LAKE KEMP REALLOCATION WITH RIVERWARE

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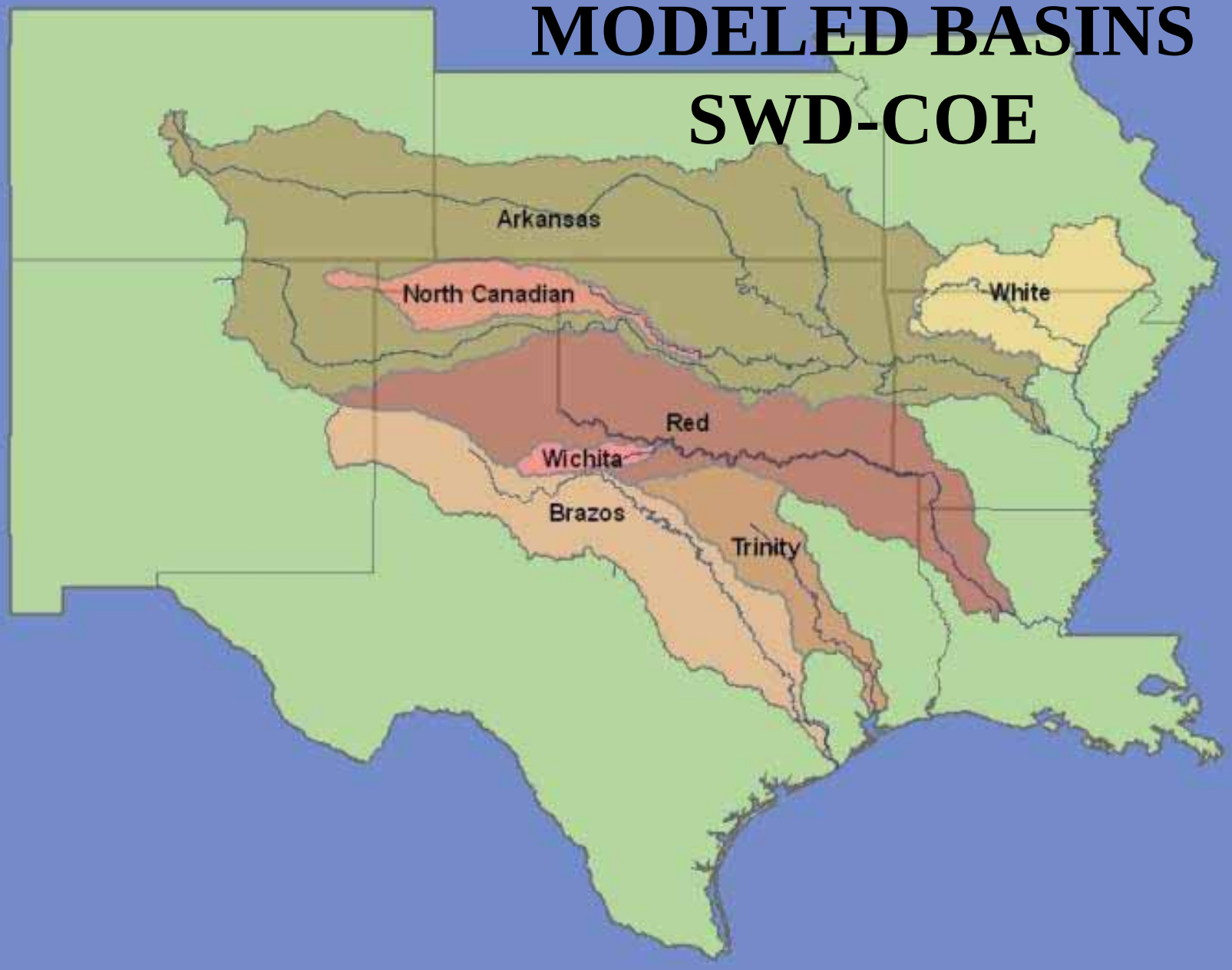
MODELED BASINS SWD-COE



