



## Persistor tool – User instructions

The Persistor tool is an ArcGIS extension tool that automates the creation of maps summarising the temporal persistence of spatial patterns (eg patterns of high and low yield).

The tool uses the two approaches of Bramley and Hamilton (2004) for representing the persistence of spatial patterns (eg crop yields) over a number of time periods.

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### System requirements

- ArcGIS version 9.2
- 3D Analyst or Spatial Analyst extensions for ArcGIS
- Microsoft .NET Framework version 2 (probably installed on most current machines)
- Microsoft .Net support for ArcGIS (installed by default by ArcGIS 9.2 installation program).

### Last update

13 December 2007

### Persistor output

Persistor is used to summarise a series of rasters in two ways.

- The “Target over all years” method assigns a value to each cell which indicates the number of instances in which that cell was either less than or greater than the mean for that raster (+/- a nominated percentage).
- The “Target probability” method assigns a value to each cell which indicates the probability of the cell is (a) Less than the mean minus a nominated percentage, (b) Within the range of mean +/- percentage or (c) Greater than the mean plus the nominated percentage

This may be used, for example, to summarise the patterns of yield across a block over a number of years such as those in Figure 1a (below). Examples outputs of the two Persistor methods are shown in Figures 1b and 1c.

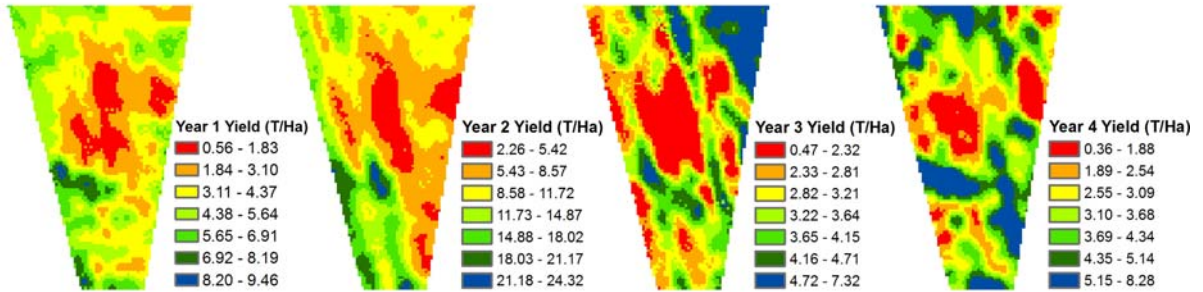
### Installation

Installation of the tool is in two main steps.

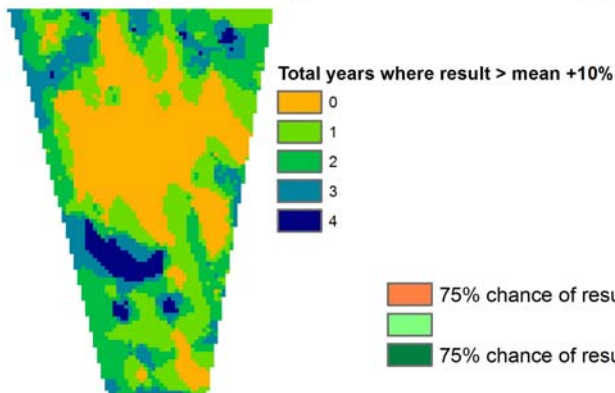
1. Install the necessary files
  - Locate and run the setup.exe file
  - Step through the installation program, accepting the default settings
2. Add the tool to the ArcMap user interface.
  - Run ArcMap
  - From the **Tools** menu, click **Customise**
  - Click the **Commands** tab
  - In the lower section of the window set **Save in:** to be Normal.MXT
  - Locate and highlight **Precision Agriculture** in the **Categories** box
  - Click on the **Persistor Tool** in the commands box and drag this tool to a blank area on any toolbar.

- Click **Close** on the Customise dialogue window

(a) Patterns of yield over 4 years



(b) Output of "Target over all years" method



(c) Output of "Target probability" method

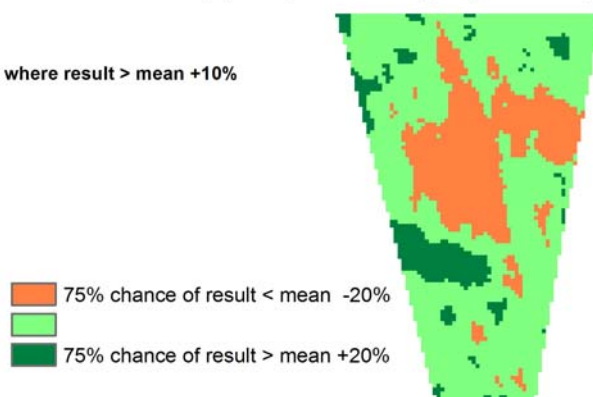


Figure 1: Illustration of the two methods used by Persistor

## Using the Persistor program

The rasters to be summarised must be loaded into ArcGIS before running Persistor, ArcGIS must be in **Data View** (not Layout View) or the Persistor Tool toolbar button (shown to right) will be disabled.

When the Persistor toolbar button is clicked the window shown in



Figure 2 should appear.

