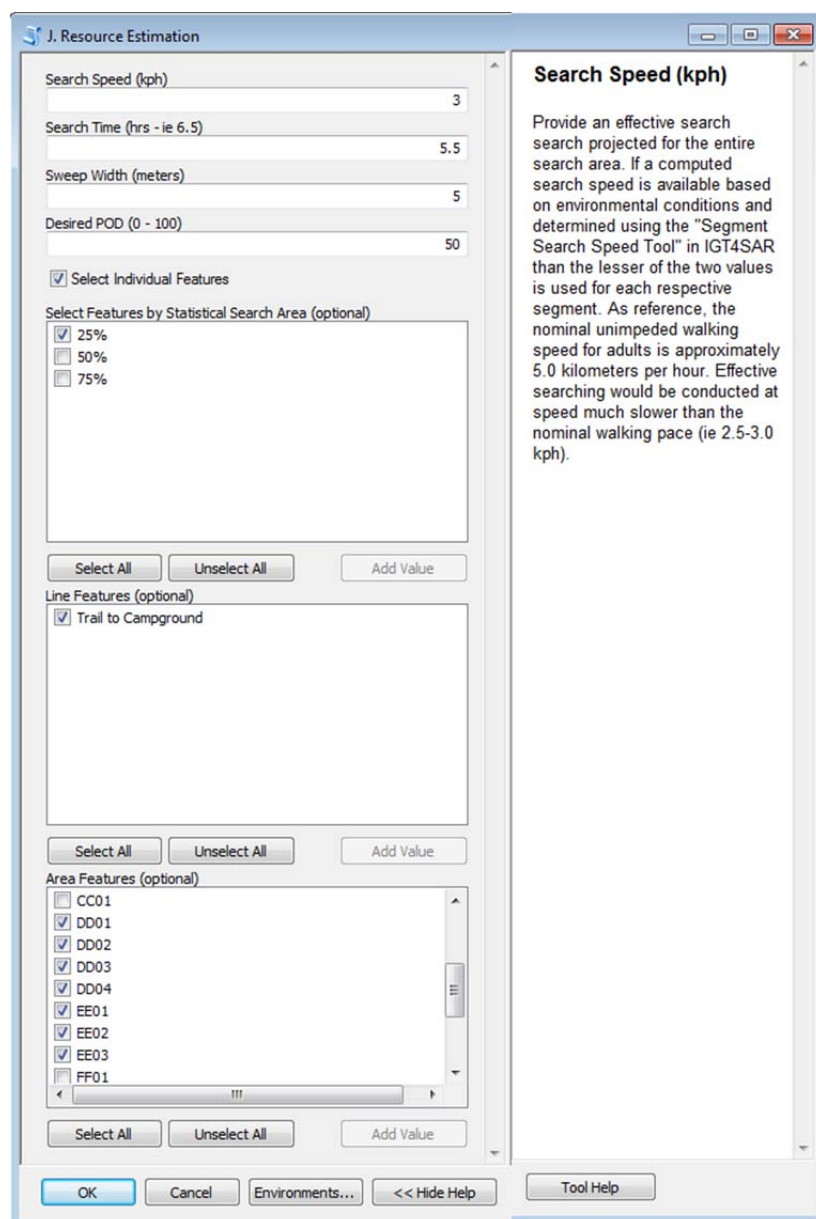


Resource Estimation (IGT4SAR_SARPlanner.py)

This tool provides Search Planners and Managers the ability to determine the number of ground searcher resources required to complete a desired search given a specified Effective Sweep Width, desired Probability of Detection and (Effective) Search Speed. The Search Speed input may be provided as a general regional average value or may be defined on an individual segment basis using the “Segment Search Speed Tool” which has long been part of IGT4SAR.



Given a collection of Quick Response (Hasty) Tasks or Search Segments a Search Planner needs to identify the number of ground resources necessary to Effectively search the designated areas to the POD specified based on Koopman’s Random Search Theory. Currently only Ground Searcher resources are considered. The next generation Resource Estimation tool will include additional resources.

