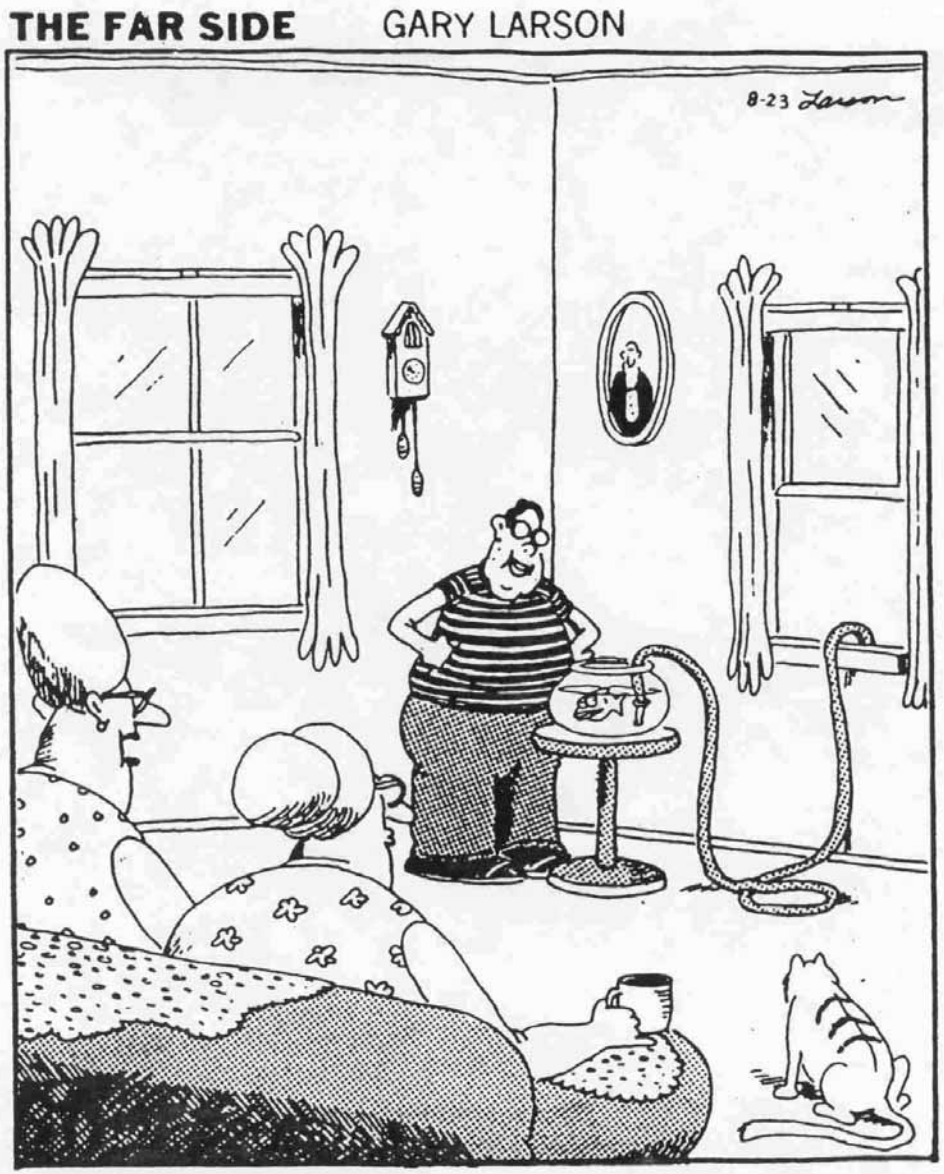
Reservoir Management and Drought in the Savannah River Basin

COL Edward Kertis

Commander, Savannah District

17 NOV 09

US Army Corps of Engineers
BUILDING STRONG®



"Oh, there goes Lenny again—draining off the goldfish bowl. . . . He wants to one day work for the Army Corps of Engineers, you know."

The Birth of the Army and Origin of the Corps

Bunker Hill

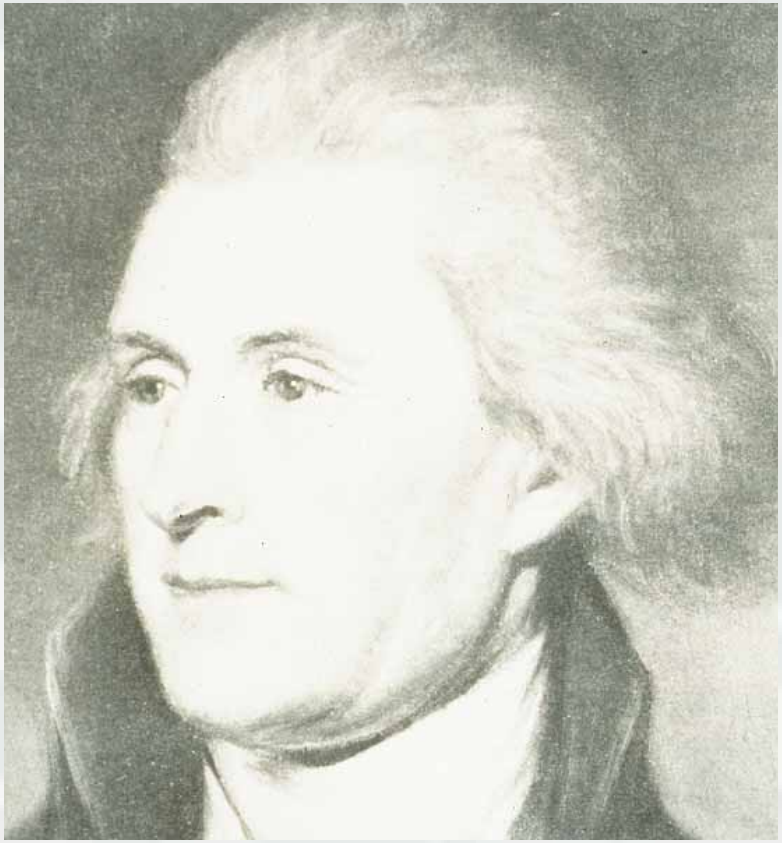
- 14 June 1775 Congress authorizes an Army

- 16 June 1775 Provision for Chief Engineer and two assistants

- 1779 - “engineers in the service of the United States shall be **formed into a corps and styled the 'Corps of Engineers**‘ (1783- mustered out)

Yorktown

Visionary Leadership & Engineering



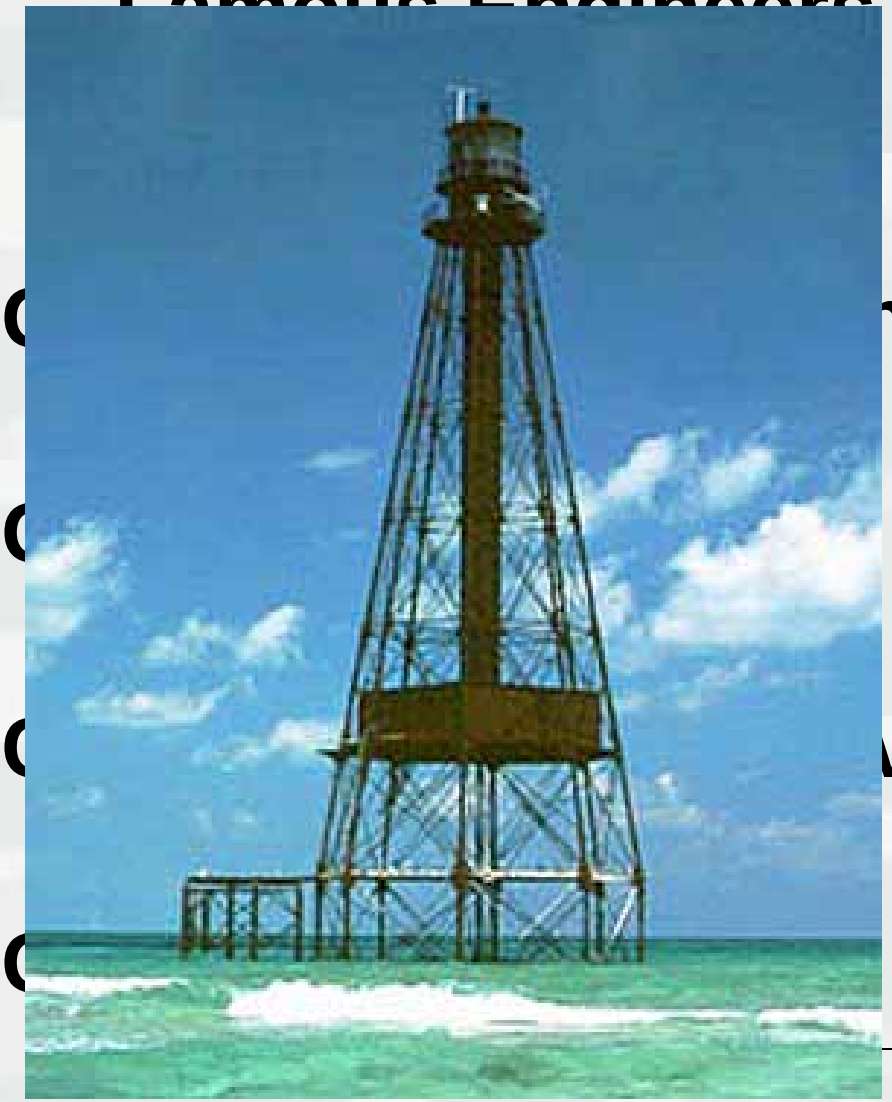
- 1802, Est. of West Point & Corps of Engineers
- Surveying & mapping of the West
- Construction of coastal defenses

