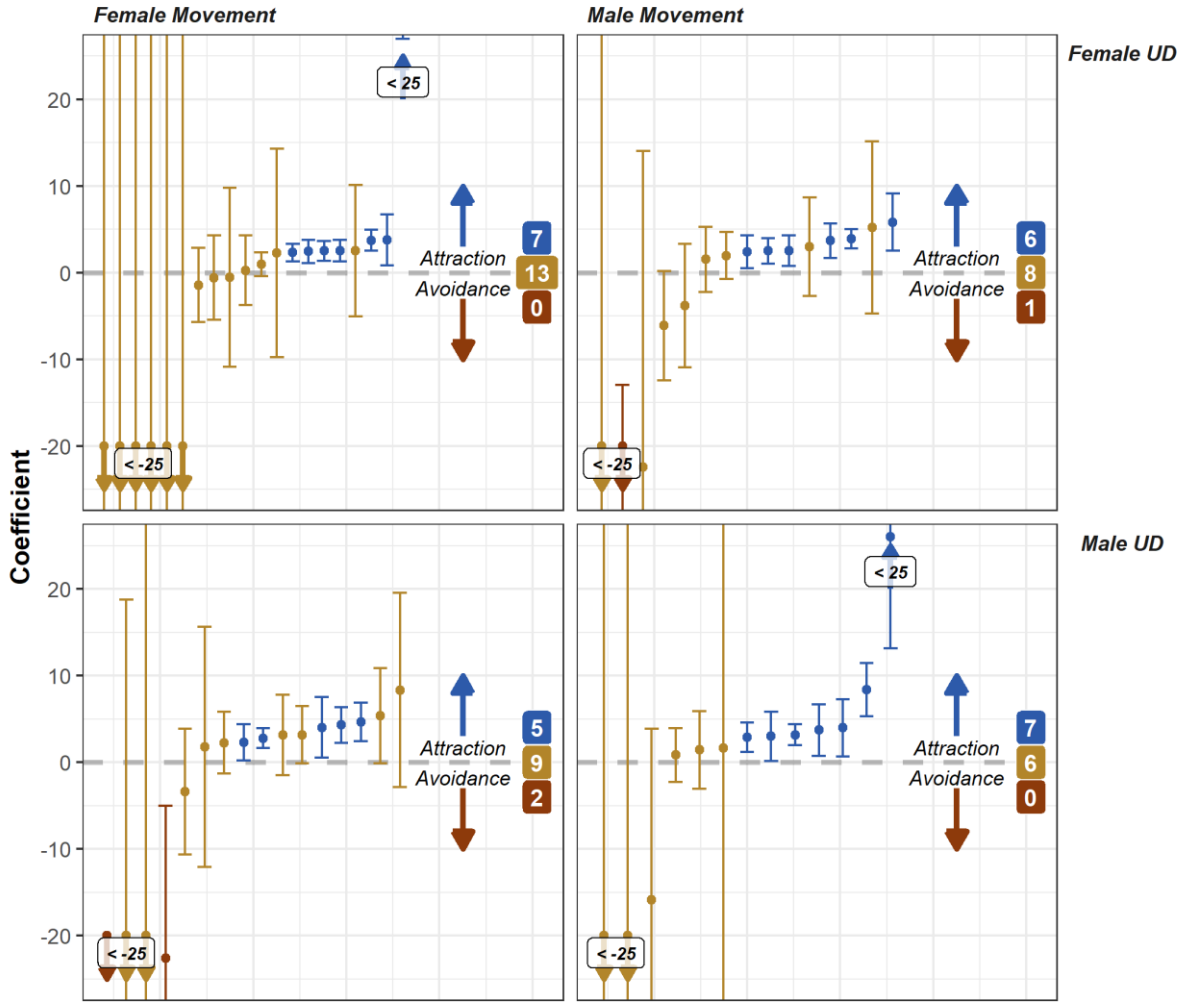

Figure S11. Model coefficients describing attraction or avoidance between individuals in the model with interactive effects. *Error bars represent the standard error on the coefficient estimate. Point and error bar colours indicate the direction of the effect and whether the confidence intervals overlap zero: blue = positive with no overlap, yellow = overlap therefore no clear direction, red = negative with no overlap. Right hand coloured labels show the count of coefficient estimates indicating attraction (blue), overlapping zero (yellow), and avoidance (red). Coloured arrows bottom left and top right indicate instances where point estimates and SE are extremely low or high and plotting would have obscured overall patterns (low excluded range = -3719 – -34; high excluded range = 26 – 42).*

