GPAT

Graphical Policy Analysis Tool

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Joint development by USBR and CADSWES

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Outline

- What GPAT does now
- Potential Enhancements

Comparing Potential Policies

Complex Models = Complex Output

- Multiple Slots of Interest
  - Stakeholders
- Multiple Run Analysis
  - Hydrologic scenarios
- Multiple Policies of Interest
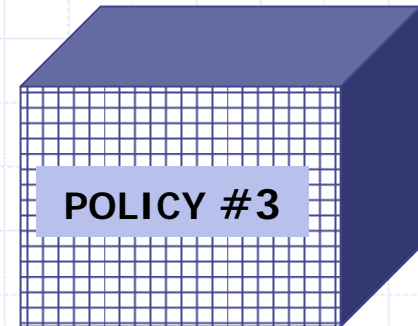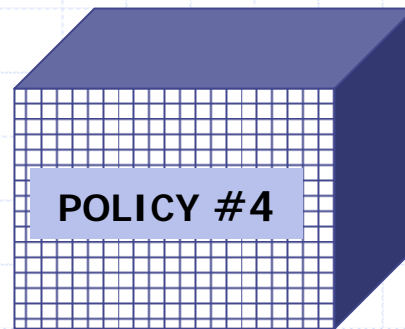- Time

Four Dimensional Space

Traditional Comparison

- ◆ Model managers extract, graph and present all results that they deem as significant – Potential bias?
  - ■ Focus on differences and not similarities
- ◆ Stakeholder inevitably ask questions for which the modelers are not prepared to answer
  - ➢ Discussions Cease
- ◆ RESCHEDULE MEETINGS = $$$

Using ExcelWriter

- Write RiverWare Outputs into Spreadsheet Format

Slot

Run

Time

POLICY #1

How to Compare Policies???

POLICY #1

POLICY #2

POLICY #3

POLICY #4

POLICY #5
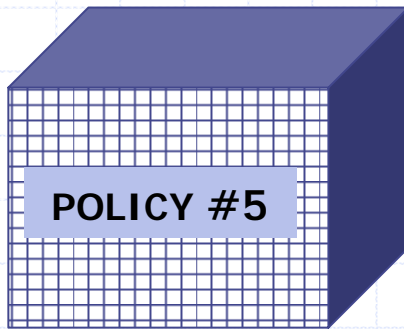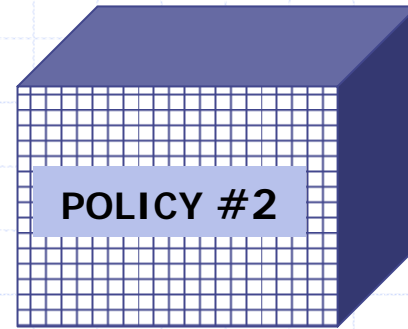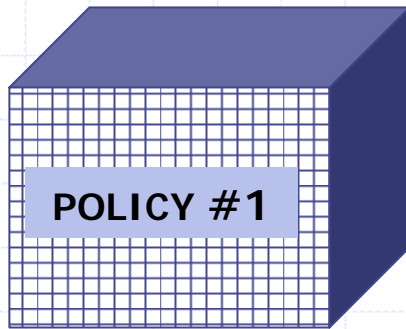
Commonly Asked Questions