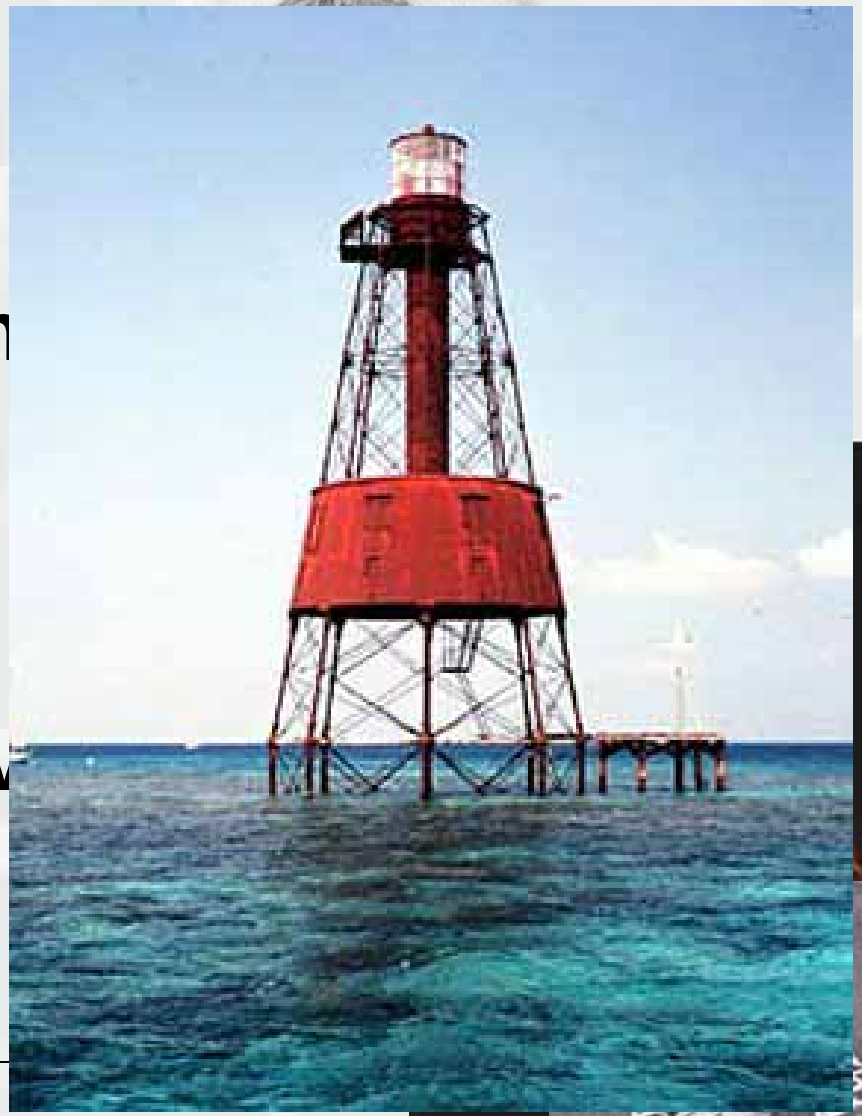
The Corps' Civil Works Mission

- 1824 General Survey Act
- 1826 Rivers and Harbors Act
- 1899 Rivers and Harbors Act

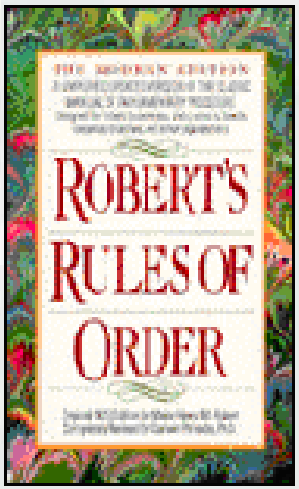
“It’s an accident of history”

MG David Fastabend, explaining to general officers from the former Soviet bloc countries, on why the Army runs dams and civil works.





