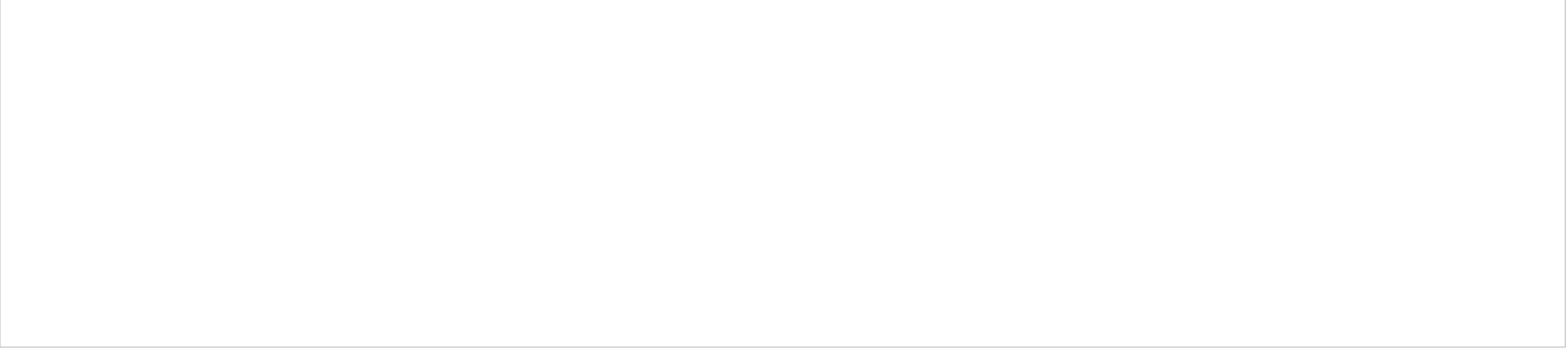




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RangeModel User's Guide

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About RangeModel

RangeModel is an animated, graphical, freeware application designed to demonstrate the mechanism behind the *mid-domain effect (MDE)*, with tools for exploring the effects of both theoretical and empirical range size frequency distributions (RSFDs) for one-dimensional domains.

In addition, RangeModel 5 can generate the mean predicted pattern of richness, and its 95% confidence intervals, for any arbitrary number of randomizations of range placement for either:

1. *continuous data*, sampled at any arbitrary set of points within a continuous, one-dimensional domain,
2. or *discrete data*, sampled at ordered sites within a one-dimensional domain.

What is the mid-domain effect (MDE)?

The mid-domain effect is the increasing overlap of species ranges towards the center of a shared, bounded domain due to geometric boundary constraints in relation to the distribution of species' range sizes, producing a peak or plateau of species richness towards the center of the domain. Domains may be spatial, temporal, or functional.

Major Features

- Easy-to-use, graphical interface with button and menu-driven commands.
- Tools for exploring the role of several theoretical range size frequency distributions (RSFDs), with or without upper and lower ranges size thresholds.
- Options to display and export realized range-size frequency distributions, realized midpoint distributions, and Stevens' Rapoport plots.
- Tools for importing and visualizing empirical richness patterns, based on midpoint-range data.
- Tools for randomizing the placement of empirical ranges (or any RSFDs input by the user) and for producing 95% confidence intervals (CIs) for random range placement, for either (1) a continous domain with continuous ranges, or for (2) a domain defined by a set of discrete, ordered points. For continuous domains, sampling is based on user-specified sampling points. For both continuous and discrete domains, the user may specify the number of randomizations.
- Exports all results to delimited text files for analysis in Excel or statistics applications.
- Highly uniform random number generation, based on strong hash encryption technology.
- RangeModel is free.

Platforms

RangeModel 5 runs *native* under Windows XP or Mac OS X (certified for OS 10.4), with native user interface on each platform.

Quick Start

When you first launch RangeModel, the main window appears automatically, showing two square graph areas and eight buttons. In addition, seven menus appear at the top of your screen.

Graphical Simulations Tools– The Action, Export, and Import menus each have a Graphical Simulations section with commands for these tools. Using the Action menu, you can launch a new graphical simulation. The Export menu offers commands for exporting the results. The Import menu has a tool for importing empirical midpoint-range data.

The best way get started is to click the Add One Species button repeatedly, while watching the effect in the graphs. When you want to add more than one species at a time, use the Add N Species button. *(The display is unfortunately rather slow, so be patient!)* Use the Clear button to clear the graphs and start over.