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

Fixed Hydrology with Multiple Policies
Mead Pool Elevation (ft), Run40
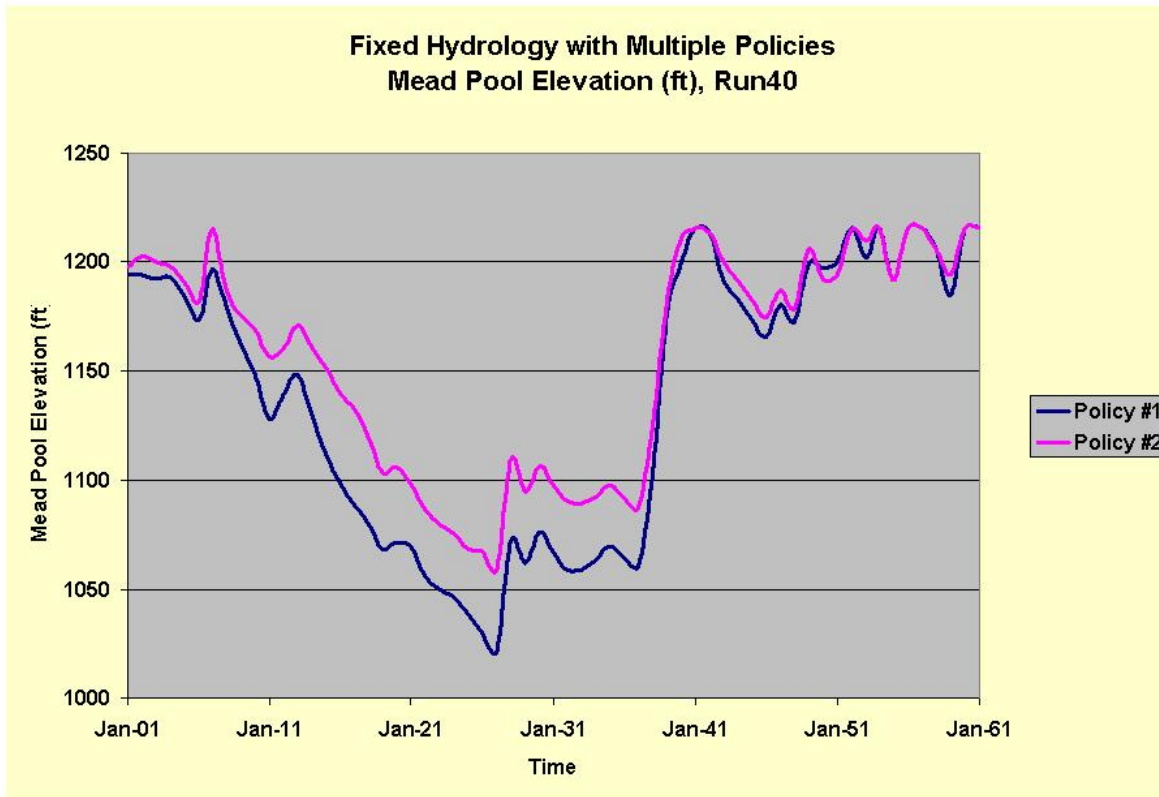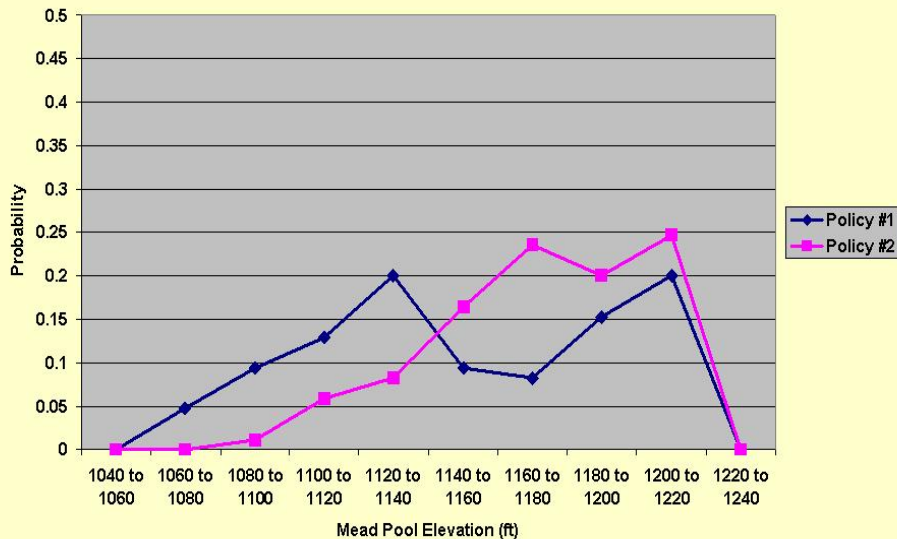
Commonly Asked Questions

