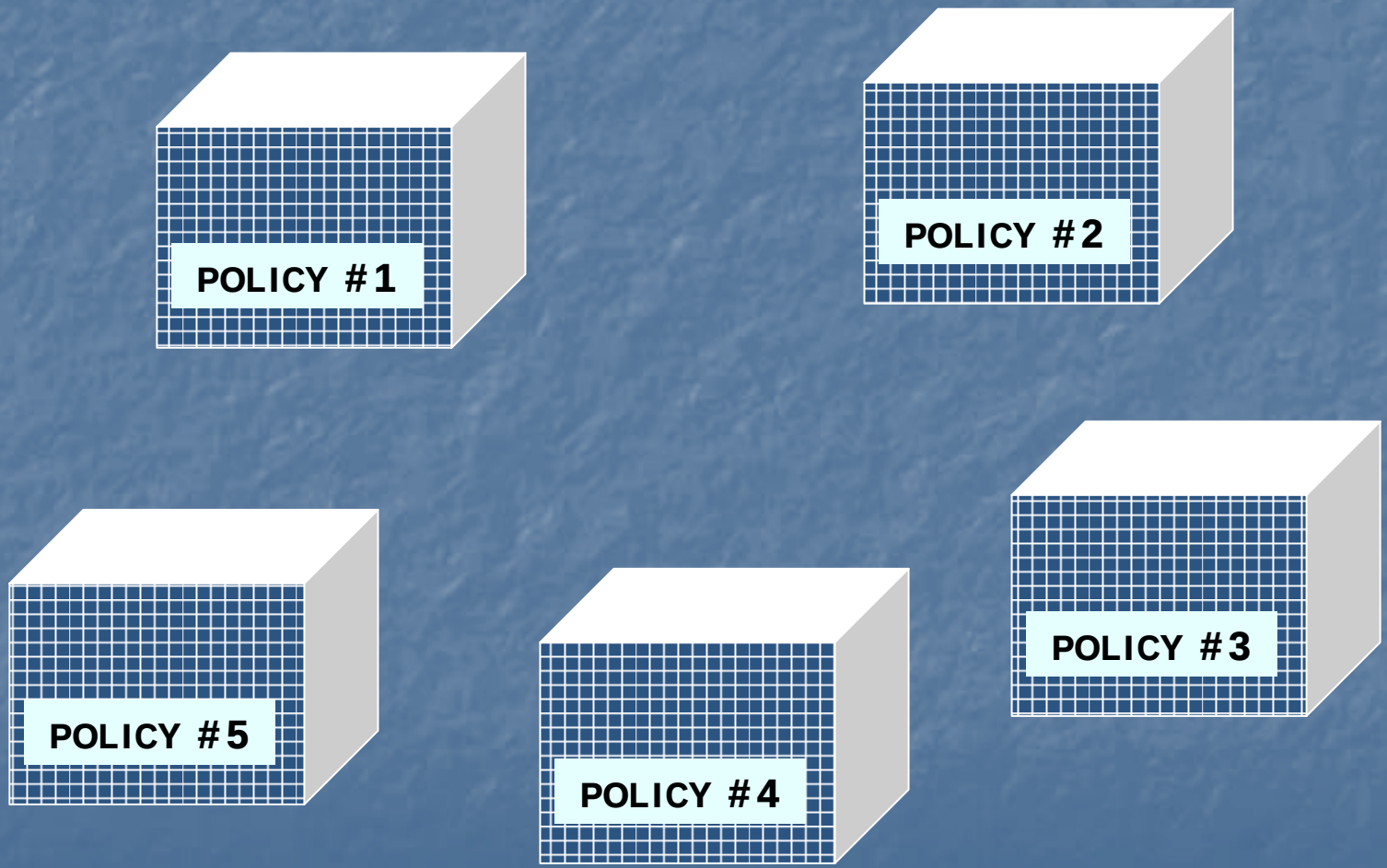
GPAT

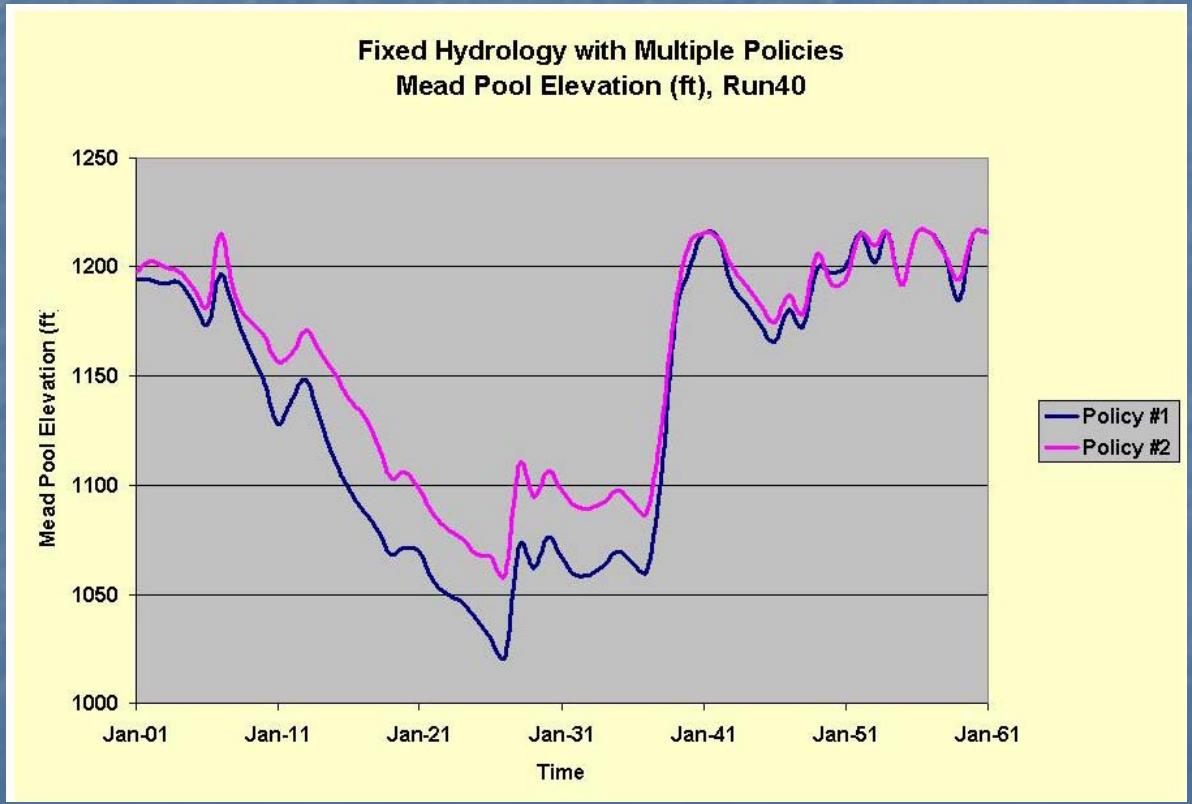
- Graphical Policy Analysis Tool (GPAT)
- Implemented in Visual Basic for Applications (VBA) as an Add-in to Excel
- Analyzes and Compares Excel output from multiple RiverWare runs (policies, hydrologic scenarios, etc.)
- Graphs slots, statistics, percentile, probability distributions and exceedance probabilities
- Allows dynamic data exploration

How to Compare Policies???



