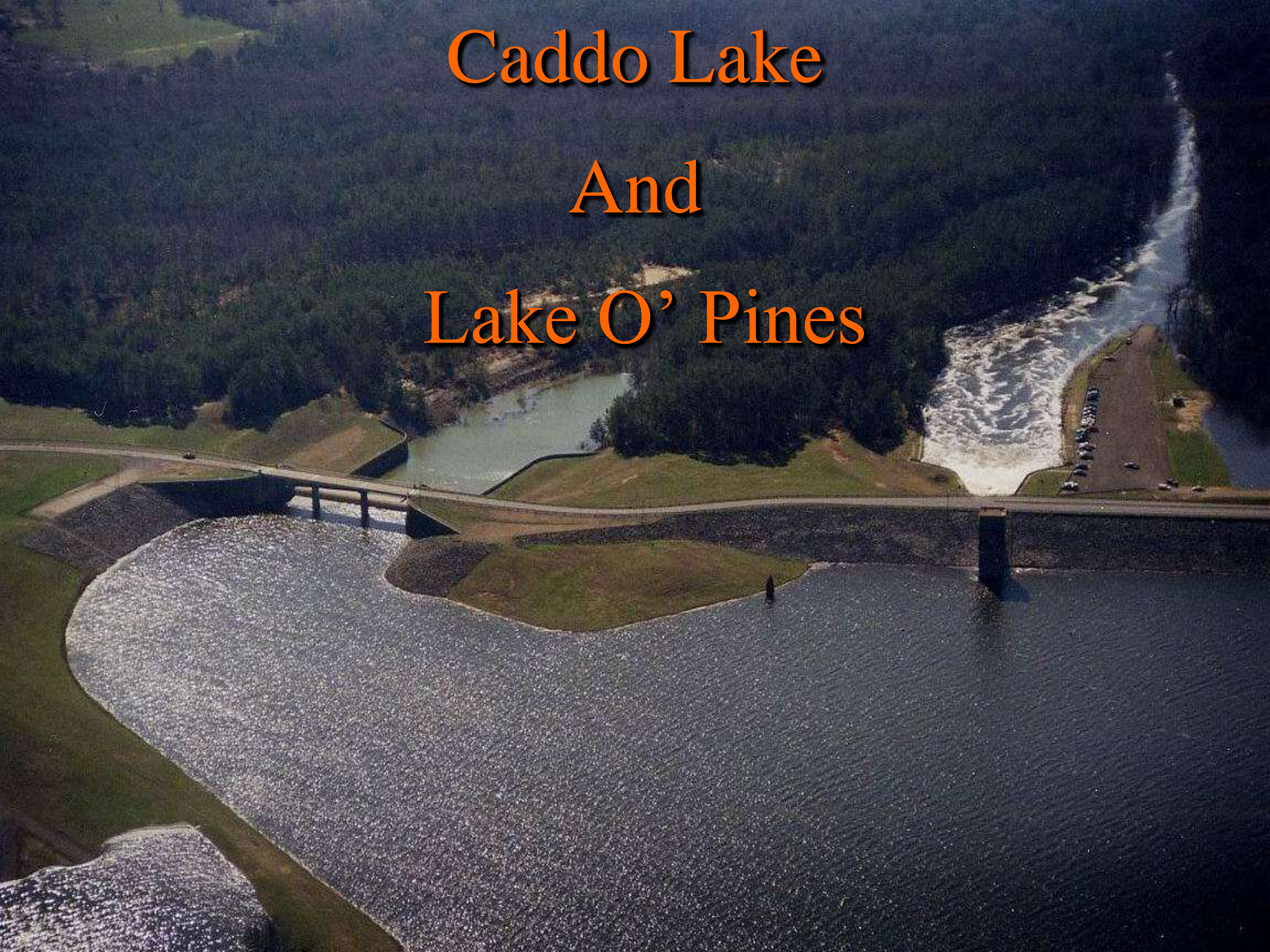


Caddo Lake And Lake O' Pines





Lake Caddo

- **Project History**
 - **Original Dam 1914**
 - **Cypress Bayou Navigation Project**
 - **Reconstruction Began August 1968**
 - **Reconstruction Completed June 1971 (COE)**



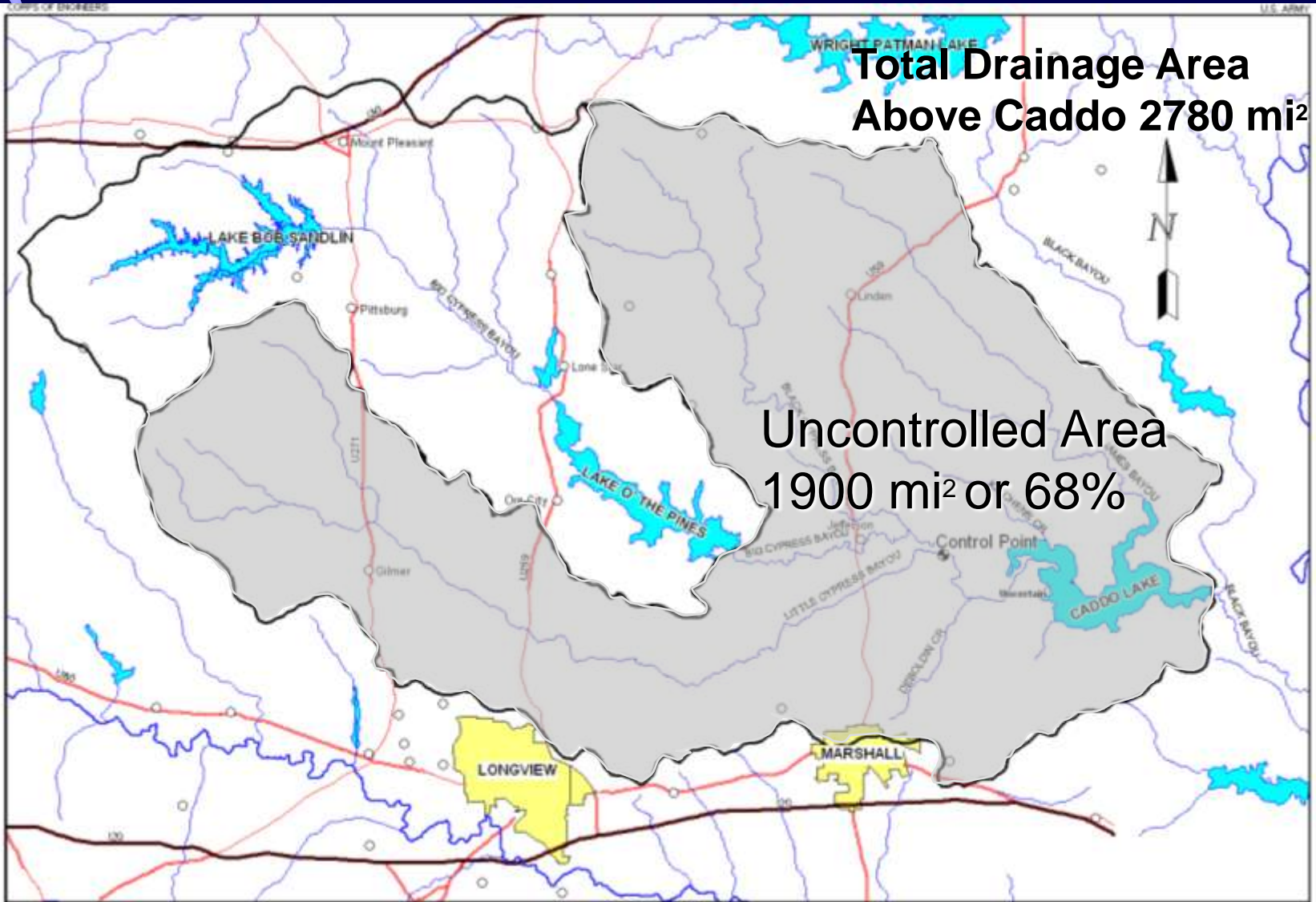
Lake Caddo

- **Project Specific Physical Data**
 - **2780 mi² of Drainage Area Above Lake Caddo**
 - **1900 mi² Uncontrolled Area (68 %)**
 - **880 mi² Controlled By Lake O' Pines (32%)**
 - **2400 Spillway @ 168.5 (860 ft) and 170.5 (1540 ft)**