◆ I want to compare the statistics of all hydrologic scenarios over time
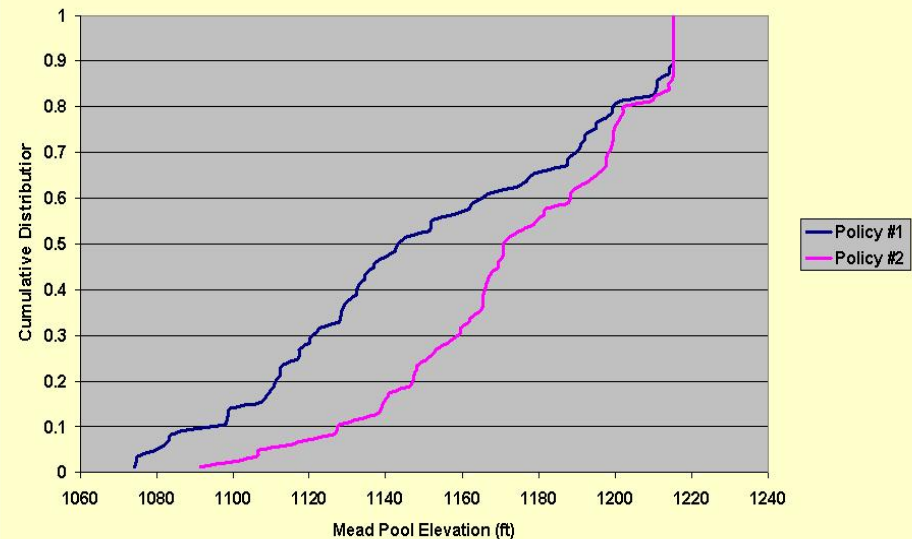 ■ Mean, Minimum, Maximum, Standard Deviation
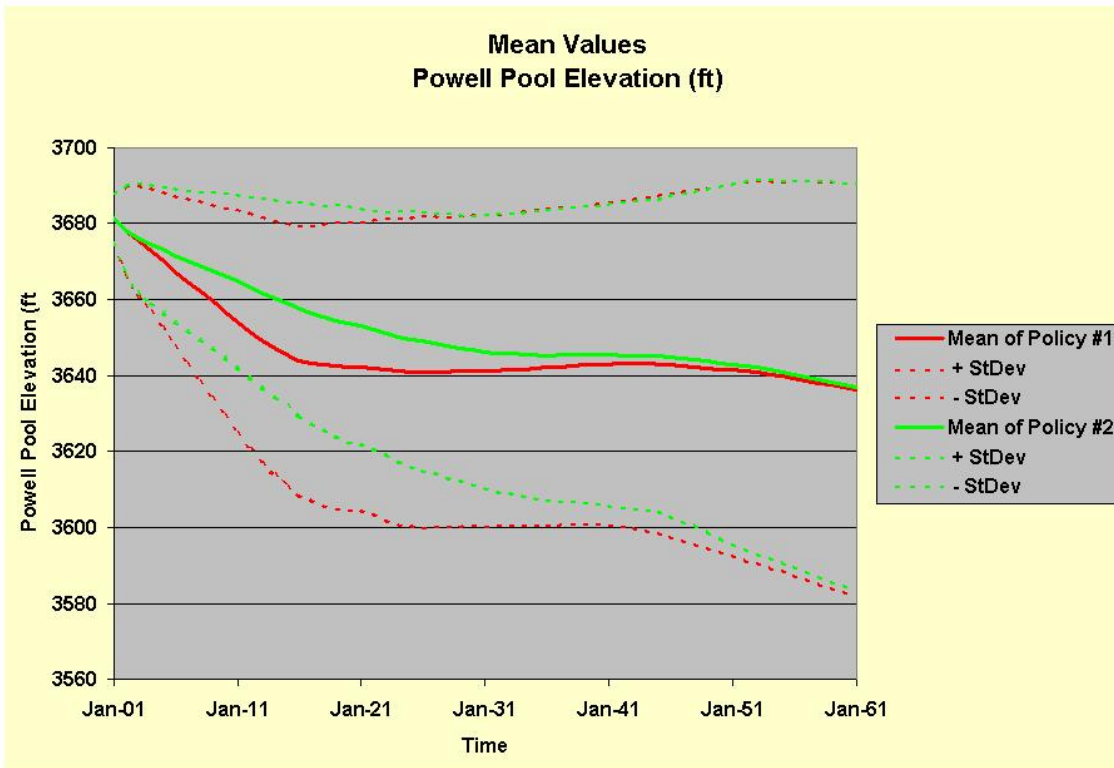
Commonly Asked Questions