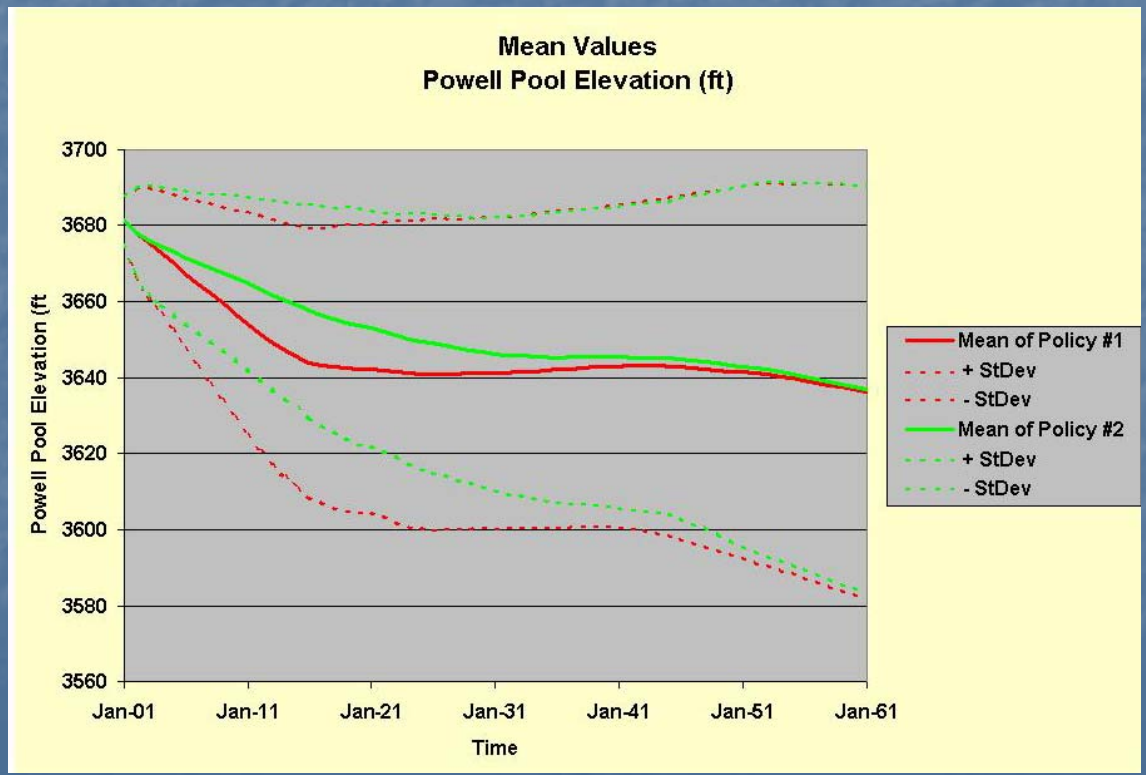
One run, Alt. policies

- I want to compare individual slot values over time for a common hydrology



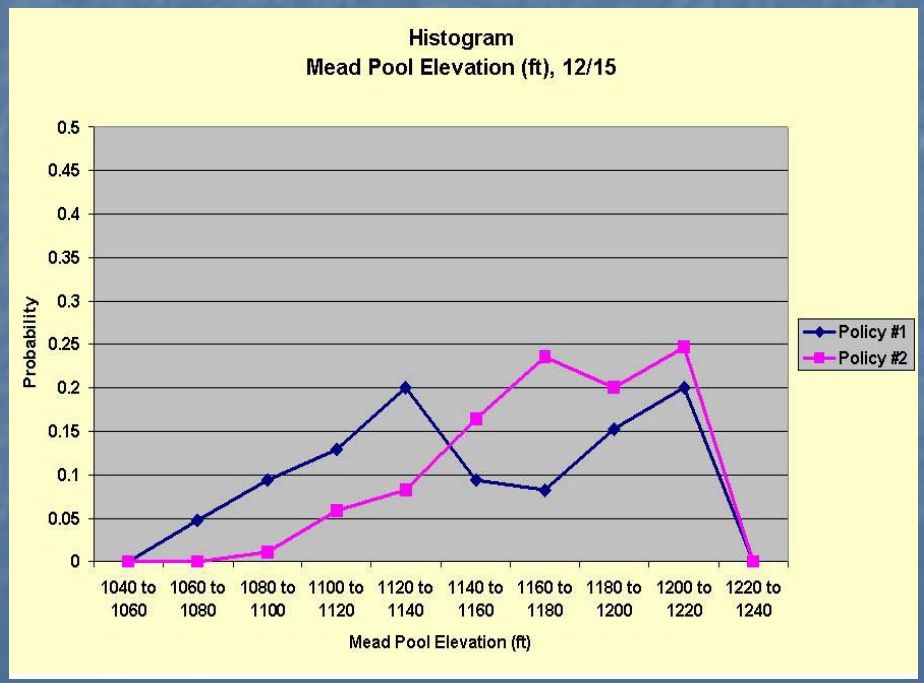