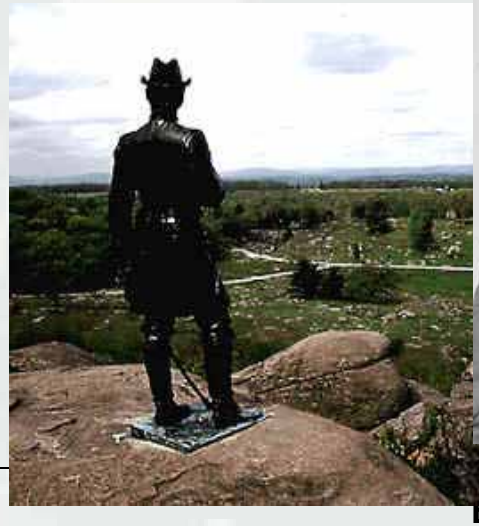
Not-So-Famous
Engineer Officers



MAJ Henry Martyn Robert

MG Gouverneur K. Warren

LT Moses Cleaveland



The Corps' Engineering Leadership

Panama Canal

JFK Eternal Flame

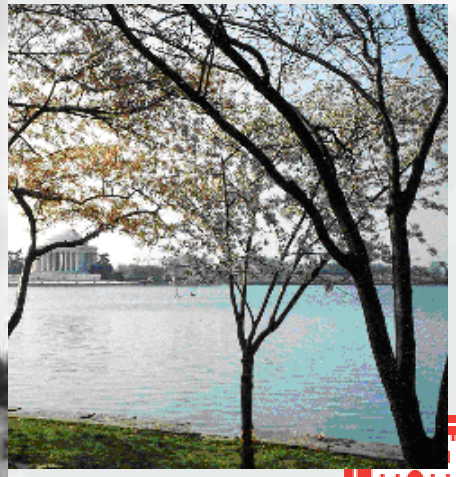
D.C. Aqueduct

Manhattan Project

The Corps' Cons

Pentagon

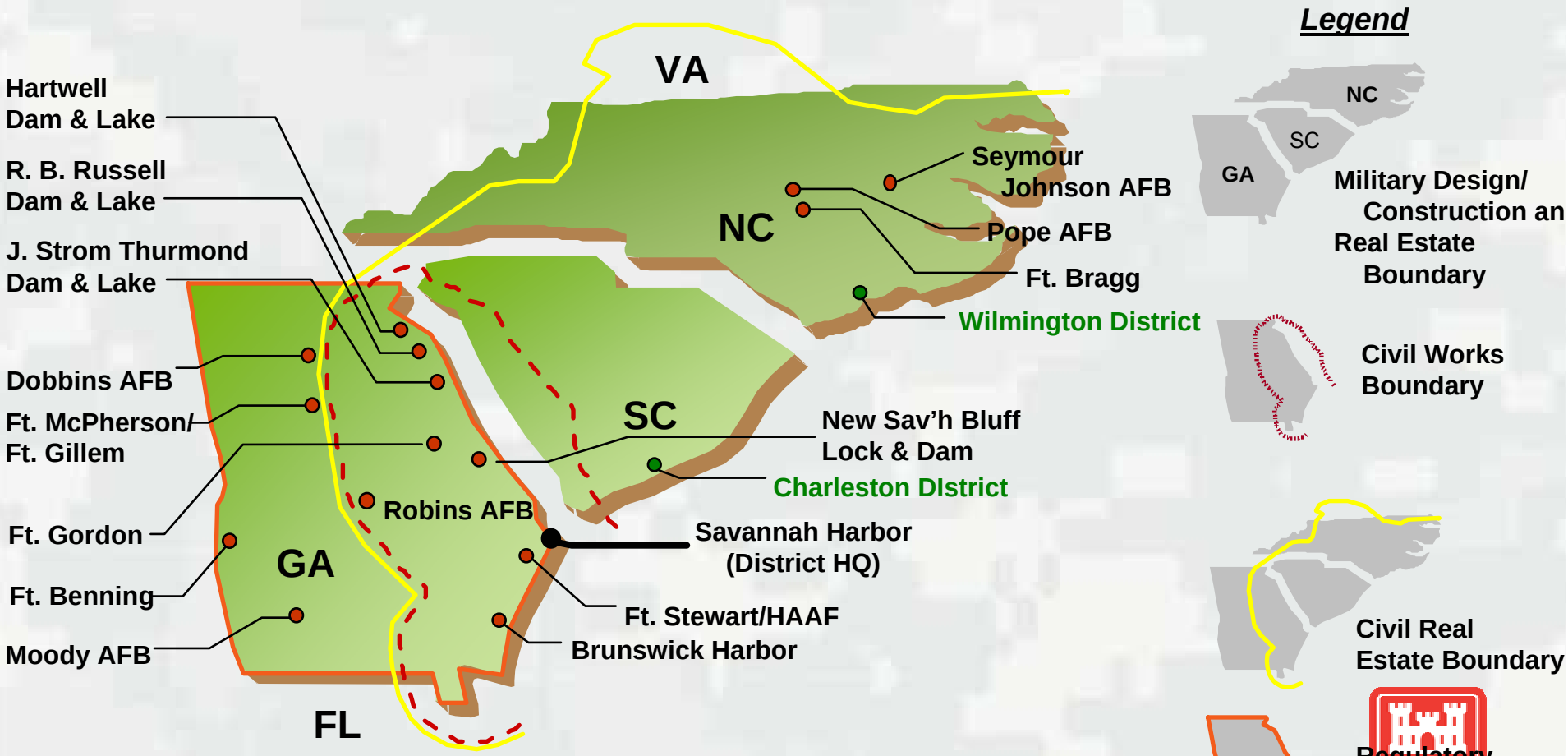
e Canaveral



Tidal Basin Cherry Trees (D.C.)

KKMC, Saudi Arabia

Savannah District Boundaries



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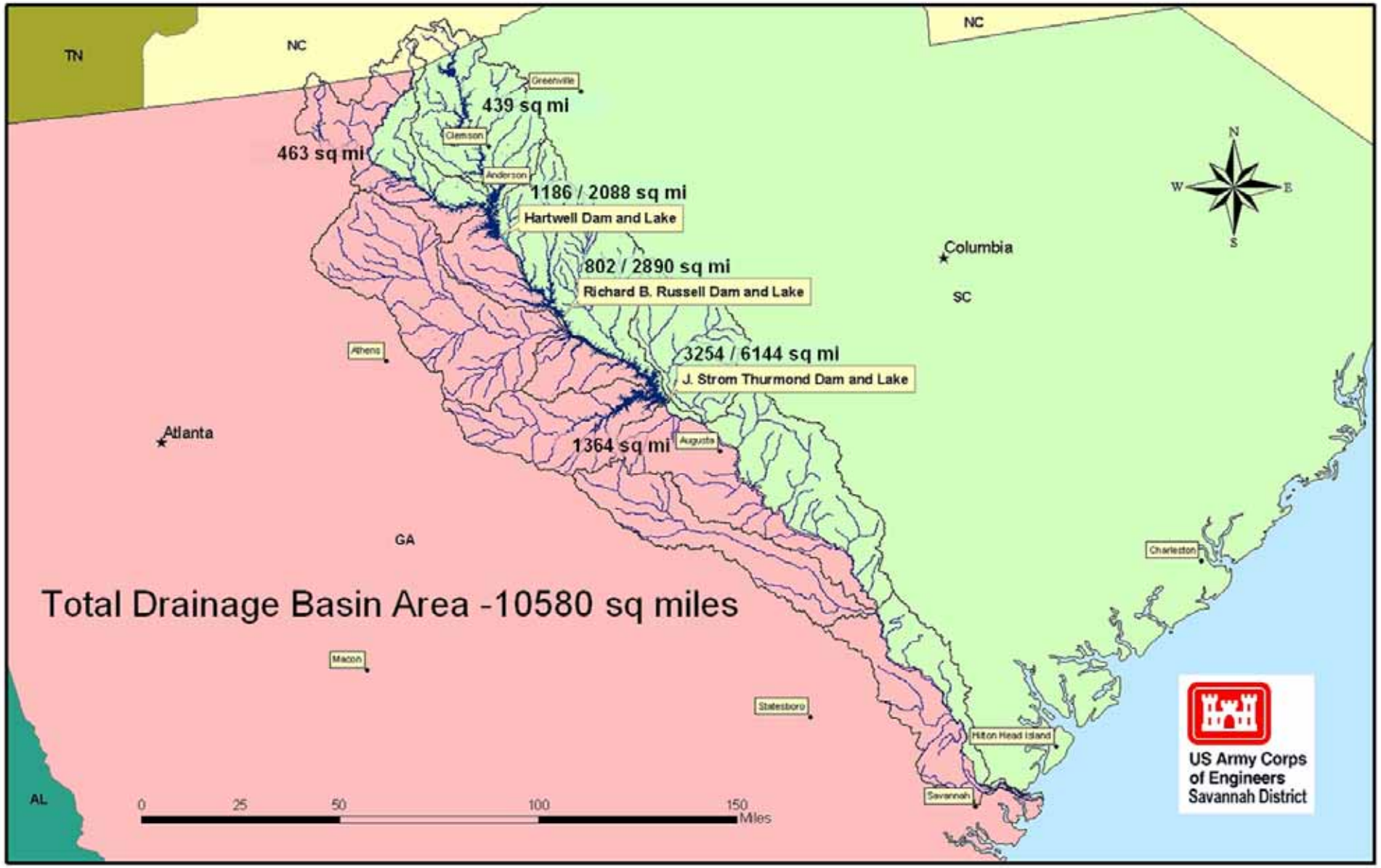
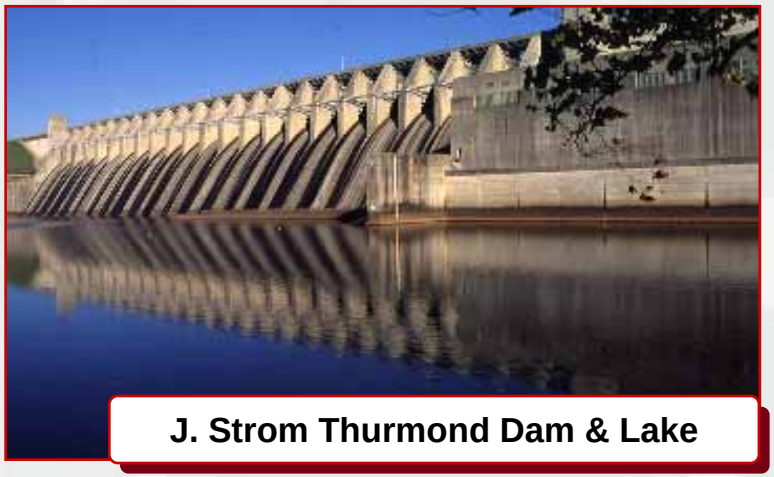
US Army Corps of Engineers