Cypress Bayou Basin

Total Drainage Area
Above Caddo 2780 mi²

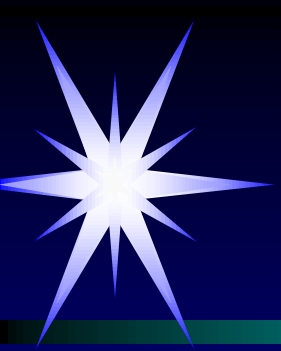
Uncontrolled Area
1900 mi² or 68%



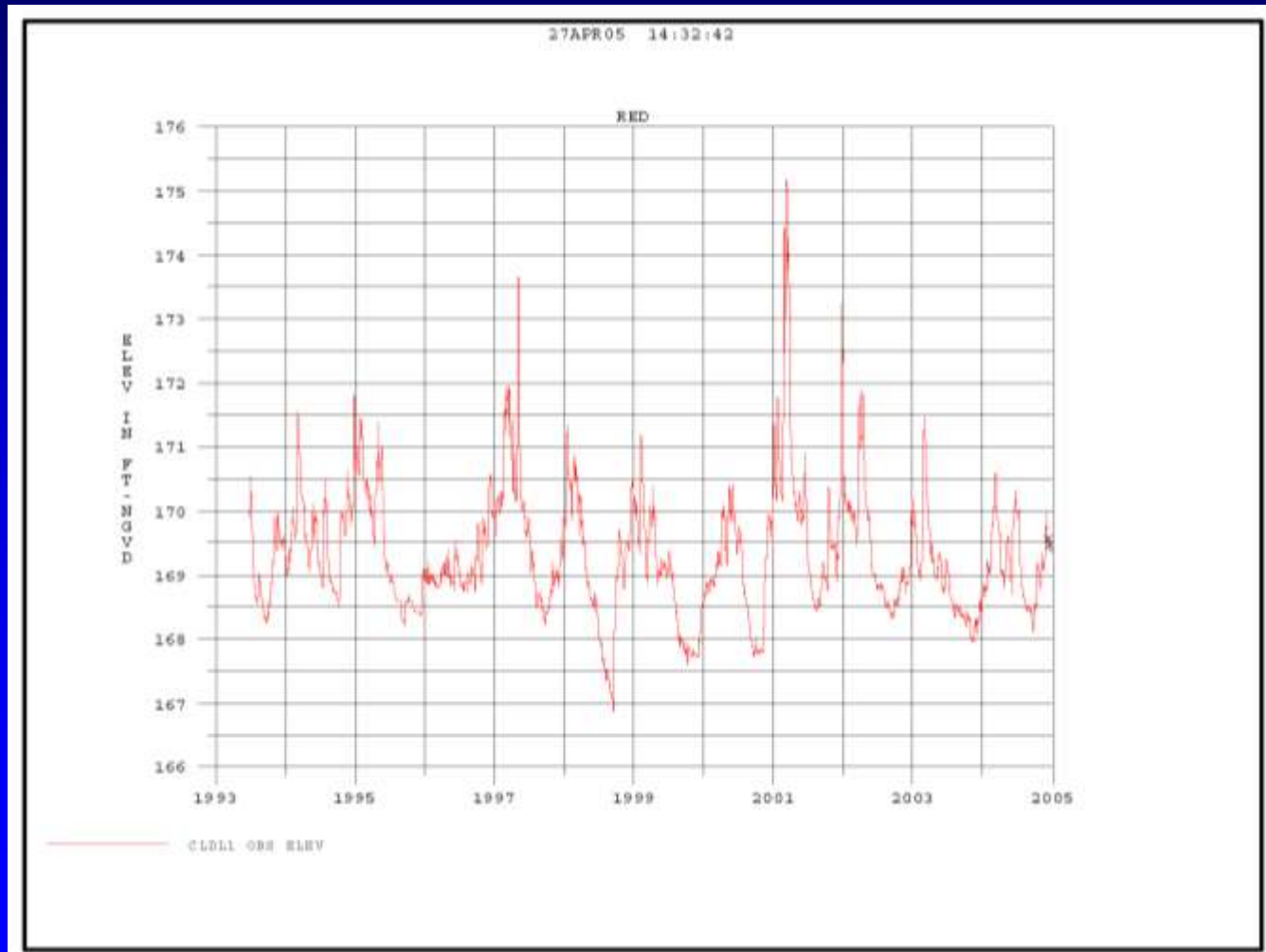


Lake Caddo

- **Operational or Regulation Plan**
 - **Uncontrolled Spillway (No Human Operations Required)**
 - **Planning Studies to Look at Modifying Lake Caddo Operation Characteristics**



Lake Caddo Elevations (1993-2004)

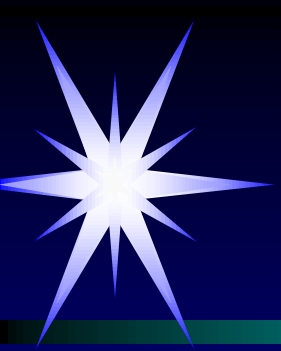




Lake Caddo

- **Historical Flood Data**

Flooding <u>Date</u>	Elevation <u>(ft – NGVD)</u>
May 1958	182.6
May 1966	180.2
March 2001	175.3
January 1988	176.7
April 1989	176.4

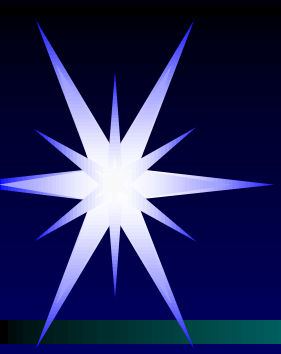


Lake Caddo Damages (2001)

- **Flooding of Homes & Businesses Around Lake Caddo**
 - **Costs Not Quantified**
- **Road Closures Due To High Water**
- **Overall Damage Cost Not Quantified**
 - **Need Available Data of Damage Costs**

Lake Caddo Damages (2001)



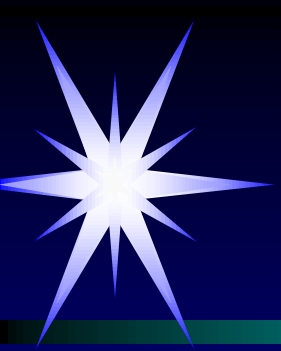


Lake Caddo Damages (2001)



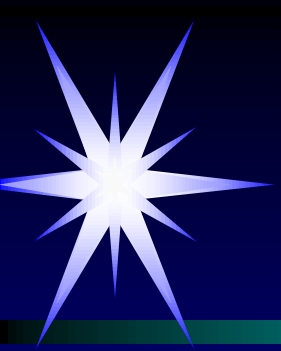
Lake Caddo Damages (2001)





Lake Caddo Damages (2001)





Lake Caddo Damages (2001)



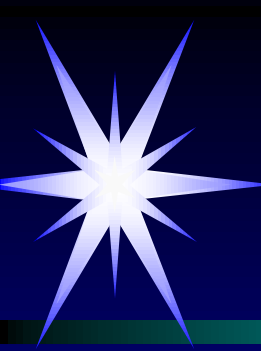


Lake Caddo

- **Exceedence Probability Data**

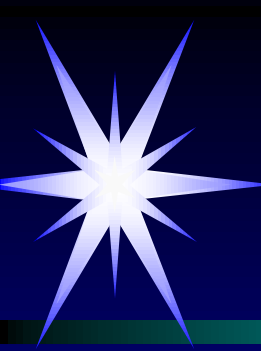
Exceedence <u>Probability</u>	Elevation <u>(ft – NGVD)</u>
1 (100-year)	185.0
2 (50-year)	182.7
4 (25-year)	179.3
10 (10-year)	175.5 (2001 – 175.3)
20 (5-year)	173.1

Source: Cypress Bayou Basin, Feasibility Report, February 1987



Lake O' The Pines

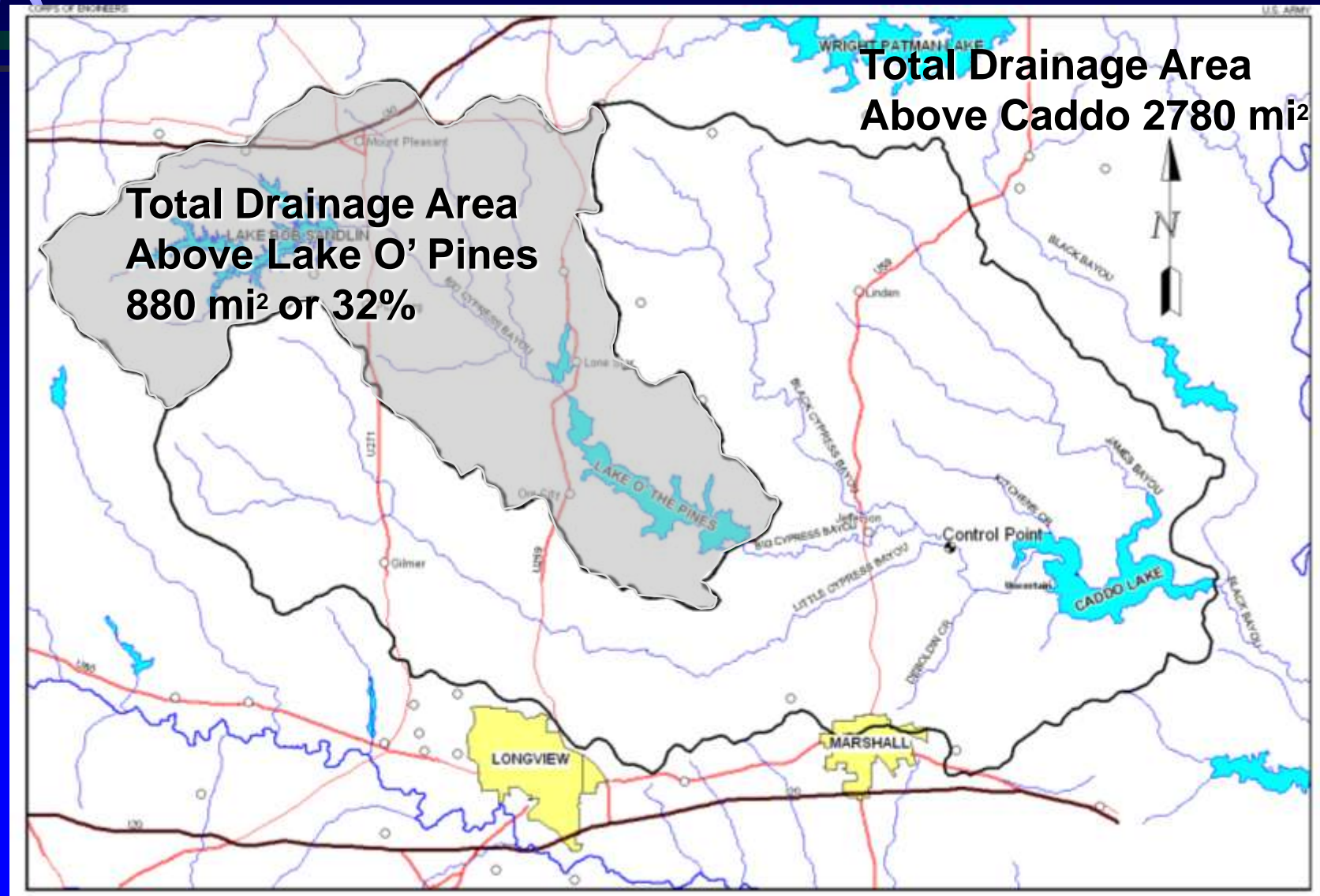
- **Project History**
 - **Construction Began January 1955**
 - **Impoundment Began August 1957**
- **Project Purpose**
 - **Flood Control (Flood Control Act of 1946)**
 - **Water Supply (Flood Control Act of 1936)**
 - **As Requested By NE TX Municipal Water Dist.**
 - **100% of Conservation Pool (201 – 228.5 ft NGVD
No Flood Storage This Zone)**