Statistic(runs), Alt. policies

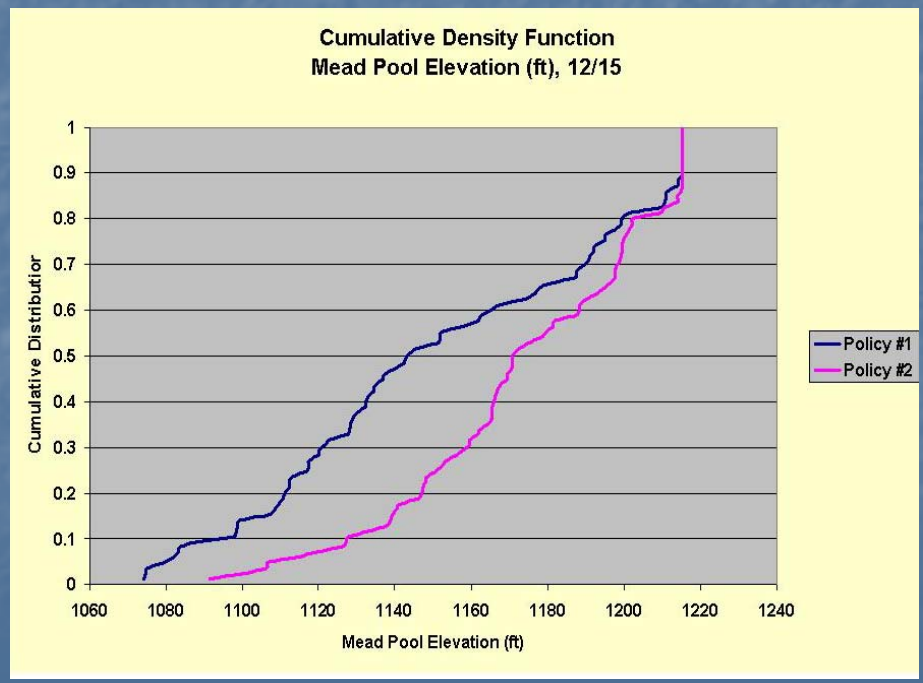
- I want to compare the statistics of all hydrologic scenarios over time
  - Mean, Minimum, Maximum, Standard Deviation