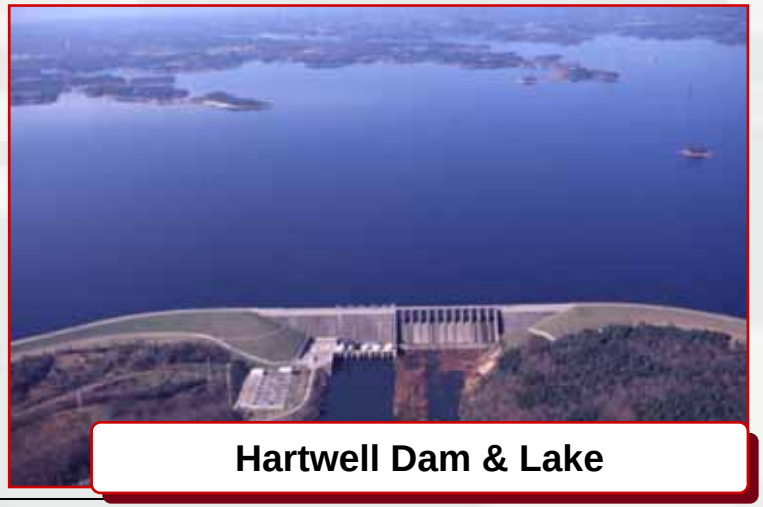


Three Multi-Purpose Projects

- 3 Multi-Purpose Dam & Lake Projects
- 18M Visitors in FY 08 – Hartwell & Thurmond in top 5 most-visited lakes in the nation!
- 286,473 Acres of Land and Water Managed
- 203 Recreation Sites
- $66M Hydropower FY 08
- Largest hydropower generation east of Mississippi
  - Produce 60% of hydropower for SEPA
  - Total Megawatt Capacity = 1,086MW



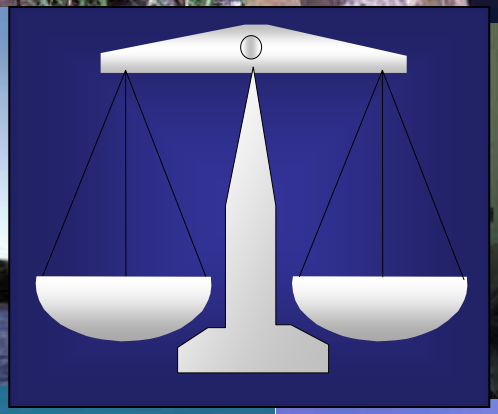
J. Strom Thurmond Dam & Lake



Hartwell Dam & Lake

Richard B. Russell Dam & Lake

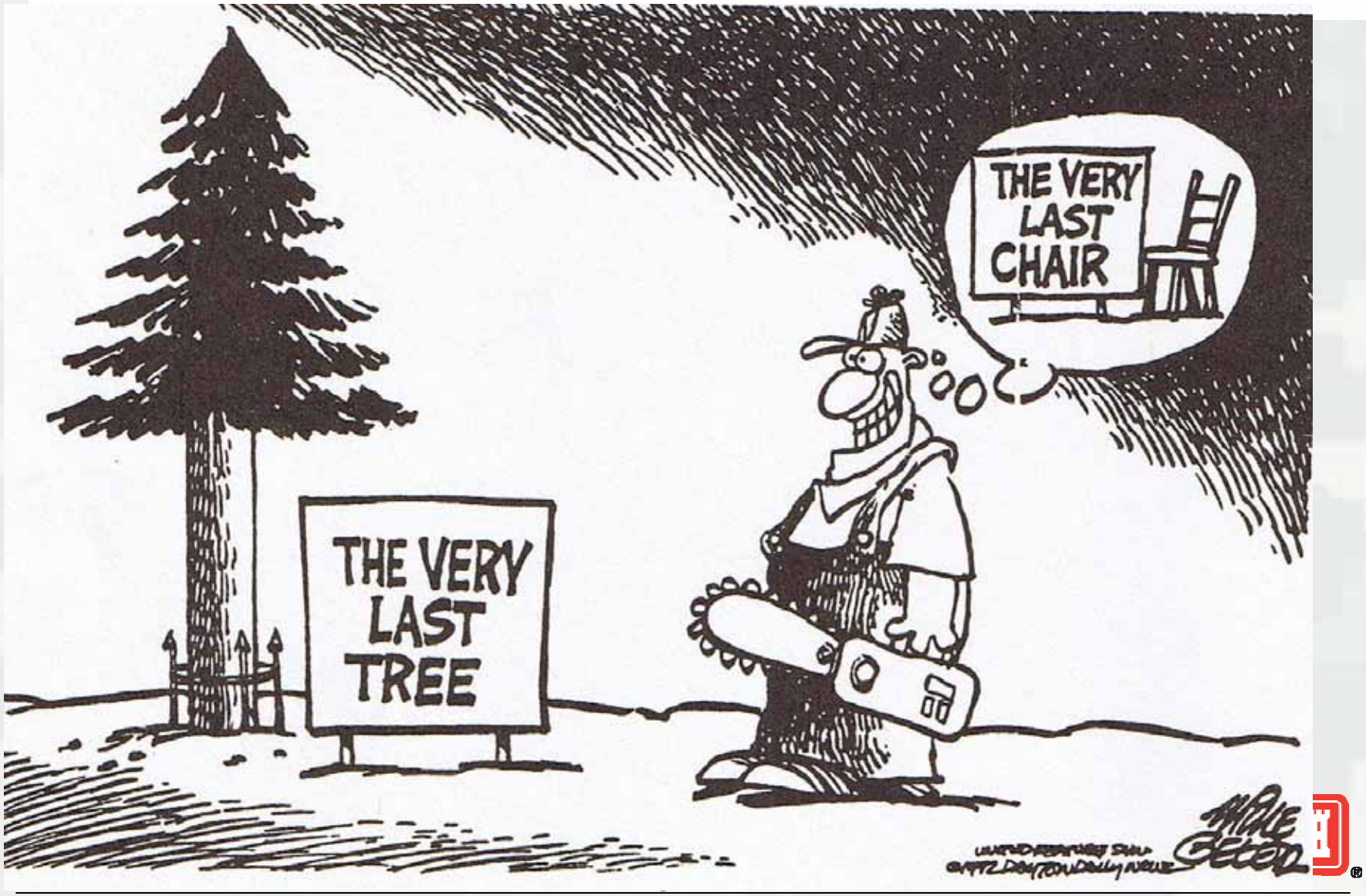
Multi-Purpose Projects



General Management Objectives

- Minimize Flooding and Loss of Life
- Provide Maximum Benefit to the Public
  - Water Supply; Water Quality; Recreation; Navigation; Hydro-Production; Environmental Stewardship
- Balance Impacts to Project Purposes
- Adaptively Manage Projects
- Educate the Public

Water Resource Needs—Seeking Synergy



In Lake Water Supply Intakes

Hartwell	RBR	JST
Bottom of Conservation Pool		
625	**470**	**312**
Lavonia, GA 625	RBR State Park 468	Savannah Lakes 324
Hartwell, GA 612	Elberton, GA 465	Lincolnton, GA 311.5
Anderson County, SC 618/600 with extension	Santee Cooper 460.5	Thomson, GA 304
Milliken Corp 611	Abbeville, SC 457.5	Columbia County, GA 304
	Calhoun Falls, SC 457	Washington, GA 307

Georgia Surface Water Withdrawals

(below Thurmond) (15)

Facility Name	Permit Number	Source Water
Columbia County Water System	036-0110-01	Stevens Creek Reservoir
Augusta Richmond County	121-0191-06	Augusta Canal
Augusta Richmond County	121-0191-09	Savannah River
DSM Chemicals Augusta, Inc.	121-0191-07	Savannah River
Fort James Operating Co. (Georgia Pacific)	051-0114-01	Savannah River
General Chemical Corp. Augusta Plant	121-0191-01	Savannah River
Georgia Power Co. Plant McIntosh	051-0192-01	Savannah River

Georgia Surface Water Withdrawals
(below Thurmond)

Facility Name	Permit Number	Source Water
Georgia Power Co. Plant Wentworth	052-0192-02	Savannah River
International Paper Corp. Augusta Mill	121-0191-02	Savannah River
International Paper Corp.	025-0192-07	Savannah River
PCS Nitrogen Fertilizer, L.P.	121-0191-03	Savannah River
Southern Nuclear Operating Co., Inc. Plant Vogtle	017-0191-05	Savannah River
Tronox Pigments Inc.	025-0192-03	Savannah River
Weyerhaeuser Co.	025-0192-03	Savannah River
Savannah Industrial and Domestic Water System	051-0115-01	Abercorn Creek