Lake Kemp

13 ft Dia Conduit: Gated
3000 ft Spillway: Uncontrolled

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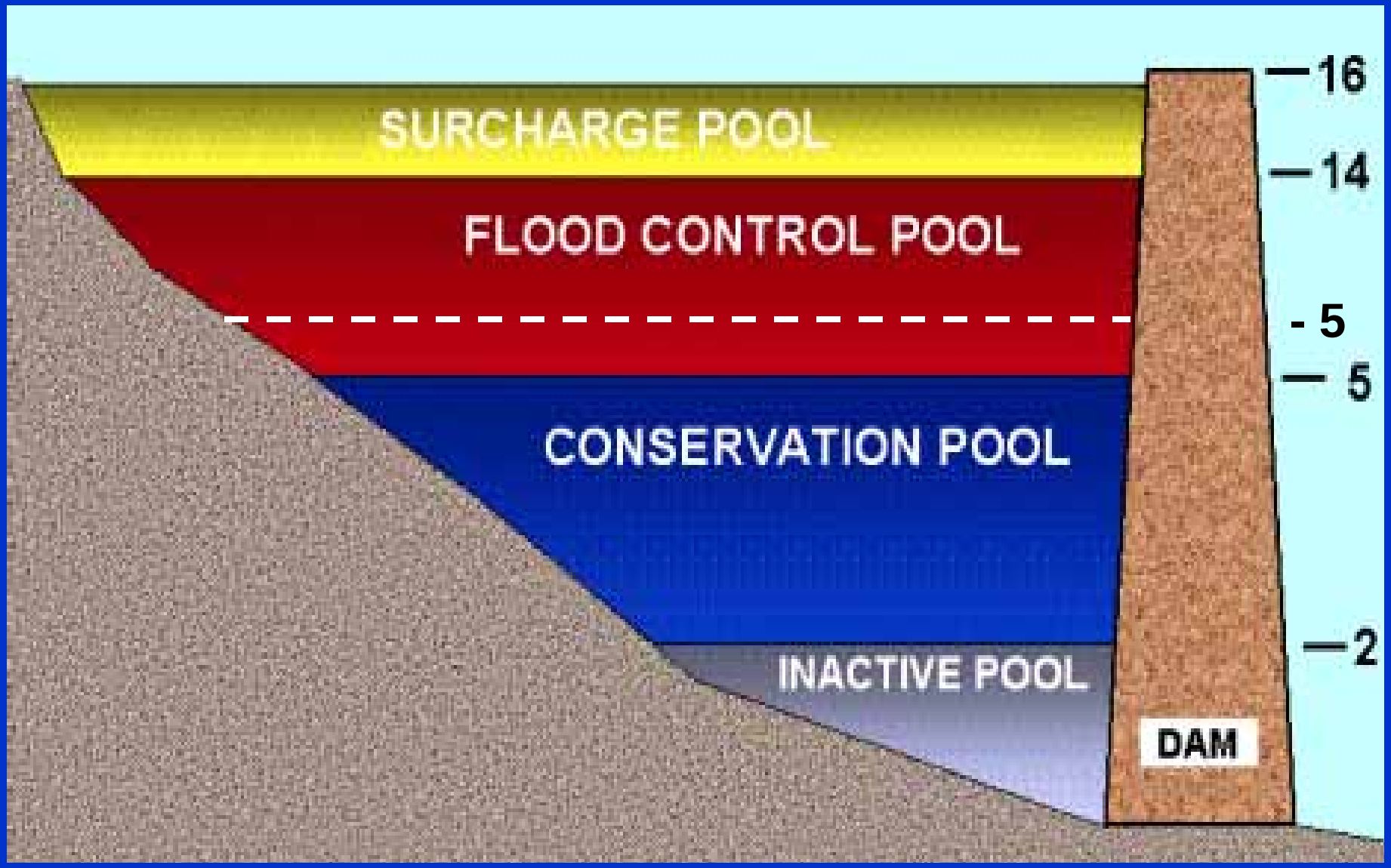
ALTERNATIVES FOR INCREASING YIELD:

- **Seasonal Pool**
- **Dredging Consv Pool**
- **Reallocating Some Flood Control**



USACE storage divisions and balance levels

EXISTING CONDITIONS:

Conservation Pool

Elev 1090.0 – 1044.0

266,700 ac-ft

Flood Control Pool

Elev 1140.0 – 1156.0

234,900 ac-ft

REALLOCATION ALTERNATIVES:

Consv Pool Incr.	F.C. Storage Decr.
Elev 1144.0 – 1145.2	8.2%
1144.0 – 1146.2	18.9%
1144.0 – 1148.0	28.7%
1144.0 – 1149.0	36.6%
1144.0 – 1149.8	Raise Dam

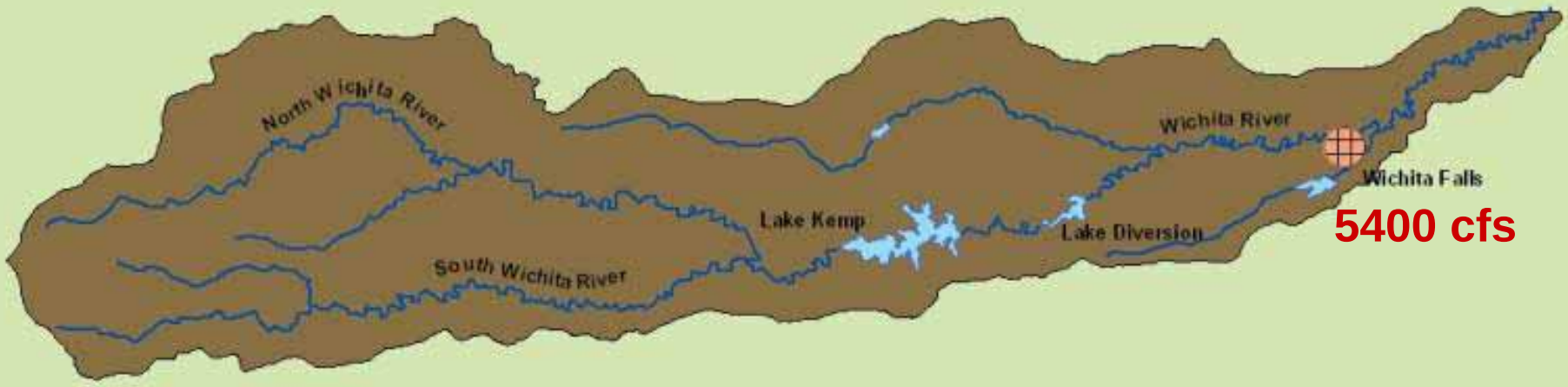
EFFECTS OF REALLOCATION:

- **Less F.C. Storage**
- **Increased Elev-Freq**
- **Downstream Flood Risk Increased**
- **Environmental**
- **Cultural**

Benefits/Costs Analysis Required

Wichita River Basin: approx 3,480 sq mi

Lake Kemp: approx 2,090 sq mi



RIVERWARE APPROACH:

- **SWD CoE Flood Control Balancing Method**
- **79-Year Period of Record Simulation, 1-Day TS**
- **Rules Based Simulation**
- **Alternative Runs & Multi-Run-Mgr for Yield**
- **Statistics**

SWD-FLOOD CONTROL SIMULATION PROCESS: PER TIME STEP

1. Forecasted Inflows & Locals
2. Mandatory Releases, Surcharge
3. Regulation Discharge at Control Points
4. Empty Space Allocation
5. Flood Control Release
6. Release Routing

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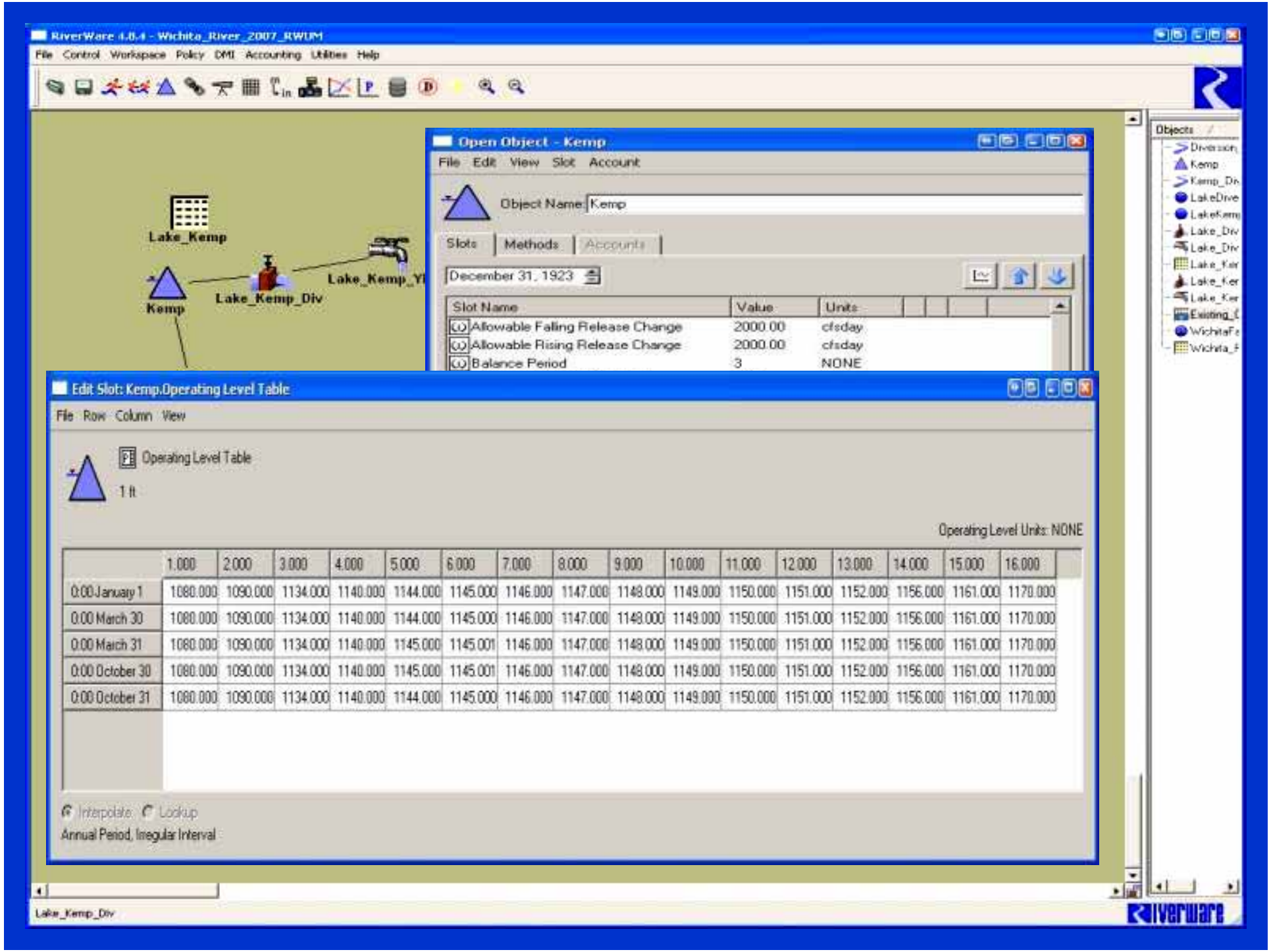

