Additional files

In the main text of this manuscript, we showed the fitting and simulating results for Cat 1. Here, we have the adjusted BIC emission distribution comparisons, adjusted BIC across all FMM and HMM models, diurnal step lengths and autocorrelation plots for Cat 2, 14, and 15. Table A1 gives the name of panther ID (Cat ID) in Institutional Repository at the University of Florida (IR@UF), [1], and number of observations for each panther.

Table A1: Cat ID and number of observations; ID numbers are given matching those shown by van de Kerk et al. 2015 and those in the data located at the UF Institutional repository (IR@UF).

van de Kerk 2015	IR@UF	Number of Observations
130	1	10286
131	2	9458
48	14	14645
94	15	10250

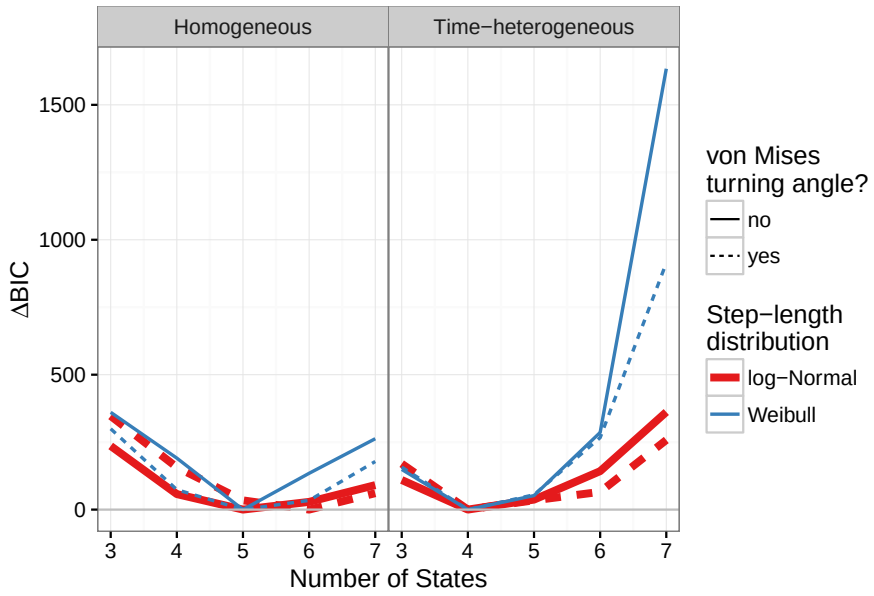

Figure A1: Cat 2: Comparison of BIC-optimal state predictions for homogeneous transition HMMs (left panel) and heterogeneous transition HMMs (right panel) with different emission complexities on panther data. Solid line represents univariate response/emission HMMs (without turning angles) and dotted line represents multivariate response HMMs (including turning angles with von-Mises distribution). Red lines represents log-normal step-length distribution and blue lines represents Weibull step-length distribution.

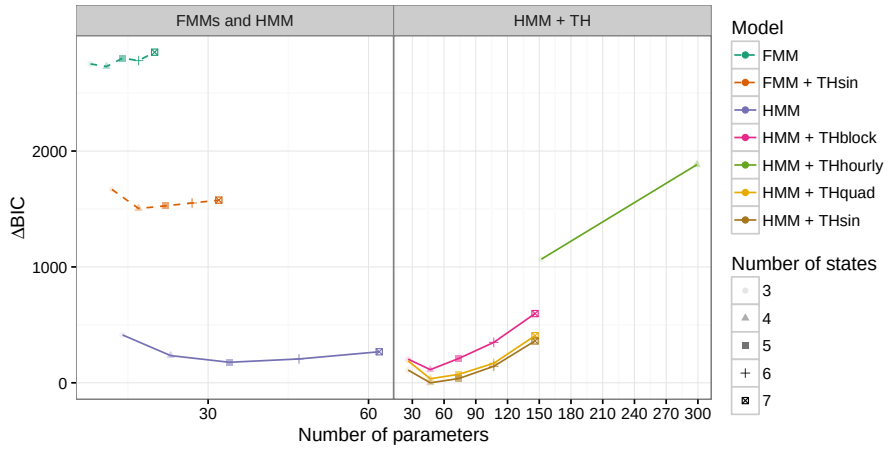

Figure A2: Cat 2: Comparison of adjusted BIC for all HMM transition complexities. The left panel shows homogeneous FMM, heterogeneous FMM (with a sinusoidal prior) and homogeneous HMM. The right panel shows HMMs with different temporal transitions. Dashed lines represents FMMs and solid lines represents HMMs.