Georgia Permitted Wastewater Treatment Facilities discharging to Savannah River below Thurmond Dam (31)

- Atlantic Wood (GA0047783)
- Avondale Mills – Sibley Water Plant (GA0038504)
- Citgo Asphalt Refininig Co. (GA0004332)
- Columbia County Little River (GA0047775)
- DSM Chemicals Augusta (GA0002160)
- E.M. Industries (GA0034355)
- Engelhard Corp Chatham (GA0048330)
- GAF Corp Savannah (GA0003841)
- Garden City WPCP (GA0031038)
- General Chemical Corp (GA0002925)
- GA Pacific Resins Inc (GA0047007)
- GA Pacific Savannah River Mill (GA0046973)
- Global Ship Shipments (GA0003671)
- International Paper (GA0001988)
- International Paper (GA0002801)
- Olin Corp. Augusta (GA0003719)
- PCS Nitrogen Fertilizer (GA0002071)
- PCS Nitrogen Fertilizer LP (GA0002356)
- Savannah Crossroads (GA0038326)
- Savannah Electric Plant Kraft (GA0003816)
- Savannah Electric Plant McIntosh (GA003883)
- Savannah Electric Plant Riverside (GA0003751)
- Savannah President Street (GA0025348)
- Savannah Sugar Refinery (GA0003611)
- Savannah Travis Field (GA0020427)
- South Carolina Electric (GA0003786)
- Southern Nuclear Commission Plant Vogtle (GA0026786)
- Southern States Phosp & Fert. (GA0002437)
- Tronox Pigments (GA0003646)
- Tybee Island (GA0020061)
- Weyerhaeuser Comp. Port Wentworth (GA002798)

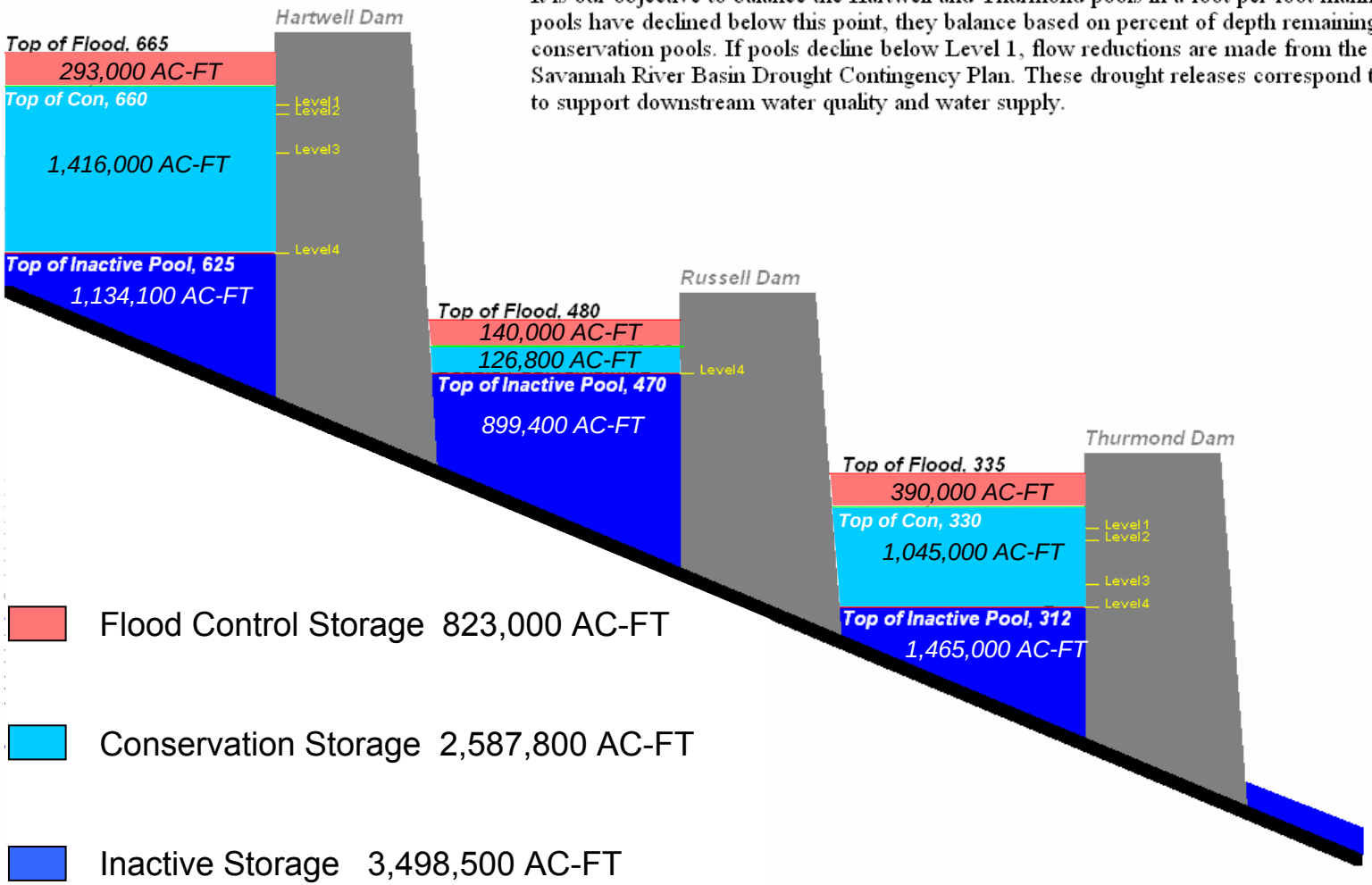
USACE Water Management in the Savannah Basin

- Operational Guidance Documents
  - Operating manuals
  - Water Management Plan (Updated 1996)
  - Drought Contingency Plan (1989; Updated 2006)
- Savannah River Basin Comprehensive Study (WRDA 96)
  - Phase I – Drought Plan Update, Macro look at changes
  - Phase II – Detailed analysis of major operational changes
  - Mechanism for incorporation of ecological flow restoration

Collaborative Stakeholders

Savannah River System
Pool Schematic

It is our objective to balance the Hartwell and Thurmond pools in a foot per foot manner for the top 15 feet. Once the pools have declined below this point, they balance based on percent of depth remaining in their respective conservation pools. If pools decline below Level 1, flow reductions are made from the system in accordance to the Savannah River Basin Drought Contingency Plan. These drought releases correspond to the minimum flows needed to support downstream water quality and water supply.