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

Histogram
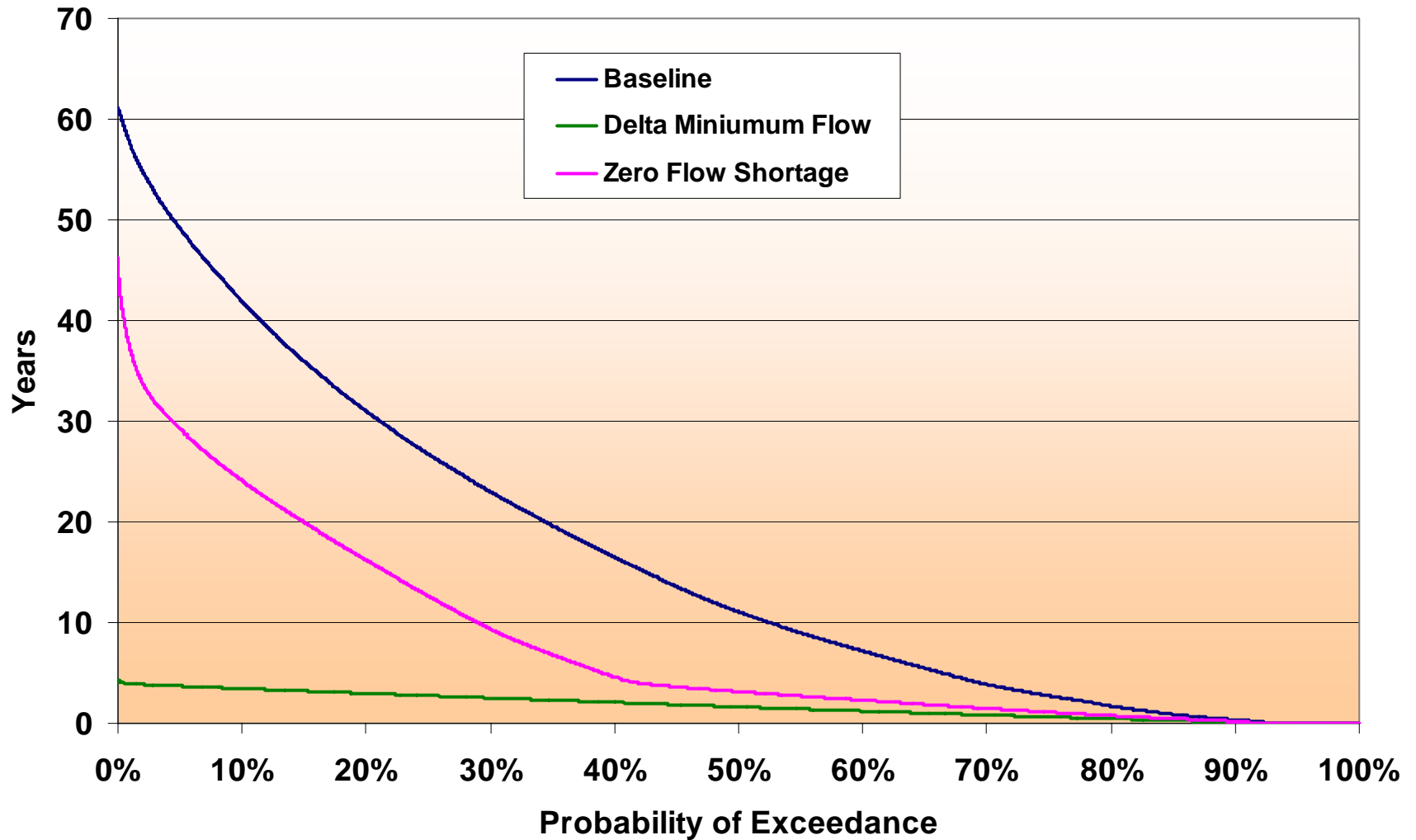Mead Pool Elevation (ft), 12/15

Cumulative Density Function
Mead Pool Elevation (ft), 12/15

Cumulative Distribution Function - Length of time since a 260 kaf flood event for the Colorado Delta

Legend:
- Baseline
- Delta Miniumum Flow
- Zero Flow Shortage

Y-axis: Years (0, 10, 20, 30, 40, 50, 60, 70)

X-axis: Probability of Exceedance (0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%)

Commonly Asked Questions

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

Statistical Percentiles
Mead Pool Elevation (ft)

Legend:
- 10% of Policy #1
- 50% of Policy #1
- 90% of Policy #1
- 10% of Policy #2
- 50% of Policy #2
- 90% of Policy #2