After RangeModel has entered some species in the graphs, click the Show Marginal Distributions button to display the empirical frequency distributions of range sizes and range midpoints, or the Show Stevens Plot button to display mean range size as a function of position on the Domain, based on the species in the main graphs. (You can do this at any time, then return to the main window and add more species if you wish.)

To change the assumptions of the model, click the Set Null Distributions button. Six options are offered to specify the joint distribution of range sizes and range midpoints and the model (classic or Spreading Dye), plus a seventh option to randomize an empirical range/midpoint distribution.

The Import Format Help button in the Options dialog, or the Import Format Help item in the Graphical Simulation section of the Import menu, tells you how to set up the file for import, or see (and try out!) the example file that is installed with RangeModel: LeesButterflies.txt (a midpoint-range file). These data are from Lees et al. (1998, see the [References](#) page).

The Export menu has tools for exporting the results of a graphical simulation to text files that you can work with in Excel or another spreadsheet application.

Items in the Settings menu allow you to change the number of 'bins' used in the Richness, Marginal, and Stevens plots; to set the minimum or maximum range size; set a constant range size; or set the maximum number of pairs to be archived for export.

Continuous Domain AnalysisTools– The Action, Export, and Import menus each have a Continuous Domain Analysis section with commands for these tools.

Using Continuous Domain Analysis tools from the Import menu, you can import midpoint-range data and empirical sampling point locations from a continuous, real-world domain (or an imaginary one). Import format instructions for Continuous Domain Analysis are available in the menu (Import Format Help), or see (and try out!) the continuous domain example files that are installed with RangeModel: LeesButterflies.txt (a midpoint-range file) and LeesSamplingPoints.txt (a sampling point file). These data are from Lees et al. (1998, see the [References](#) page).

In the Action menu, in the Continuous Domain Analysis section, you can Compute Confidence Intervals for MDE predictions based on the imported range data. Use the Continuous Domain Analysis tools in the Export Menu to export the results or plot the empirical distribution *(The display is unfortunately rather slow for plotting the results, so be patient!)*

[See the Known Bugs section on the Support page for a minor limitation](#) (The 2-randomizations Bug).

Discrete Domain AnalysisTools– The Action, Export, and Import menus each have a Discrete Domain Analysis section with commands for these tools.

Using Discrete Domain Analysis tools the Import menu, you can import "ranges and fill" data and empirical richness data from ordered sampling points on a real-world domain (or an imaginary one). Import format instructions for Discrete Domain Analysis are available in the menu (Import Format Help), or see (and try out!) the discrete domain example files that are installed with RangeModel: TorneAllRandF.txt (a Ranges and Fill input file) and TorneAllRichness.txt (an Empirical Richness file). These data are from Dunn et al. (2006, see the [References](#) page), which is recommended reading before you try to use the Discrete Domain tools.

In the Action menu, in the Discrete Domain Analysis section, you can Compute Confidence Intervals for MDE predictions based on the imported discrete range data. Use the Discrete Domain Analysis tools in the Export Menu to export the results.

Buttons for Graphical Simulation

[This section of the User's Guide is not yet available. See the [Quick Start](#) section.]

Menus and Tools

[This section of the User's Guideis not yet available. See the [Quick Start](#) section.]

How to Cite RangeModel

If you appreciate the effort that has gone into RangeModel, please credit the application and its author in any published work that makes use of results from RangeModel, citing RangeModel as an electronic publication and giving the RangeModel website address if the journal permits it.

Here is one possible form for a References Cited entry:

Colwell, R. K. 2006. RangeModel A Monte Carlo simulation tool for assessing geometric constraints on species richness. Version 5. User's Guide and application published at:
<http://viceroy.eeb.uconn.edu/rangemodel>.

If the journal or book editor will not permit an entry containing a web citation in the References Cited section, you might try this text citation: "...computed using RangeModel (Version 5, R. K. Colwell, <http://viceroy.eeb.uconn.edu/rangemodel>)...."

Failing that, you may be reduced to: "...computed using RangeModel (Version 5, R. K. Colwell, unpublished)....," perhaps slipping in the RangeModel website address in the Acknowledgments section.

I would be most grateful if you would kindly send a pdf or paper reprint of any paper based on your use of the program to:

Robert K. Colwell, Department of Ecology and Evolutionary Biology, U-43,
University of Connecticut, Storrs, CT 06269-3043, USA.

What You Must Agree To

RangeModel is a freeware application. By downloading and using RangeModel, you must agree not to distribute RangeModel in any commercial form.

You are most welcome to use RangeModel in any way you like for your own research, as long as such use is acknowledged as outlined above.

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