

Testimony before the Committee on Small Business
United States House of Representatives

Tuesday, March 25, 2008

12:00 noon

Callaway Center for International Business Development
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Written Testimony of:

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Written Statement
of
Pat Stevens
Chief, Environmental Planning Division
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before

The Committee on Small Business
United States House of Representatives

on

The Impact of the 2006-2007 Drought on Georgia's Economy
March 25, 2008

I. Opening

Madam Chair and Distinguished Members of the Subcommittee:

Thank you for the opportunity to testify before you on the issue of drought. I am testifying today in my capacity as Chief of the Atlanta Regional Commission's Environmental Planning Division, a position that I have held since 1985. Prior to that time I was a planner with the Atlanta Regional Commission and a planner with the Georgia Department of Natural Resources. The Atlanta Regional Commission is a metropolitan area planning and development commission for 10 counties and all the cities within in the metropolitan Atlanta area. In this capacity I am responsible for directing the agency's planning efforts in the areas of water resources programs, implementation of the Metropolitan River Protection Act, and providing planning staff for the Metropolitan North Georgia Water Planning District.

Recent drought conditions have focused much attention on the water supply in north Georgia and the operations of Federal reservoirs. I will provide testimony on the water supply situation and provide our recommendations for the future. The main focus of my comments today will be on the Apalachicola Chattahoochee Flint River Basin (ACF).¹

II. Metro Atlanta Water Resources Background

Metro Atlanta obtains 99% of its water supply from surface water sources – rivers, lakes and streams. Groundwater is an insignificant source of water because the bedrock is typically nonporous crystalline type bedrock as exemplified by Stone Mountain granite. Although the region receives an average of 50 inches of rain a year, this rainfall can be extremely variable – as low as 30 inches to as high as 70 inches of rain a year. Because of this variable rainfall and

¹ A slideshow providing an overview presentation for the Subcommittee is attached as Exhibit A.

because there are no natural lakes in north Georgia, metro Atlanta must use manmade reservoirs to store water during rainy periods to use during times of drought.

Knowing that a major metropolitan area in north Georgia needed a major reservoir, Atlanta's Mayor Hartsfield and Georgia's Senator Richard Russell worked with the U.S. Army Corps of Engineers and the Congress in the 1940s and 50s to create Buford Dam and Lake Lanier, 50 miles northeast of the city.

Lake Lanier is the primary source of drinking water for the metropolitan Atlanta area, as it was intended to be. Indeed, the Corps has stated on numerous occasions—including in its testimony before Congress seeking authorization for the project—that the need to ensure an adequate water supply for metro Atlanta was one of the “principal” and “primary” purposes of Lake Lanier. Other authorized purposes, in addition to water supply, include flood control, hydroelectric power generation, navigation and recreation.²

Nearly 70% of the metro Atlanta area's water supply comes from Lake Lanier and the Chattahoochee River. About 20% of the metro area's water supply is withdrawn directly from the reservoir, while most (50%) is withdrawn from the Chattahoochee River below the dam. Although these systems do not take water directly out of Lake Lanier, they do rely on the reservoir to maintain sufficient flows in the Chattahoochee River to cover their intakes.

Lake Lanier is one of five reservoirs the U.S Army Corps of Engineers operates on the Chattahoochee River. Over three million people in metro Atlanta depend on the storage in Lake Lanier for water supply. Lake Lanier is the northernmost federal reservoir in the Apalachicola Chattahoochee Flint (ACF) River Basin. It is the single largest reservoir in the system. Many of us in the metro Atlanta region are aware that the water in Lake Lanier is a resource that must be shared. But it is also important to understand the limitations of this lake in the headwaters of the river basin.

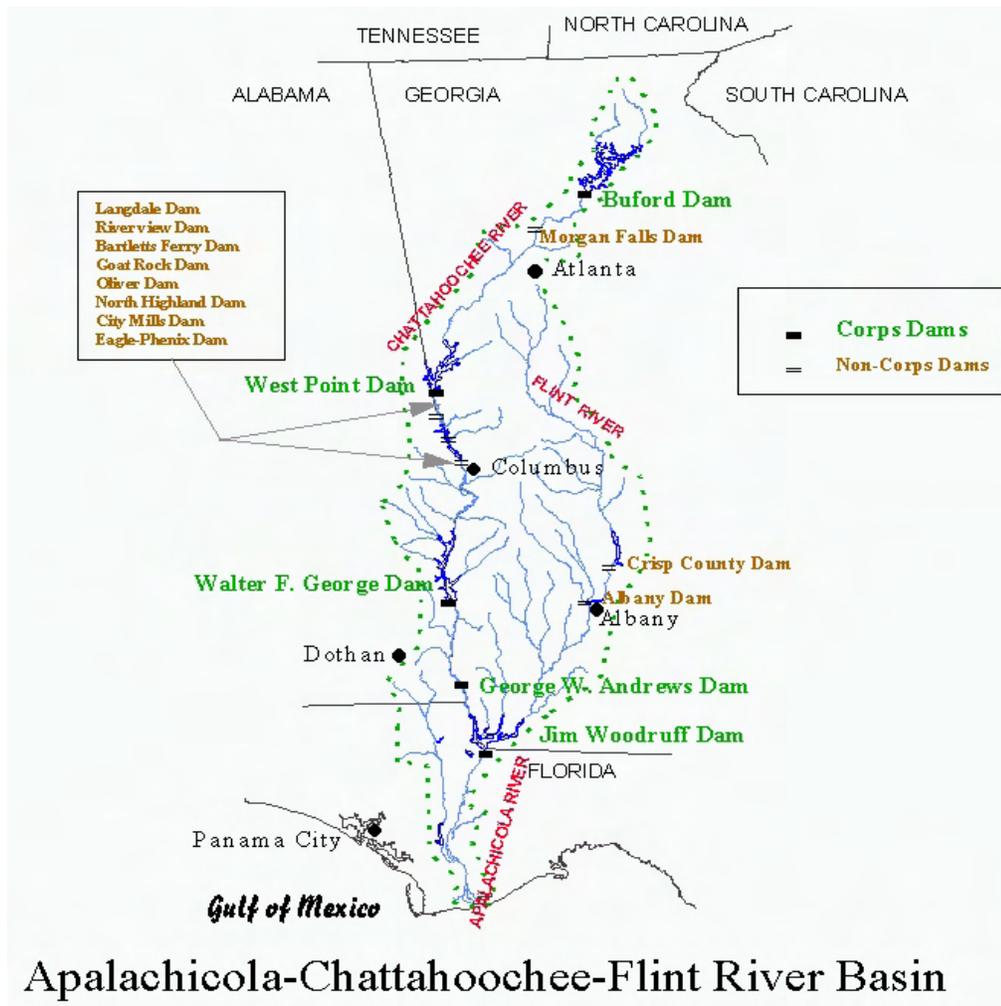
Lake Lanier only has 5.3% of the ACF River Basin drainage area above it and it controls only a very small part of the water in the basin. This means that almost all of the rainfall that flows into the river system comes in downstream of Lake Lanier. Lake Lanier is a headwaters reservoir that controls just 9% of the total flow of the basin above the Florida line. While Lanier is 60% of the storage in the system, it is important not to overestimate the ability of this storage to make a significant difference in the river flows in Florida. Even with the influence of storage from Lanier and the other reservoirs on the system, the river as it flows into Florida is 10 times the size it is below Lake Lanier, and when it flows into the Apalachicola Bay it is typically 13 times the size it is below Lake Lanier. The small ratio of drainage area to storage volume in Lake Lanier means that, once depleted, it takes a very long time for this reservoir to refill.

Large releases might help downstream users over the short term, but large releases from Lanier to create artificially high flows in the Apalachicola River are unsustainable throughout an

² See 33 C.F.R. § 222.5 (listing the authorized purposes of Lake Lanier and other reservoirs); see also “Q&A,” Exhibit B.

extended drought and could imperil a critical supply of water for all of us in the ACF basin. This was made clear this past year.

Figure 1. Source USACE



III. Current Drought Conditions and ACF Reservoir Operations

Conflicts and litigation among the states of Georgia, Florida and Alabama as well as drought have made the reasonable management of the ACF reservoirs increasingly difficult for the U.S. Army Corps of Engineers. Although the region is in serious drought, earlier this decade we experienced three back to back drought years that some consider worse, without as much disruption to the economy. The current drought has caused record low flows throughout the ACF River Basin, but it is the management plan implemented by the Corps in 2006 that exacerbated the impact of the drought on ACF reservoirs.

In March of 2006, the U.S. Army Corps of Engineers adopted a new operating plan called the “Interim Operations Plan for Jim Woodruff Lock and Dam,” (the “IOP”). The IOP was hurriedly adopted in response to litigation threatened by the State of Florida.

As many parties protested when the IOP was first adopted, this operating plan is not sustainable because it requires large releases from reservoir storage to meet artificially high flows at the Florida line *without ever allowing the reservoirs to refill*. In budgetary terms, the IOP draws heavily on savings (water stored in reservoirs) during the summer and fall, when river flows are naturally low, without allowing savings to be replenished in the winter and spring, when river flows are naturally high. This is like running a deficit year after year without ever allowing a surplus. This unsustainable plan nearly emptied the federal reservoirs in 2007.

Although the nominal purpose of the IOP is to protect threatened and endangered species that inhabit the Apalachicola River (the threatened Gulf sturgeon and three species of threatened and endangered mussels—the threatened purple bankclimber and Chipola slabshell and the endangered fat threeridge), the plan was developed and implemented before the Corps or the United States Fish and Wildlife Service (USFWS) had collected sufficient information to understand the needs of these species. Moreover, because the plan was adopted and implemented without sufficient analysis to determine whether operations under the IOP could be sustained through a record drought such as we are currently experiencing, the plan has proved to be bad for all users, including the federally-protected species.

As required by the IOP, the lower reservoirs on the ACF were essentially drained to provide artificially high spring flows for the sturgeon and then, as the system proceeded into the drought, unsustainable releases from the conservation storage in Lake Lanier were made in the fall of 2007 to provide much of the minimum required flow to the Apalachicola River. Due to the IOP, from May to November 2007, the water delivered from the federal reservoirs on the Chattahoochee River to the Apalachicola River amounted to 220% of the river’s natural, “unimpaired flow”—i.e., the flow that would have been experienced if there were no reservoirs and no depletions anywhere in the ACF River Basin—during that same time period. There were weeks last October and November that Lanier was being called upon to provide 80% of the flow in the Apalachicola River. As a result Lanier reached the lowest level on record and is still now only half full.

Although conditions in the basin have improved over the past couple of months, such that lower reservoirs have completely filled, it will take a much longer time to refill Lake Lanier because its drainage area is so small. Lanier is currently fifteen feet below full pool, which is a record low for this time of the year. Unless we have extraordinary rains over the next two months, Lake Lanier will not refill this year.