Y-axis: Mead Pool Elevation (ft), ranging from 900 to 1250
X-axis: Time (Jan-01, Jan-11, Jan-21, Jan-31, Jan-41, Jan-51, Jan-61)
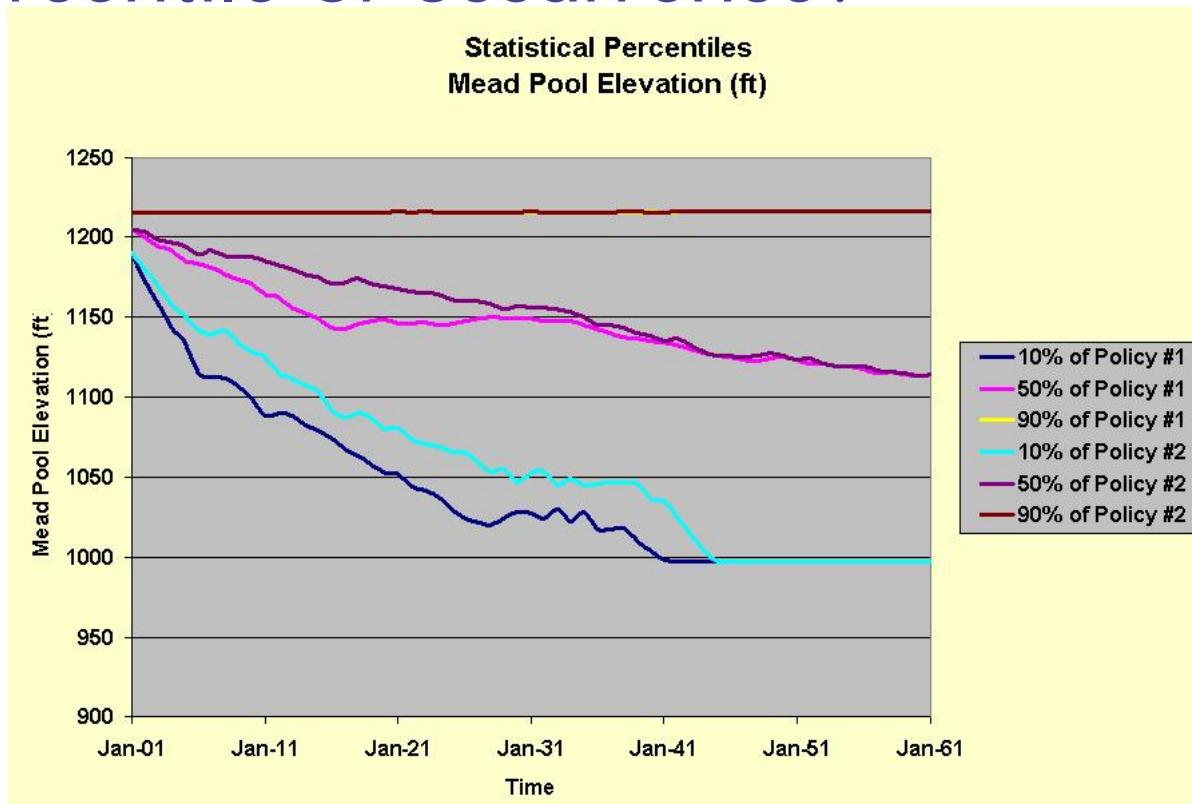
Lake Mead Elevation
Interim Surplus Criteria Alternatives
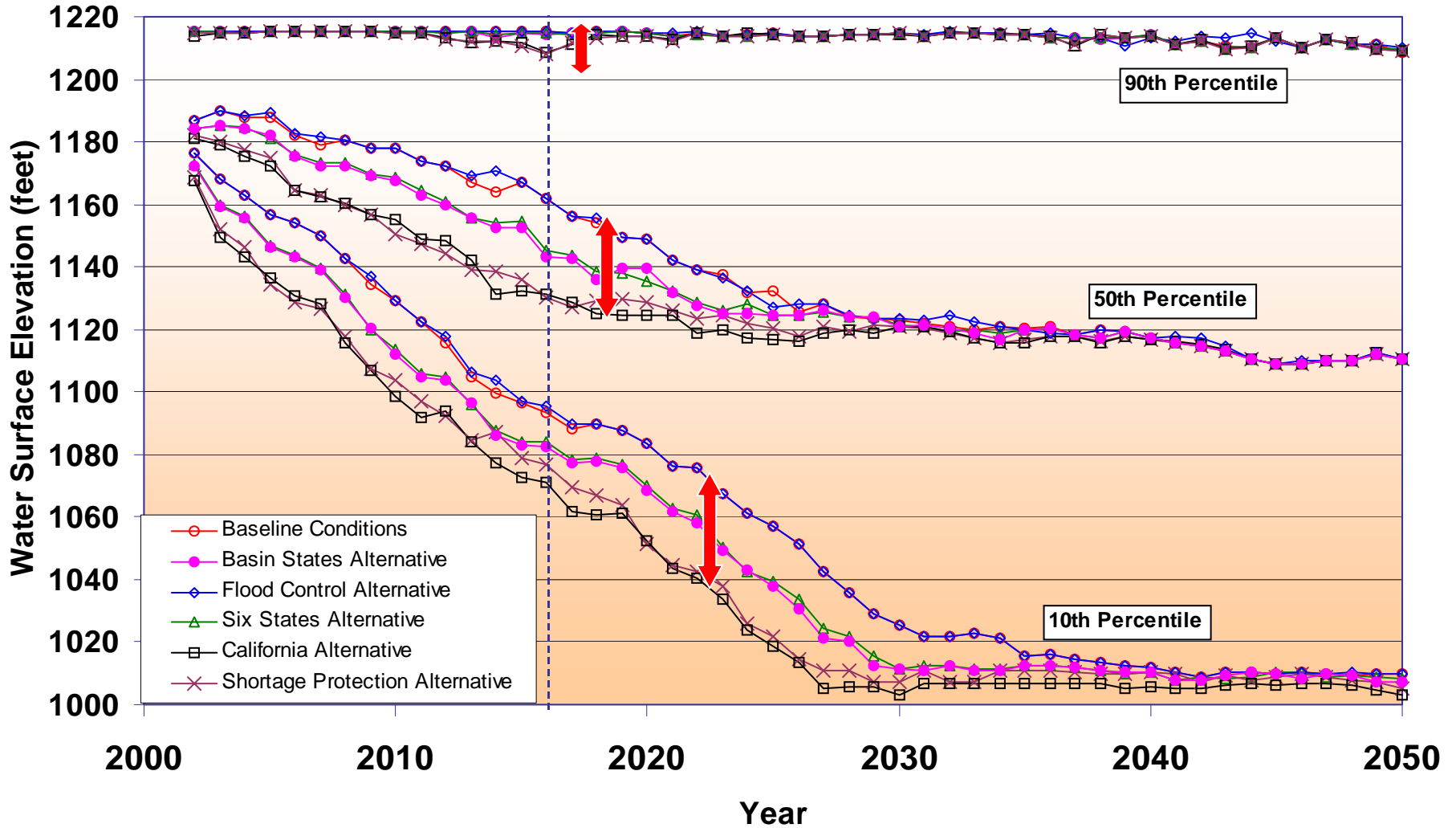
Commonly Asked Questions
Probabilities