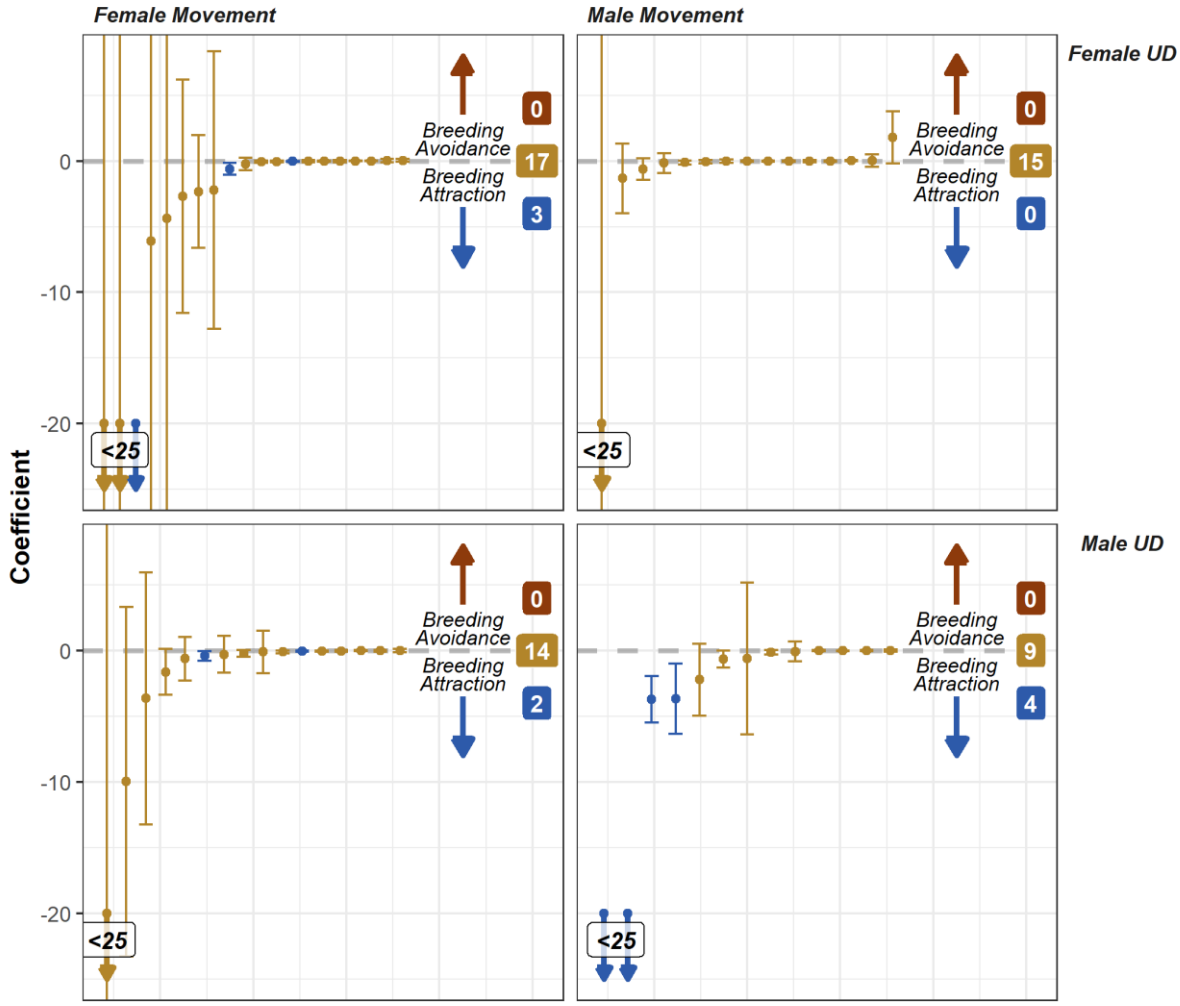

Figure S12. Model coefficients describing the interaction between attraction or avoidance and number of days until/since an observation of breeding activity. *Error bars represent the standard error on the coefficient estimate. Point and error bar colours indicate the direction of the effect and whether the confidence intervals overlap zero: blue = negative with no overlap, yellow = overlap therefore no clear direction, red = positive with no overlap. Right hand coloured labels show the count of coefficient estimates indicating greater attraction closer to breeding activity (blue), overlapping zero (yellow), and greater avoidance closer to breeding activity (red). Coloured arrows bottom left indicate instances where point estimates and SE are extremely low and plotting would have obscured overall patterns (excluded range = -8670 – -54).*