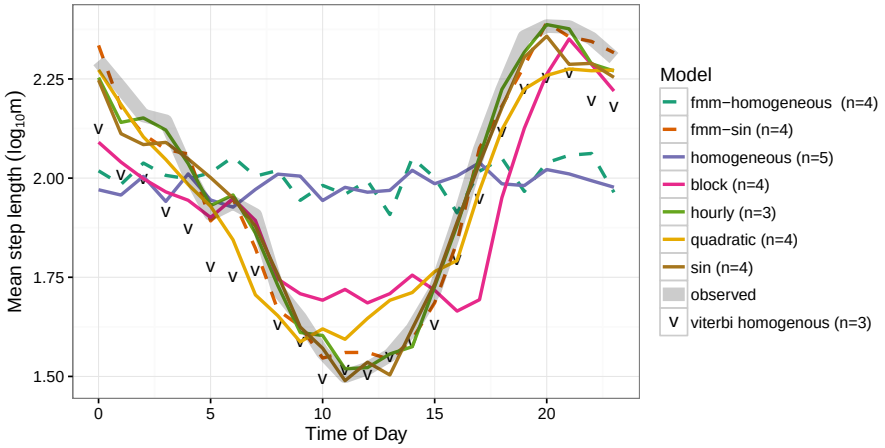

Figure A3: Cat 2: Comparison of average step-length by time of day out of sample predictions for BIC-optimal state FMMs (dashed line) and HMMs (solid lines) of different transition complexities. Gray highlight indicate the observed average step length from panther and "V" points represents Viterbi predictions (within sample) of a three-state homogeneous transition HMM.

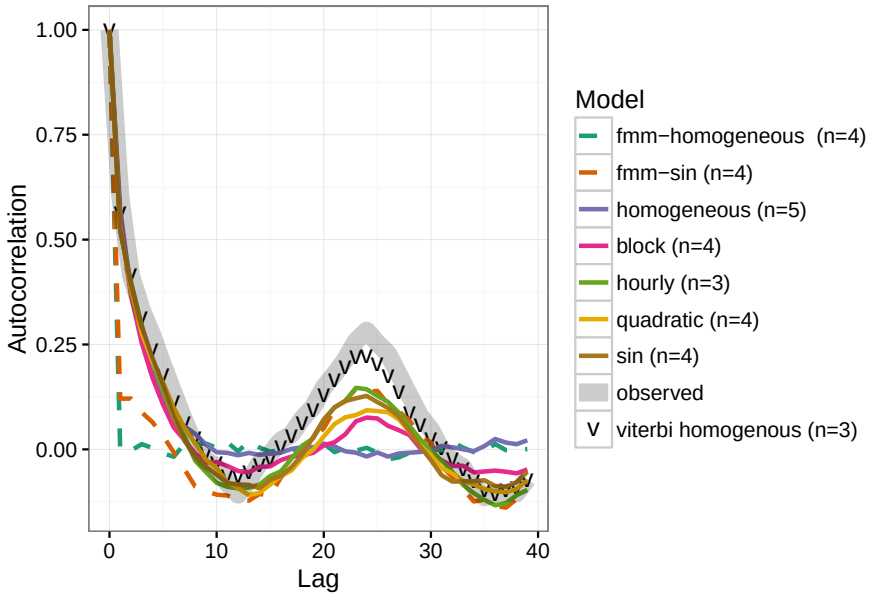

Figure A4: Cat 2: Comparison of out of sample predictions autocorrelations for BIC-optimal state FMMs (dashed line) and HMMs (solid lines) of different transition complexities. Gray highlight indicate the observed average step length from panther and "V" points represents Viterbi predictions (within sample) of a three-state homogeneous transition HMM.