Our concern now is that Lake Lanier is lower than it has ever been at this time of year, and we may be entering the next year of a severe multi-year drought. The low level of storage places the security of the water supply for 3 million people at great risk. It also places the environment downstream at great risk. If Lake Lanier has not recovered by June 1, the result could be very detrimental to the entire ACF Basin, but especially to north Georgia.

The economic impacts to the metro Atlanta area can be directly linked to the level of Lake Lanier. The recreational economy surrounding Lanier generates over five billion dollars annually. The Lake Lanier Association is in the process of documenting the impact but initial estimates show millions of dollars in lost revenue and many job layoffs. The loss to the major water systems that depend on Lanier is estimated at \$50 million. This loss is due to the outdoor water bans and the 10% reduction in use imposed by the State. We believe that much of this loss could have been avoided if Lanier had been maintained at a higher level. Finally, much of the State's revenues in the landscape and garden industry are generated by businesses in the metro Atlanta area. We believe that the low level of Lanier and the resulting outdoor water restrictions have had a direct adverse impact on this industry statewide. The economic impacts to this industry have been recently documented by the University of Georgia Center for Urban Agriculture. The losses are astounding at \$260 million per month and the loss of 35,000 jobs.

IV. Metro Atlanta's water use is not the problem in the ACF.

Downstream water users cite metro Atlanta's water use as the cause of the ACF tri-state water crisis. Farmers believe there would be more water in the basin for their crops were it not for metro Atlanta; fishermen in Florida believe their livelihood is threatened because of metro Atlanta's demands for water. But these claims are not supported by the facts.

The fact is that metro Atlanta uses 1% of the annual water volume in the ACF basin during normal years and just 2% even during extreme drought. In other words, if metro Atlanta did not withdraw a single drop of water, flows at the Georgia-Florida border would improve, at best, by a mere 2%.

This is a function of the geography detailed above. Because Lake Lanier controls only 9% of the total flow of the basin above the Florida line, 91% is geographically inaccessible to the metro area. Therefore our *maximum* impact on the system—the impact that would result if the area consumed 100% of the water that passes through Lake Lanier without returning anything to the system—would be to reduce the flow of the Apalachicola River by just 9%. In reality, of course, we use only a fraction of the flow that is actually accessible to us, and we return the majority of the water withdrawn. That is why our total impact is on the order of just 1 to 2%.

Furthermore, Metro Atlanta is not even biggest user in the ACF Basin. Consider the following:

- Depletions to the Flint River due to agricultural irrigation in South Georgia average approximately 268 mgd (415 cfs), which is about 66% more than metro Atlanta's net water consumption. Total agricultural withdrawals for irrigation are even higher. The number cited above is the total depletion of surface waters in the Flint River due to the combination of surface and groundwater withdrawals.
- Metro Atlanta's net water withdrawal is 162 million gallons per day (mgd) or 250 cubic feet per second (cfs).

- The State of Florida has authorized a large interbasin transfer from the lower Chipola River, a tributary to the Apalachicola River, to the town of Port St. Joe. The Florida Department of Environmental Protection has stated that the withdrawal varies monthly but can reach a monthly high of 126 cfs. Therefore, it appears the very small town of Port St. Joe is diverting about half as much water from the ACF River Basin (and from the Apalachicola Bay) as is used by the entire Atlanta metropolitan area combined. *See* Florida DEP, *See* 2005 *Water Quality Assessment Report for the Apalachicola-Chipola* at 31 & 94. Florida DEP has acknowledged that the water diverted to Port St. Joe “is transferred out of the basin and could affect salinity levels in the Apalachicola Bay.” *Id.*

V. Water conservation by all users in the ACF Basin is crucial to protect our precious water resources.

In order to protect our precious water resources, all users in the ACF Basin must practice conservation--that includes municipal, industrial and agricultural users.

That said, conservation has different effects and is important for different reasons for different users within the basin. For example, water conservation within the metropolitan Atlanta area has a negligible impact on river flows at the Florida line. As has already been explained above, if the entire metropolitan area ceased to use water altogether, flows at the Florida line would increase by only 1 to 2%. Nonetheless, conservation in the metropolitan area is vitally important to protecting the water supply of the metropolitan area and protecting our immediate downstream neighbors such as West Point Lake. We cannot expect to meet existing and future demands without practicing best-in-class conservation. Therefore the metropolitan Area is strongly motivated and fully committed to conservation even though we understand that our efforts will have no perceptible benefit to the Apalachicola River.

A. Metro Atlanta Recognizes the Need to Adopt Aggressive Conservation Measures

Metro Atlanta is doing its part and making significant progress in water conservation efforts. Sixteen counties, 98 cities and 61 water systems are working within the Metropolitan North Georgia Water Planning District to develop and implement an aggressive water conservation program. This plan, developed in 2003 through the District, has been approved by the Georgia Environmental Protection Division and adopted by local governments.

All jurisdictions in the District are committed to implementing the top ten water conservation measures that have been identified for water savings and cost effectiveness:

- Conservation pricing (the more you use, the more you pay). Ninety-eight percent of the water district’s population is subject to increasing or tiered rates.
- Replacement of old toilets. The District has just launch a cooperative toilet rebate program that covers one of the largest areas in the nation.
- Reduction of water system leaks.

- Rain sensor shut-offs for irrigation systems.
- Pre-rinse spray valves for commercial restaurants and food service operations.
- Sub-unit meters in new multi-family buildings.
- Residential water audits.
- Low-flow retrofit kits.
- Commercial water audits.
- Education and outreach.

The District requirements when coupled with other State and Federal activities are projected to reduce water withdrawals by 20% when fully implemented.

The State of Georgia displayed foresight and leadership by enacting in 2004 a drought management plan that authorized the state to impose restrictions on outdoor water use during times of drought. Under this plan outdoor water use is restricted to three days per week during non-drought periods. In drought, the State has the authority to further reduce outdoor water use. In October 2007, during the severe drought, the State imposed a ban on virtually all outdoor water use in the northern third of Georgia. In addition, the Governor mandated a 10% reduction in withdrawals for all water utilities and other permit holders in North Georgia. Those measures have recently been revised to authorize local governments to allow some limited outdoor water use.

While metro Atlanta has made progress in water conservation and will continue to make progress, it is incumbent that ALL users in the basin adopt conservation measures aimed at reducing water usage over time. Metro Atlanta is doing its part, but we must all play a role.

B. Agricultural Users Must Adopt Reasonable Conservation Measures As Well

No discussion of water management in the ACF would be complete without a discussion of agricultural withdrawals and their effects on the flow of the Flint River. Although most agricultural withdrawals in the ACF are from groundwater, these withdrawals reduce baseflow into the tributaries of the Flint River and thus have a major impact on surface water levels. Agricultural withdrawals in Southwest Georgia, Southeast Alabama and Northwest Florida are largely unregulated. These withdrawals have a major impact on the operation of the system.

According to the 2006 Flint River Basin Regional Water Development and Conservation Plan (“FRP Plan”) adopted by Georgia Environmental Protection Division (“EPD”), as much as 250 mgd (357 cfs) may be withdrawn for irrigation from surface waters during peak irrigation months. FRB Plan at 15. Groundwater withdrawals also have a major impact on stream flows, reducing stream levels by as much as 257 mgd (398 cfs) at peak season. Therefore, according to the data in this plan, the total impact on stream flows during the peak irrigation months is in the range of 507 mgd (786 cfs). The average annual impact therefore appears to be in the range of

268 mgd (415 cfs).³ In contrast, the average annual consumptive use for the entire metropolitan Atlanta area is just 161 mgd (250 cfs).

The situation with agriculture raises an important question about the authorized purposes of Lake Lanier and the other federal reservoirs. Although the federal reservoirs on the Chattahoochee are not authorized to support irrigation, they are in fact being used to support irrigation in the Flint River Basin to a large degree. This is a direct result of the Corps' decision to operate the Chattahoochee reservoirs to meet a single minimum flow target at the Chattahoochee gage in the Apalachicola River. Because the flow at this point is made up of the combined flow of the Flint River and the Chattahoochee River, for any depletion of the Flint River an equivalent amount must be supplied from the Chattahoochee River to meet the minimum flow requirement. Thus, by agreeing to meet a single minimum flow regardless of the flow of the Flint River, the Corps has, in effect, agreed to use reservoir storage to supplement any reduction in flows caused by agricultural withdrawals in the Flint River Basin. This unauthorized use of the federal reservoirs is having a significant impact on other authorized purposes and on the system as a whole.

C. The Corps Must Also Adopt Reasonable Conservation Measures

Although we recognize that water conservation is essential, the fact is that we cannot conserve our way out of the current crisis. The amount of water that can be saved through conservation pales in comparison to the amount that is continuing to be wasted through improper reservoir operations. It is literally a drop in the bucket.

From the standpoint of Corps operations, the Corps needs to conserve storage to the maximum extent possible. The Corps also needs to draw on its expertise to manage the system wisely. This is especially critical now, given the extreme drought conditions.

VI. Recommendations for Reservoir Operations

We recommend that the Corps adopt a three-step recovery plan for Lake Lanier and for the entire ACF reservoir system. The first step is to adopt an emergency recovery plan to weather the current crisis. The second step is to replace the IOP with a better, more sensible plan to ensure we do not repeat the mistakes of 2006-2007. The third step, for the longer term, is to adopt a comprehensive water control plan for the ACF Basin that is based on facts and sound science.

A. Continue the Emergency Operations Plan Until All of the Reservoirs Refill

The Corps took the first step on November 15, 2007 by adopting a recovery plan known as the Exceptional Drought Operations Plan (EDO). The EDO suspends restrictions in the IOP that prevent the reservoirs from refilling. The EDO also reduces the minimum flow requirement for the Apalachicola River to more reasonable levels.

As proposed by the Corps, the EDO would be a permanent feature of the IOP that would be triggered whenever reservoir storage is depleted to certain levels and would remain in effect until

³ See *Streamflow Depletions in the Flint River Basin Caused by Irrigation Pumping from the Floridan Aquifer in Drought Years*, Exhibit C.

the reservoirs have recovered. The United States Fish and Wildlife Service (USFWS) has only approved the EDO through June 1, 2008. Therefore, if the EDO is not extended, there is a good chance that operations will revert back to the unsustainable IOP on June 1 *even if Lake Lanier has not yet recovered*. This would be disastrous indeed. Therefore it is essential to continue the EDO beyond June 1.