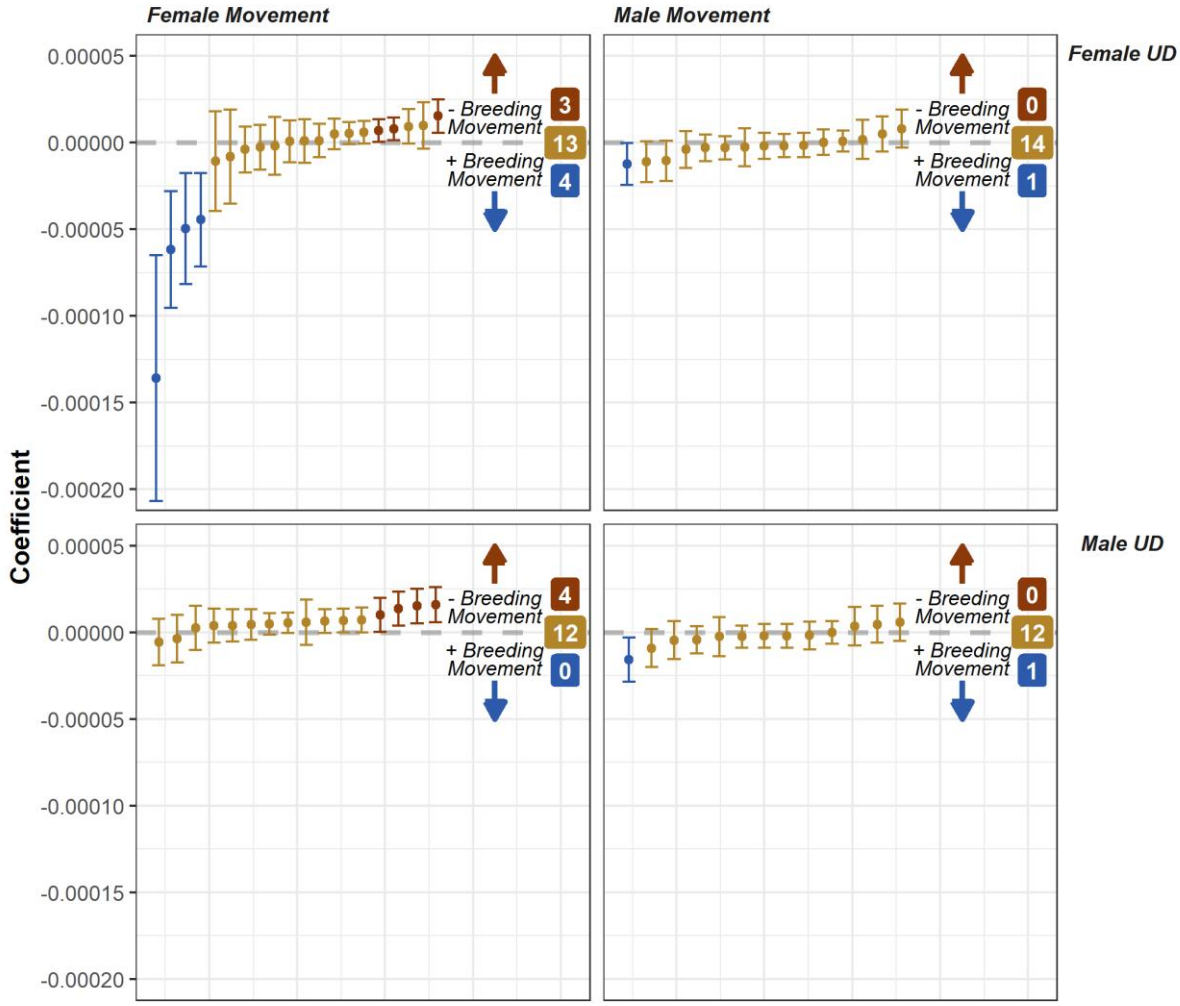

Figure S13. Model coefficients describing the interaction between step length and number of days until/since an observation of breeding activity. *Error bars represent the standard error on the coefficient estimate. Point and error bar colours indicate the direction of the effect and whether the confidence intervals overlap zero: blue = negative with no overlap, yellow = overlap therefore no clear direction, red = positive with no overlap. Right hand coloured labels show the count of coefficient estimates indicating larger step length closer to breeding activity (blue), overlapping zero (yellow), and smaller step lengths closer to breeding activity (red).*

