Python FishRand User Manual

Inputs (Excel)

Python FishRand accepts input from a specifically formated Excel spreed sheet. The basic formatted sheet (Which can be duplicated and passed to FishRand), can be found in the FishRand subfolder: *sheets/input/default.xlsx* The excel spreadsheet consists of 8 different tabs, described below.

Sample and Time input

In the time and sample tab, statistical sampling options can be set, and the time scale is defined. FishRand can be ran in 3 different ways with regard to statistical input:

With no statistical input.

If you plan of not running FishRand with any statistical input, set both *Total number of Uncertainty samples* and *Total number of inner loop samples* to 1. This insures that no repeated calculations will be made.

With statistical input, but without distinguishing between variable and uncertain parameters.

To avoid distinguishing between variable and uncertain parameters, model all parameters as variable, and set *Total number of Uncertainty samples* to 1, so that the nested monte carlo simulation enters the outside uncertainty loop 1 time but only simulates "variable" parameters on the inside loop. While statistical parameters must be labeled as variable, they can be thought as generic statistical parameters.

With Variable and uncertain statistical input.

Both number of samples can vary and both types of variables can be defined (see "Variable Definition"). Note that since uncertain parameters are sampled from in the outer loop, if there is a low number of uncertainty samples, and a high number of variable samples final output distributions will be quite inaccurate. For good results make sure that *Total number of Uncertainty samples* is set to at least 500. *Total number of Inner loop samples* can be set to 1 or more.

Latin Hypercube bins

The number of latin hypercube bins can be set too. The default is 10. With a larger number of samples few bins are required to give accurate output.

Time Input

The beginning, and end times for the simulation are entered under the sampling inputs. Beginning and end times should be entered as "MM,DD,YYYY". The time step are defined in either "Week", "Month", "Quarter", or "Day". Make sure the first letters are captialized.

Steady State

Lastly if the beginning and the ending times are the same, and only a single region is defined, one can set the Steady State option to "YES" which will give a steady state solution for the model. Otherwise set Steady State to "NO".

Parameter input formatting

In the next four input tabs, both non-statistical and statistical parameters are excepted.

adding a non-statistical parameter

To define a non-statistical parameter locate the "Entry/Distribution Parameters" pair in which you would like to input. In the "Entry" cell enter the number you would like for that parameter. Leave the "Distribution Parameters" cell completely blank (no spaces).

adding a statistical parameter

locate the "Entry/Distribution Parameters" pair. In the "Entry" cell, first define the parameter as either variable or uncertain by adding a "V" or a "U" respectively. Then define after a comma and a space, define the distribution type you would like to use. (See distribution table for distribution types).

Entry examples: "V, Log-Normal" "U, Weibull", "V, Beta".

Next, in the "Distribution Parameters" cell, add the corresponding distribution parameters each separated by a comma and a space (See distribution table for parameterizations).

Distribution Parameters examples: (For a normal distribution): 2, .5 (For a Triangle distribution): 1, 5, 4

Distribution Table

Name	Parameterization
Normal	μ, σ
Uniform	beginning, length
Triangle	beginning, ending, peak
Log-Normal	μ, σ *
Log-Uniform	beginning, length
Beta	α, β **
Weibull	λ, k

* The Log-Normal parameters μ, and σ, are not the corresponding normal μ, and σ, but are the μ, and σ of the actual Log-Normal distribution.

** α, and β define the beta function with pdf: $f(x) = \frac{\gamma(\alpha-1)(x-1)^{b-1}}{\gamma(a)\gamma(b)}$