In addition, the “trigger” for determining when normal operations should resume (i.e., when operations under the EDO should cease) needs to be changed. Currently the IOP is triggered when the “composite storage” reaches “composite zone 2.” Composite storage is a measure of the total amount of water in storage in all of the reservoirs. This measure is flawed because it is possible for composite storage to be relatively high even when storage in Lake Lanier is relatively low. In February 2008, for example, the lower reservoirs were full—and “composite storage” was approaching composite Zone 2—while Lake Lanier was still in its lowest zone. The EDO should be continued at least until *each reservoir* is in zone 2.

B. The Corps Should Adopt a New Interim Plan to Replace the IOP After the Reservoirs Have Recovered

The IOP should be replaced with a new *sustainable* operating plan. This cannot wait for the development of a long-term plan.

The combined effect of the IOP and the EDO is to keep the reservoirs in the lower zones for an extended period of time. The reservoirs might not empty, thanks to the emergency relief provided to the EDO, but the IOP will take effect to prevent them from refilling before they are ever allowed to completely refill. This type of plan will not benefit anybody.

C. New water control plans based on facts and sound science must be adopted by the Corps for the ACF reservoirs.

In the longer term, we need a comprehensive new water control plan based on facts and sound science. The Corps has recently announced that they are going to update the Water Control Manuals for the Apalachicola Chattahoochee Flint River Basin.

The Atlanta Regional Commission and the metro Atlanta area Water Supply Providers that depend on Lake Lanier strongly support the Corps’ current initiative to update water control plans for the ACF Basin. We support this effort because we believe that the update process can lead to a more balanced approach for the river basin. We also believe that the ACF basin has sufficient water to meet the reasonable demands of all users—including towns and cities, power generation, farmers and fishermen and endangered species.

As the Corps reviews operational approaches we would like to provide one alternative for consideration. This approach was developed with the support of ARC and the metro water supply providers and is called the “Maximum Sustainable Release Rule.” A summary explanation of this proposal is attached as Exhibit D. Our analysis shows that the alternative we propose would be better for *all parties*, including the endangered species that inhabit the Apalachicola River.

The Corps should be encouraged to study this and other alternatives as it develops the new water control plans for the ACF Reservoirs. The Corps should also be encouraged to collaborate with its stakeholders. The ARC and the metro-area water providers stand ready to cooperate with the Corps and with the other stakeholders to find creative, constructive solutions to this long-standing controversy.

VII. Thank you and Closing

Madam Chair, thank you for allowing me to provide testimony on this important issue. The Atlanta Regional Commission and the Metropolitan North Georgia Water Planning District look forward to being a part of solutions that will help reduce the impacts of future droughts on the metro Atlanta area and the State of Georgia

EXHIBIT A

Pat Stevens

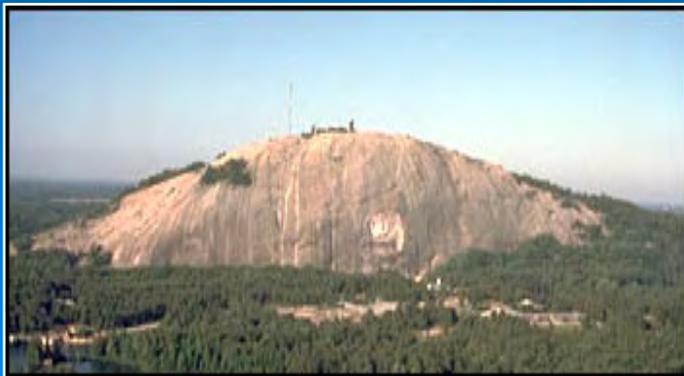
Atlanta Regional Commission

Drought Impacts Testimony

March 21, 2008

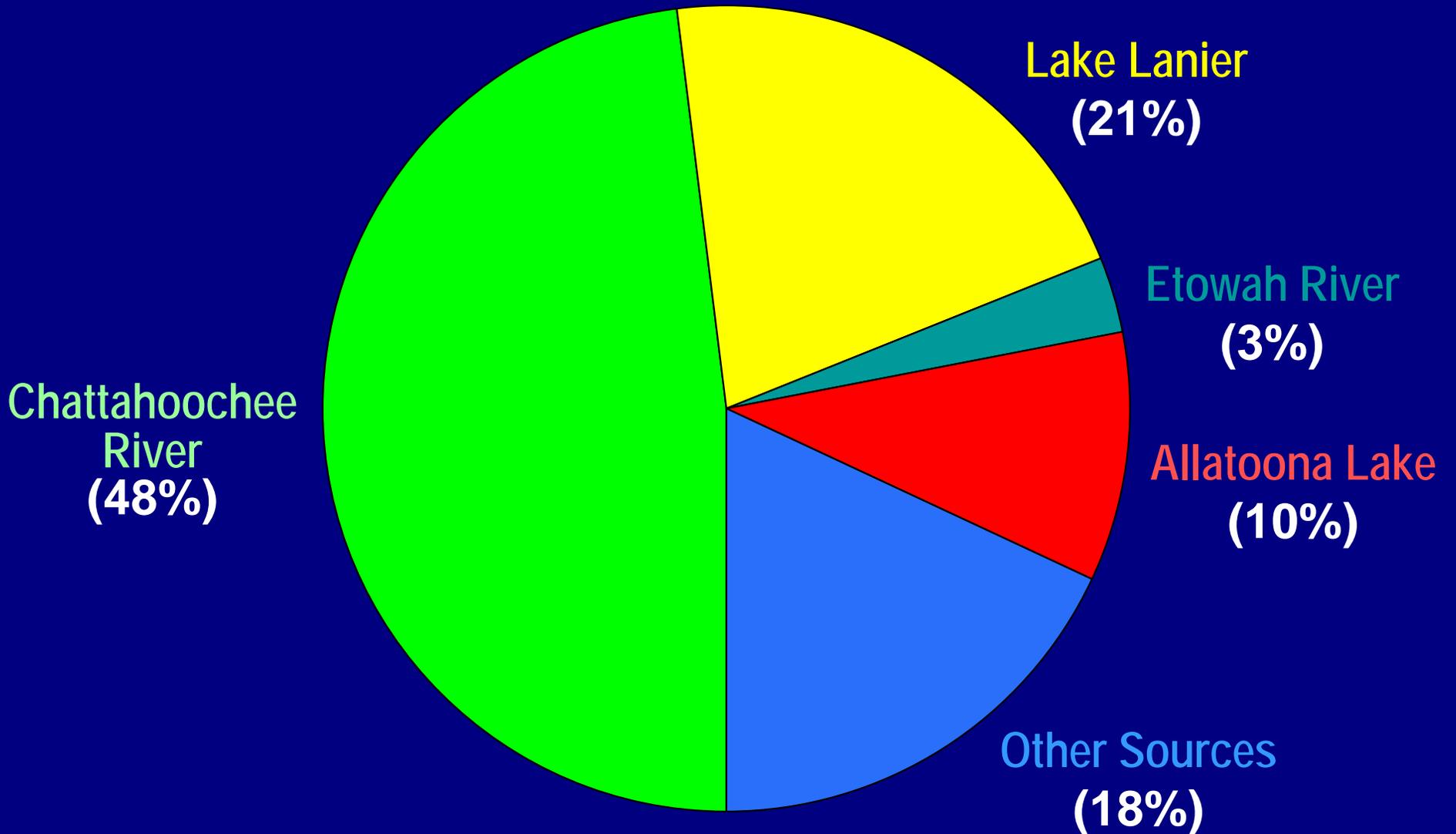


Water Sources



- **Surface water sources main source of supply**
- **Groundwater limited due to bedrock**

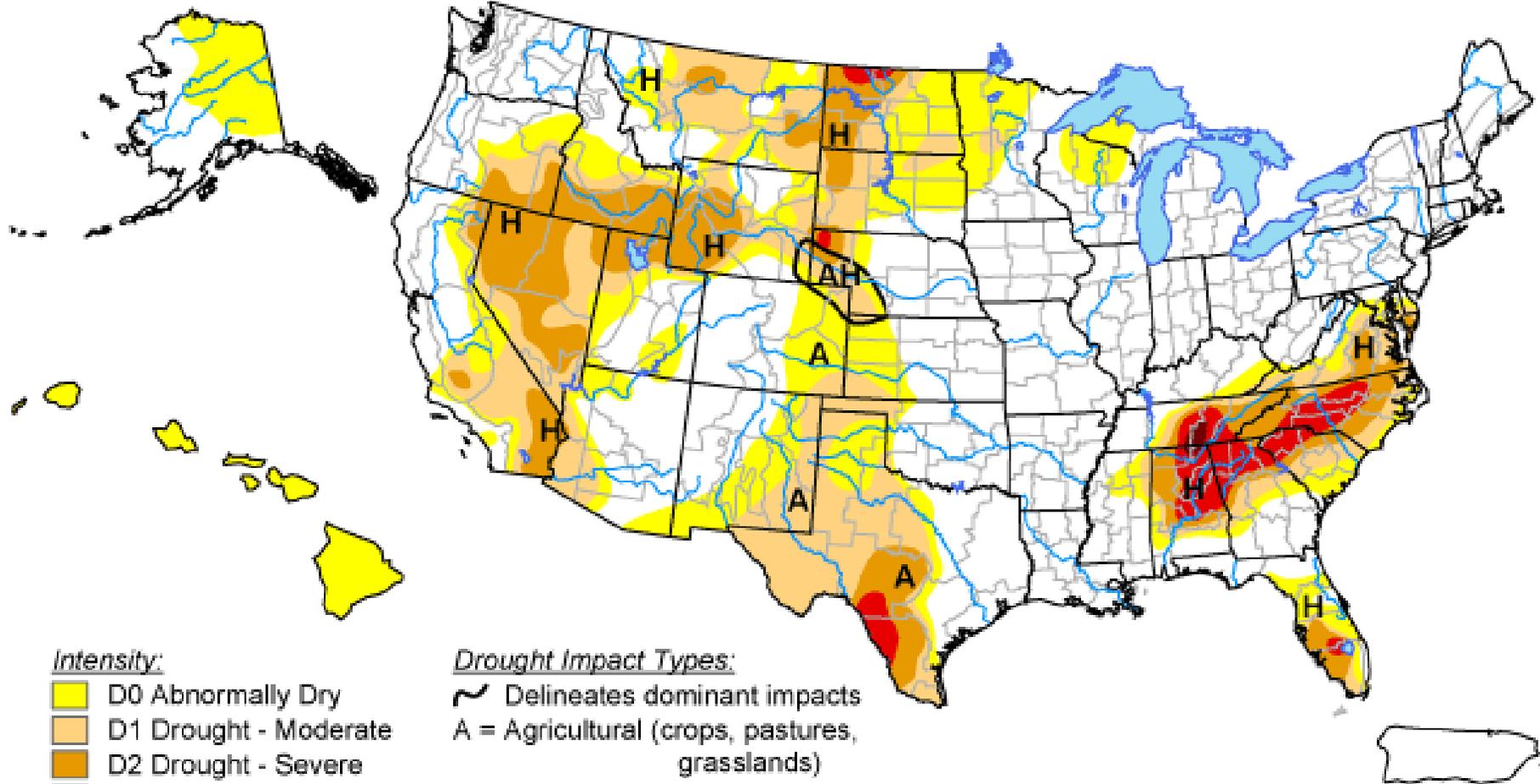
**WATER SUPPLY SOURCES
IN THE 16 County METRO AREA**