RiverWare 4.0.4 - Wichita_River_2007_RWUM
File Control Workspace Policy DMI Accounting Utilities Help
Lake_Kemp
Kemp
Lake_Kemp_Div
Lake_Kemp_Yi
Open Object - Kemp
File Edit View Slot Account
Object Name: Kemp
Slots Methods Accounts
December 31, 1923
Slot Name Value Units
Allowable Falling Release Change 2000.00 cfsday
Allowable Rising Release Change 2000.00 cfsday
Balance Period 3 NONE
Edit Slot: Kemp.Operating Level Table
File Row Column View
Operating Level Table
1 ft
Operating Level Units: NONE
1.000 2.000 3.000 4.000 5.000 6.000 7.000 8.000 9.000 10.000 11.000 12.000 13.000 14.000 15.000 16.000
0:00 January 1 1080.000 1090.000 1134.000 1140.000 1144.000 1145.000 1146.000 1147.000 1148.000 1149.000 1150.000 1151.000 1152.000 1156.000 1161.000 1170.000
0:00 March 30 1080.000 1090.000 1134.000 1140.000 1144.000 1145.000 1146.000 1147.000 1148.000 1149.000 1150.000 1151.000 1152.000 1156.000 1161.000 1170.000
0:00 March 31 1080.000 1090.000 1134.000 1140.000 1145.000 1145.001 1146.000 1147.000 1148.000 1149.000 1150.000 1151.000 1152.000 1156.000 1161.000 1170.000
0:00 October 30 1080.000 1090.000 1134.000 1140.000 1145.000 1145.001 1146.000 1147.000 1148.000 1149.000 1150.000 1151.000 1152.000 1156.000 1161.000 1170.000
0:00 October 31 1080.000 1090.000 1134.000 1140.000 1144.000 1145.000 1146.000 1147.000 1148.000 1149.000 1150.000 1151.000 1152.000 1156.000 1161.000 1170.000
Interpolate Lookup
Annual Period, Irregular Interval
Objects
Lake_Kemp_Div
Riverware

POOL YIELD:

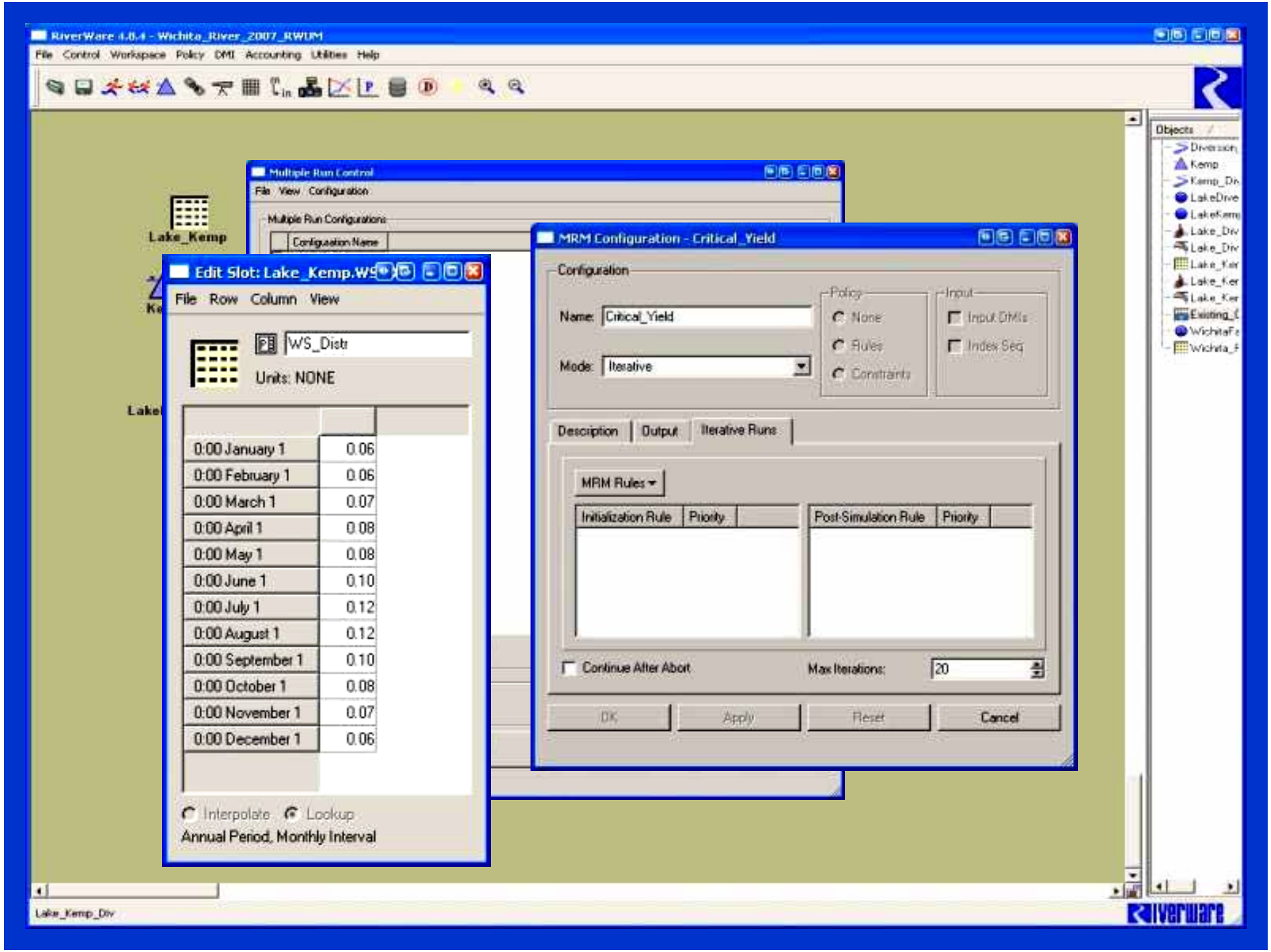
The Dependable Yield that Results in the Depletion of the Conservation Storage During Period of Record Drought