The screenshot shows the 'Persistor' dialog box with the following settings:

- Select rasters for UPPER category analysis:** ColdYrs (unchecked), WarmYrs (unchecked), Year 1 Yield (T/Ha) (checked), Year 2 Yield (T/Ha) (checked), Year 3 Yield (T/Ha) (checked), Year 4 Yield (T/Ha) (checked). Buttons: Clear all, Select all.
- Select rasters for LOWER category analysis:** ColdYrs (unchecked), WarmYrs (unchecked), Year 1 Yield (T/Ha) (checked), Year 2 Yield (T/Ha) (checked), Year 3 Yield (T/Ha) (checked), Year 4 Yield (T/Ha) (checked). Buttons: Clear all, Select all.
- Target probability method:** Selected. Upper category: 50% chance of result > mean +10%. Lower category: 50% chance of result < mean -20%.
- Target over all years method:** Not selected. Total years where result is > mean +45%. Button: Options ...
- Output Raster Name:** TargetProb.  Display intermediate (temporary) rasters.
- Output Directory:** C:\Dev\Test\Persistor\ Button: Browse...
- Buttons: About, Process, Close.

Figure 2: The Persistor Tool form being used to generate a *Target Probability* surface

For the **Target probability** method (Figure 2), the following needs to be entered:

- Two or more overlapping grids selected from each of the Upper and Lower category lists. Different grids or numbers of grids may be selected from each list.
- The probability percentages need to be selected, as does the amount above or below the mean for the upper and lower category.
- A name for the output raster (must conform to ESRI grid length limit of 13 characters) should be entered, and the output directory chosen using the browse button (or typed into the text box)
- If the 'Display intermediate (temporary) rasters' option is ticked, a number of intermediate rasters will be added to the current map. These are temporary rasters and if you want to retain them, will subsequently need to be saved using the 'Make Permanent' option in the Right-click menu in the ArcMap table of contents.

For the **Target over all years** method (Figure 3), the options are similar to the Target Probability option.

- One or more overlapping grids should be selected from each of the raster list.
- Select whether to score the values above '>' or below '<' the specified cut-off.
- The cut-off (above or below the mean) needs to be selected
- A name for the output raster (must conform to ESRI grid length limit of 13 characters) should be entered, and the output directory chosen using the browse button (or typed into the text box)
- If the 'Display intermediate (temporary) rasters' option is ticked, a number of intermediate rasters will be added to the current map. These are temporary rasters and if you want to retain them, will subsequently need to be saved using the 'Make Permanent' option in the Right-click menu in the ArcMap table of contents.

The screenshot shows the 'Persistor' dialog box with the following settings:

- Select rasters for analysis:**
  - ColdYrs
  - WarmYrs
  - Year 1 Yield (T/Ha)
  - Year 2 Yield (T/Ha)
  - Year 3 Yield (T/Ha)
  - Year 4 Yield (T/Ha)
- Method:**  Target over all years method
- Upper category:** 50% chance of result > mean +10%
- Lower category:** 50% chance of result < mean -20%
- Total years where result is:** > **mean:** +45%
- Output Raster Name:** TargetProb  Display intermediate (temporary) rasters
- Output Directory:** C:\Dev\Test\Persistor\

Figure 3: The Persistor Tool form being used to generate a *Target over all years* surface

## Options

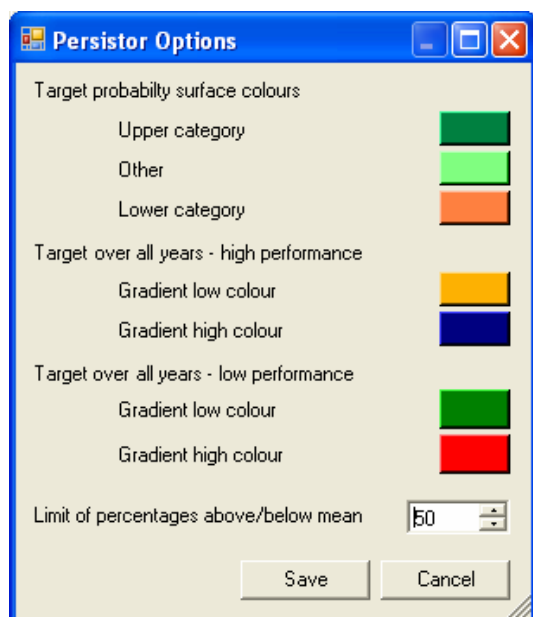


Figure 4: The Options form of the Persistor Tool

The Options button displays a form as shown in Figure 4 which allows you to

- Choose (and save) a colour scheme to be used for the legends of the two different output types. Different schemes are applied for the Target over all years maps depending on whether the high performance ">" or low performance "<" options are selected.
- Change the range of percentages displayed in the +/- mean combo box controls (the tool may need to be closed and restarted for this change to take effect).

These and other settings will be saved to disk when the tool is closed, and used next time Persistor is run.

## Maintenance

This tool was originally developed as an extension for ArcMap 9.1 using VB.Net (Visual Studio 2005) in August 2006, to assist with Precision Viticulture research. For queries, please contact David Gobbett from CSIRO Sustainable Ecosystems.

## Notice

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## Reference

Bramley, R.G.V. and Hamilton, R.P. (2004) Understanding variability in winegrape production systems. 1. Within vineyard variation in yield over several vintages. *Australian Journal of Grape and Wine Research* **10**, 32-45.

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