U.S. Drought Monitor

March 18, 2008

Valid 8 a.m. EDT



Intensity:

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

Drought Impact Types:

-  Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

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



Released Thursday, March 20, 2008

Author: Mark Svoboda, National Drought Mitigation Center

<http://drought.unl.edu/dm>



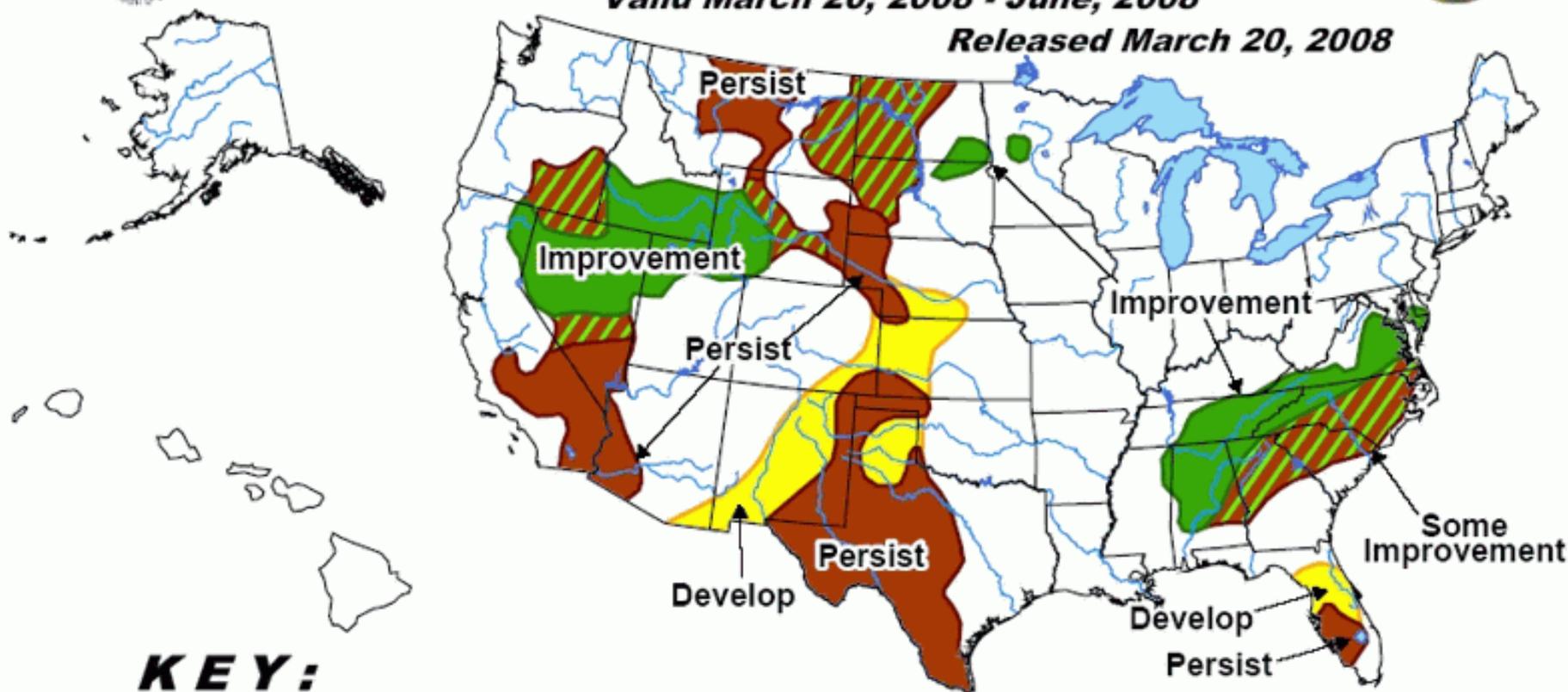
U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid March 20, 2008 - June, 2008



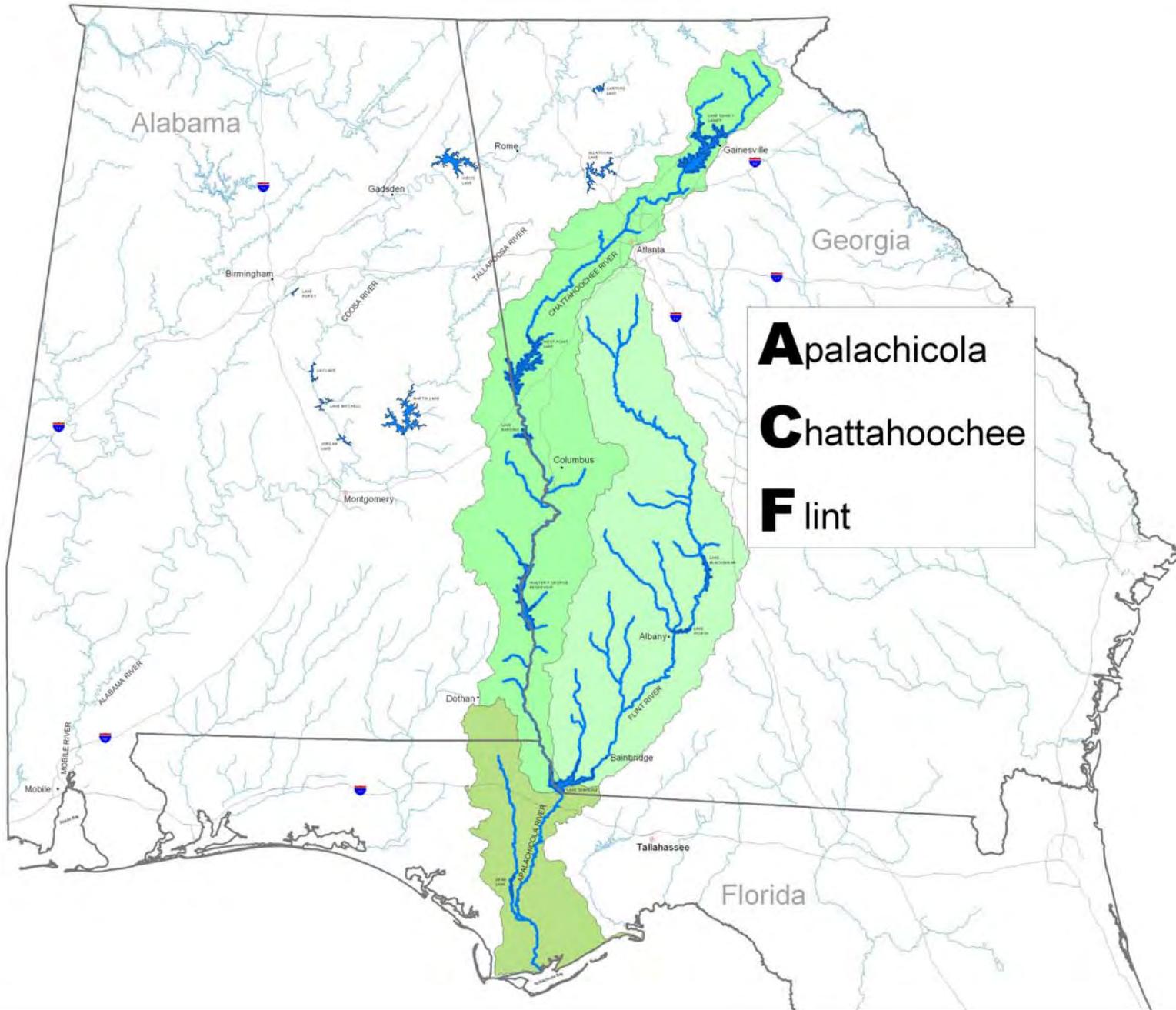
Released March 20, 2008



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.



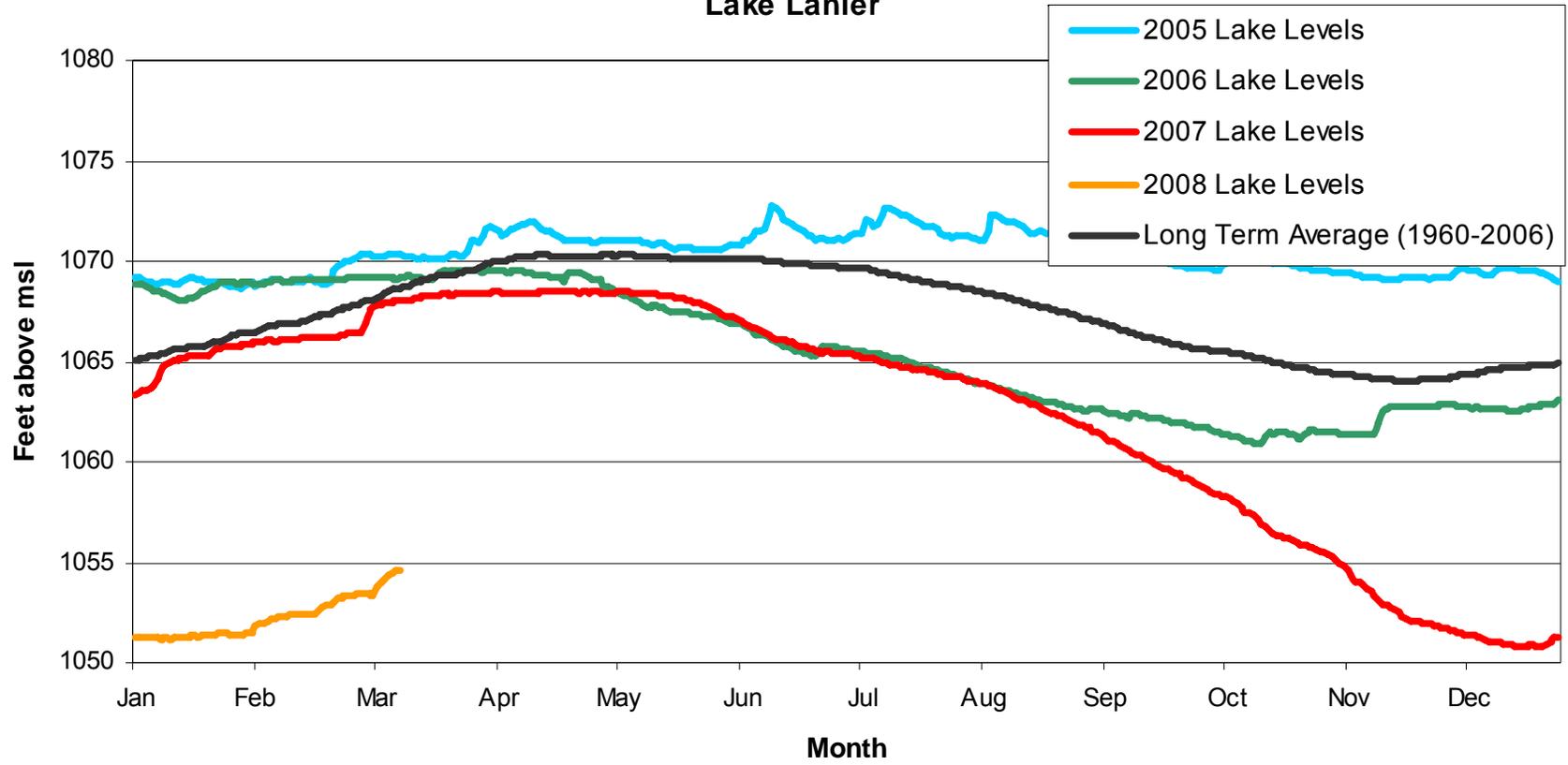
Corps Interim Operations Plan for ACF (IOP)