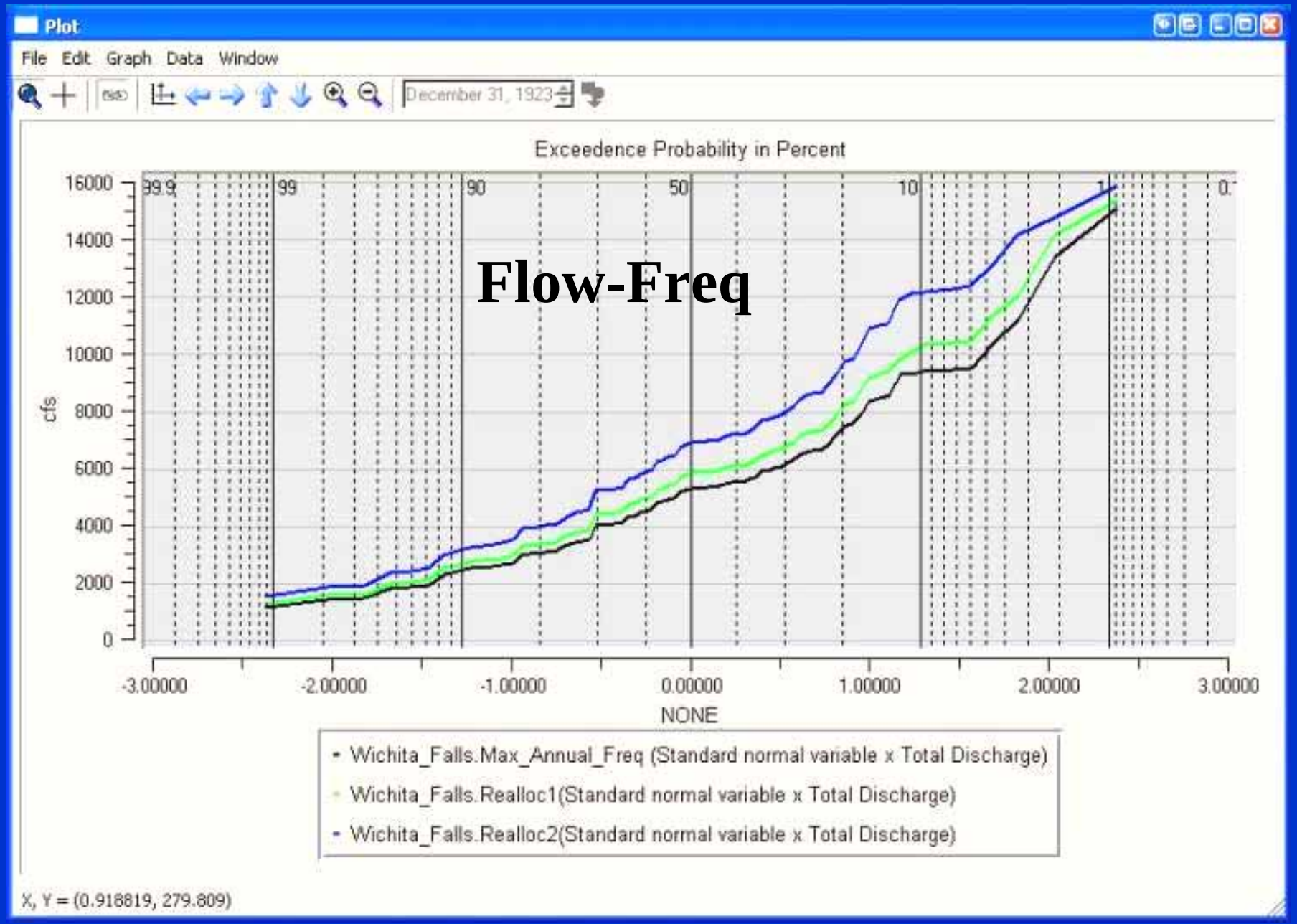
“Critical Dependable Yield”