Distribution(runs), Alt. policies

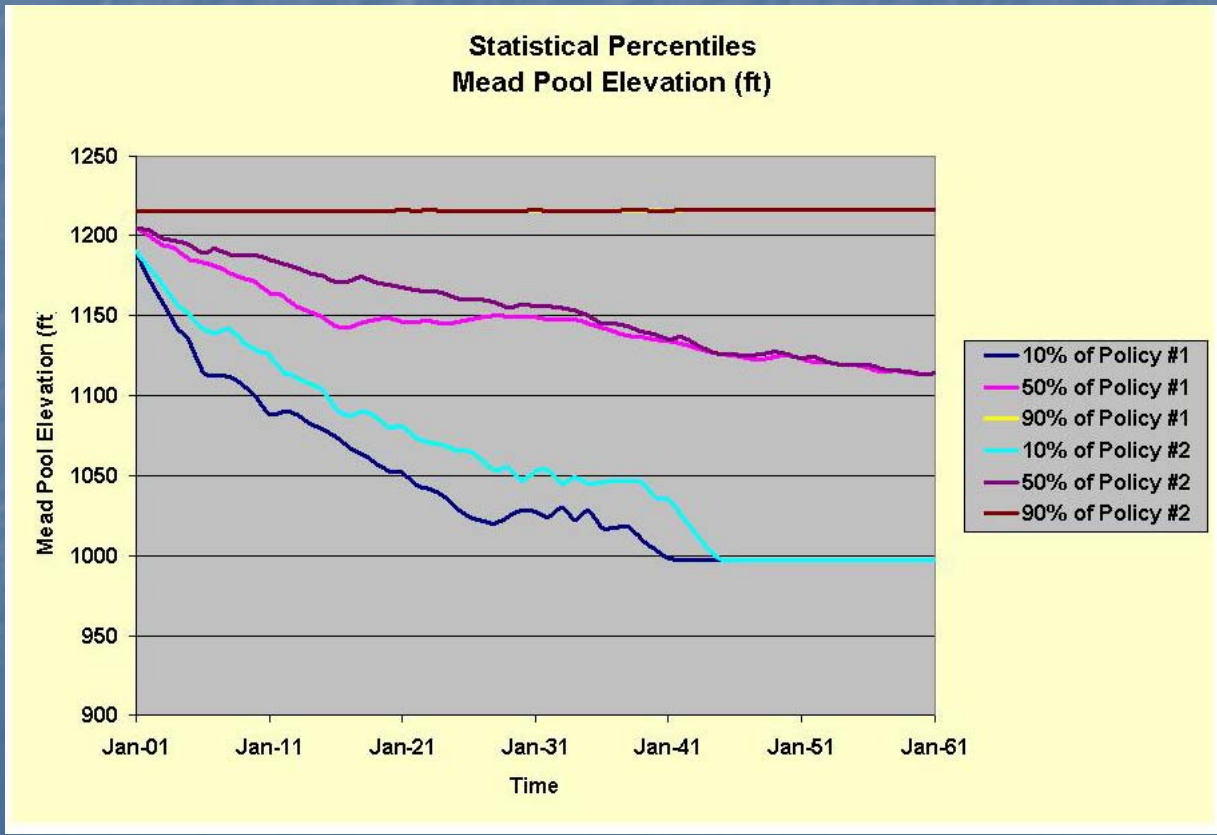
- How do the probabilistic distributions of slot values compare at one point in time? PDF (Histogram) , CDF





Percentiles(runs), Alt. policies

- What will the slot values be over time that correspond to a particular percentile of occurrence?