- Adopted March, 2006
- Restrictions on reservoir storage, prevents reservoirs from refilling
- Draws from storage to supplement flows in Florida (5000cfs)
- Unsustainable during dry conditions
- The IOP drained the lakes
 - Discharged 100% of inflow and 75% of storage
 - Delivered 220% of natural flow to Apalachicola

ACF - Corps Emergency Drought Operations (EDO)

- Suspends limitation on storing water in reservoirs until composite storage reaches top of Zone 3
 - Reduces supplemental flows to Florida (4150 cfs)
 - Until June 1, 2008
- 

Midnight Pool Elevation Lake Lanier



Economic Impacts

- Landscape and Garden Industry
- Water Based Recreation
- Water System Lost Revenue

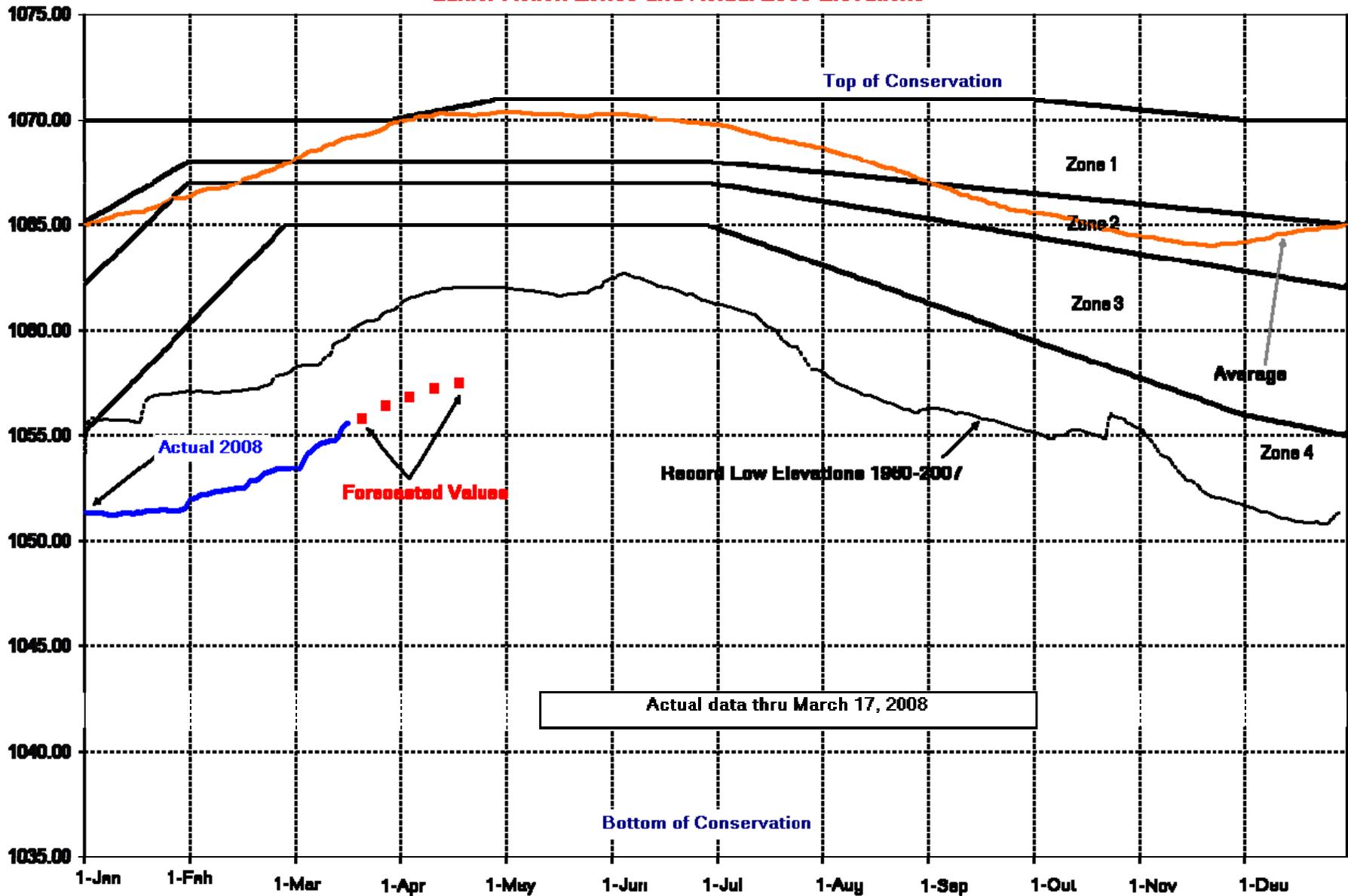


Federal Reservoirs in Metro Atlanta

- Lanier reached record low on December 26, 2007 (1050.79)
- Lanier is currently 1056 and expected to rise slightly over the next month
- Allatoona is currently 839 and expected to be stable over the next month

