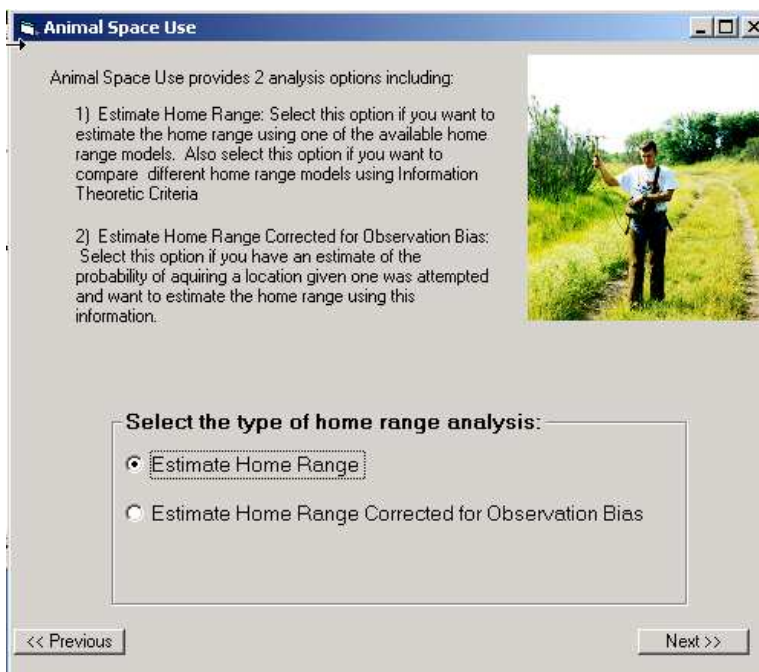
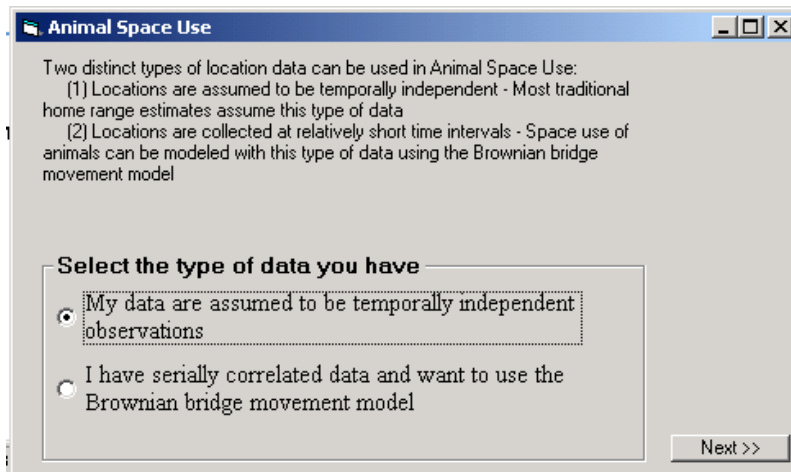
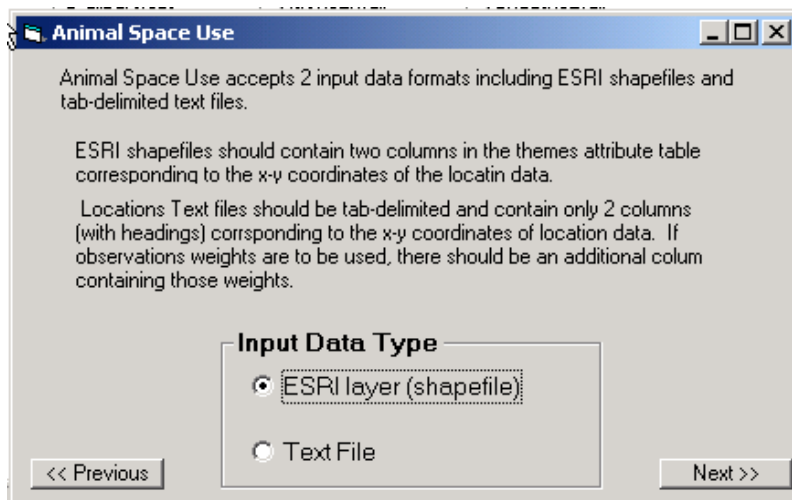