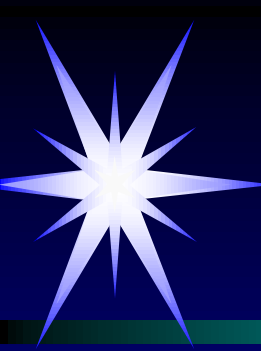


Lake O' The Pines

- **Project Specific Physical Data**
 - **880 mi² of Drainage Area Above Lake O' The Pines**
 - **32% Combined Lake O' Pines/Lake Caddo Area**
 - **200 ft Uncontrolled Spillway**
 - **Maximum Capacity 68,200 cfs**
 - **Outlet Works 2 – 8 ft x 12.5 ft Gates**
 - **Maximum Controlled Release = 3000 cfs**
 - **Top of Conservation Pool 228.5 ft NGVD**
 - **Surface area 17,649 ac-ft**
 - **Top of Flood Control Pool 249.5 ft NGVD**

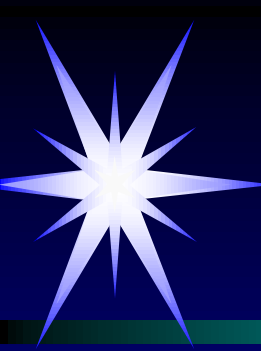
Cypress Bayou Basin





Lake O' The Pines

- **Real Estate**
 - **Federal Ownership to 236 ft NGVD (29,105 acres)**
 - **Federal Easements 236 – 254.5 ft NGVD (16,320 acres)**
 - **Damage to Structures Begin Around 242 ft NGVD**

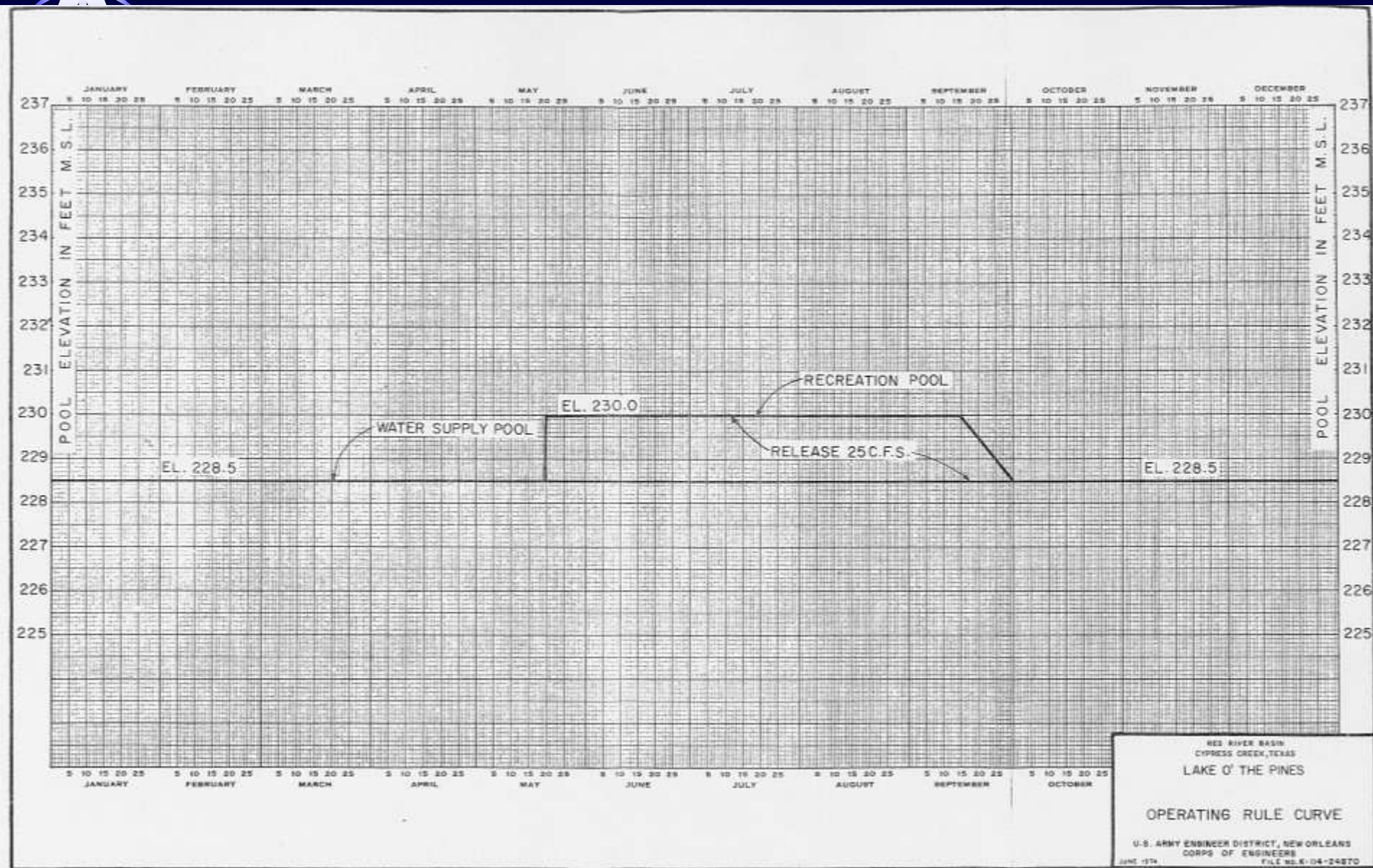


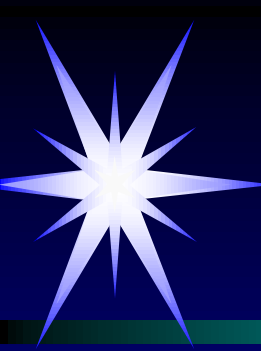
Lake O' The Pines

- **Operational or Regulation Plan**
 - **Guidelines**
 - Evacuate as quickly as possible to prepare for subsequent flooding events
 - Prevent uncontrolled spillway flows when possible
 - Control 3000 cfs except when Shreveport stage > 31 ft *
 - Total of gaged flows for Little, Black and Big Cypress Jefferson gages not to exceed 7000 cfs
 - **Rule Curve – 230.0 (May – Sept.), otherwise 228.5**

***Note: Structural and flooding factors limit releases to 3000 cfs even though outlet works are capable of releasing more.**

Pines Operating Rule Curve



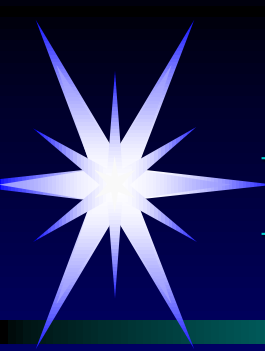


Lake O' The Pines

1 Day @ 200 cfs	equivalent volume	400 ac-ft
1 Day @ 500 cfs	equivalent volume	1000 ac-ft
1 Day @ 1000 cfs	equivalent volume	2000 ac-ft
1 Day @ 1800 cfs	equivalent volume	3600 ac-ft
1 Day @ 3000 cfs	equivalent volume	6000 ac-ft
1 Day @ 1800 cfs	equivalent volume	3600 ac-ft
1 Day @ 1000 cfs	equivalent volume	2000 ac-ft
1 Day @ 500 cfs	equivalent volume	1000 ac-ft
1 Day @ 200 cfs	equivalent volume	400 ac-ft


Total Volume

20000 ac-ft



Lake O' The Pines

- **Deviation Process**
 - **Deviation Required To Regulate Other Than to Adopted Plan of Regulation**
 - **SWF Requests Deviation To Plan**
 - **SWD Reviews & Approves or Denies**