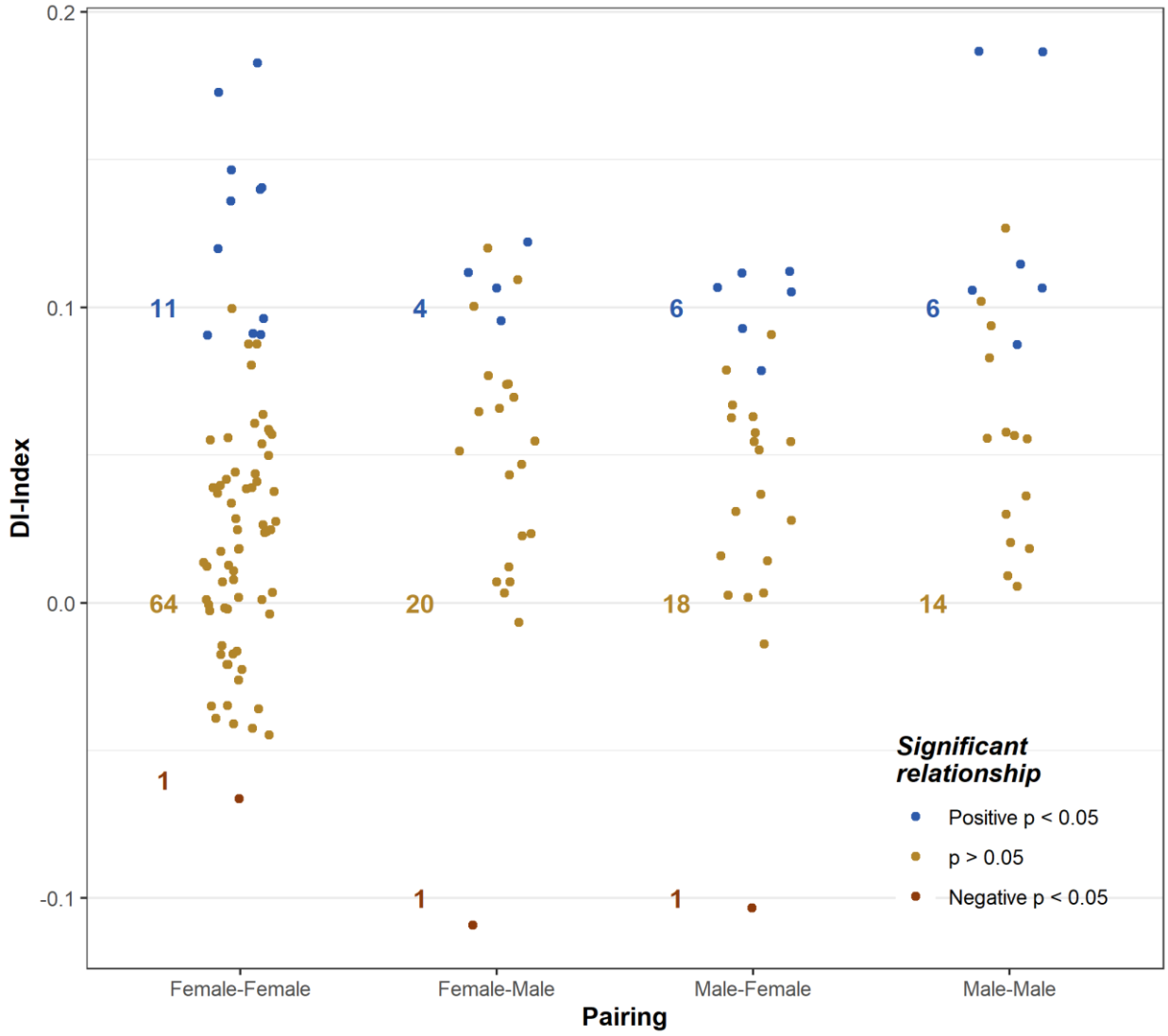

Figure S14. Global Dynamic Interaction index results for each tortoise pairing. *Numbers are counts of the significantly coherent movements (blue), non-significant choesnion between movements (orange), and significantly incoherent movements (red). Nb. DI-index ranges from -1 to 1, but y-axis ranges from -0.1 to 0.2.*