- 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
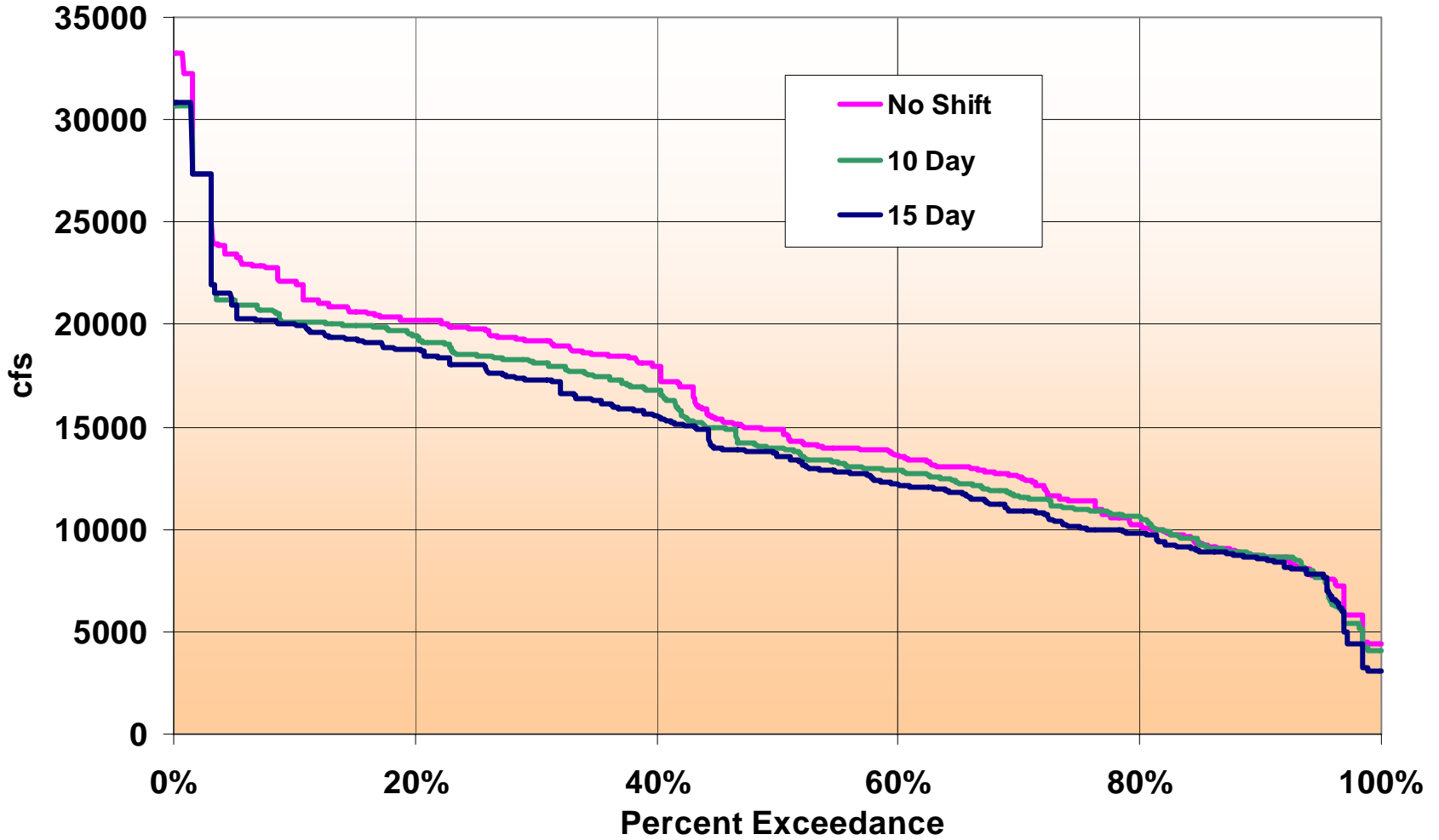
Example: Depleting Reservoirs