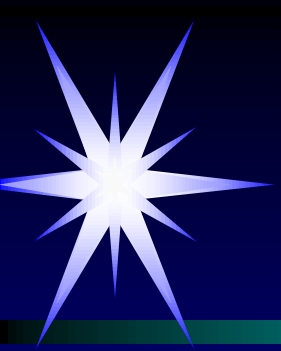


Lake O' Pines

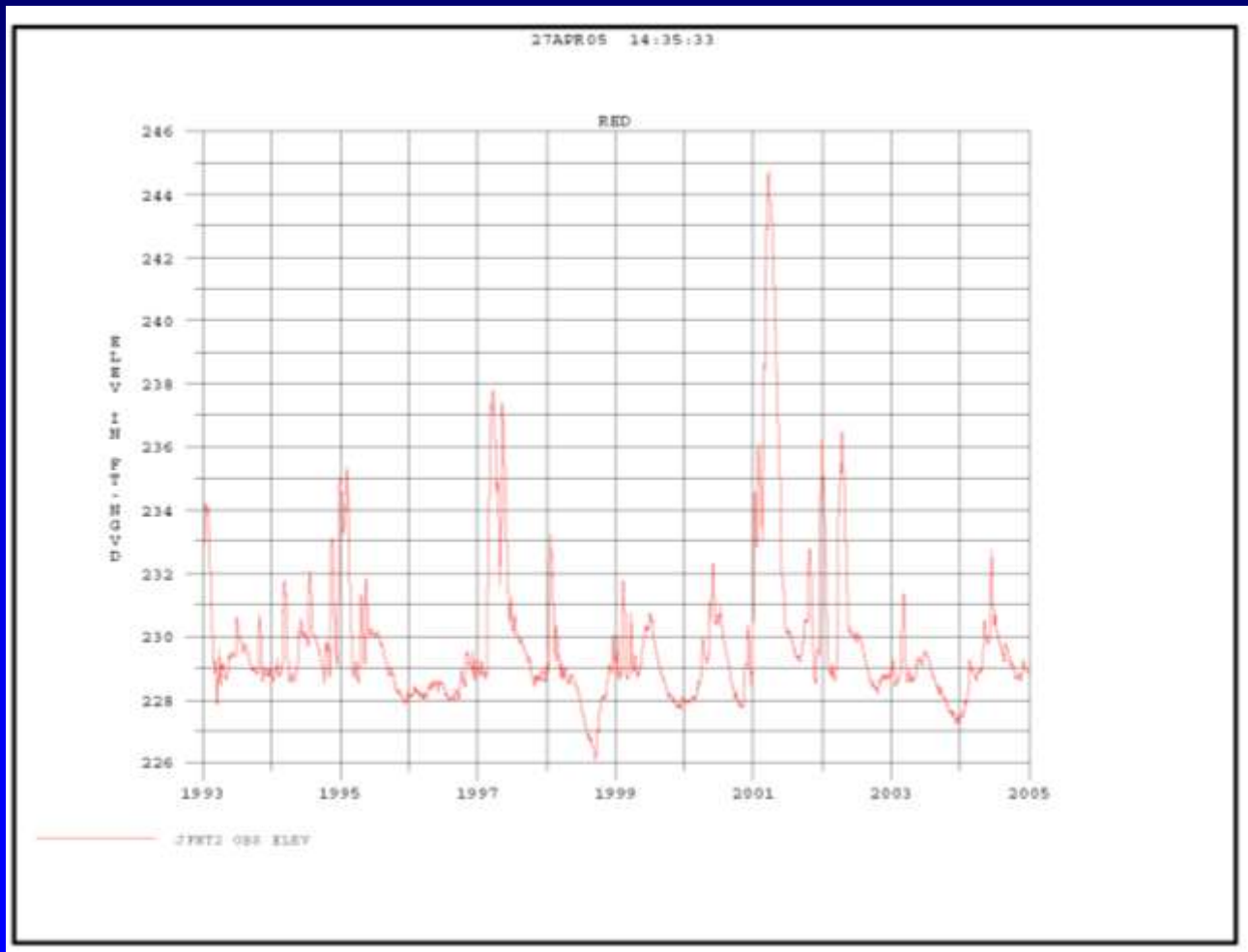
- **Historical Flood Data**


Flooding <u>Date</u>	Elevation <u>(ft – NGVD)</u>
May 1958	239.7*
May 1966	245.4
March 2001	244.7

* Deliberate impoundment began, August 1957 with a starting water surface elevation of 208.42. Maximum pool elevation of 246.5 would have resulted if the flood would have occurred on a normal pool level of 228.5.



Lake O' Pines Elevations (1993-2004)

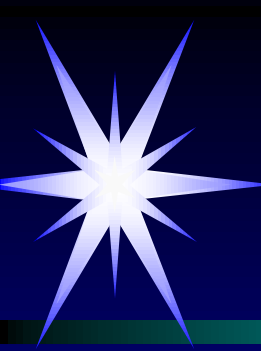




Lake O' Pines

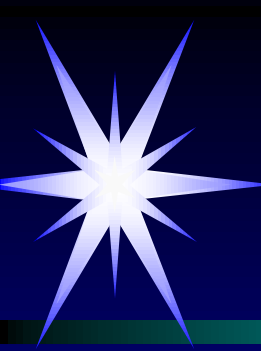
- **Exceedence Probability Data**

Exceedence <u>Probability</u>	Elevation <u>(ft – NGVD)</u>
1 (100-year)	253.5
2 (50-year)	249.5
10 (10-year)	239.3
20 (5-year)	235.4



Notable Historical Floods

- **December – March 2001**
 - **Maximum Precipitation 30”**
 - **Basin Average Precipitation 28”**
 - **Peak Inflow /Elevation of 25,000 cfs/244.7 ft NGVD**
- **23 April – 2 May 1966**
 - **Maximum Precipitation 24.5”**
 - **Basin Average Precipitation 17.5”**
 - **Peak Inflow/Elevation of 38,600 cfs/245.4 ft NGVD**
- **25 April – 4 May 1958**
 - **Maximum Precipitation 18.1”**
 - **Basin Average Precipitation 15.3”**
 - **Peak Inflow/Elevation of 69,200 cfs/239.7 (246.9) ft NGVD**