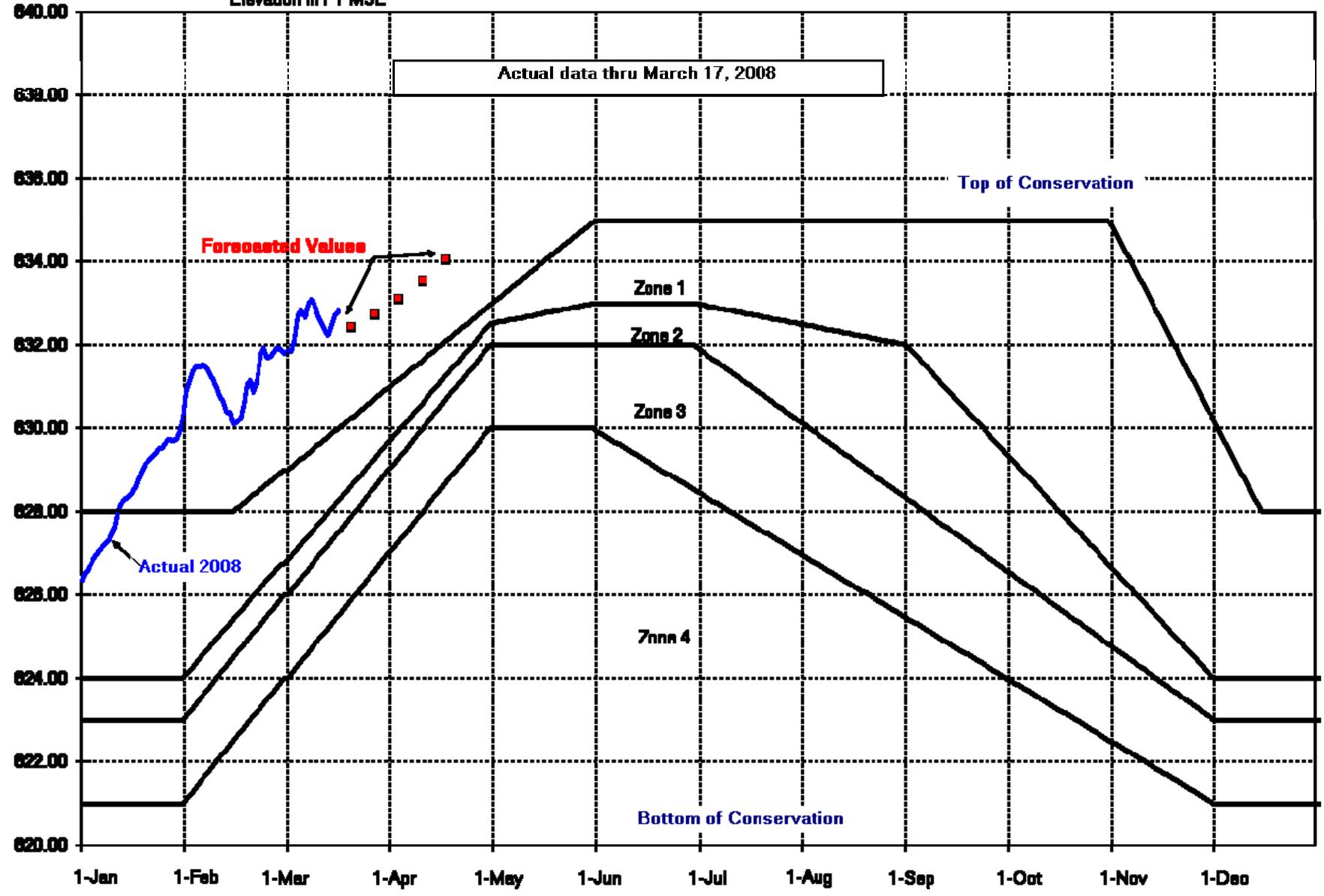
Elevation in FT MSL

Lanier Action Zones and Actual 2008 Elevations



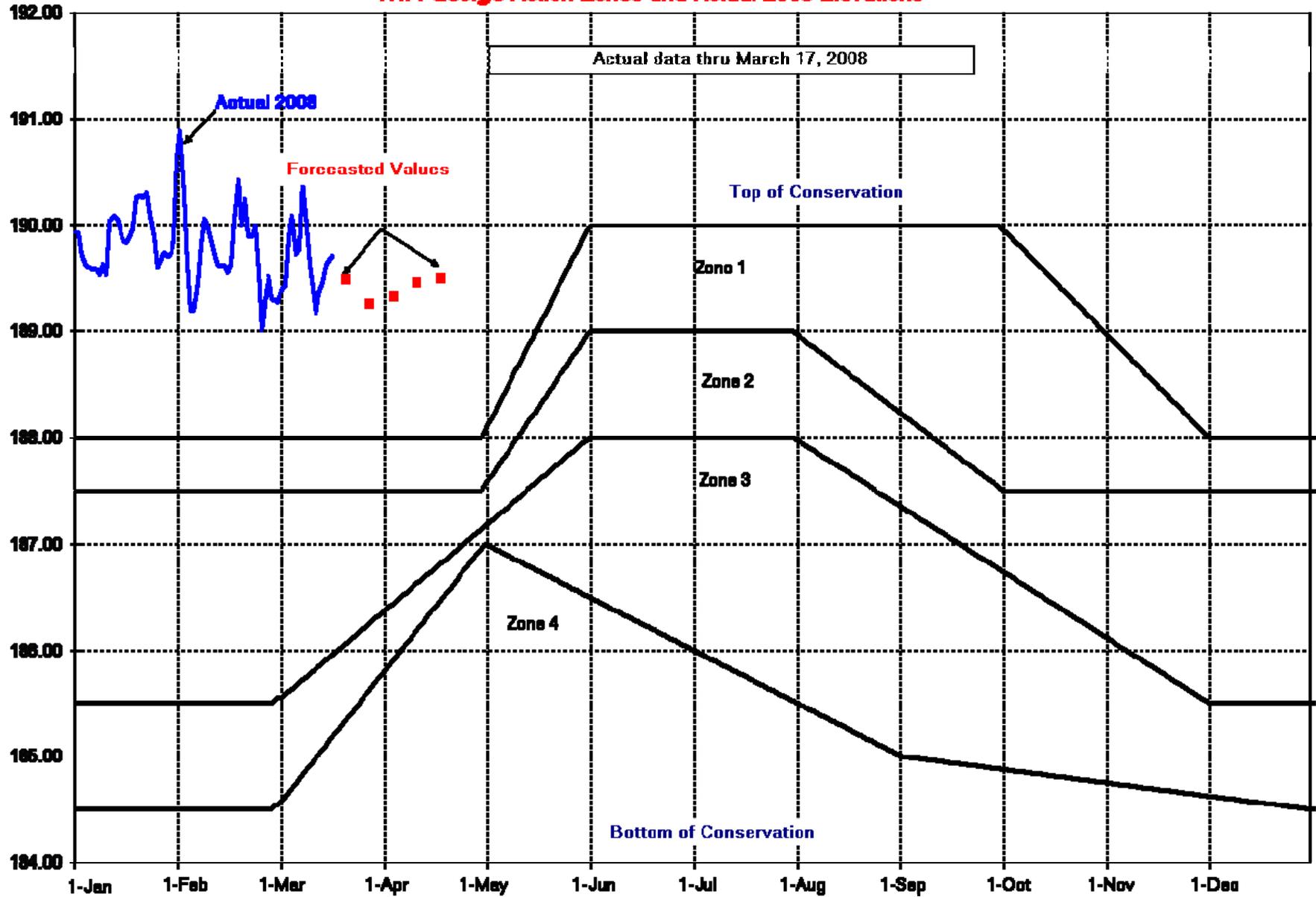
Actual data thru March 17, 2008

Elevation in FT MSL *West Point Action Zones and Actual 2008 Elevations*



Elevation in FT MSL

W.F. George Action Zones and Actual 2008 Elevations

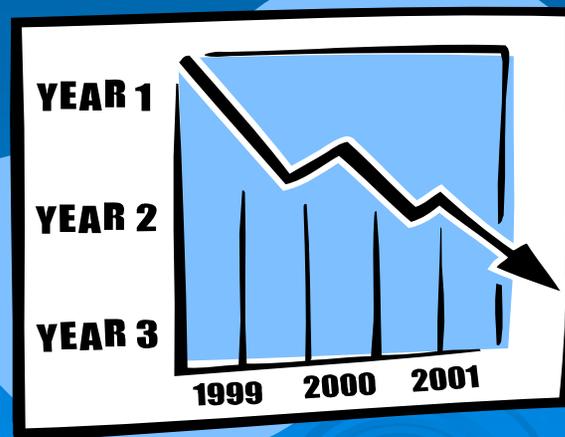
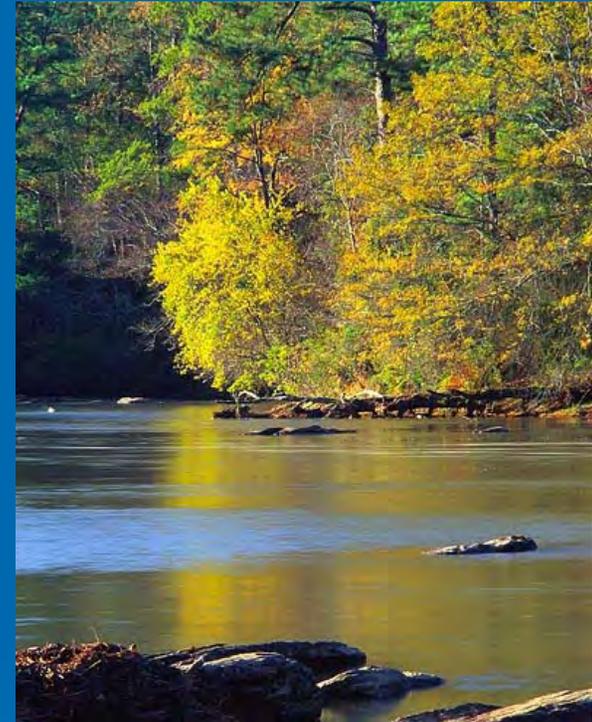


Other Local Small Lakes

➤ Smaller reservoirs

- Cherokee – 92% of storage left
- Clayton – 100% of storage left
- Douglas – 100% of storage left
- Fayette – Kedron 94%, Horton 62%
- Henry – 90% of combined storage left
- Rockdale – 95% of storage left
- Palmetto – 100% of storage left

Aggressive water conservation is a **CRITICAL** element of our future



District Water Conservation Measures

1. Conservation pricing
 2. Replace old inefficient toilets
 3. Assess and reduce system leakage
 4. Rain sensor legislation
 5. Low flow pre-rinse restaurant spray valves
 6. Sub-unit meter in new multi-family buildings
 7. Conduct residential water audits
 8. Distribute low-flow retrofit kits
 9. Conduct commercial water audits
 10. Education and public awareness
- 

Maximum Sustainable Release Rule: Three Main Principles

1. Base reservoir releases on a “Balanced Budget Rule”
 - Consider available reservoir storage and forecasted inflow
 - Provide a 90% probability of refill by June 1
2. Maintain “Reserve Storages” as a failsafe
3. Adjust operations to meet specific operational objectives

Thank You



EXHIBIT B

Q&A re Authorized Purposes of Buford Dam

Lewis B. Jones, King & Spalding LLP

March 11, 2008

QUESTIONS

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 - 1.3. What does the authorizing legislation say about the purposes of the project?..... 2
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 - 1.5. What did the “survey report” approved by the Chief of Engineers say about the authorized purposes of Buford Dam? 4
 - 1.6. What did the Army Corps of Engineers tell Congress about the purposes of the project when it requested authorization for it? 4
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 - 2.2. Has any court issued a decision regarding the authorized purposes of Buford Dam?..... 7
 - 2.3. Does the decision of the United States Court of Appeals for the D.C. Circuit (Southeastern Federal Power Customers v. Geren) invalidating the Settlement Agreement for Lake Lanier mean that water supply is not an authorized purpose of Lake Lanier? 7
 - 2.4. I’ve seen a quote from an Eleventh Circuit opinion that appears to address this issue. Doesn’t that mean the issue has been decided by the Eleventh Circuit?..... 8

ANSWERS

1. Questions about the authorized purposes for Buford Dam

1.1. What are the authorized purposes of Buford Dam and Lake Lanier?

The authorized project purposes for the reservoir are: flood control; hydroelectric power generation, navigation, recreation, water quality, water supply, and, fish and wildlife conservation.

1.2. Does any official document specifically enumerate the “authorized purpose” of Buford Dam? If so, what does it say?

Short Answer: The Corps’ official position regarding the authorized and operating purposes of its projects is set forth in the Code of Federal Regulations at 33 C.F.R. § 222.5. This regulation identifies “municipal and industrial water supply” as one of the “authorized” and “operating” purposes of Lake Lanier.

Long Answer:

Neither the authorizing legislation nor the documents referenced by the authorizing legislation enumerate specific “authorized purposes.” In fact, this terminology was not even used by the Corps in 1946 when Buford Dam was authorized by Congress.

However, the Corps’ official regulations enumerate the “authorized” and “operating” purposes for each and every one of its reservoirs. **This regulation identifies “Municipal and/or Industrial Water Supply” as a “Project Purpose” of Buford Dam and Lake Lanier.** See 33 C.F.R. § 222.5.

The Corps promulgated these regulations response to a congressional mandate. Section 311 of the Water Resources Development Act of 1990, Pub. L. No. 101-640 (“WRDA 1990”), directed the Secretary of the Army to “conduct a study of the operations of reservoir projects which are under the jurisdiction of the Secretary (1) to identify the purposes for which each such project is authorized; and (2) to identify the purposes for which each such project is being operated.” The report—*Authorized and Operating Purposes of Corps of Engineers Reservoirs* (First Printing July 1992, *Second Printing* (with revisions not related to Buford Dam) November 1994)—was issued in 1992. The 1992/1994 Report specifically distinguishes “authorized purposes” from “incidental purposes.” The report identifies “water supply” as an “authorized purpose” of Buford Dam based on the original authorizing legislation. See *id.* at E-74. The report is the basis of the information published in the Code of Federal Regulations.

1.3. What does the authorizing legislation say about the purposes of the project?

Short Answer: Nothing.

Long Answer:

Buford Dam and Lake Lanier. Buford Dam and Lake Lanier were authorized by the Rivers and Harbors Act of 1945 (PL 79-14,) as amended by Section 1 of the Rivers and Harbors Act of 1946 (P.L. 79-525). This legislation does not, however, provide any details about the project or its authorized purposes.

Both bills were omnibus bills in which Congress “adopted” and “authorized” certain water projects “to be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers, in accordance with the plans and subject to the conditions recommended by the Chief of Engineers in the respective reports herein designated.” 60 Stat. 634. The list of authorized projects included certain works within the Apalachicola Chattahoochee Flint (“ACF”) River Basin, including the Buford Project, which were to be prosecuted in accordance with “the report of the Chief of Engineers, dated May 13, 1946.” (JA0834).

1.4. What do the “project documents” referenced in the authorizing legislation say about the authorized purposes of Buford Dam?

Short Answer: The say that water supply for the Atlanta area was one of the purposes of the project.