ANIMAL SPACE USE 1.2 beta TUTORIAL

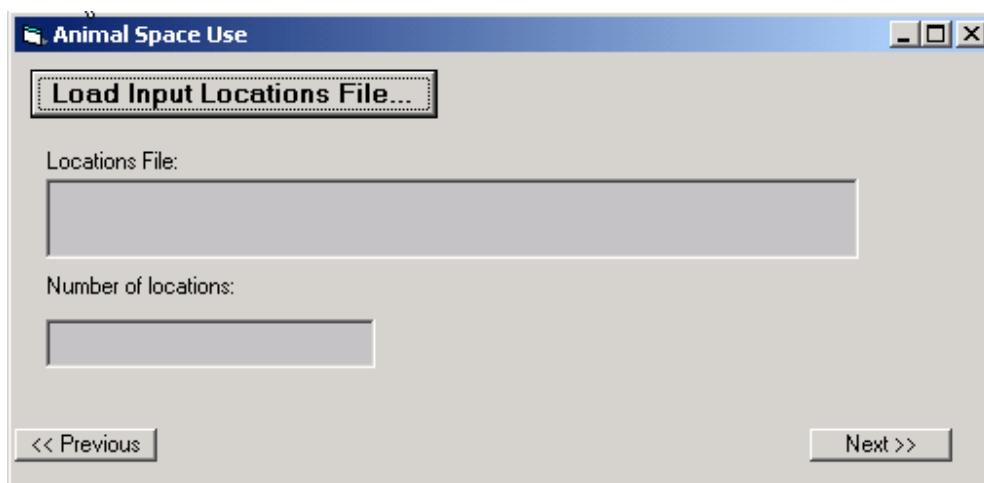
http://www.cnr.uidaho.edu/population_ecology/animal_space_use.htm

Check often and if there is a newer version, download and install the newer version!





The coordinate system can be any Cartesian system (NOT latitude-longitude). UTM's work fine.



Let's take a look at an example input text file

Open 'borealowl.txt'

Animal Space Use

Load Shapefile...

Shapefile:

Shape type:

Number of records:

View Shapefile

Fields:

Field	Type

Select Data Fields for Easting and Northing

Easting (x):

Northing (y):

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Animal Space Use

Locations File:

C:\Program Files\Animal Space Use 1.0 Beta\Example Location Data\borealowl.shp

Estimate Home Range Using Selected Models
 Output will be a grid saved as an x, y, z text file. The 3 columns correspond to the x-coordinate, y-coordinate, and estimated probability of occurrence in that grid cell (i.e., utilization distribution).

Compare Selected Models Using Information Theoretic Criteria

Estimate Home Range Using:

Model	Number of Parameters
<input type="checkbox"/> Exponential Power	4
<input type="checkbox"/> 1 Mode Bivariate Normal	6
<input type="checkbox"/> 2 Mode Bivariate Circle Mix	7
<input type="checkbox"/> 2 Mode Bivariate Normal Mix	11
<input type="checkbox"/> Fixed Kernel	nonparametric
<input type="checkbox"/> Adaptive Kernel	nonparametric

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First let's compare the home range models using information theoretic criteria

Let's go back and look at some other options

Animal Space Use

Load Shapefile...

Shapefile:
C:\Program Files\Animal Space Use 1.0 Beta\Example Location Data\multipleminima.shp

Shape type:
Point

Number of records:
20

View Shapefile

Field	Type
XCOORDINAT	Double
YCOORDINAT	Double

Select Data Fields for Easting and Northing

Easting (x):
XCOORDINAT

Northing (y):
YCOORDINAT

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Animal Space Use

Four methods are available for choosing the smoothing parameter including:

- 1) Likelihood cross-validation (CVh) which is based on minimizing the Kullback-Leibler distance
- 2) Least squares cross-validation (LSCVh) which is based on minimizing the integrated squared error
- 3) The optimal smoothing parameter if data are normally distributed (h_{ref}) or a user-specified percent of h_{ref}
- 4) A user-specified value

CVh = 1.71490359219043

LSCVh = 2.20778790246964

h_{ref} = 3.36112327458961

View graph of CVh and LSCVh functions

Estimate Fixed Kernel Home Range Using:

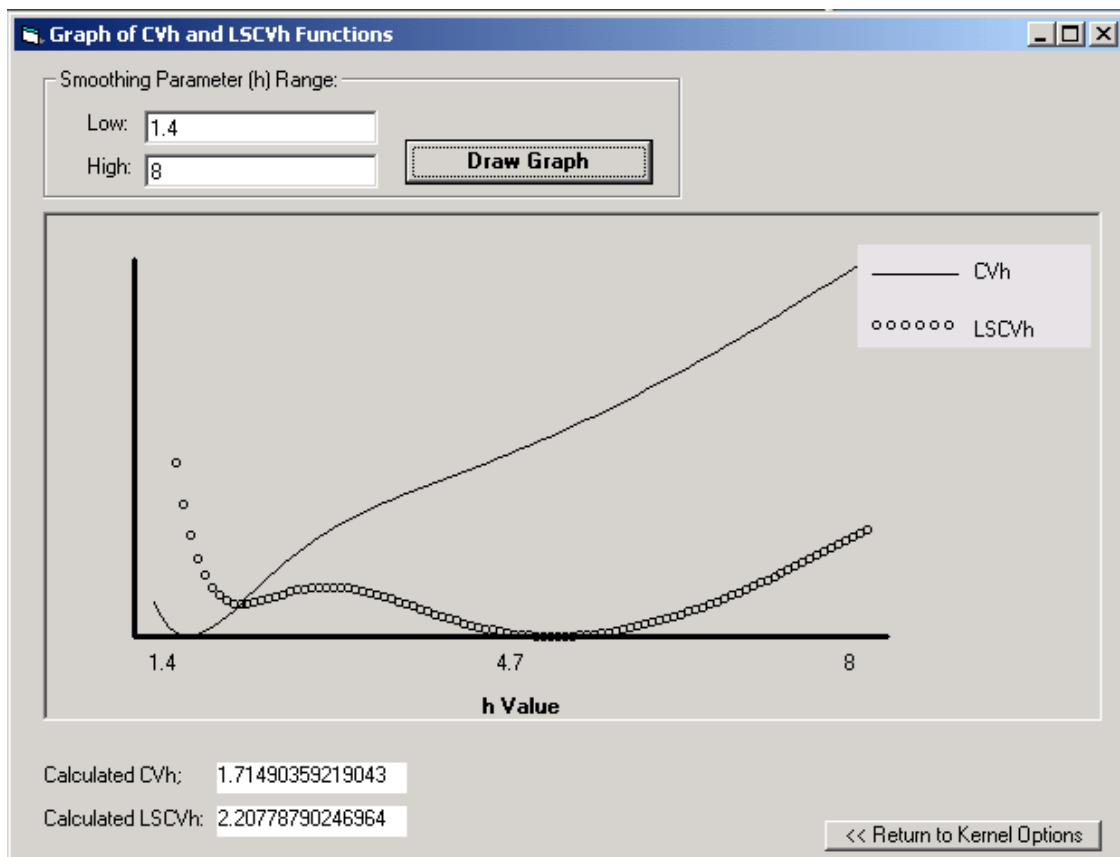
CVh

LSCVh

Percent of h_{ref} 100

User specified value:

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Explore different ranges for Low and High h Values to determine if there are multiple minima.

To display Animal Space Use output grid in ArcView:

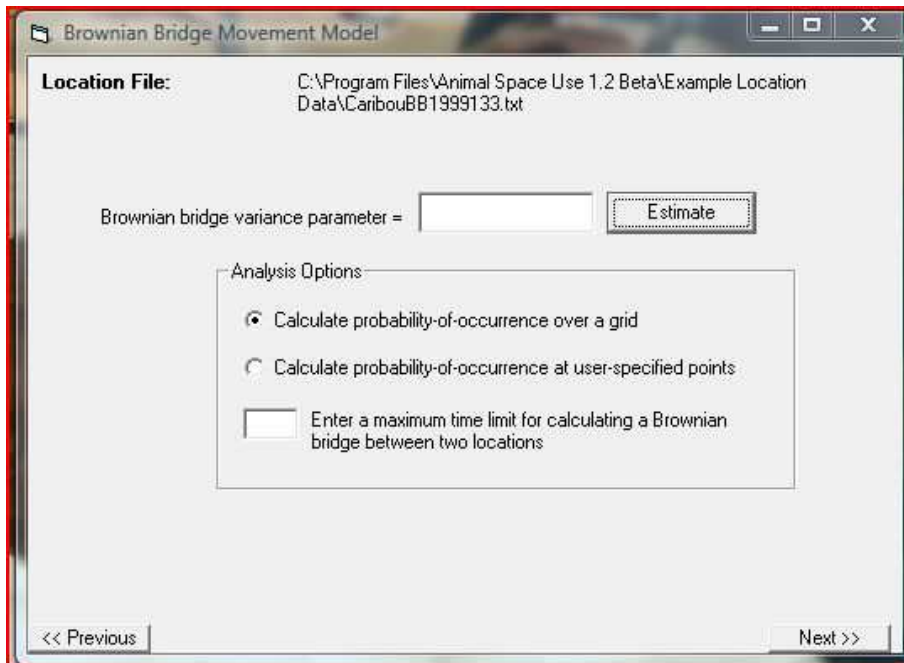
1. First we will make a **cumulative probability** column in the text file using Excel
 - a. Sort by “Probability” *descending*
 - b. Enter Cumulative probability calculations

	A	B	C	D	E	F
1	X	Y	Probability	Cumulative		
2	11.39268	18.2942	0.000255	0.000255		
3	11.55323	18.2942	0.000255	=D2+C3		
4	11.39268	18.10032	0.000254			
5	11.55323	18.10032	0.000254			
6	11.55323	18.48808	0.000253			
7	11.39268	18.48808	0.000253			
8	11.23213	18.2942	0.000253			

- c. Fill down and save edits
 - d. The sum of column D should = 1 (or very close)
2. Open ArcView’s “Project” window
 - a. Select “Tables” and then “Add”
 - b. Under “List Files of Type”, select “Delimited text (*.txt)”
 - c. Navigate to Animal Space Use output grid text file
3. Go ArcView’s “View” window
 - a. Under “View” select “Add Event Theme”
 - b. Make sure the “Table” is the output grid text file

- c. Display the point theme
 - i. Zoom in to determine grid cell size
 - ii. Using ArcView's measure tool, choose the largest distance in the x and y dimensions
 - d. Go to "Theme" and select "Convert to Grid"
 - i. For "Output Grid Extent" set to event theme's name
 - ii. Set "Output Grid Cell Size" to that determined in step 3.c.ii
 - iii. Select the desired field (e.g., "probability" or "cumulative probability") for the cell values
 - e. Use the legend editor to change display options
 - i. You may need to change the "Round values at" option. Do this in the Legend editor by selecting "Classify" and setting the "Round values at" to the one with the most decimal places.
4. Use the GIS grid for future analyses

Brownian Bridge Movement Model



First, type in a maximum time limit between locations beyond which a BB will not be calculated. If you want to use all or your data and calculate a BB between all pairs of locations, then type in a value that is greater than the longest time interval between any 2 locations.

Next, click the “Estimate” button to calculate the Brownian motion variance parameter.

To calculate the probability of use (i.e., utilization distribution) across an area, select the option for calculating across a grid. The other option is useful if you want to, for example, calculate the probability of ‘crossing’ along a road represented by a string of points along the road.

Brownian bridge output grid extent

Auto Calculate Grid Extent

Minimum X: 557000 Maximum X: 559400

Minimum Y: 5424000 Maximum Y: 5426200

Distance between grid points: 30

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You can try using the “Auto Calculate Grid Extent” but it is very difficult to automate the extent of the output grid with the Brownian bridge movement model! I suggest looking at your data in a GIS and making your best guess as to what the grid extent should be that would incorporate most of the utilization distribution. Record the lower-left coordinates and upper-right coordinates and enter these values in the text boxes. The “Distance between grid points:” is the grid resolution. The smaller this number is, the longer it takes to calculate the utilization distribution (sometimes it takes quite a long time – hrs or possible days if you have thousands of locations, a very large grid extent and very fine resolution). To get things started and make sure all is working, I suggest typing in a large number here (a very coarse grid where there are < 2500 or so points in the grid extent).