SODA - Single-season Occupancy study Design Assistant

Version 0 – October 2009

About SODA

SODA is a tool developed to assist the design of single-season occupancy studies. It allows running automated searches for suitable designs as well as testing specified designs. Note that SODA is an assistant and can not replace careful evaluation of the characteristics of each study. There are additional issues, such as cost of the surveys or other logistical constraints, which may need to be taken into account when designing the study.

SODA standalone application installation

SODA itself does not need to be installed. The tool will automatically operate after clicking on the *.exe file. Note that the tool will take longer to open up the first time it is used as some files need be decompressed at this stage (this should happen automatically). However, in order to run SODA, MATLAB Compiler Runtime (MCR) needs to be installed in the machine. For details on installation of MCR refer to the readme.txt file included in the package.

Starting the tool

Once SODA is started two windows open up: the main window and the auxiliary window.

- In the **main window** 1) the user inputs the required information and 2) the main results of the analysis are displayed both as text and plot.
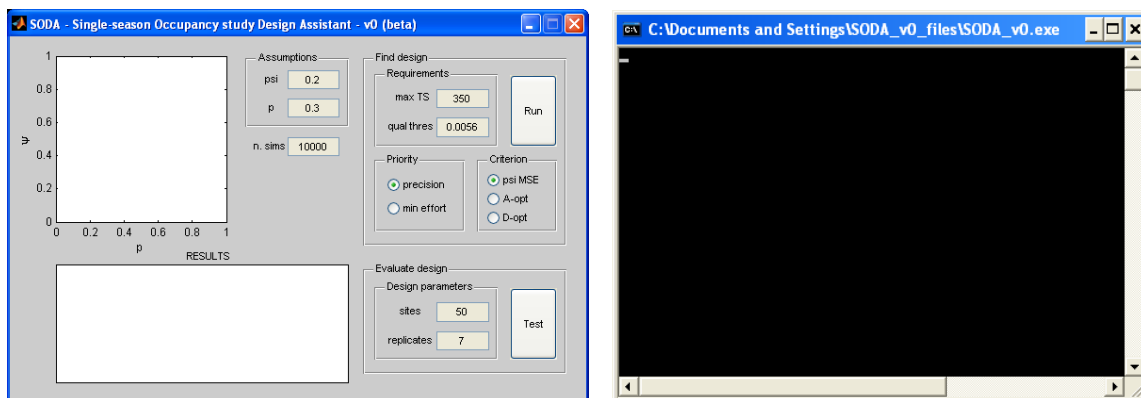- The **auxiliary window** displays details of the analysis (e.g. performance of all the analysed designs)

Figure 1 Main and auxiliary window

Running the tool

User input happens in the main window. Regardless of whether SODA is used to find or evaluate a design, the user has to input the **initial assumptions** for **psi** (occupancy) and **p** (detectability), as well as the number of **simulation iterations** to run per design evaluated.

1) RUNNING AN AUTOMATED SEARCH

Additional user input for running an automated search:

- **Criterion**: whether the design is chosen based on 1) MSE_Ψ, 2) the sum of MSE_Ψ and MSE_p or 3) the determinant of the MSE matrix
- **Requirements**:
  - **max TS**: maximum number of units of total effort (sites x replicates) that can be employed in the study
  - **qual thres**: threshold against which to evaluate the quality of the estimator/s, i.e. the minimum quality expected for the estimator/s:
    - maximum MSE_Ψ for criterion "psi MSE"
    - maximum ($MSE_\Psi + MSE_p$) for criterion "A-opt"
    - maximum determinant of the MSE matrix for criterion "D-opt"
- **Priority**: whether the design is chosen given priority to maximizing estimator quality or minimizing total effort.

The automated search is run by pressing the "Run" button.

2) TESTING A SPECIFIED DESIGN

Additional user input for evaluating a specified design

- **Sites:** number of sampling sites (S)
- **Replicates:** number of repeated surveys carried out at each site (K)

The test is run by pressing on the "Test" button.

Results

SODA displays results in both the main and the auxiliary window.