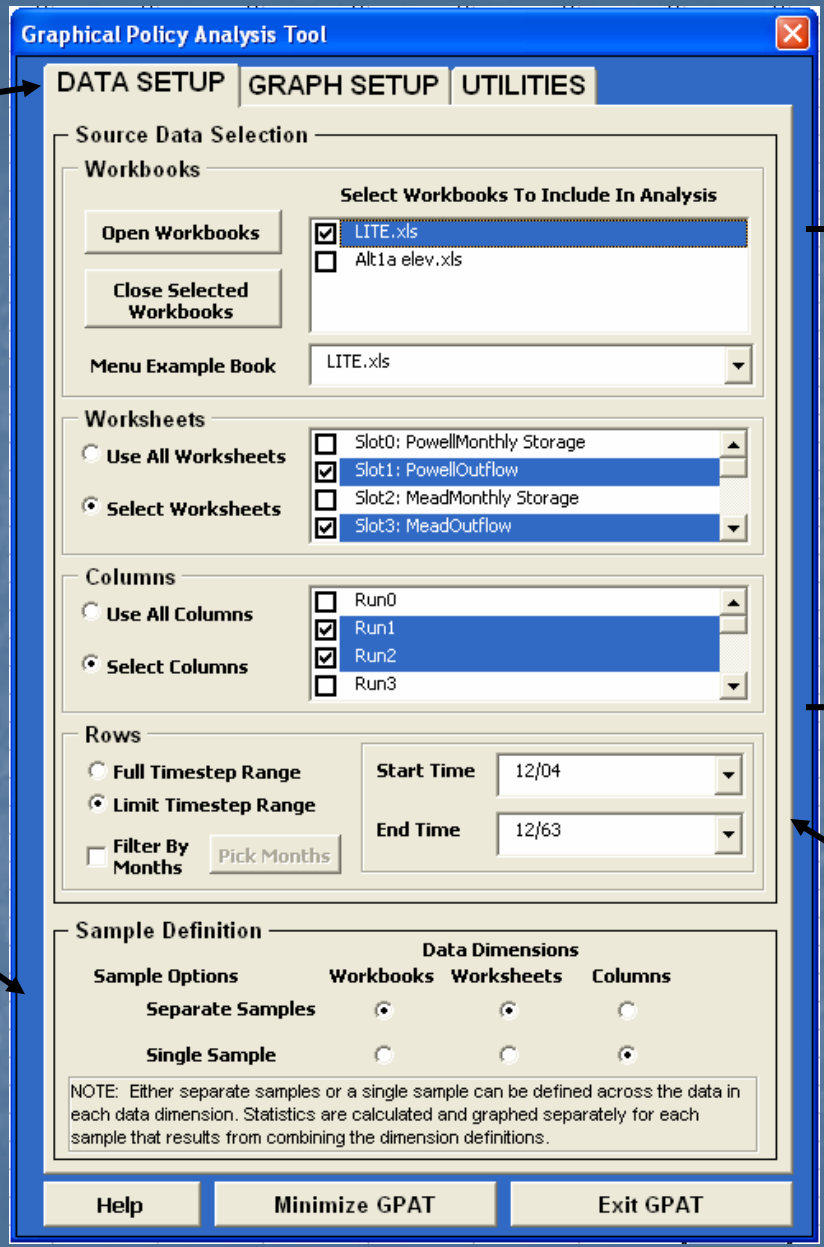
Exceedance Probability

- What is the probability of a slot variable exceeding or not exceeding a certain value through time?
- What is the probability of a slot variable falling within a specified range through time?
- What is the probability of a binary occurrence?
  - Flood release, shortage, surplus, equalization flags

Recent GPAT Development

- GUI reorganized into tabbed interface
- Flexible specification of samples across columns, worksheets, and workbooks
- Time range specification
- Graph format options for vertical gridlines and data markers
- Choice of six methods for calculating percentiles