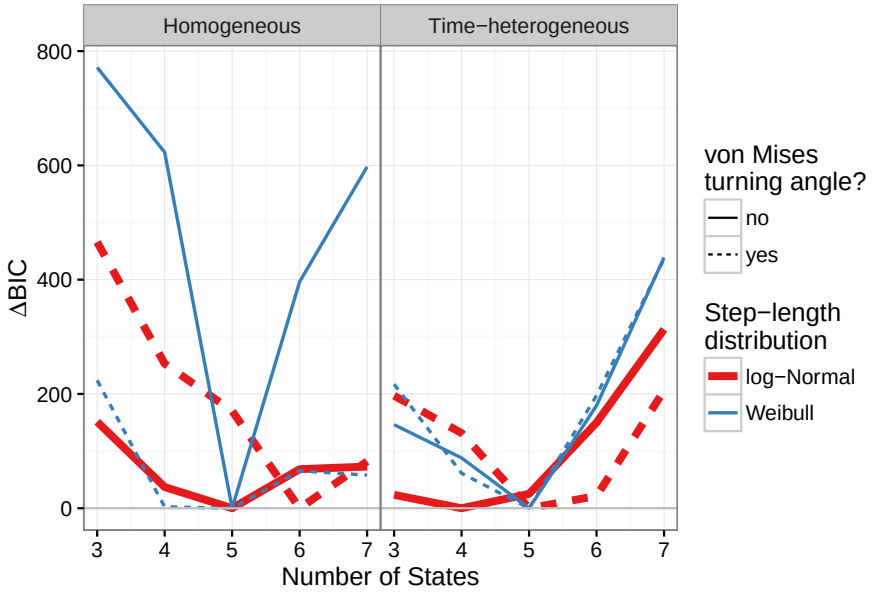

Figure A5: This figure mataches Figure A1, but for Cat 14.

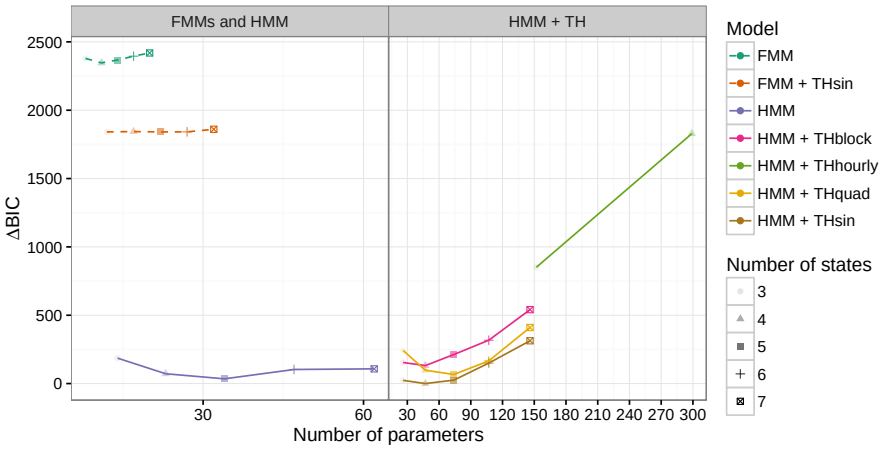

Figure A6: This figure mataches Figure A2, but for Cat 14.

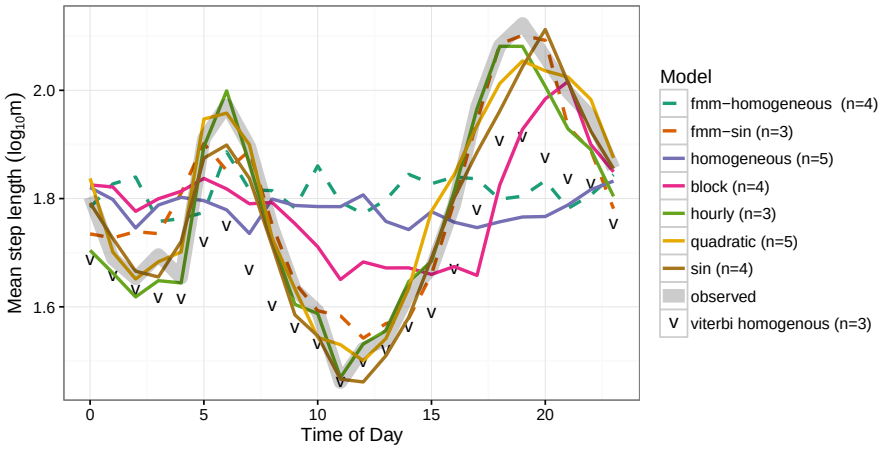

Figure A7: This figure mataches Figure A3, but for Cat 14.

