

Model & Data for

Economical defense of resources structures territorial space use in a cooperative carnivore

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Mechanistic model:

Wolf_Territory_Model.nlogo. NetLogo model file used for designing and running the mechanistic model.

Model inputs:

preysummer.asc. Used in the model to build the optimality landscape. The summer prey benefit for wolves (summer density index for deer + elk + moose per km²).

preywinter.asc. Used in the model to build the optimality landscape. The winter prey benefit for wolves (winter density index for deer + elk + moose per km²).

ruggedness.asc. Used in the model to build the optimality landscape. Ruggedness index, based on Vector Ruggedness Measure.

humansqrt.asc. Used in the model to build the optimality landscape. The density of humans, square root-transformed.

regions.asc. MFWP administrative region identity, used to inform the optimality landscape and model rules.

ecoregions.asc. Ecoregion identity, used to inform the optimality landscape and model rules.

.prj. Projection file for rasters inputs for the model (meets NetLogo data importation requirements).

Model outputs for analyses:

Note: In file names, “Primary” refers to primary model runs to predict space use at 2014 – 2019 densities. “Other” refers to model runs to predict space use at 2008 – 2009 wolf densities. Files under “GIS Layers” are stored in the GIS folder.

Data_1_Primary_Predictions.csv. Model predictions, by-agent outputs (territory size, overlap, etc.), for primary model runs of 2014 – 2019.

Data_2_Primary_Accuracy.csv. Comparison of predicted versus observed territory sizes from primary model run (2014 – 2019), measured as described in SI:p16.

Data_3_Other_Accuracy.csv. Comparison of predicted versus observed territory sizes from 2008 – 2009 model run, measured as described in SI:p16.

Data_4_Primary_Observations.csv. Data measured within each empirically-observed territory boundary (territory size, and measures of prey, competition, and human density; SI:p7), 2014 – 2019.

Data_SI_1_Other_Predictions.csv. Model predictions, by-agent outputs (territory size, overlap, etc.), for model runs for 2008 – 2009.

Data_SI_2_Prey_Predictions.csv. Model predictions, by-agent outputs, for SI:Appendix C model runs for variable prey levels.

Data_SI_3_Competition_Predictions.csv. Model predictions, by-agent outputs, for SI:Appendix C model runs for variable competition levels.

Data_SI_4_Other_Observations.csv. Data measured within each empirically-observed territory boundary (territory size, and measures of prey, competition, and human density), 2008 – 2009.

GIS Layers:

Data_5_Primary_Distribution_Predictions. Predicted distribution of wolves in Montana, combined output from primary model run (runs for 2014 – 2019).

Data_6_Primary_Distribution_Freq_Predictions. Same as above, but as a raster with # times each 1-km² cell was selected by agents.

Data_7_Primary_Tsize_Predictions. Model predictions for territory size in raster format (cells selected by >1 agent are assigned the mean value of the territory size of those agents). From primary model runs (2014 – 2019), used to summarize territory size predicted within KDEs.

Data_8_Other_Distribution_Predictions. Predicted distribution of wolves in Montana, combined output from 2008 & 2009 model runs.

Data_9_Other2008_Tsize_Predictions. Model predictions for territory size in raster format (cells selected by >1 agent are assigned the mean value of the territory size of those agents). From 2008 model runs, used to summarize territory size predicted within 2008 KDEs.

Data_10_Other2009_Tsize_Predictions. Model predictions for territory size in raster format (cells selected by >1 agent are assigned the mean value of the territory size of those agents). From 2009 model runs, used to summarize territory size predicted within 2009 KDEs.

Code for analysis & output plots

Manuscript_Code.R. Program R code for plotting model results.

Manuscript_Code_SI.R. Program R code for plotting model results for SI.