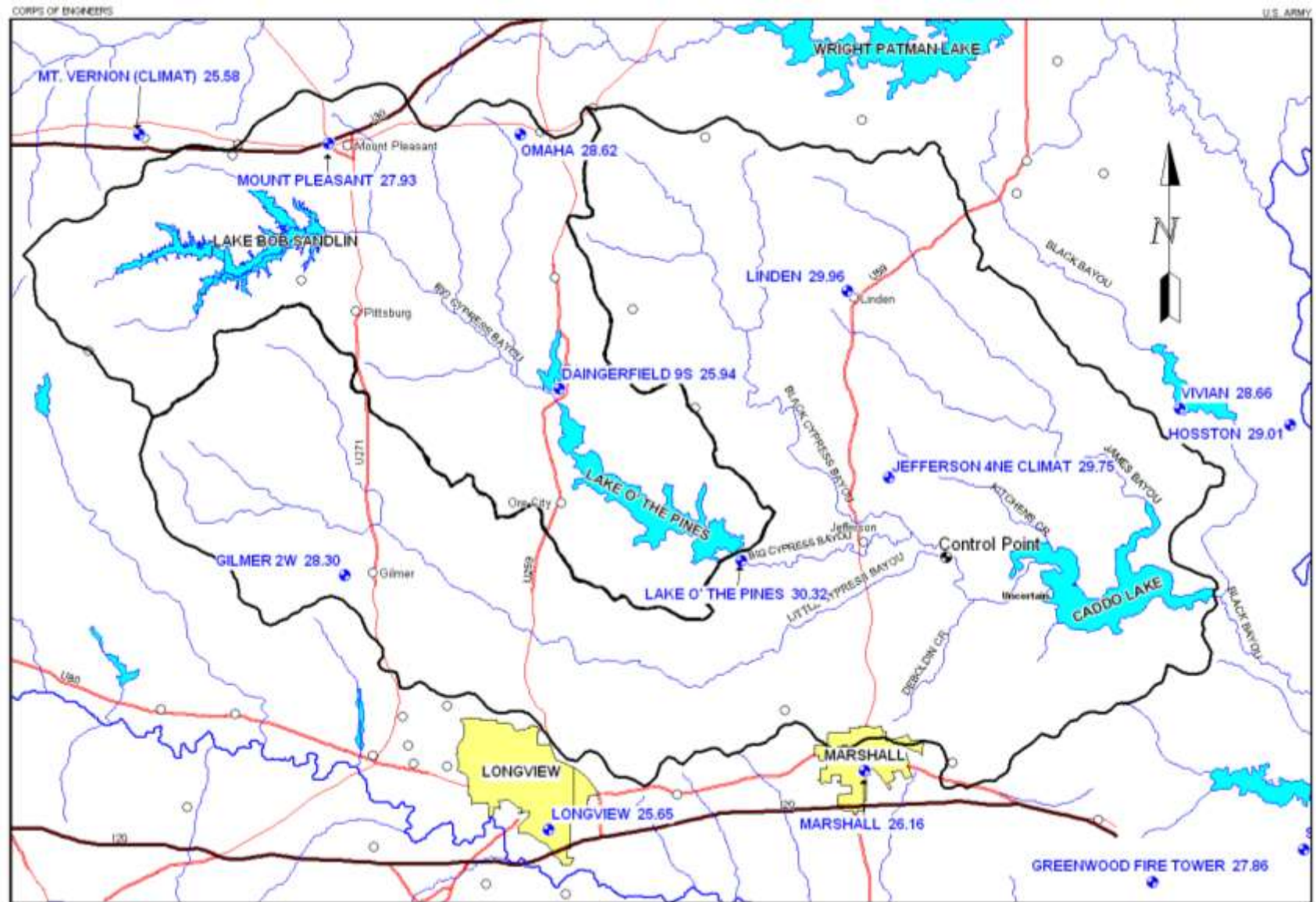


Lake Caddo & Lake O' Pines

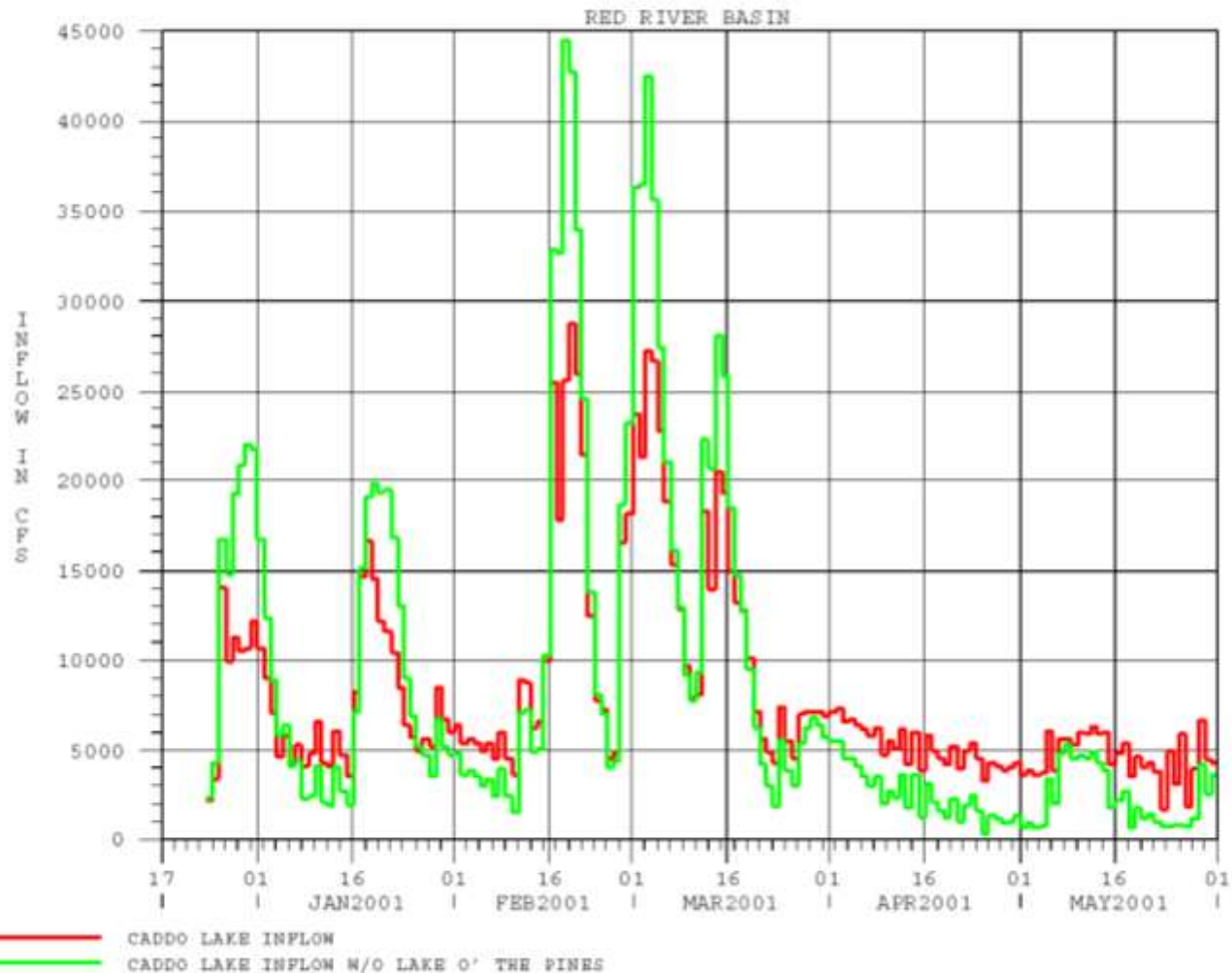
- **December – March 2001 Flood Event**
 - **Long Duration Event**
 - **Extremely High Rainfall Accumulations**
 - **Pines Basin Average 27.3”**
 - **Caddo Basin Average 28.3”**
 - **Continued Rainfall Prevented Evacuation**

Cypress Bayou Basin

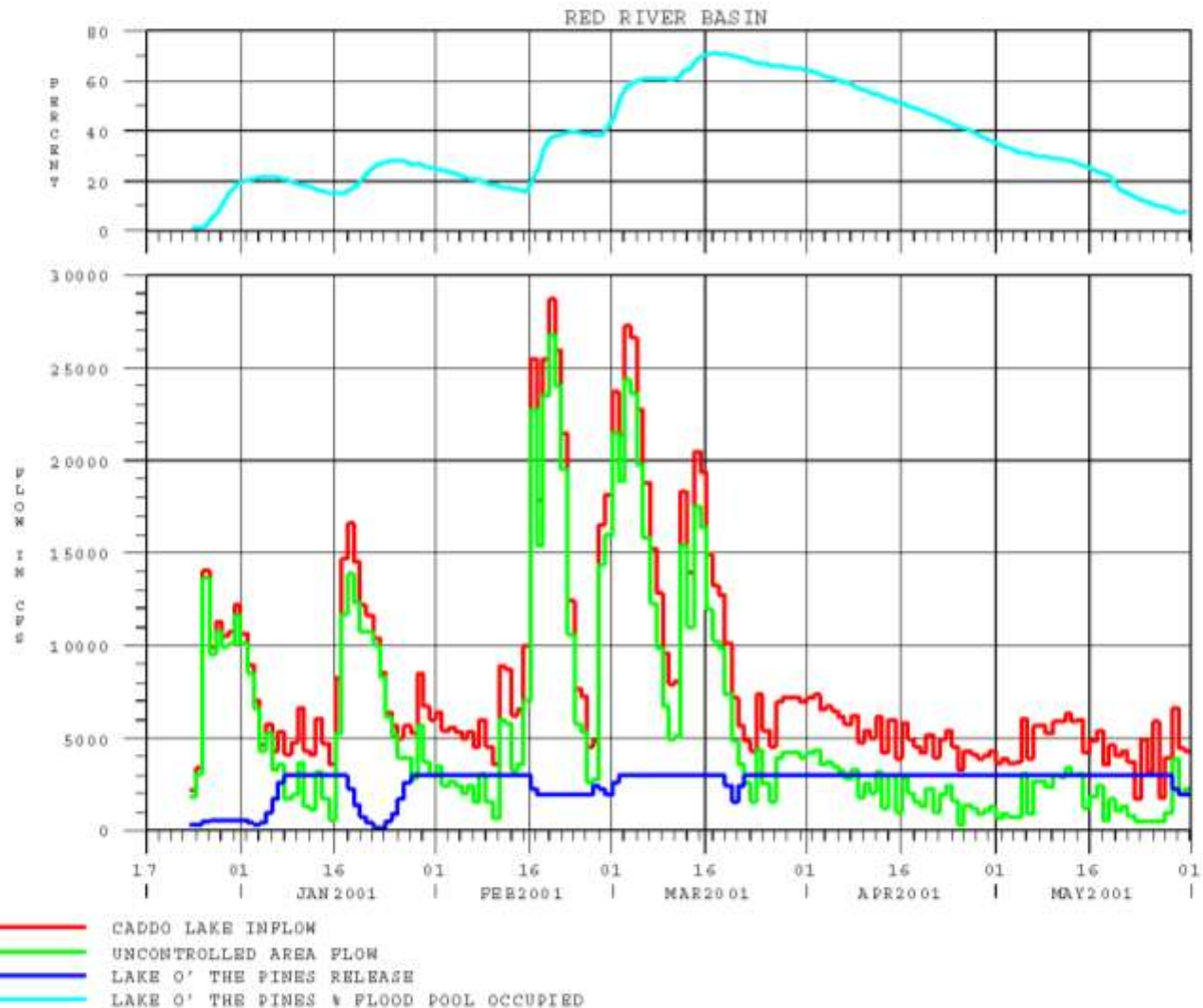
(December 2000 – March 2001 Rainfall)