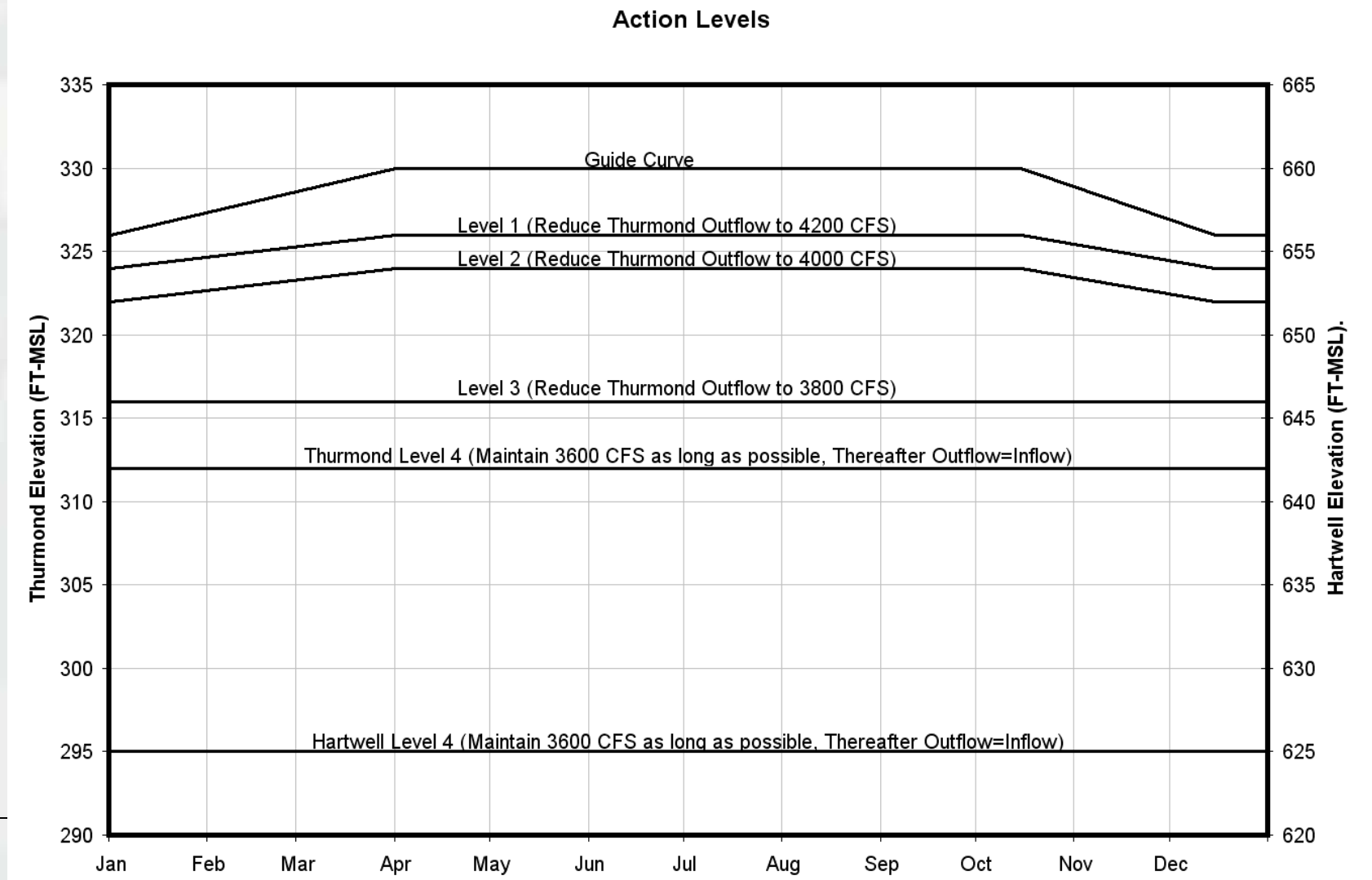


Flood Control Storage 823,000 AC-FT

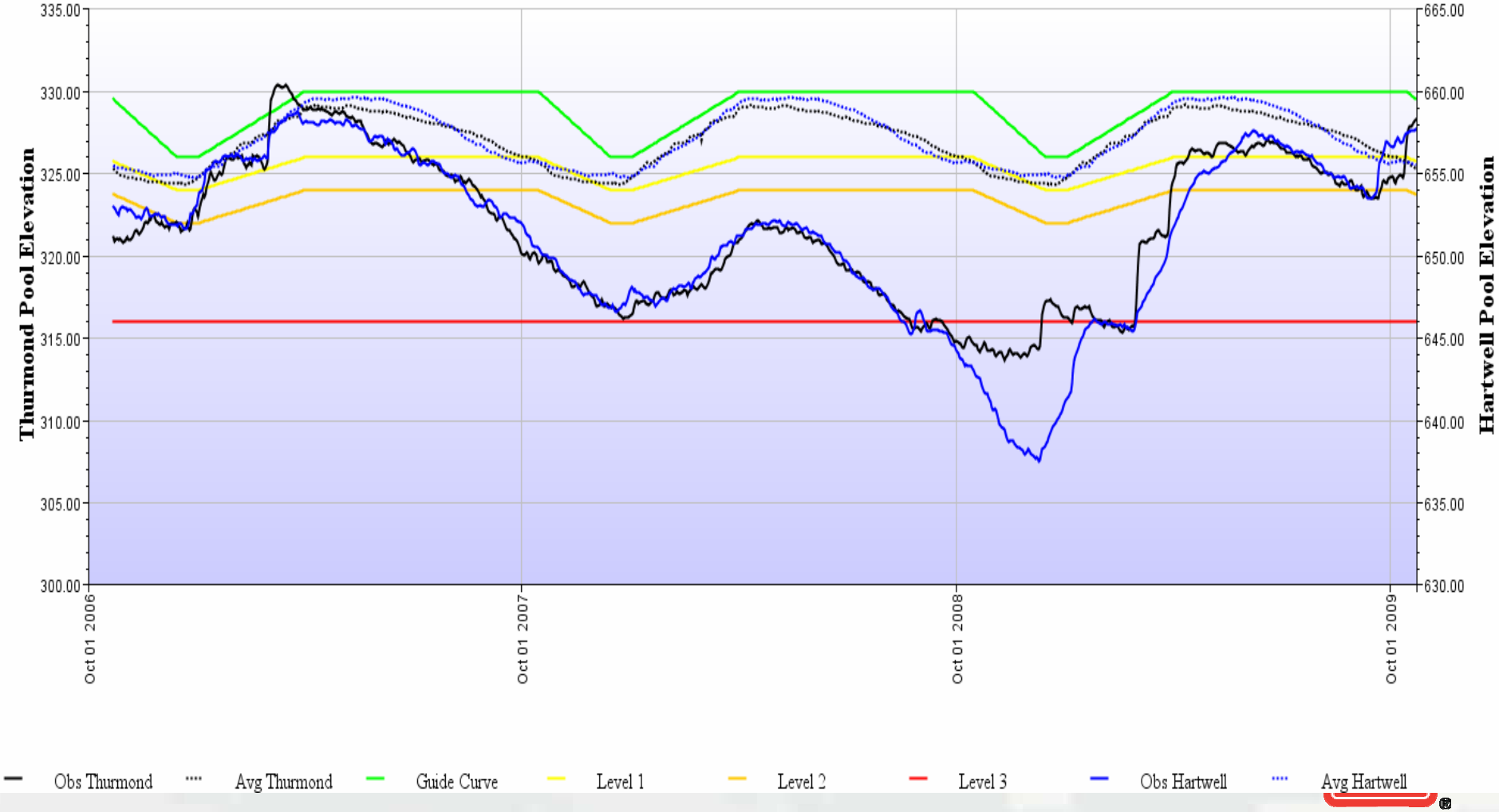
Conservation Storage 2,587,800 AC-FT

Inactive Storage 3,498,500 AC-FT

Savannah River Basin Drought Contingency Plan

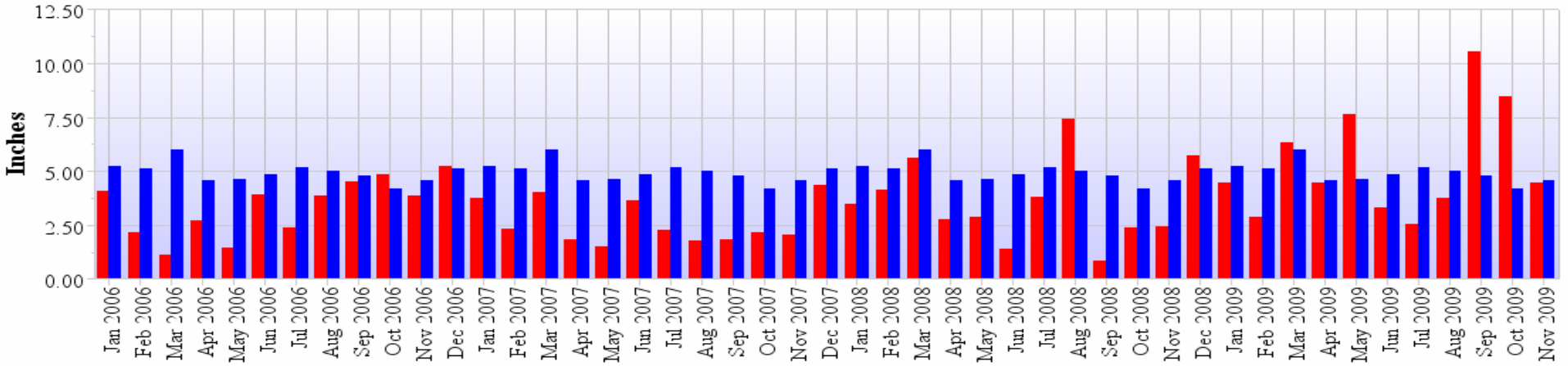


Elevation Comparison FT-MSL



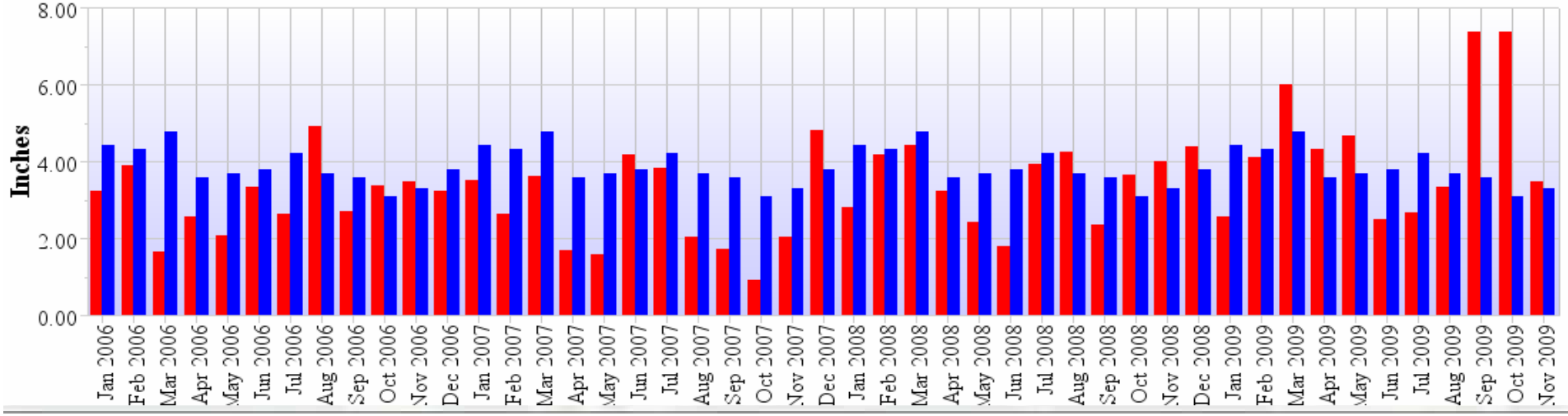
Hartwell Basin

Jan06 - Nov09 deficit = 58.7 in **Jan07 - Oct09 deficit = 39.6 in** **Jan08 - Oct09 deficit = 11.8 in**



Thurmond Basin

Jan06 - Oct09 deficit = 21.7 in **Jan07 - Oct09 deficit = 12.5 in** **Jan08 - Oct09 deficit = -1.1 in**