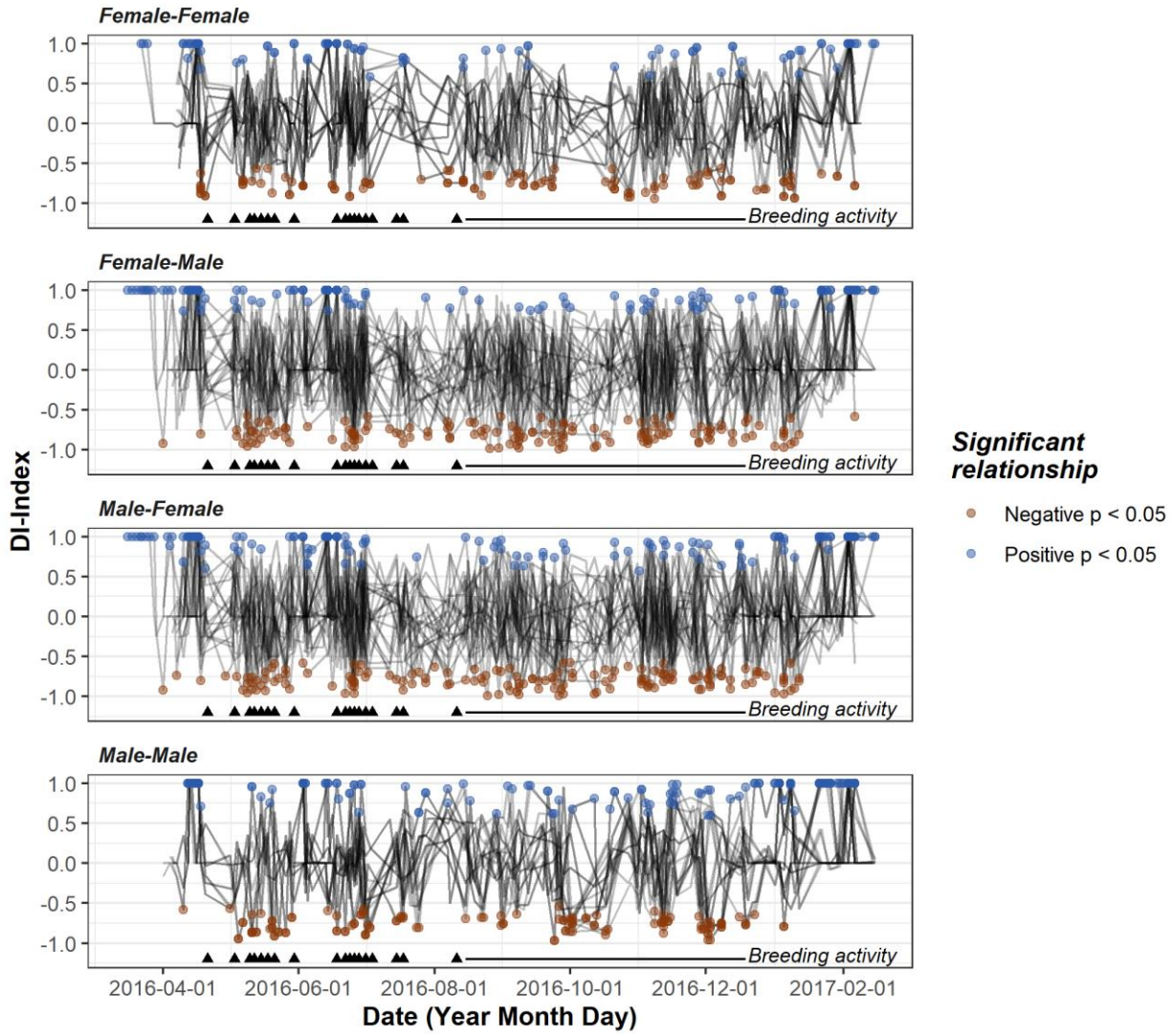

Figure S15. Local Dynamic Interaction index results for the 2016/2017 cohort. *Circles indicate times of significantly cohesive (blue) or incoherent (red) movements between individuals. Triangles at the lower area of each plot show breeding activity observations (Nb. breeding observations positions are compiled from all study years). Nb. DI-index ranges from -1 to 1.*

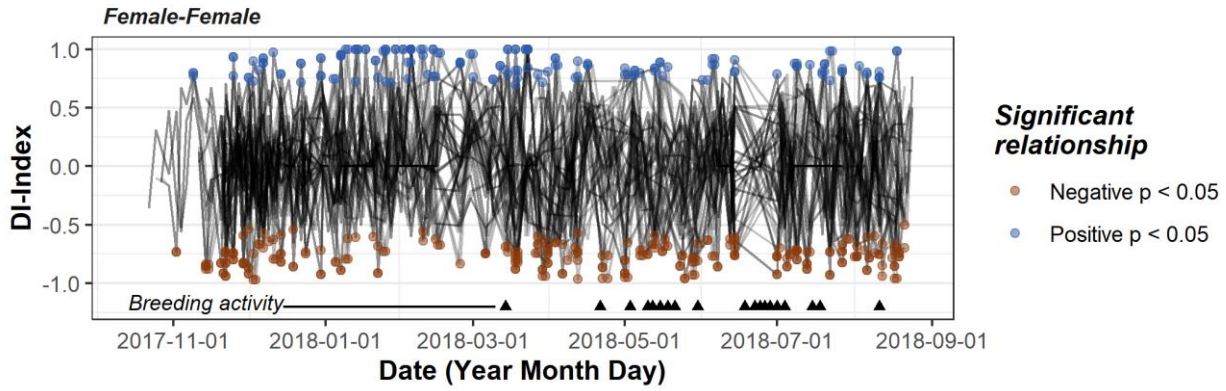

Figure S16. Local Dynamic Interaction index results for the 2017/2018 all female cohort. *Circles indicate times of significantly cohesive (blue) or incoherent (red) movements between individuals. Triangles at the lower area of each plot show breeding activity observations (Nb. breeding observations positions are compiled from all study years). Nb. DI-index ranges from -1 to 1.*

Table S1. Results from non-interactive step-selection models. *"tar" = the individual's whose subset dBBMM occurrence distribution was used in the model. "opp" =.the individual's whose movement data was used in the model. "res" = whether the model completed. "coef" = the point estimate for attraction/avoidance. "se" = the standard error associated with the point estimate. "n" = the total number of points in each model (observed and random). "nevent" = the number of time steps examined by the model. "warn" = warning connected to model convergence. "opp.sex" = the sex of the oppoent of the model. "tar.sex" = the sex of the target of the model. "avoid" = whether the point estimate suggested avoidance or attraction. "overlap0" = whether the standard error overlaps with zero.*