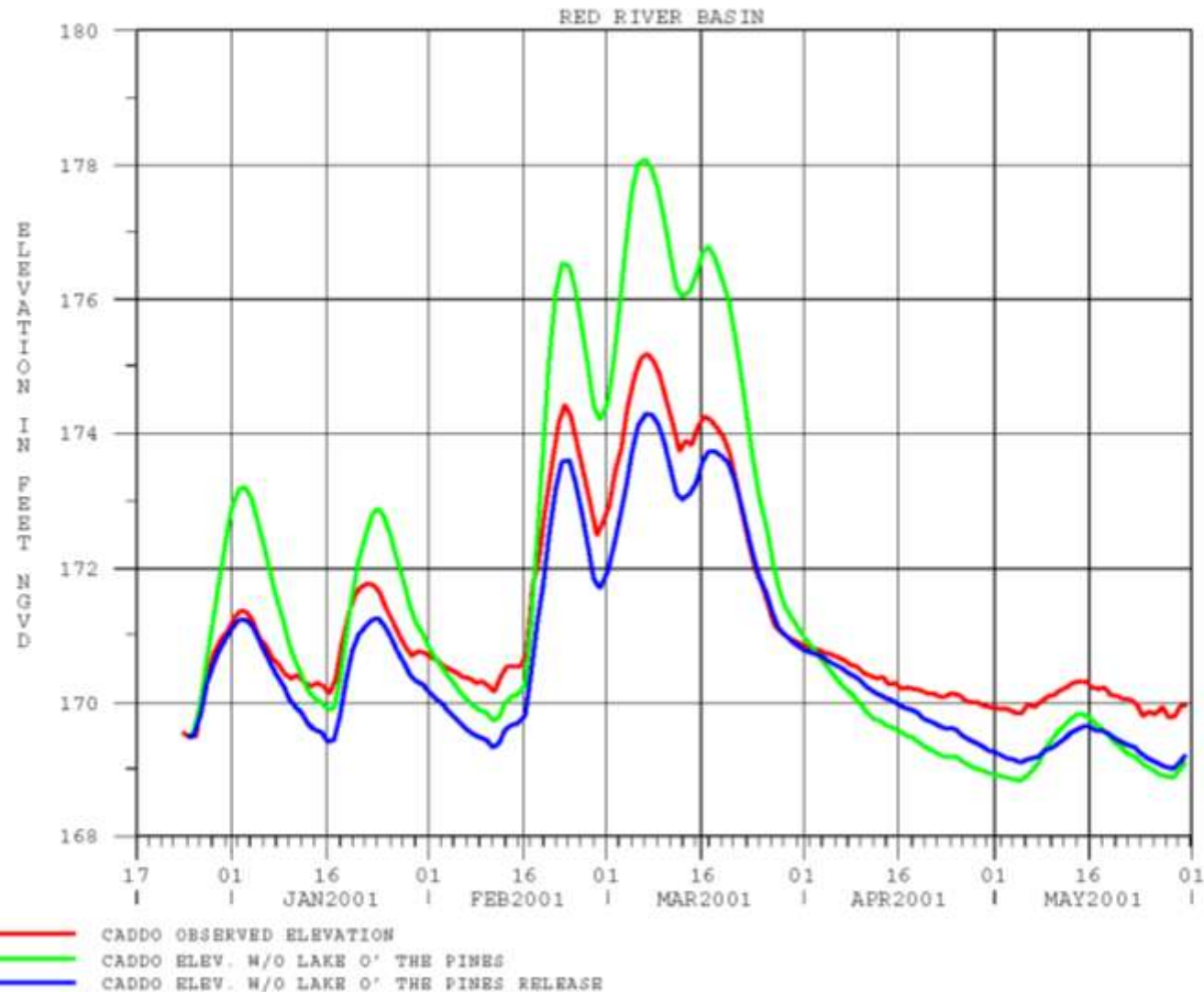
Lake Caddo Inflow



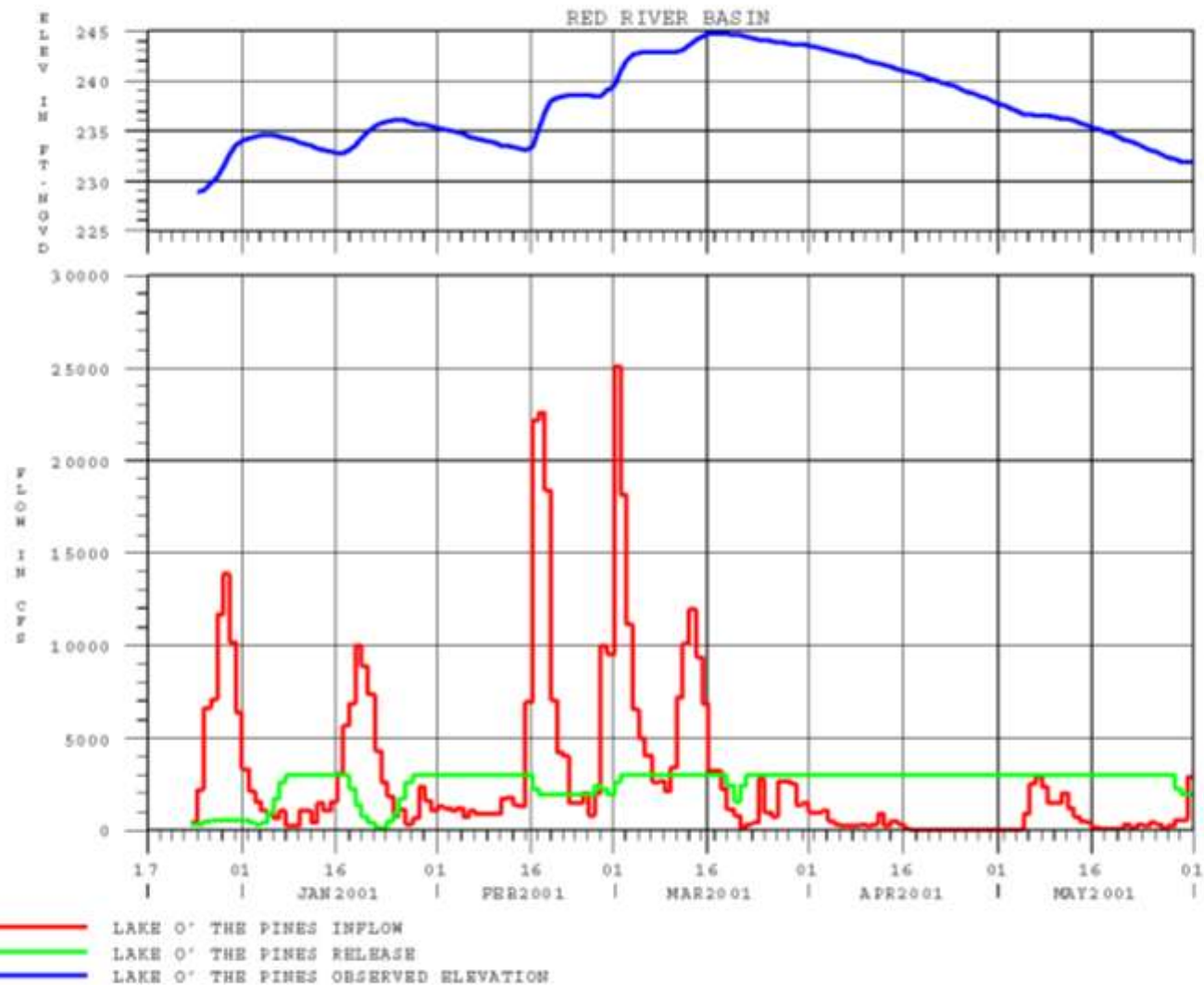
Caddo Inflow w/ Pines % Pool Occupied



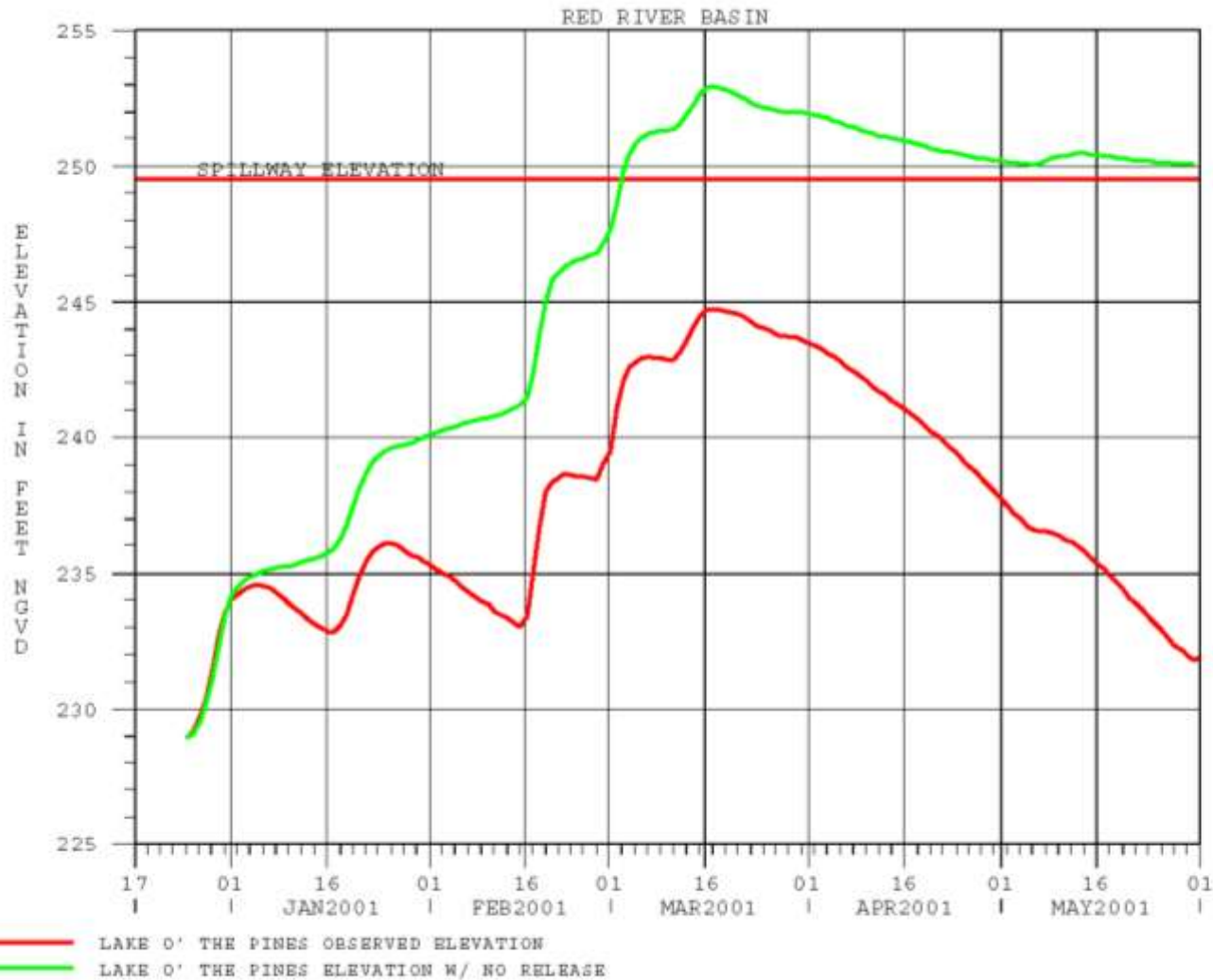
Lake Caddo Elevations

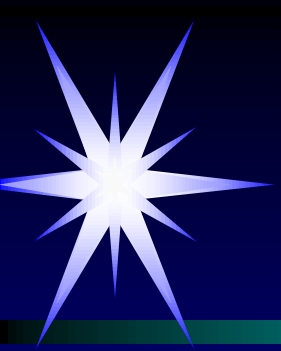


Lake O' Pines Inflow & Release



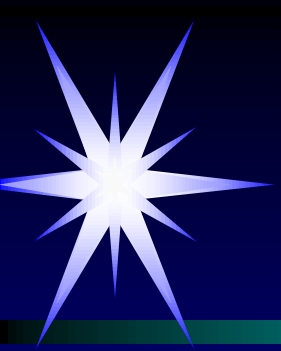
Lake O' Pines Elevations





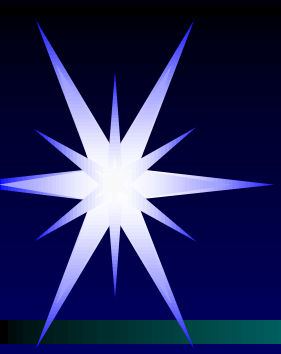
Lake O' Pines Damages (2001)

- **Flooding of Homes & Businesses Around Lake O' Pines**
 - **Costs Not Quantified**
- **Damage to Spillway Approach, Parks, Recreational & Other Government Facilities**
 - **\$1,155,000 (\$900,000 Spent to Date)**
- **Marinas**
 - **Costs Not Quantified**
- **Road Closures Due To High Water**
- **Overall Damage Costs Not Quantified**
- **Splitter wall failed below outlet works**



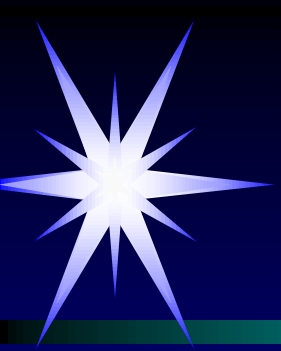
Lake O' Pines Damages (2001)





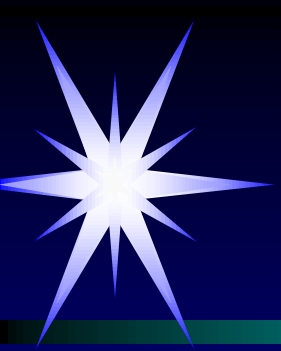
Lake O' Pines Damages (2001)





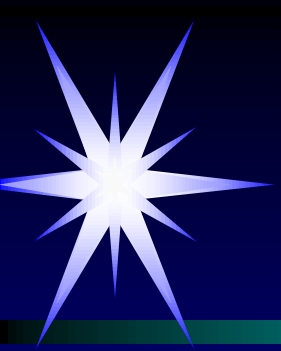
Lake O' Pines Damages (2001)