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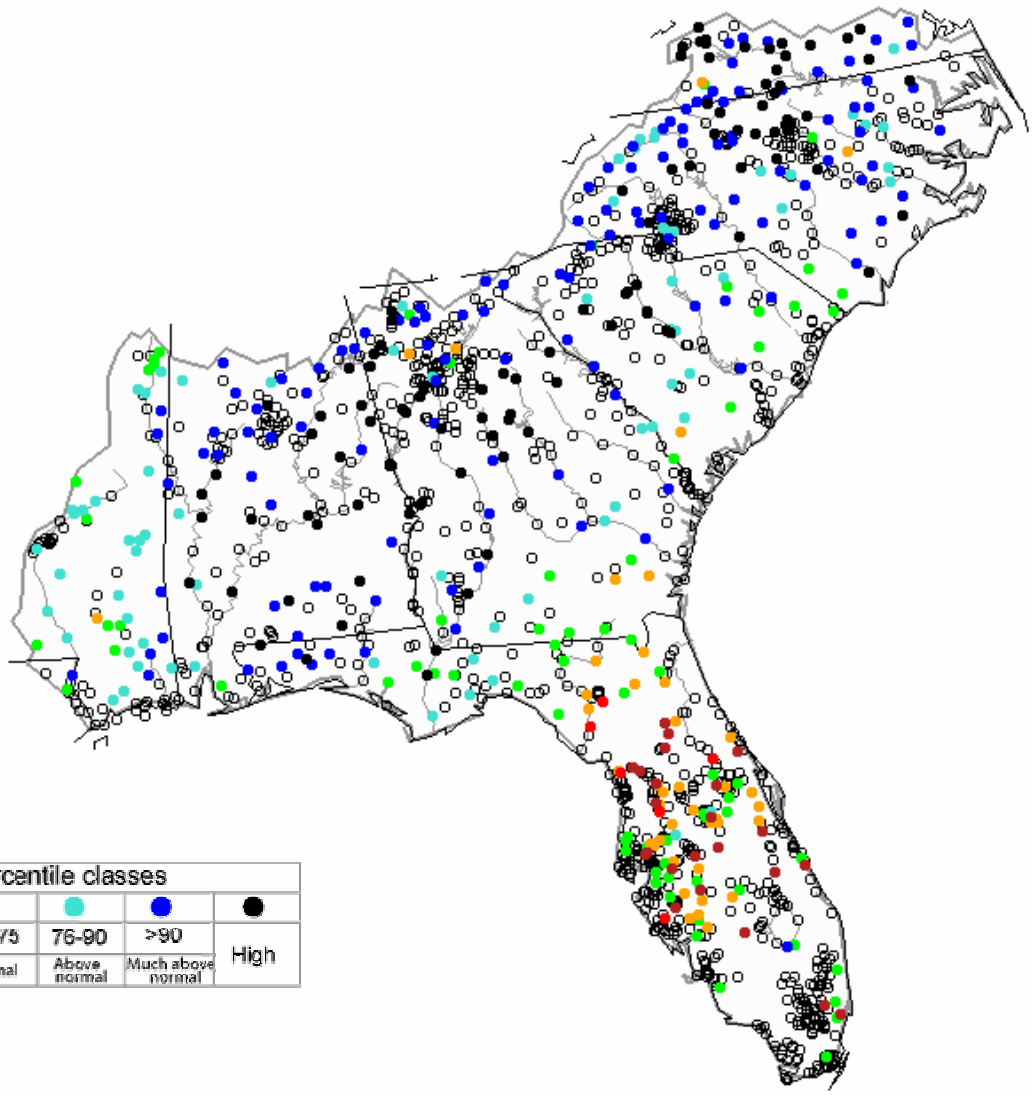

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

USGS

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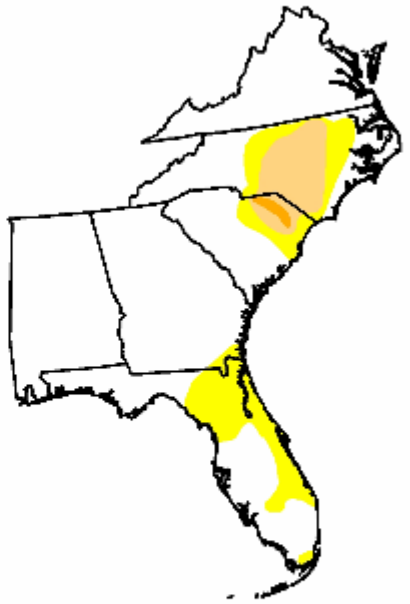
U.S. Drought Monitor

Southeast

November 10, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	80.0	20.0	6.7	0.5	0.0	0.0
Last Week (11/03/2009 map)	80.0	20.0	6.7	0.5	0.0	0.0
3 Months Ago (08/18/2009 map)	62.7	37.3	1.0	0.0	0.0	0.0
Start of Calendar Year (01/06/2009 map)	65.3	34.7	15.7	5.3	2.8	0.0
Start of Water Year (10/06/2009 map)	82.6	17.4	5.5	1.0	0.0	0.0
One Year Ago (11/11/2008 map)	47.3	52.7	32.3	19.1	8.8	4.6



Intensity:

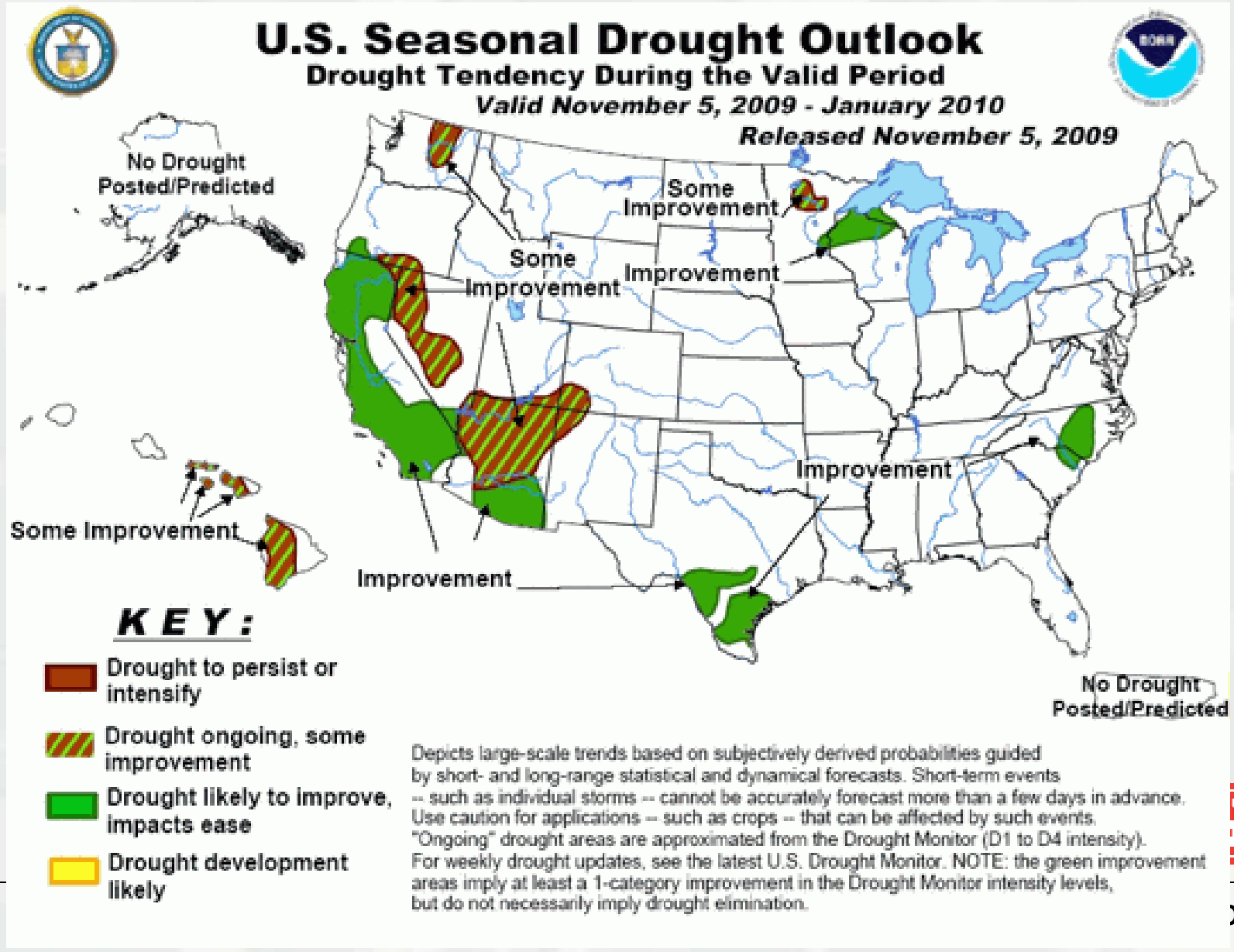
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

Released Thursday, November 12, 2009

Author: Brian Fuchs, National Drought Mitigation Center


U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid November 5, 2009 - January 2010
Released November 5, 2009
No Drought Posted/Predicted
Some Improvement
Some Improvement
Improvement
Some Improvement
Improvement
Improvement
No Drought Posted/Predicted
KEY:
Drought to persist or intensify
Drought ongoing, some improvement
Drought likely to improve, impacts ease
Drought development likely
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

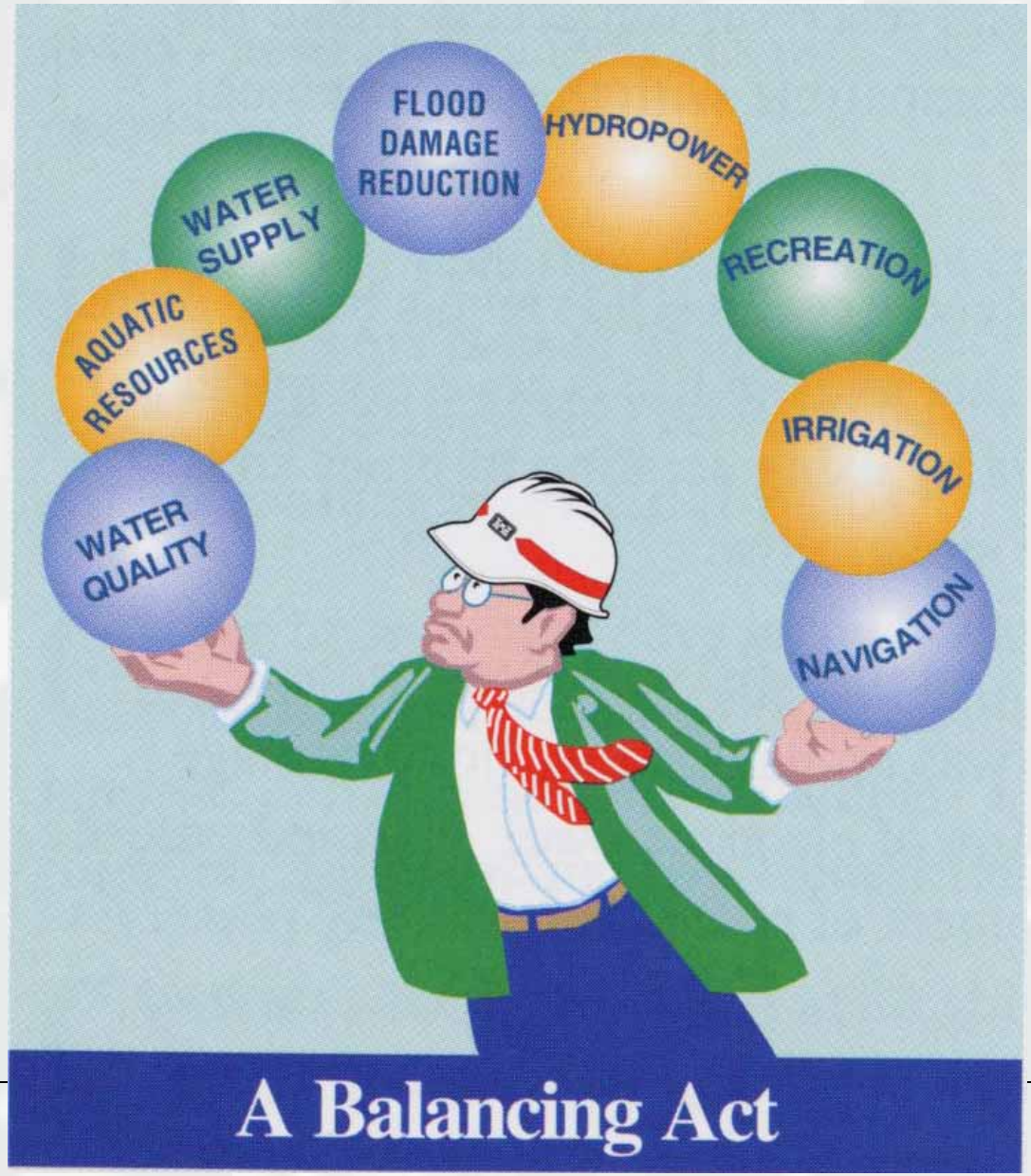
Summary

- The Savannah Basin has experienced a new drought of record (2006-2009…)

- Collaborative steps have been taken to conserve the reservoir pools as much as currently allowed

- Another flow reduction EA is being processed for 3100 cfs this winter if the system is in Level 3

- ***El Nino forecast for winter could bring significant rainfall***


FLOOD DAMAGE REDUCTION
HYDROPOWER
WATER SUPPLY
RECREATION
AQUATIC RESOURCES
IRRIGATION
WATER QUALITY
NAVIGATION
A Balancing Act

Questions??

Website http://water.sas.usace.army.mil