tar	opp	res	coef	se	n	nevent	warn	opp.sex	tar.sex	avoid	overlap0
F01	M01	Modelled	3.532248	0.926098	11008	109	NA	Male Movement	Female UD	attrac	Attraction
F01	F02	Modelled	0.739601	6.970387	9993	99	NA	Female Movement	Female UD	attrac	Overlaps
F01	M03	Modelled	-7.28139	7.392422	11699	116	NA	Male Movement	Female UD	avoid	Overlaps
F01	M04	Modelled	0.316434	5.67011	11102	110	NA	Male Movement	Female UD	attrac	Overlaps
F01	F04	Modelled	-242.853	189.8231	10908	108	NA	Female Movement	Female UD	avoid	Avoidance
F01	F05	Modelled	-288.63	239.8907	12019	119	NA	Female Movement	Female UD	avoid	Avoidance
F01	F03	Modelled	-4.61038	4.953753	10908	108	NA	Female Movement	Female UD	avoid	Overlaps
F01	M05	Modelled	3.093109	1.213824	11597	115	NA	Male Movement	Female UD	attrac	Attraction
F01	M06	Modelled	-0.05915	5.096662	8350	83	NA	Male Movement	Female UD	avoid	Overlaps
M01	F01	Modelled	2.021348	0.876176	10093	100	NA	Female Movement	Male UD	attrac	Attraction
M01	M03	Modelled	1.290017	2.312569	11484	114	NA	Male Movement	Male UD	attrac	Overlaps
M01	F03	Modelled	-23.4515	17.1215	10705	106	NA	Female Movement	Male UD	avoid	Avoidance
M01	M05	Modelled	3.074336	0.902794	11284	112	NA	Male Movement	Male UD	attrac	Attraction
M01	M06	Modelled	-706350	1298402	8047	80	NA	Male Movement	Male UD	avoid	Overlaps
F02	F01	Modelled	-4.46921	11.97109	8681	86	NA	Female Movement	Female UD	avoid	Overlaps