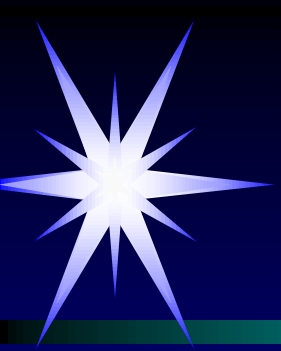
Lake O' Pines Damages (2001)





Lake O' Pines Damages (2001)





Lake O' Pines Erosion (2001)





Summary

- **Operational Plan for Lake O' Pines**
 - **Limit, Not Totally Prevent, Downstream Flooding**
 - **Minimize Uncontrolled Spillway Discharges**
 - **Ensure Safety of Dam**
- **Limited Flood Storage In Lake O' Pines**
- **Flood Water Must Be Quickly Evacuated**
- **Majority of Runoff into Lake Caddo is From the Uncontrolled Area (68 %)**
- **Historically Lake O' Pines Reduces Lake Caddo Elevations 3-5 ft**
- **The 2001 Flood Was a 10-year Event**

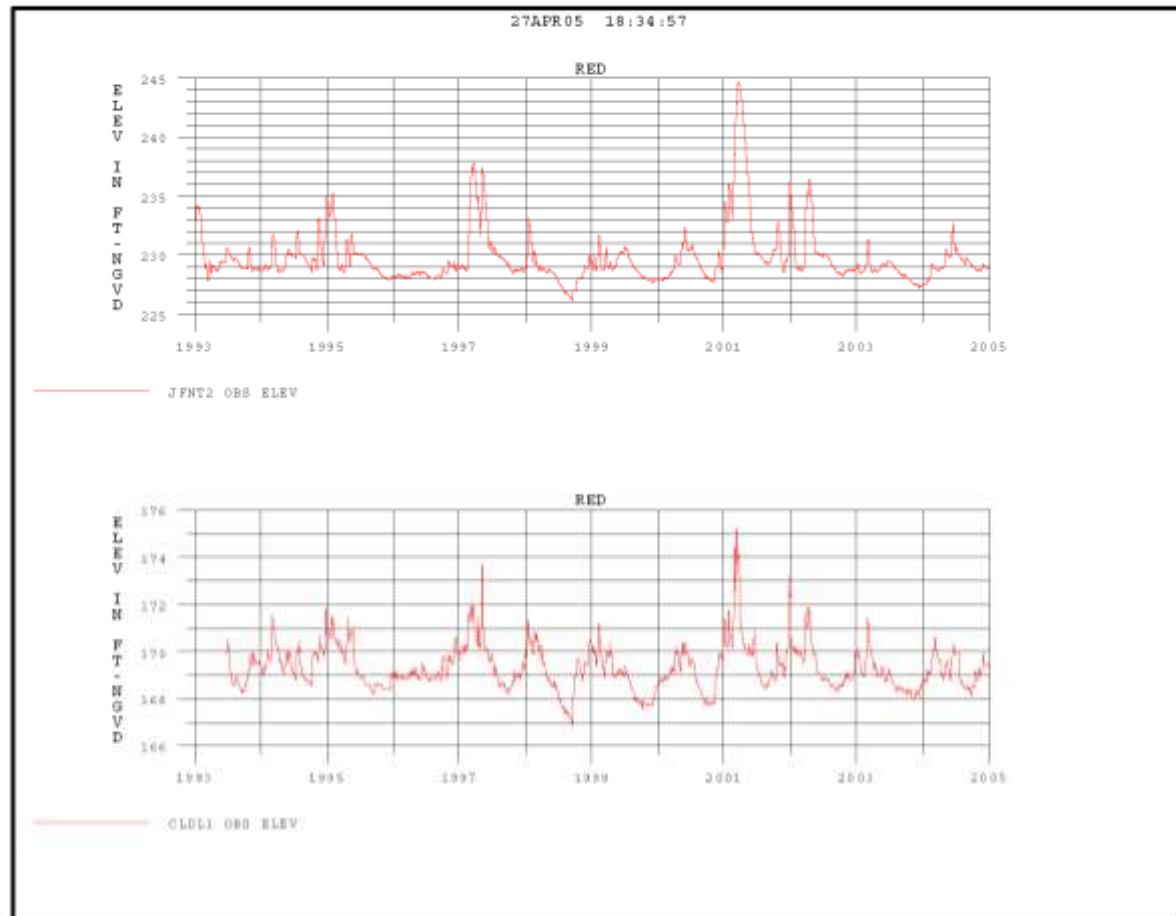


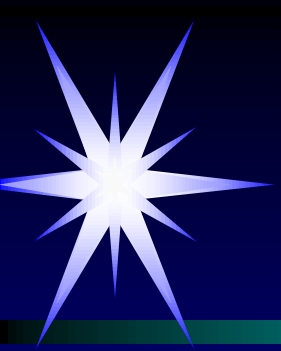
Lake Caddo

- **Recent Planning Studies For Lake Caddo**
 - **Reconnaissance Report, Cypress Valley Watershed, Texas, September 1995**
 - **Environmental Emphasis**
 - **Flood Reduction Options for Caddo Lake Included**
 - **More Efficient Spillway**
 - **Downstream Channelization of Twelvemile Bayou**
 - **No Local Sponsor Identified**