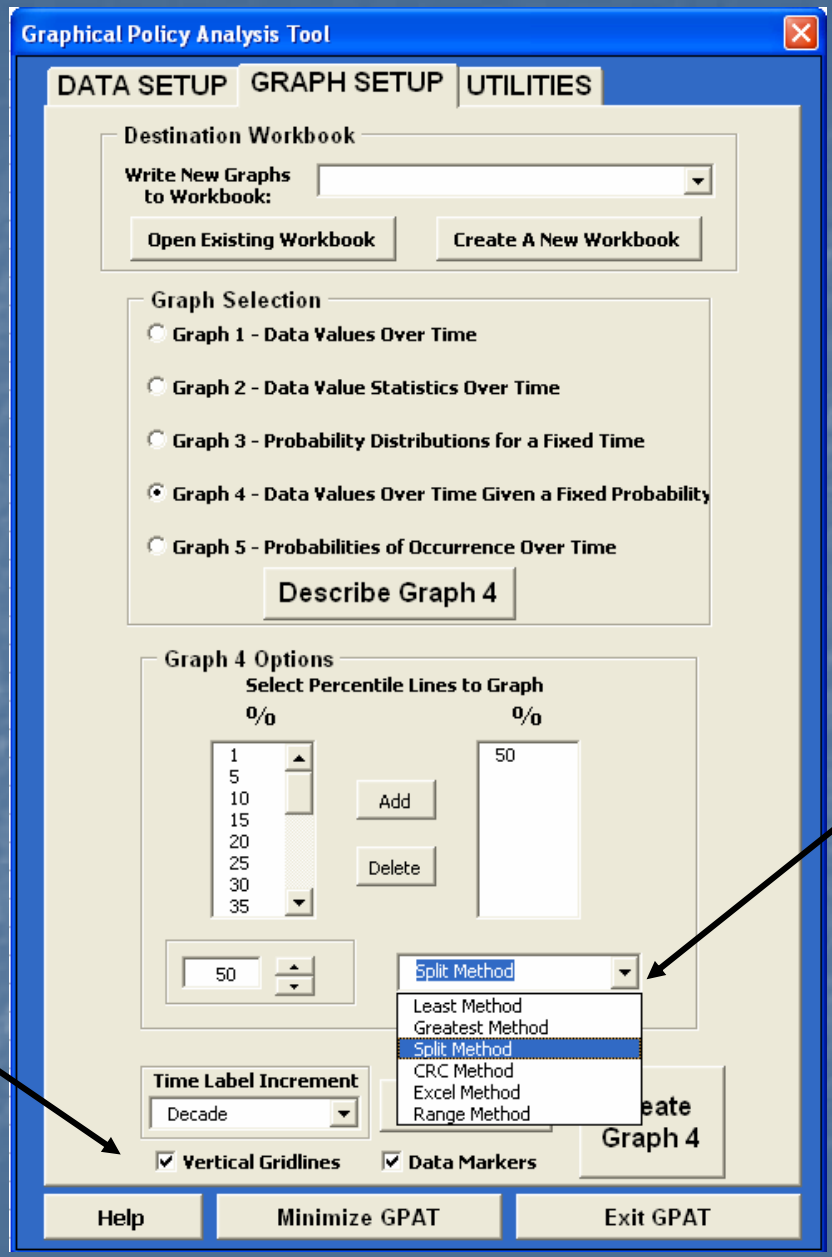
Tabbed Interface



Customized Selection of Workbooks Worksheets & Columns

Flexible Sample Specification

Time Range Choice



Options for Including Vertical Gridlines & Data Markers

Six Methods for Calculating Percentiles

Percentile Methods

- Particularly with small sample sizes, the methods can yield very different results
- Suppose we have 4 observations with values of: 1, 2, 3, and 4. The percentiles (p) associated with the values are shown in the following table

Observation	Least	Greatest	Split	CRC	Excel	Range
1	0	25	12.5	20	0	0 = p = 25
2	25	50	37.5	40	33.3	25 < p = 50
3	50	75	62.5	60	66.7	50 < p = 75
4	75	100	87.5	80	100	75 < p = 100

Upcoming GPAT Development*

- New analysis for probability of event occurrence among time series
  - Find the number of times a shortage is declared in each run
  - Calculate statistics and plot distribution of the numbers of shortages across the runs

* Funded by Lower Colorado Region of USBR

Upcoming GPAT Development*

- Compound event definition
  - Define an event with required conditions across a number of different slots
  - Lake Mead elevation < 1075 and

    Lake Powell elevation > 3526 and

    Lake Powell elevation < 3575

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Upcoming GPAT Development*

- Graph format options for pre-selecting plot area color, line formats, and data marker formats
- Placeholder in results for an initial timestep value so a value can be easily entered and displayed on graphs

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Potential Future Development

- Change the user interface from specifying a graph “type” to specifying transformations and analyses
- Expand capabilities for sampling by time, transforming series, and analyzing events
- Non-spreadsheet GPAT to bypass row/column limitations in Excel