### Daniel J. Hocking, James T. Thorson, Kyle O’Neil, Benjamin H. Letcher. A geostatistical state-space model of animal densities for stream networks. *Ecological Applications*

### Data S1

### Functions to simulate and analyze spatio-temporal count data in stream networks accounting for imperfect detection.

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### File list (files found within DataS1.zip)

OU\_GMRF\_v1i.cpp

sim\_functions.R

Spatial\_Simulations.R

ST\_Power\_Analysis.R

**Description**

OU\_GMRF\_v1i.cpp – TMB model code to analyze spatio-temporal count data from stream networks.

sim\_functions.R – R functions to simulate spatial and spatio-temporal count data in a stream network following an Ornstein-Uhlenbeck process.

Spatial\_Simulations.R – R code used to simulate and analyze the spatial replicates varying spatial decorrelation and asymptotic spatial variation used in the manuscript.

ST\_Power\_Analysis.R – R code for the simulation study varying the number of years and sites to assess the performance of the spatio-temporal model.