

Explanation of Simulations of Input to Program PRESENCE, and analysis of examples, from Kendall et al., “Relaxing the closure assumption in occupancy models: staggered arrival and departure times”

Simulations used in this paper to verify the correctness of the model presented were conducted with a combination of the C code included (both source code and executable). This program generates an input file for program PRESENCE (J. Hines, www.mbr-pwrc.usgs.gov/software) , which can be used to analyze the data. Similarly the data from the amphibian occupancy example presented in the manuscript can be analyzed by PRESENCE in the same way.

The files included with this submission are:

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|--------------------------|--|
| genpres4_stag.c | C source code for simulating the open occupancy model described in the manuscript. |
| rngs.c, rngs.h | A module and include file called by genpres4_stag.c for random number generation. |
| genpres4_stag.exe | The executable of the program above. |

The simulation code is annotated to explain the flow of the program. To compile the program you would open a command prompt and, using the gcc compiler, type

```
gcc -o genpres4_stag.exe genpres4_stag.c rngs.c
```

To simply run the simulation program with user-specified parameter values, open a command prompt and type

```
genpres4_stag T N p p p p ... e e e e ... d d d d...
```

where each input is separated by a space and

- | | |
|-------------------|--|
| <i>T</i> | the number of time periods in the season |
| <i>N</i> | the total number of sites in the study area |
| <i>Psi</i> | the probability that a given site is occupied at some point in the season (see the manuscript) |
| <i>p p p p...</i> | detection probability for each the <i>T</i> time periods (e.g., 4 time periods) |

e e e e... conditional entry probabilities T time periods (e.g., 4 time periods)

d d d d... departure probability for each the T time periods (e.g., 4 time periods)

On the use of PRESENCE to run these analyses

The documentation provided with program PRESENCE gives instructions on running various types of models. To analyze data using the model mentioned in this paper, follow the instructions in the documentation to provide the input data and select the 'single-season staggered-entry' model menu item from the 'run' menu. This will cause the program to allow for entry of the additional parameters in the design matrix needed for this type of model.

Analysis of real data

The paper includes an analysis of real data for three species of amphibians. Three files for input to program PRESENCE are included in the zipped file **Kendall et al data_examples.zip**. Follow the directions for running PRESENCE, as alluded to in the section above.