F02	M04	Modelled	1.918762	1.431761	10095	100	NA	Male Movement	Female UD	attrac	Attraction
F02	F03	Modelled	2.026993	2.025002	9393	93	NA	Female Movement	Female UD	attrac	Attraction
F02	M05	Modelled	-126.911	134.2635	9674	96	NA	Male Movement	Female UD	avoid	Overlaps
F02	M06	Modelled	-5.08884	5.469359	7142	71	NA	Male Movement	Female UD	avoid	Overlaps
M03	F01	Modelled	-3.84923	11.55509	9692	96	NA	Female Movement	Male UD	avoid	Overlaps
M03	M01	Modelled	5.951964	1.93073	10604	105	NA	Male Movement	Male UD	attrac	Attraction
M03	F04	Modelled	2.301187	1.556065	11110	110	NA	Female Movement	Male UD	attrac	Attraction
M03	F05	Modelled	1.153081	3.85214	12019	119	NA	Female Movement	Male UD	attrac	Overlaps
M03	M05	Modelled	-41.3434	66.41956	11784	117	NA	Male Movement	Male UD	avoid	Overlaps
M04	F01	Modelled	-4.04898	5.512686	9785	97	NA	Female Movement	Male UD	avoid	Overlaps
M04	F02	Modelled	0.759227	1.672313	9587	95	NA	Female Movement	Male UD	attrac	Overlaps
M04	F03	Modelled	2.278631	1.570924	10908	108	NA	Female Movement	Male UD	attrac	Attraction
M04	M05	Modelled	-17.2122	15.17394	11687	116	NA	Male Movement	Male UD	avoid	Avoidance
M04	M06	Modelled	0.23359	1.691974	8568	85	NA	Male Movement	Male UD	attrac	Overlaps
F04	F01	Modelled	-15220.5	10864.44	9087	90	NA	Female Movement	Female UD	avoid	Avoidance
F04	M03	Modelled	2.32413	1.501769	10488	104	NA	Male Movement	Female UD	attrac	Attraction
F04	F05	Modelled	1.727343	0.903749	11716	116	NA	Female Movement	Female UD	attrac	Attraction
F04	M05	Modelled	-395808	557626.6	11392	113	NA	Male Movement	Female UD	avoid	Overlaps
F05	F01	Modelled	-5316.87	7766.462	8883	88	NA	Female Movement	Female UD	avoid	Overlaps
F05	M03	Modelled	4.40695	2.601933	10183	101	NA	Male Movement	Female UD	attrac	Attraction
F05	F04	Modelled	1.253851	1.000294	10201	101	NA	Female Movement	Female UD	attrac	Attraction
F05	M05	Modelled	-552.69	1047.745	11181	111	NA	Male Movement	Female UD	avoid	Overlaps
F03	F01	Modelled	-0.41856	3.773302	9082	90	NA	Female Movement	Female UD	avoid	Overlaps
F03	M01	Modelled	-20.433	27.7636	9696	96	NA	Male Movement	Female UD	avoid	Overlaps
F03	F02	Modelled	-0.05598	2.890057	8483	84	NA	Female Movement	Female UD	avoid	Overlaps
F03	M04	Modelled	1.222531	1.631707	9694	96	NA	Male Movement	Female UD	attrac	Overlaps
F03	M05	Modelled	1.733587	1.563966	11388	113	NA	Male Movement	Female UD	attrac	Attraction
F03	M06	Modelled	1.77833	1.364318	8252	82	NA	Male Movement	Female UD	attrac	Attraction
M05	F01	Modelled	4.114175	1.691884	9184	91	NA	Female Movement	Male UD	attrac	Attraction
M05	M01	Modelled	2.505389	1.123013	9796	97	NA	Male Movement	Male UD	attrac	Attraction
M05	F02	Modelled	-64.7618	67.72971	8377	83	NA	Female Movement	Male UD	avoid	Overlaps
M05	M03	Modelled	-127.68	125.2981	10391	103	NA	Male Movement	Male UD	avoid	Avoidance
M05	M04	Modelled	-4.73032	7.270869	9689	96	NA	Male Movement	Male UD	avoid	Overlaps
M05	F04	Modelled	-1302.21	745.9877	10302	102	NA	Female Movement	Male UD	avoid	Avoidance
M05	F05	Modelled	-101.967	96.81355	11715	116	NA	Female Movement	Male UD	avoid	Avoidance
M05	F03	Modelled	1.090282	3.027172	10403	103	NA	Female Movement	Male UD	attrac	Overlaps
M05	M06	Modelled	0.054377	3.92889	8569	85	NA	Male Movement	Male UD	attrac	Overlaps
M06	F01	Modelled	-1.61706	7.449025	6865	68	NA	Female Movement	Male UD	avoid	Overlaps
M06	M01	Modelled	-196.159	200.7269	7373	73	NA	Male Movement	Male UD	avoid	Overlaps
M06	F02	Modelled	0.971614	4.078356	6461	64	NA	Female Movement	Male UD	attrac	Overlaps
M06	M04	Modelled	1.462205	1.998918	7268	72	NA	Male Movement	Male UD	attrac	Overlaps
M06	F03	Modelled	0.630949	1.580912	7676	76	NA	Female Movement	Male UD	attrac	Overlaps
M06	M05	Modelled	1.299094	3.095187	8765	87	NA	Male Movement	Male UD	attrac	Overlaps
F06	F09	Modelled	-1.38826	5.597973	8787	87	NA	Female Movement	Female UD	avoid	Overlaps
F08	F10	Modelled	0.874519	1.179953	7777	77	NA	Female Movement	Female UD	attrac	Overlaps
F09	F06	Modelled	-1.57896	5.824193	7676	76	NA	Female Movement	Female UD	avoid	Overlaps
F05b	F15	Modelled	-233.188	382.7014	7575	75	NA	Female Movement	Female UD	avoid	Overlaps
F12	F15	Modelled	2.175321	0.845756	7474	74	NA	Female Movement	Female UD	attrac	Attraction

F10	F08	Modelled	2.934635	0.905272	7272	72	NA	Female Movement	Female UD	attrac	Attraction
F15	F05b	Modelled	-317.81	872.6327	7676	76	NA	Female Movement	Female UD	avoid	Overlaps
F15	F12	Modelled	2.578639	0.90442	6969	69	NA	Female Movement	Female UD	attrac	Attraction

Individual files can be viewed at: https://osf.io/6vfp9/