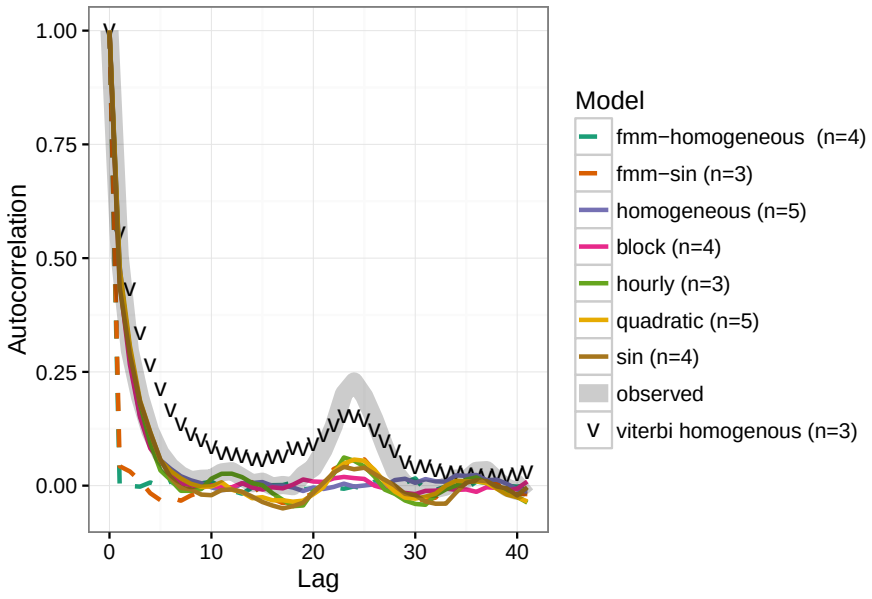

Figure A8: This figure mataches Figure A4, but for Cat 14.

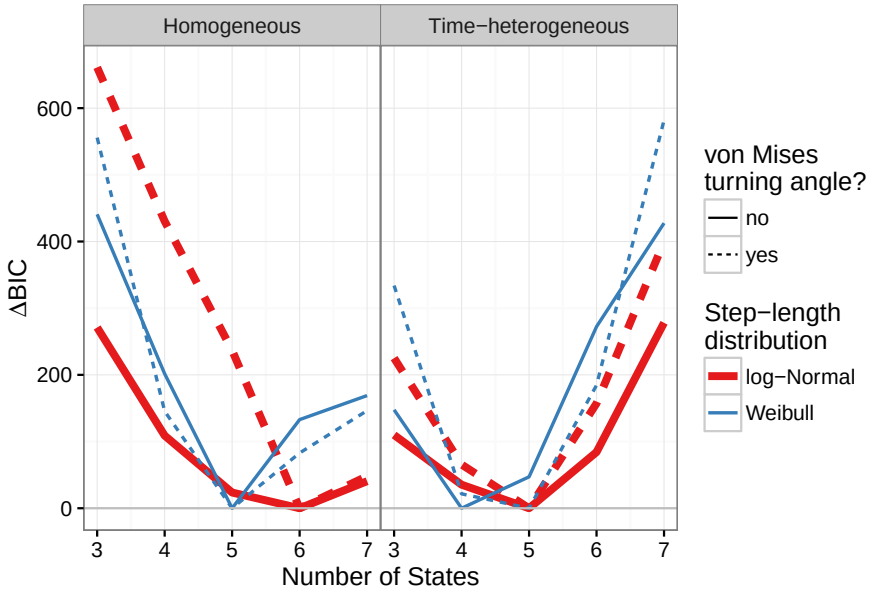

Figure A9: This figure mataches Figure A1, but for Cat 15.