Long Answer:

The Rivers and Harbors Act of 1946 authorized Lake Lanier/Buford Dam to be constructed in accordance with “the report of the Chief of Engineers, dated May 13, 1946.” The report of the Chief of Engineers, which Congress approved, is a 7-page report generally recommending approval of a study prepared by the Division Engineer. *See* H.R. Doc. No. 80-300 (1947). With respect to Buford Dam, the Chief of Engineers noted that “[t]he city of Atlanta and local interests in that area urge that a reservoir be constructed above Atlanta to meet a threatened shortage of water for municipal and industrial purposes.” *See* Chief of Engineers’ Report ¶ 9. The Chief of Engineers further explained that the Division Engineer had proposed construction of just such a dam: specifically, that he had proposed construction of the Buford Reservoir on the Chattahoochee River that would, among other things, “assure an adequate supply of water for municipal and industrial purposes in the Atlanta metropolitan area.” *See* Chief of Engineers’ Report ¶ 11(d). Finally, the Chief of Engineers generally recommended that the previously-authorized plan for the development of the ACF basin “be modified to provide for construction of Buford multiple-purpose reservoir . . . in accordance with the plans of the Division Engineer.” Chief of Engineer’s Report ¶ 16.

The Chief of Engineers, in turn, recommended approval of a “Survey Report” prepared by the Division Engineer. The Survey Report explains the recommended plan of development together with its expected benefits.

1.5. What did the “survey report” approved by the Chief of Engineers say about the authorized purposes of Buford Dam?

Short Answer: that the proposed project would provide “assured water supply for the city of Atlanta.”

Long Answer:

The 1946 “Survey Report” by the Division Engineer is an extensive document that explored all aspects of the planned developments for the Chattahoochee River. Despite the breadth of its focus, the Survey Report discussed the water supply needs of metropolitan Atlanta in some detail. *See* Division Engineer’s Survey ¶¶ 79-80, *reprinted in* H.R. Doc. No. 80-300 (1947) at 34.¹

Paragraph 79 of the Survey Report provided estimates of the region’s present and projected future water supply demands. Paragraph 80 described how Buford Dam might operate to meet these demands. To meet the area’s then “present needs,” the Division Engineer recommended that the dam release up to 600 cfs for withdrawal near Atlanta. *See id.* ¶ 80. The Survey Report had already explained, however, that the area’s projected future demands for municipal and industrial water supply would reach 800 cfs by the year 1965. *See id.* ¶ 79. Thus, the Division Engineer suggested that adjustments to the 600 cfs maximum release would probably have to be made in the future to accommodate increasing demand as the area developed. *See id.*

The Division Engineer also considered the trade-off between the need to make such adjustments and the impact on hydropower. He first noted that a small off-peak generator could be installed to capture the energy that would otherwise be lost by virtue of water supply releases. *See id.* He also noted, however, that increases in water supply releases in the future would impinge somewhat on power returns from the dam. *See id.* He did not view this as a problem. Instead, he noted that such adjustments would not materially affect returns from the dam and would not affect downstream power benefits at all. *See id.* In any event, the Division Engineer concluded that **“the benefits to the Atlanta area from an assured water supply for the city and the Georgia Power Company’s steam plant downstream would outweigh any slight decrease in system power value.”** *See id.*

1.6. What did the Army Corps of Engineers tell Congress about the purposes of the project when it requested authorization for it?

Short Answer: That “water for the City of Atlanta” was one purpose of the project.

¹ The Division Engineer’s Survey was reprinted, along with the recommendation of the Chief of Engineers, in H.R. Doc. No. 80-300 (1947). Note, however, that House Document 80-300 was compiled in 1947, after the vote on authorization. For this reason, it includes documents from both before and after the vote on authorization.

Long Answer:

When asked about the authorized purposes of the Buford Project, the Corps specifically stated that it was a multiple-purpose project that would provide “water for the city of Atlanta”:

Q: Is this a power project mainly?

A: Colonel Feringa: This is basically a multiple-purpose project.
**** [T]here is proposed a multiple purpose dam at the Buford site which would provide power; **also water for the city of Atlanta....**”

Hearings on Rivers and Harbors Bill (May 3, 1946). This exchange is the only instance during the pre-authorization hearing that the authorized purposes of Buford Dam were discussed.

1.7. What did the Army Corps of Engineers tell the State of Georgia about the purposes of the project when it requested the State’s support for the project?

Short Answer: The Corps of Engineers told Governor Arnall that the project for which it sought authorization would “ensure adequate municipal and industrial water supply for the Atlanta metropolitan area.”

Long Answer: In its consultation with the Governor of the State of Georgia prior to submitting its recommendation to Congress, the Corps stated the Buford Project would “ensure adequate municipal and industrial water supply for the Atlanta metropolitan area.” Specifically, the Corps told Governor Arnall that it was recommending ...

[T]hat a multi-purpose reservoir be provided on the Chattahoochee River at the Buford site, about 45 miles above Atlanta, to regulate the stream flow for navigation below Columbus and for the economical operation of the existing and proposed power plants downstream, **to ensure adequate municipal and industrial water supply for the Atlanta metropolitan area**, and to reduce flood stages and damages in the valley below.

See Letter of Ellis Arnall, Governor of the State of Georgia to Chief of Corps Engineers (April 29, 1946).²

² Governor Arnall’s letter pre-dates the report of the Chief of Engineers, which was issued on May 13, 1946. The State’s comments were based on the survey prepared by the Division Engineer.

Note that Congress specifically directed the Corps to consult with the State before submitting any plans, proposals or reports to Congress. *See* Pub. L. No. 79-14 (1945) § (a). Congress directed the Corps to consult with the State because it recognized the “interests and rights of the states in the development of the watersheds within their boundaries.” *See id.* For this reason, the Corps “traditionally defers to the adverse view of a Governor on a proposed project located in his or her state.” *See* EP 1165-2-1 ¶ 3-3 (“Opposition by a State”) (July 30, 1999). *See also* Pub. L. No. 79-14 (1945) § (a). If the Corps were to recommend a project over a Governor’s objection, the Governor’s opposition would have to be fully documented and submitted to Congress. *See id.* *See also* Pub. L. No. 79-14 (1945) § 2. Therefore it is highly significant that the Corps described the project as a water supply project in its communications with Governor Arnall.

1.8. What did the Army Corps of Engineers tell the public when it requested support for this project prior to its authorization?

Short Answer: That the proposed project would “ensure an adequate municipal and industrial waters supply for the Atlanta metropolitan area.”

Long Answer: The public notice stated the following about Buford Dam:

“[T]he report recommends ... that a multiple purpose reservoir be provided on the Chattahoochee River at the Buford site ... to regulate the stream flow for navigation below Columbus and for the economical operation of the existing and proposed power plants downstream, **to ensure an adequate municipal and industrial water supply for the Atlanta metropolitan area**, and to reduce flood stages and damages ...”

Public Notice (March 30, 1946)

1.9. What did the Corps say about the purposes of the Buford Project in the “Definite Project Report”—the report that was the basis of congressional appropriations for Buford Dam?

Short Answer: that water supply was one of the “principal” and “primary” purposes of the project that Congress authorized.

Long Answer:

The Definite Project Report for Buford Dam describes the authorized purposes of the project in two places, both of which include “water supply for Atlanta”:

“In addition to flood control discussed above, the **primary purposes** of the Buford project are production of hydroelectric power, increased flow for navigation in the Apalachicola river and an **increased water supply for Atlanta.**”

Definite Project Report at 34 (1949).

“As previously stated, the principal purposes of the Buford project are: to provide flood control; to generate hydroelectric power; to increase the flow for open-river navigation; and to assure a sufficient supply of water for Atlanta.”

Definite Project Report at 41 (1949).

2. Questions about the litigation

2.1. Has the authority issue been presented to any court?

The authority issue is presented in several pending cases, but it has never been decided by any court. Specifically, the issue is pending in *Georgia v. United States Army Corps of Engineers*, 3:07-cv-251 (M.D. Fla.) and *Alabama v. United States Army Corps of Engineers*, 3:07-cv-249 (M.D. Fla.). It is also a peripheral issue in *Southeastern Federal Power Customers v. Caldera*, Appeal No. 06-5080, which is currently pending before the United States Court of Appeals for the District of Columbia.

2.2. Has any court issued a decision regarding the authorized purposes of Buford Dam?

No.

The issue is directly presented in *Georgia I* and was partially briefed to the court in 2001. Briefing was interrupted, however, when the court decided to stay proceedings to avoid any conflict with proceedings in the *Alabama* case.

After Georgia raised the authority issue in *Georgia I*, the Alabama and Florida amended their pleadings in the *Alabama* case to allege that water supply is *not* an authorized purpose of Lake Lanier. There have been no substantive proceedings on these claims in the *Alabama* case, however.

2.3. Does the decision of the United States Court of Appeals for the D.C. Circuit (Southeastern Federal Power Customers v. Geren) invalidating the Settlement Agreement for Lake Lanier mean that water supply is not an authorized purpose of Lake Lanier?

No. The issue was not directly presented in the *SeFPC* appeal and the court specifically declined to address it.

The *SeFPC* appeal related to a settlement agreement between the Water Supply Providers, the Southeastern Federal Power Customers (“SeFPC”), the United States and Georgia. The settlement agreement provided for the execution of interim contracts between the Corps and the Water Supply Providers to secure water supply

storage space in Lake Lanier. Alabama and Florida challenged the Corps' authority to enter into this agreement and the D.C. Circuit sustained this challenge.

The court's decision, however, is strictly limited to the authorization provided by the Water Supply Act of 1958 (the "WSA"). There are two potential sources of authority for the Corps' water supply operations—the WSA is one, and the original authorization for the project under the Rivers and Harbors Act of 1946 is the other. The settling parties disagree about the original authorization. Therefore, for settling purposes only, the settling parties agreed to rely exclusively on the WSA in constructing and defending the settlement agreement.

The WSA provides general authority for the Corps to include water supply storage in all of its projects subject to certain constraints. The authority provided by the WSA is limited to projects that do not severely impact other project purposes or require a "major operational change." These constraints do not apply to projects that were originally authorized for water supply.

The *SeFPC* court determined that the settlement agreement could not be authorized under the WSA because the agreement would require a "major operational change." Although we disagree with this holding, it does not have any bearing on the authority provided by the original authorizing legislation. Therefore this issue is still pending and will be decided in subsequent litigation.

2.4. I've seen a quote from an Eleventh Circuit opinion that appears to address this issue. Doesn't that mean the issue has been decided by the Eleventh Circuit?