Probability of Mead Pool Elevation (ft) NOT Exceeding 1083
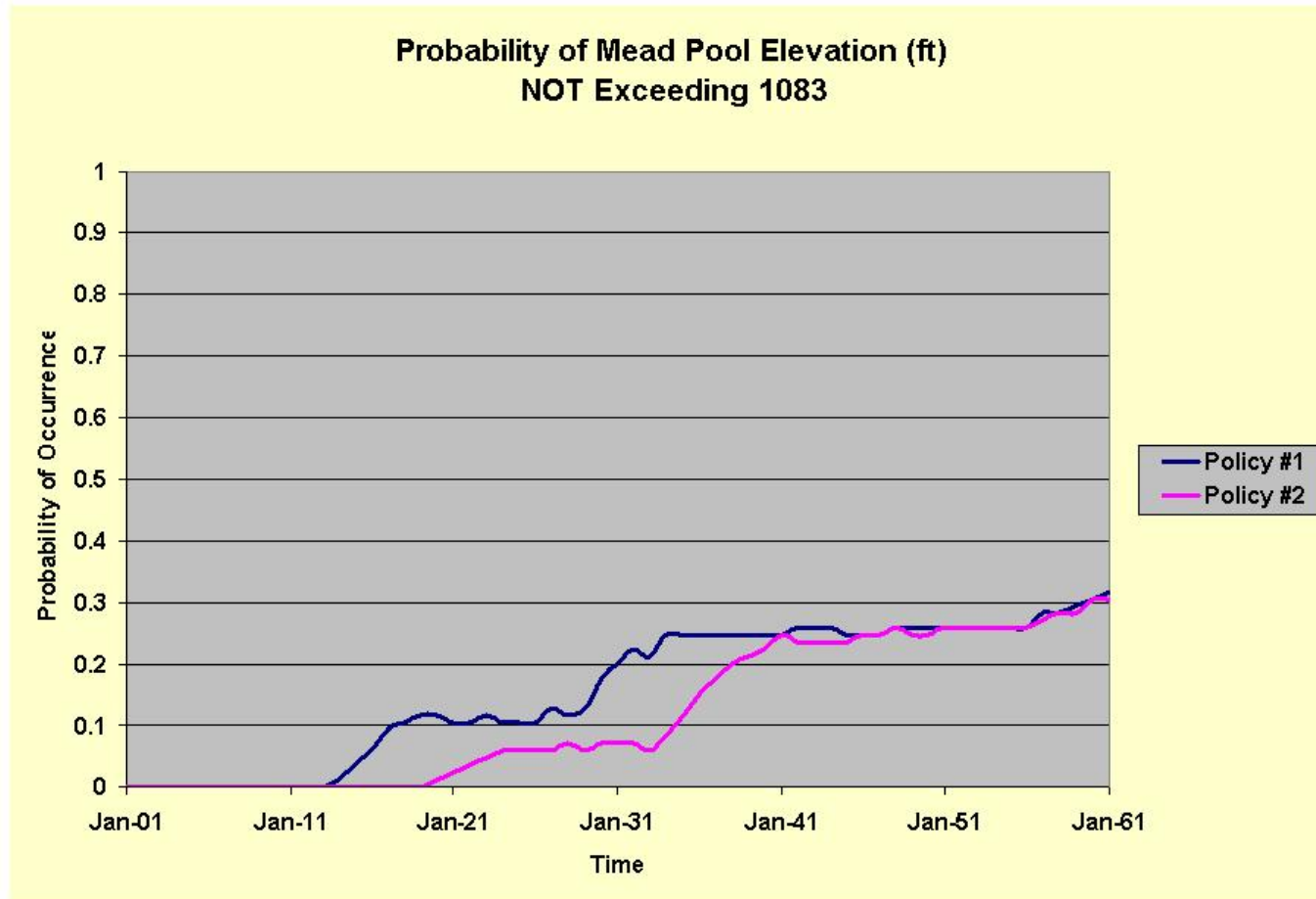
Flow Duration Curves for Flaming Gorge Release December
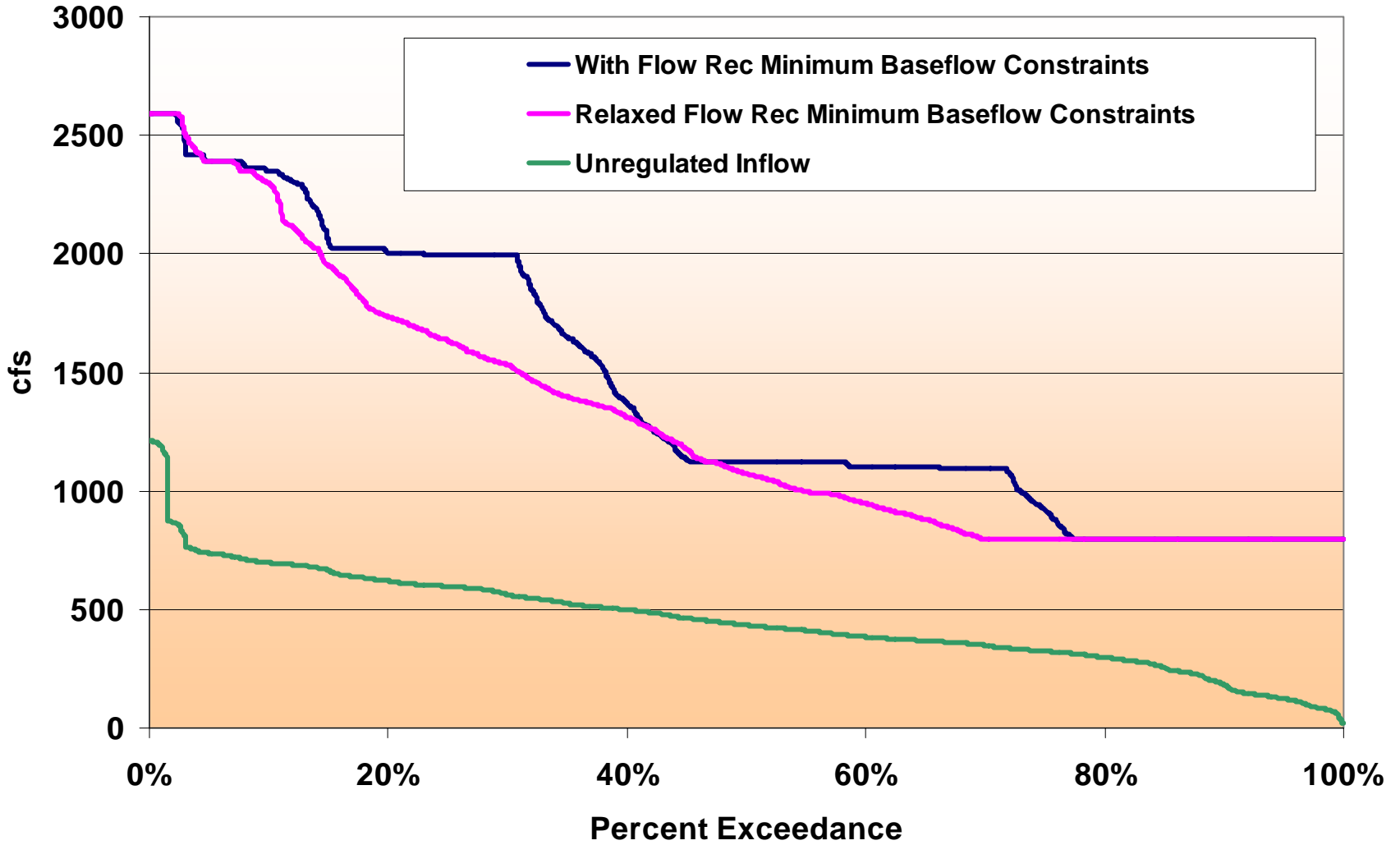
Maximum 14 Day Flow Duration Curves Below Green-Yampa Confluence