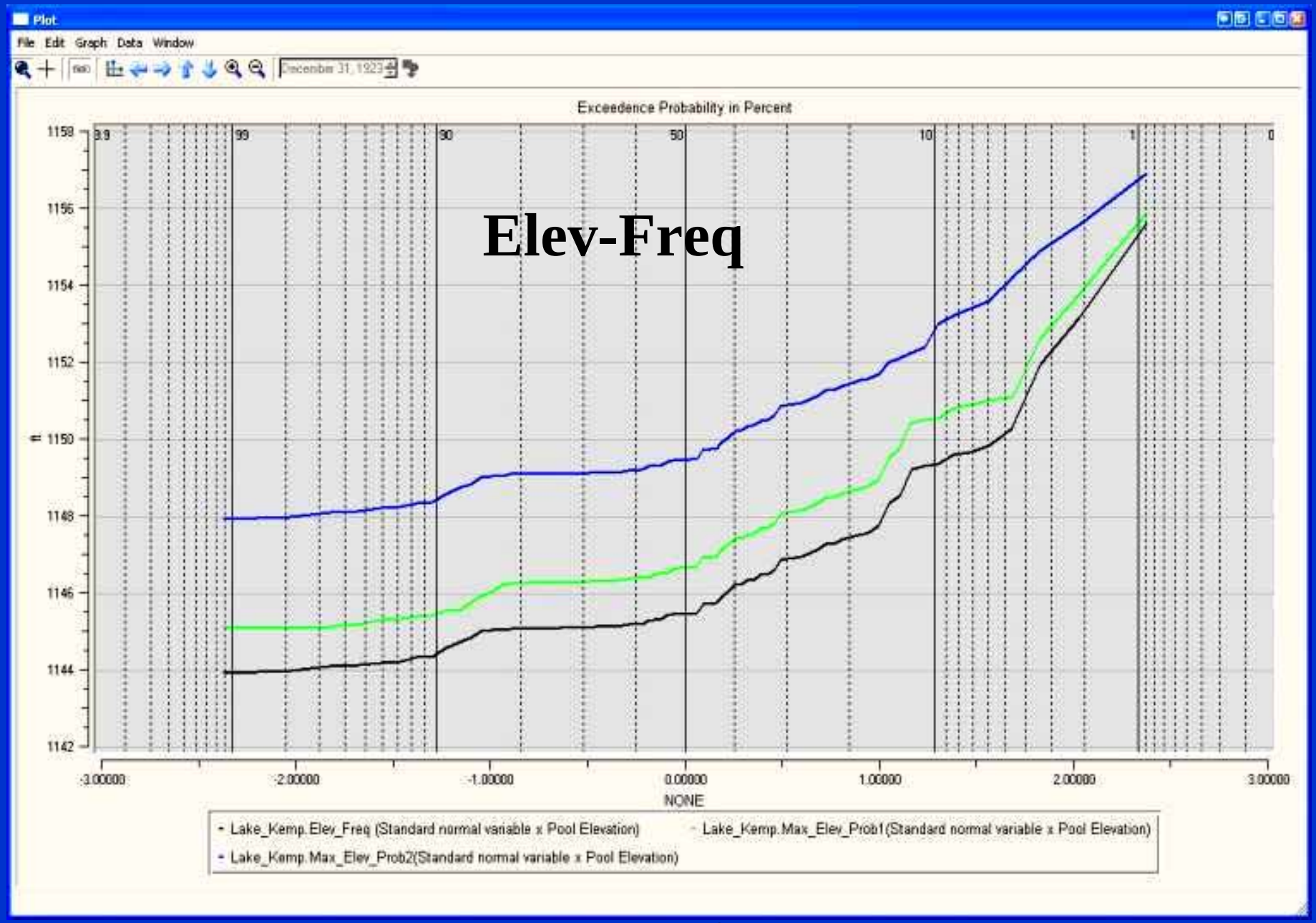
Future Sediment Conditions

MRM
CRITICAL DEPENDABLE YIELD:

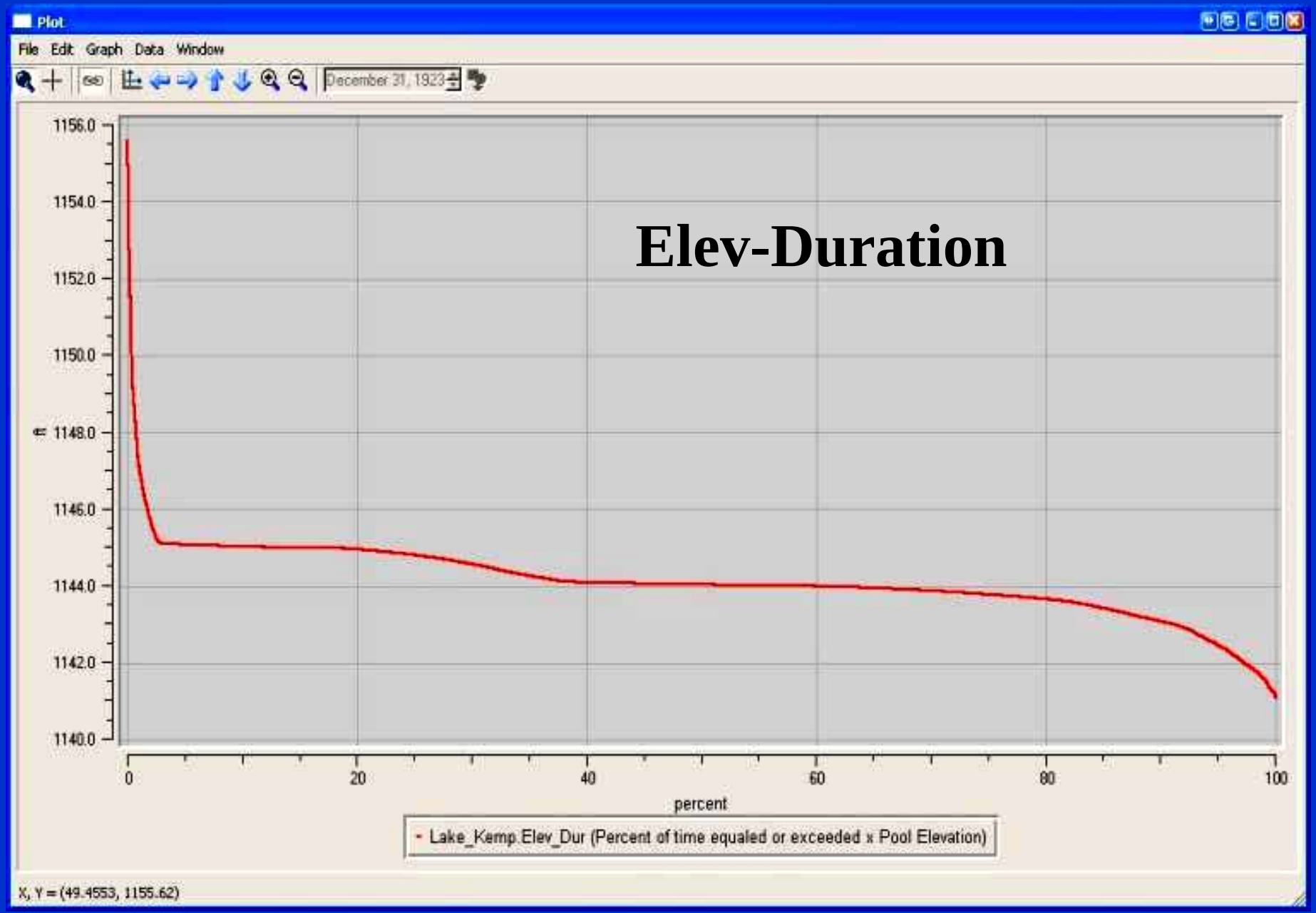
1) **Initialize Rules**
2) **Model Run**
3) **Post Simulation Rule**
4) **Max Iteration Check**
5) **Convergence Rule Check**