Search Speed (kph)

User is asked to define the average effective search speed expected across the search area in kilometers per hour. As a reference the nominal, unimpeded walking speed for an adult is approximately 5.0 kph. It is expected that the effective search speed would be considerably less than the nominal walking speed (ie 2.5 – 3.0 kph). IGT4SAR also contains the Segment Search Speed tool that calculates an estimated effective search speed based on

various geospatial data layers. Execution of the “Segment Search Speed Tool” results in the effective search speed being calculated for Search Segments (only) with the value placed in the “Search Speed (km/hr)” field in the Search_Segments Attribute Table. If that field is populated, the Resource Estimation tool uses the lesser value in performing its calculations.

Search Time (hrs)

User defined value on the number of hours available for the resources to search. This does not include travel time as all the permitted time is considered search time.

Sweep Width (meters)

User defined value for the search area Effective Sweep Width. The Average Mean Detection Range (AMDR) may be considered a surrogate for ESW if it is not readily available. Specified in meters.

Desired POD (0-100)

Enter the desired Probability of Detection (POD). This is applied to each of the search areas regardless of the defined POA/POC. Resource Estimation is based on a calculated Coverage as described in Koopman's Random Search Theory ($POD = 1 - \exp(-Coverage)$).

Select Individual Features

The user may elect to select the individual features as defined below and/or if not selected the tool will calculate required personnel based on the Statistical Search Area (if defined). In order to use the Statistical Search Area the appropriate tool must first be run.

Select Features by Statistical Search Area (Optional)

Use of the statistical search area is dependent on the "Statistical Search Area Tool" having previously been executed in order to define the various regions. If this field is "unselective" the Statistical Search Area would need to be defined.

Line Features (Optional)

Select the desired line features (QRT_Lines). "Select Individual Features" must be selected to specify this parameter. If no features are listed then none are available in QRT_Lines.

Area Features (Optional)

Select the desired Area features (QRT_Segments and Search Segments). "Select Individual Features" must be selected to specify this parameter. If no features are listed then none are available in QRT_Segments or Search_Segments.

The result of executing this tool is a report provided in the Message Window detailing the number of resources required to perform the desired tasks. This report is also saved as a text file in the "Products" folder within the Incident directory.

Report

Resource Estimate - Time: 0115_1253PMPD target of 50.0 with 5.5 hour(s) of Search Time
Assuming a Sweep width of 5.0 meters

Area: DD04
Size(km²): 0.279, Search Speed (kph): 1.75, # Searchers: 5.0
Area: DD01
Size(km²): 0.366, Search Speed (kph): 1.75, # Searchers: 6.0
Area: DD02
Size(km²): 0.224, Search Speed (kph): 1.0, # Searchers: 6.0
Area: DD03
Size(km²): 0.397, Search Speed (kph): 1.0, # Searchers: 11.0
Area: EE02
Size(km²): 0.193, Search Speed (kph): 1.0, # Searchers: 5.0
Area: EE03
Size(km²): 0.425, Search Speed (kph): 2.0, # Searchers: 6.0
Area: EE01
Size(km²): 0.215, Search Speed (kph): 1.0, # Searchers: 6.0

A total of 45.0 Searchers as required to complete the desired task(s).

A total of 7 Segemnts equally 2.099 square kilometers.

Note that the total area of these Segments may exceed the Statistical Search Area (if defined)

Statistical Search Area Considerations

Estimate Searcher Speed (kph): 3.0 - This speed may differ from the estimated Segment speeds

To Search the 25% Statistical Search Area (Area = 0.33 sq KM), would require 3.0 Searchers

A total of 3.0 Searchers area required to search the desired Statistical Search Areas of 25% in the allotted time. A total area of 0.325 sq KM

References:

1. Koopman, B. O., Search and Screening: General Principles with Historical Applications , Pergamon Press, New York, 1980.