1) Results in the main window:

- Plot showing the distribution of the estimates (psi,p) for the best / tested design.
- Summary of the results displayed on the "RESULTS" panel including:
  - Performance of the best / tested design
  - A warning indicating if no design has been found to fulfil the requirements

2) Results in the auxiliary window: the auxiliary window displays details of all the steps carried out in the analysis, including the performance of the different designs evaluated when running an automated search
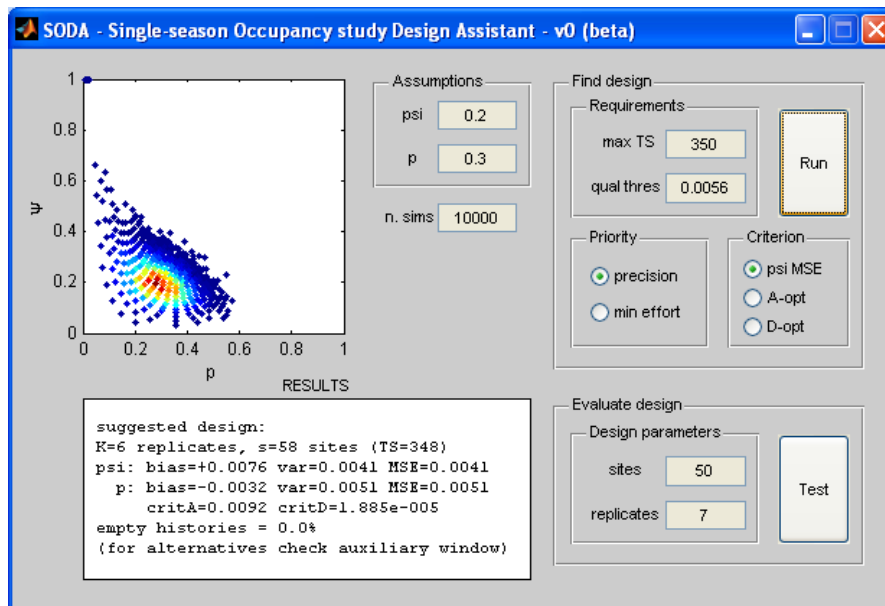

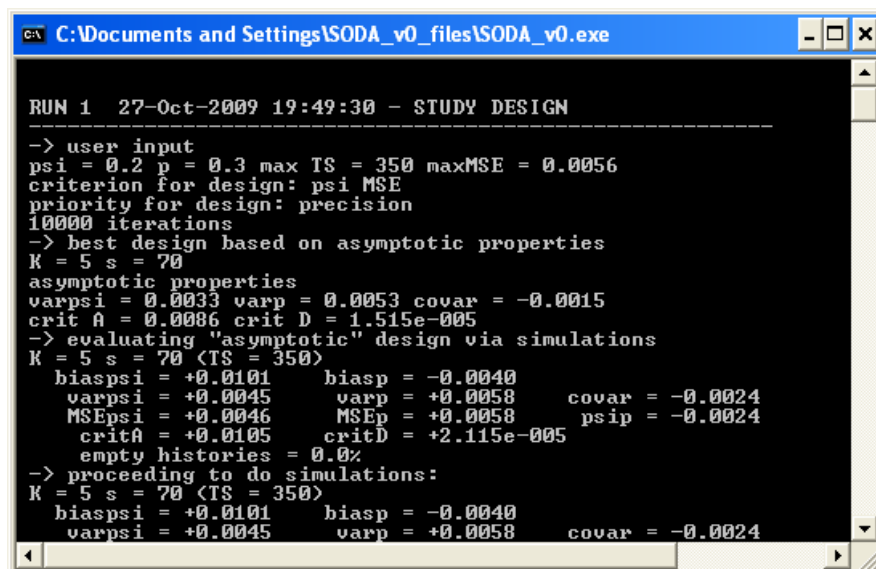**Figure 2 Results displayed in the main window**

Figure 3 Results displayed in the auxiliary window

NOTE: When working with very low probabilities and sample sizes there is a risk of obtaining empty histories (i.e. histories with no detections). These histories are not included in the computation of the estimator MSE. However SODA displays the proportion of empty histories obtained under each design, theoretically $(1-\Psi \cdot p^*)^S$ where $p^*=1-(1-p)^K$. It is up to the user to take this into consideration when interpreting the results of the analysis.