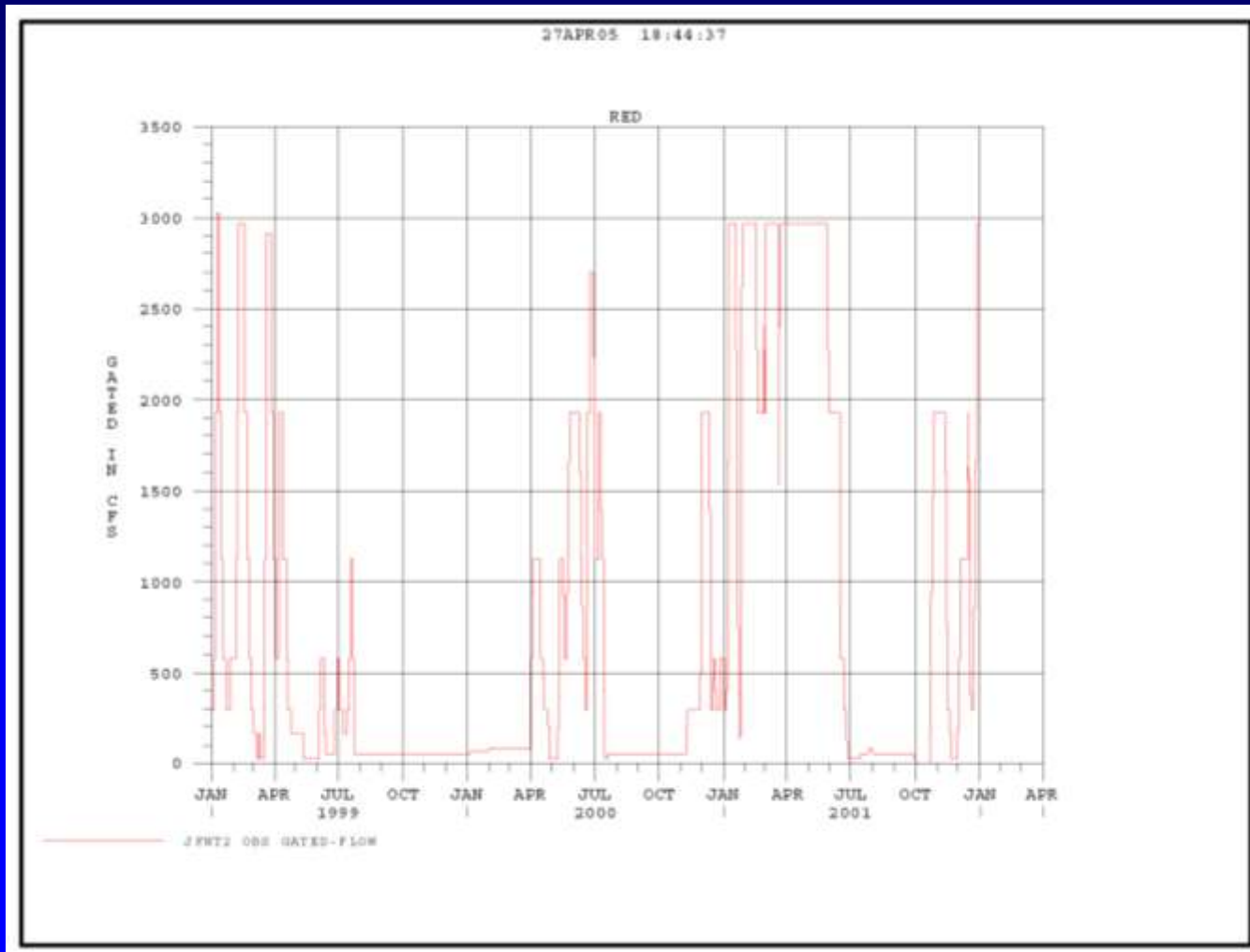


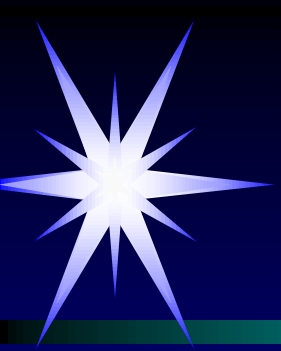
Lake O' Pines & Caddo Elevations (1993-2004)



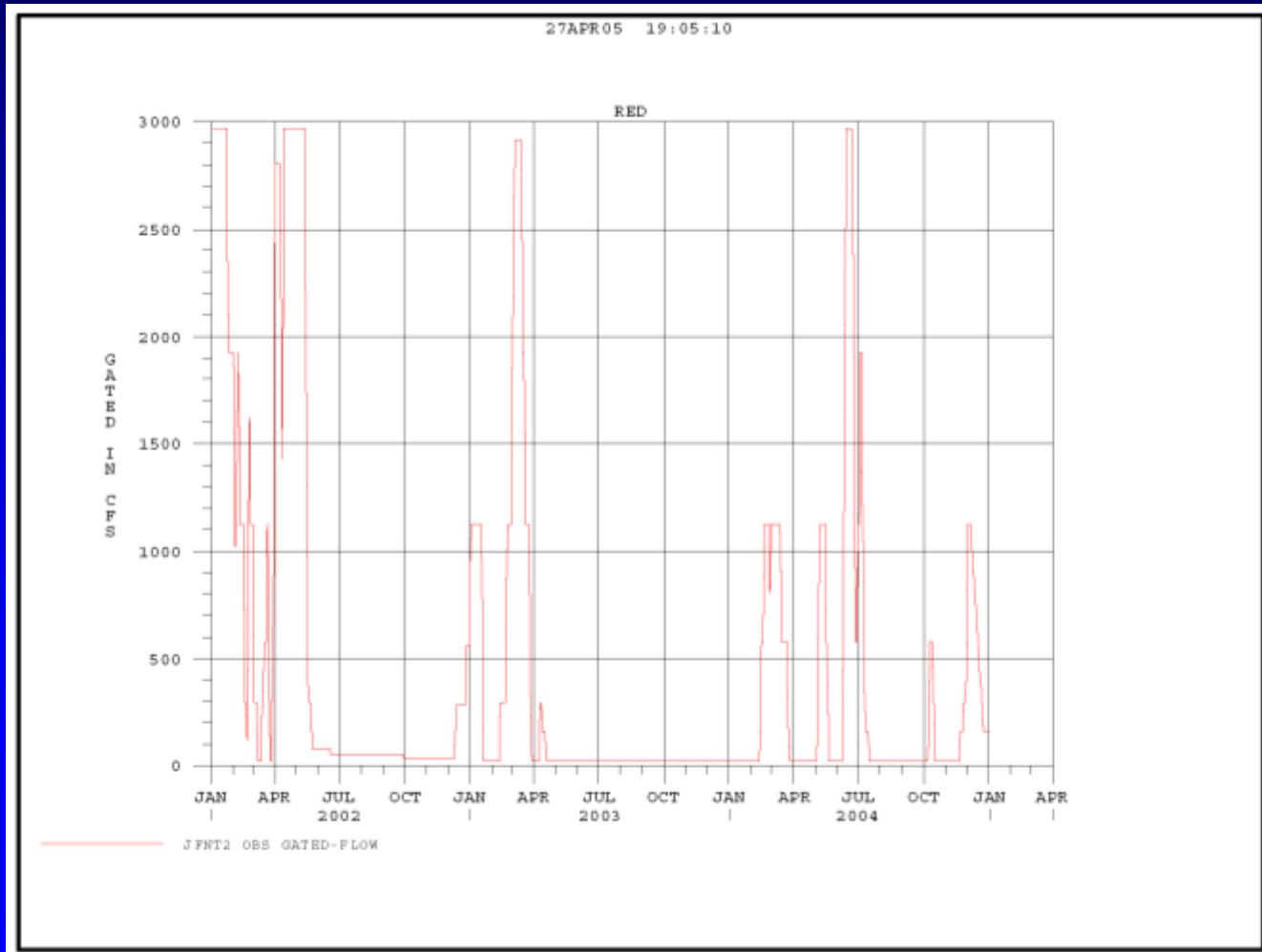


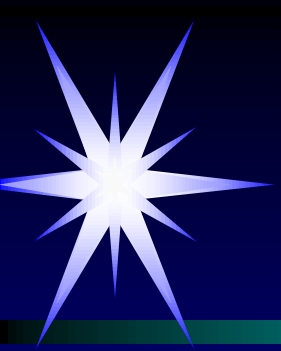
Lake O' Pines Outflows (1999-2001)





Lake O' Pines Outflows (2002-2004)





Questions?