Specialty Functions

- Arithmetic operations between slots in the same policy to create new slots
  - What is the total storage capacity in the system?
- Arithmetic operations between different policies
  - What are the differences between two policies for ALL slots?
- Isolate Monthly Values
  - What is the probability exceeding a slot value during a specific set of months?
- Record and recall graphs produced

Benefits

- Give rapid access to all model results
  - Answer questions "on the fly"
- Facilitate model interpretation by stakeholders
- Generate a qualitative AND quantitative understanding of similarities and tradeoffs
- Promote interactive discussions between stakeholders – Generate new policies

Present

- Version 1.1 on the RiverWare web site
- Version 1.2 Development circulating
- TVA developed a tool with a similar goal
  - Some desirable additional features
  - Joined the GPAT effort
- This Year
  - Partial funding
  - Bulletproof version 1.2 and release
  - Software Review and Restructuring
    - Separation of functionalities such as graphics, reporting, math functions, etc
  - Enhancements for version 2.0

Potential Enhancements

- Wider array of Input Data
    - Non-RiverWare Data, e.g. HDB, WSM
    - Single Run Data
    - All RiverWare timesteps
- Improved transfer of data
    - Excelwriter
    - RiverWare

Potential Enhancements cont'd

- ◆ Reporting
  - Equivalent summary report for each graph.
- ◆ Aggregations
- ◆ Graphics
  - Ability to view selected slots interactively
  - Retaining user preferences for graphs
- ◆ Additional analysis and graphs?