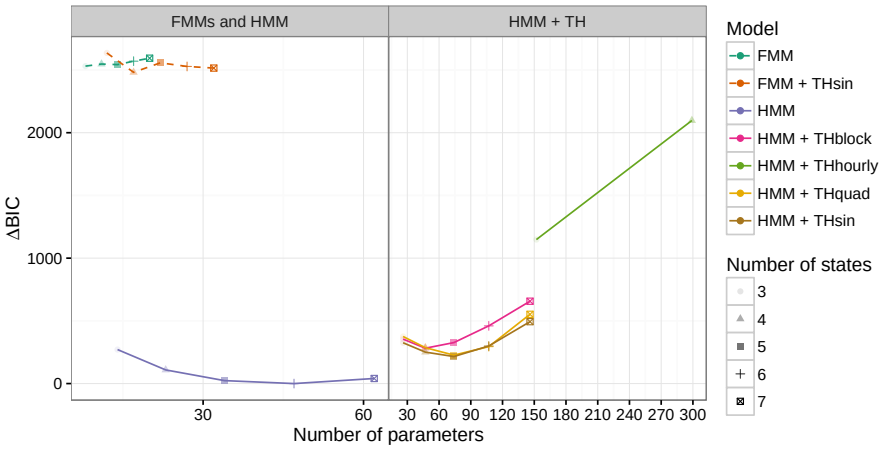

Figure A10: This figure mataches Figure A2, but for Cat 15.

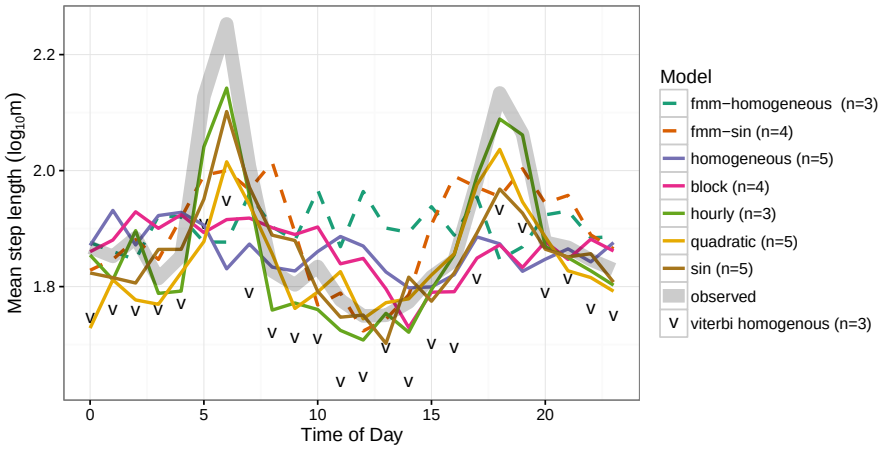

Figure A11: This figure mataches Figure A3, but for Cat 15.

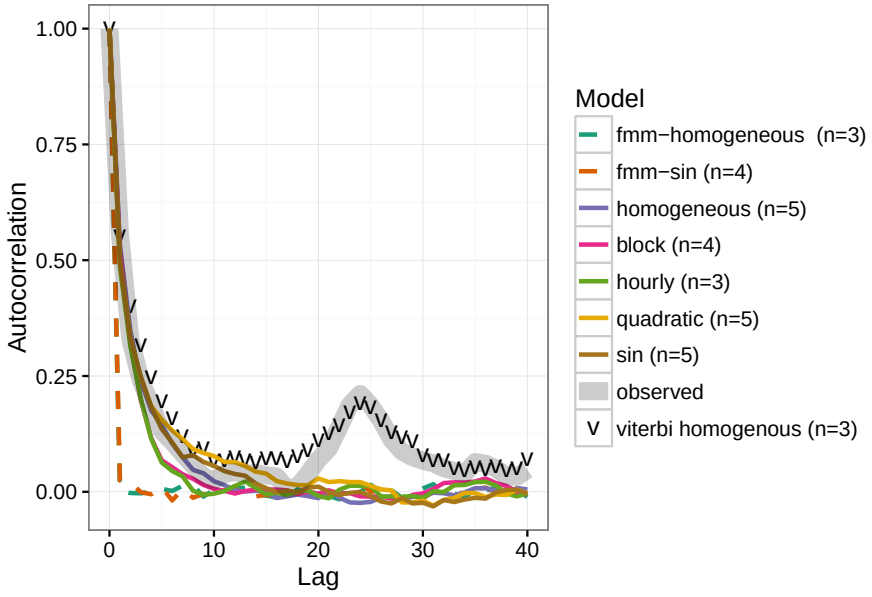

Figure A12: This figure mataches Figure A4, but for Cat 15.

References

[1] van de Kerk, M., Onorato, D.P., Criffield, M.A., Bolker, B.M., Augustine, B.C., McKinley, S.A., Oli, M.K.: Hidden semi-Markov models reveal multiphasic movement of the endangered Florida panther. Journal of Animal Ecology **84**(2), 576–585 (2015)