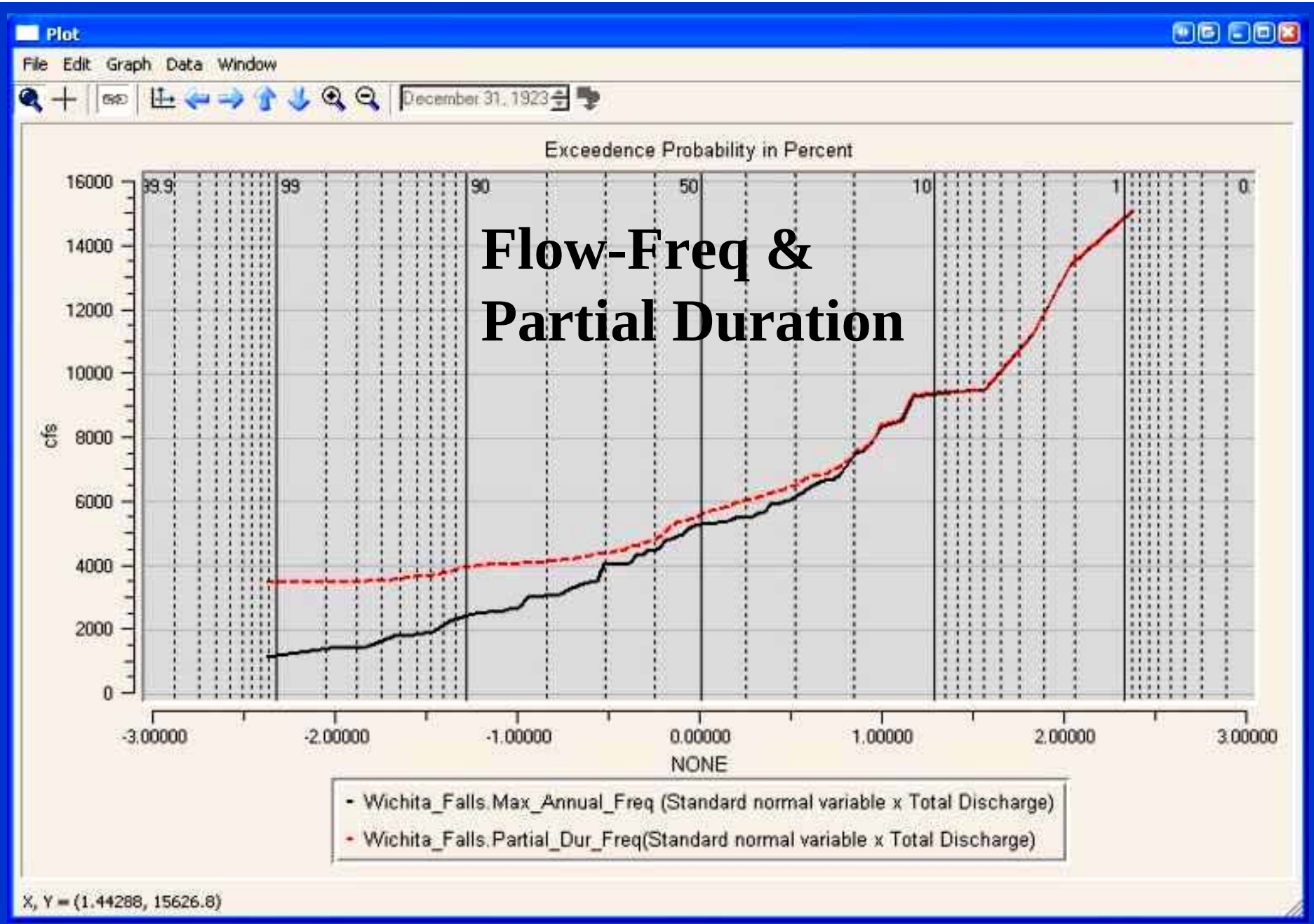

RiverWare 4.0.4 - Wichita_River_2007_RWUM
File Control Workspace Policy DMI Accounting Utilities Help
Lake_Kemp
Multiple Run Control
File View Configuration
Multiple Run Configurations
Configuration Name
Edit Slot: Lake_Kemp.WS
File Row Column View
WS_Distr
Units: NONE
0:00 January 1 0.06
0:00 February 1 0.06
0:00 March 1 0.07
0:00 April 1 0.08
0:00 May 1 0.08
0:00 June 1 0.10
0:00 July 1 0.12
0:00 August 1 0.12
0:00 September 1 0.10
0:00 October 1 0.08
0:00 November 1 0.07
0:00 December 1 0.06
Interpolate Lookup
Annual Period, Monthly Interval
MRM Configuration - Critical_Yield
Configuration
Name: Critical_Yield
Mode: Iterative
Policy
None
Rules
Constraints
Input
Input DMIs
Index Seq
Description Output Iterative Runs
MRM Rules
Initialization Rule Priority
Post-Simulation Rule Priority
Continue After Abort
Max Iterations: 20
OK Apply Reset Cancel
Objects
Lake_Kemp_Div
Riverware


Plot
File Edit Graph Data Window
December 31, 1923
Exceedence Probability in Percent
99.9
99
90
50
10
16000
14000
12000
10000
8000
6000
4000
2000
0
cfs
-3.00000
-2.00000
-1.00000
0.00000
1.00000
2.00000
3.00000
NONE
Flow-Freq
Wichita_Falls.Max_Annual_Freq (Standard normal variable x Total Discharge)
Wichita_Falls.Realloc1(Standard normal variable x Total Discharge)
Wichita_Falls.Realloc2(Standard normal variable x Total Discharge)
X, Y = (0.918819, 279.809)


Plot
File Edit Graph Data Window
December 31, 1923
Exceedence Probability in Percent
99.9
99
90
50
10
1
0
Elev-Freq
1158
1156
1154
1152
1150
1148
1146
1144
1142
ft
-3.00000
-2.00000
-1.00000
0.00000
1.00000
2.00000
3.00000
NONE
Lake_Kemp.Elev_Freq (Standard normal variable x Pool Elevation)
Lake_Kemp.Max_Elev_Prob1(Standard normal variable x Pool Elevation)
Lake_Kemp.Max_Elev_Prob2(Standard normal variable x Pool Elevation)


Plot
File Edit Graph Data Window
December 31, 1923
Exceedence Probability in Percent
99.9
99
90
50
10
1
0
1146.0
1145.0
1144.0
1143.0
1142.0
1141.0
ft
-3.00000
-2.00000
-1.00000
0.00000
1.00000
2.00000
3.00000
NONE
Minimum Elev-Freq
Lake_Kemp.Min_Elev (Standard normal variable x Pool Elevation)
Lake_Kemp.Min_Elev_Freq1(Standard normal variable x Pool Elevation)
X, Y = (-1.9889, 1145.91)


Plot
File Edit Graph Data Window
December 31, 1923
Elev-Duration
1156.0
1154.0
1152.0
1150.0
1148.0
1146.0
1144.0
1142.0
1140.0
ft
0
20
40
60
80
100
percent
Lake_Kemp.Elev_Dur (Percent of time equaled or exceeded x Pool Elevation)
X, Y = (49.4553, 1155.62)


Plot
File Edit Graph Data Window
December 31, 1923
Exceedence Probability in Percent
99.9
99
90
50
10
1
0
16000
14000
12000
10000
8000
6000
4000
2000
0
cfs
-3.00000
-2.00000
-1.00000
0.00000
1.00000
2.00000
3.00000
NONE
Flow-Freq &
Partial Duration
Wichita_Falls.Max_Annual_Freq (Standard normal variable x Total Discharge)
Wichita_Falls.Partial_Dur_Freq(Standard normal variable x Total Discharge)
X, Y = (1.44288, 15626.8)

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Questions?