The quote is from *Alabama v. United States Army Corps of Engineers*, 424 F.3d 1117, 1122 (11th Cir. 2005), in which the United States Court of Appeals for the Eleventh Circuit vacated a preliminary injunction issued by the Northern District of Alabama. Before getting to the substance of a scathing opinion holding that the Northern District of Alabama had abused its discretion in multiple instances in its handling of the litigation, the Eleventh Circuit stated as "background" that "Lake Lanier was created for the explicitly authorized purposes of flood control, navigation, and electric power generation." The court also stated that, "although not explicitly authorized by Congress, the Corps has historically maintained that water supply use is an "incidental benefit" flowing from the creation of the reservoir." *Id.*

These incorrect statements are included in the "Background" section of the opinion because they were not relevant to the issues addressed in the substance of the Eleventh Circuit opinion. None of the parties to the case discussed the issue in their briefs to the court. In legal terms this language is "*dicta*" with no legal effect.

The United States and the Southeastern Federal Power Customers—who strongly disagree with Georgia and the Water Supply Providers about the authorized purposes of Buford Dam—are both on record that the Eleventh Circuit's statement is *dicta* that should be disregarded.

We have no idea why the 11th Circuit included this language in the opinion or where it got its information. The court did not cite any authority to support its statement. It is clear that court did not actually read the authorizing legislation for Lake Lanier, because the authorizing legislation does not “explicitly” authorize any purpose (contrary to the court’s statement). What appears to have happened, instead, is that court may have searched the internet for newspaper articles or other similar sources for background information to fill out its opinion. Not realizing that the issue is a source of controversy, the Court appears to have accepted as true statements that parties with an interest in the litigation have made about the authorized purposes of Buford Dam.

EXHIBIT C

Streamflow Depletions in the Flint River Basin Caused by Irrigation Pumping from the Floridan Aquifer in Drought Years

	Depletions Caused by Groundwater Pumping*			Depletions Caused by Surface Water Withdrawals	Total**	
	Spring Creek Gage (cfs) ¹	Bainbridge Gage (cfs) ²	Total GW (cfs) ³	Total SW (cfs) ⁴	cfs	mgd ⁵
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	3.8	42	46	48	94	60
April	8.8	79	88	92	179	116
May	32.9	252	285	297	582	375
June	40.9	320	361	376	737	476
Jul	33.7	338	372	388	759	490
Aug	29.5	352	382	398	779	503
Sept	21.9	341	363	378	741	478
Oct	10.5	220	231	240	471	304
Nov	8.3	171	179	187	366	236
Dec	4.7	130	135	140	275	178
Average	203 cfs			212 cfs	415 cfs	268 mgd

Source: Flint River Basin Regional Development and Conservation Plan (Mar. 20, 2006)

*Actual groundwater withdrawals for irrigation are much higher.

**Depletions for municipal and industrial use within the Flint River Basin are not included.

¹ See Flint River Basin Regional Development and Conservation Plan (“FRB Plan”) at 111, Table 6.2(c) (“Backlog” column). Spring Creek is a former tributary of the Flint River that now flows directly into Lake Seminole.

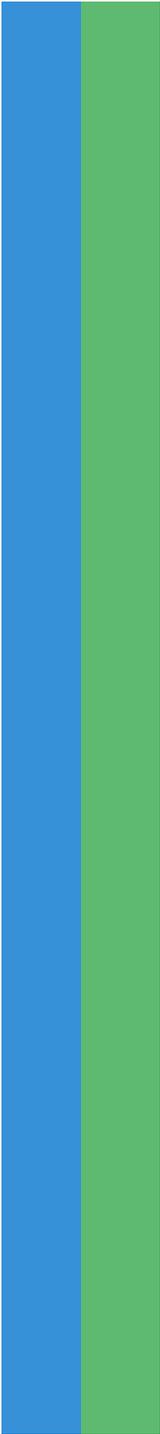
² See FRB Plan at 112, Table 6.2(e) (“Backlog” column).

³ Numbers in this column exclude minor streamflow reductions from irrigation pumping within the Ichawaynochaway Creek drainage area. See FRB Plan 110, Table 6.2(a).

⁴ The FRB Plan does not provide monthly data for surface water withdrawals. It does state, however, that “approximately 250 mgd [387.5 cfs] are used basin wide by agricultural surface water withdrawals in July (the peak month) of a typical irrigation season during a drought year.” FRB Plan at 15. The estimates of monthly use and yearly average provided in this column were derived by assuming that surface water withdrawals vary seasonally in the same manner as groundwater withdrawals, which we believe is a safe assumption.

⁵ The conversion between mgd (millions of gallons per day) and cfs (cubic feet per second) is as follows: 1 mgd = 1.55 cfs; 1 cfs = .646 mgd.

EXHIBIT D



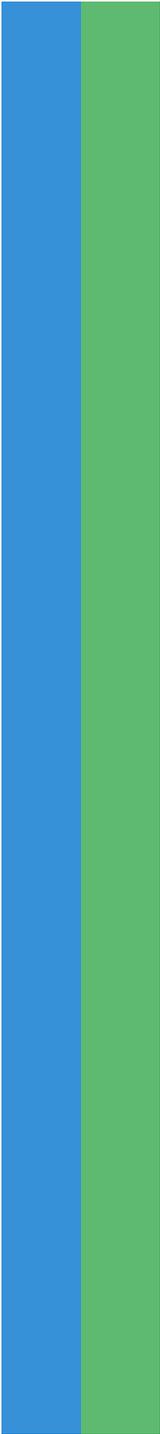
Alternative ACF Reservoir Operations

Overview of the Maximum Sustainable Release Rule

March 2008

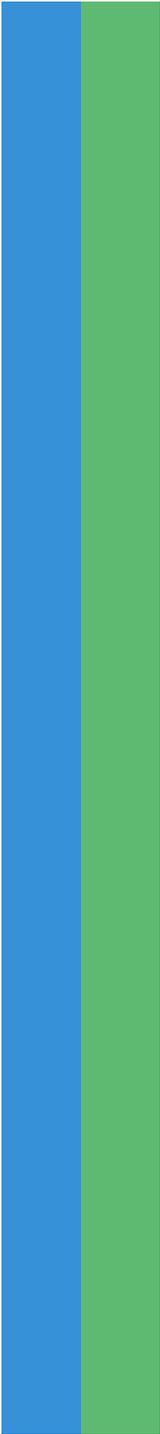
Daniel P. Sheer, Ph.D, P.E
HydroLogics, Inc.

Lewis B. Jones
King & Spalding LLP



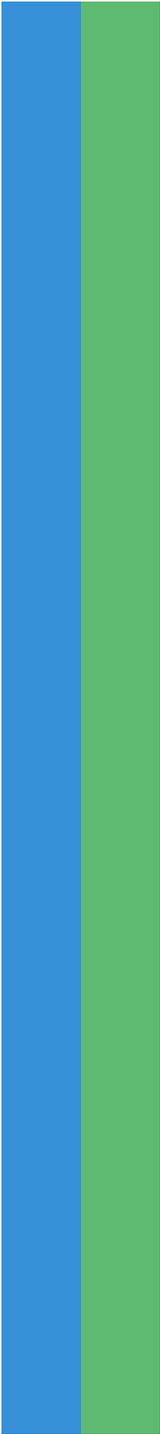
The Interim Operations Plan (IOP) Operations for the ACF

- The IOP was hastily adopted in 2006 in response to litigation by Florida.
- It is demonstrably flawed and not sustainable.
 - It prevents the reservoirs from refilling and requires the Corps to use reservoir storage to artificially maintain high flows in the Apalachicola River.
 - The IOP nearly emptied the ACF reservoirs in 2007.
- The IOP was suspended by the EDO in November 2007. However, the EDO is scheduled to terminate on June 1, 2008 and will be lifted if Composite Storage reaches Zone 2.
- We simply cannot return to the IOP. Therefore, a new interim plan must be developed until the Water Control Manuals can be updated.



There Are Alternative Management Options Available That Can Accommodate the Demands of All Users

- We need a new operating plan based on facts and sound science.
 - The facts will show that metro area water use is reasonable ... just 1% of the annual water budget in the ACF River Basin in an average year and just 2% in an extreme drought year.
 - The system can accommodate these demands if the reservoirs are properly operated.
- We have proposed on plan of operations—the “Maximum Sustainable Release Rule” or “MSRR”—that would perform better than the IOP for almost all operational objectives that have been identified.
 - While the MSRR can be improved based on input from other stakeholders, it demonstrates that sound alternatives to the IOP are available.

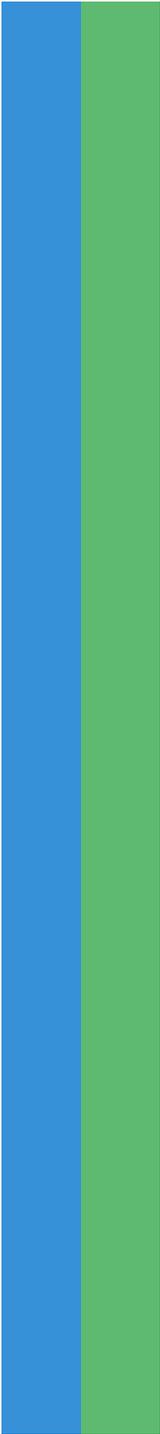


Maximum Sustainable Release Rule: Three Main Principles

1. Make release decisions based upon a “Balanced Budget Rule”
 - Consider available reservoir storage and forecasted inflow
 - Provide a 90% probability of refill by June 1
2. Maintain “Reserve Storages” as a failsafe
3. Adjust operations to meet specific operational objectives

1. Balanced Budget Rule

- The Annual Water Budget is the total amount of water available for all purposes in a given year.
- Reservoir storage is available to *manage* the annual budget, but reservoirs do not *increase* the budget.
 - Releasing water from storage is like spending money from a savings account in anticipation of future income to solve a cash-flow problem.
- An operating plan is sustainable only if annual releases (expenses) are roughly equivalent to annual inflow (income).
- A “Balanced Budget Rule” for the reservoirs will ensure that releases from storage do not exceed expected income.
 - The major flaw in the IOP is that it places high demands on reservoir storage to support minimum flows in the summer and fall without allowing the reservoirs to refill in the winter and spring. Therefore annual demands under the IOP substantially exceed annual income.
- The Balanced Budget Rule provides necessary security for water supply (by ensuring that reservoirs will not be emptied) but also produces a more natural flow regime.



1. Balanced Budget Rule

- To implement the balanced budget rule, follow these steps each week:
 - Determine how much water is in storage in the reservoirs
 - Prepare an inflow forecast to estimate the volume of inflow expected before June 1
 - Based on the status of system storage and the inflow forecast, calculate the amount of water that must be kept in storage to provide a high probability that all reservoirs will refill by June 1.
 - Water in excess of this amount is the “available storage”
 - Budget for all available storage to be released in accordance with a schedule adjusted to maximize benefits.

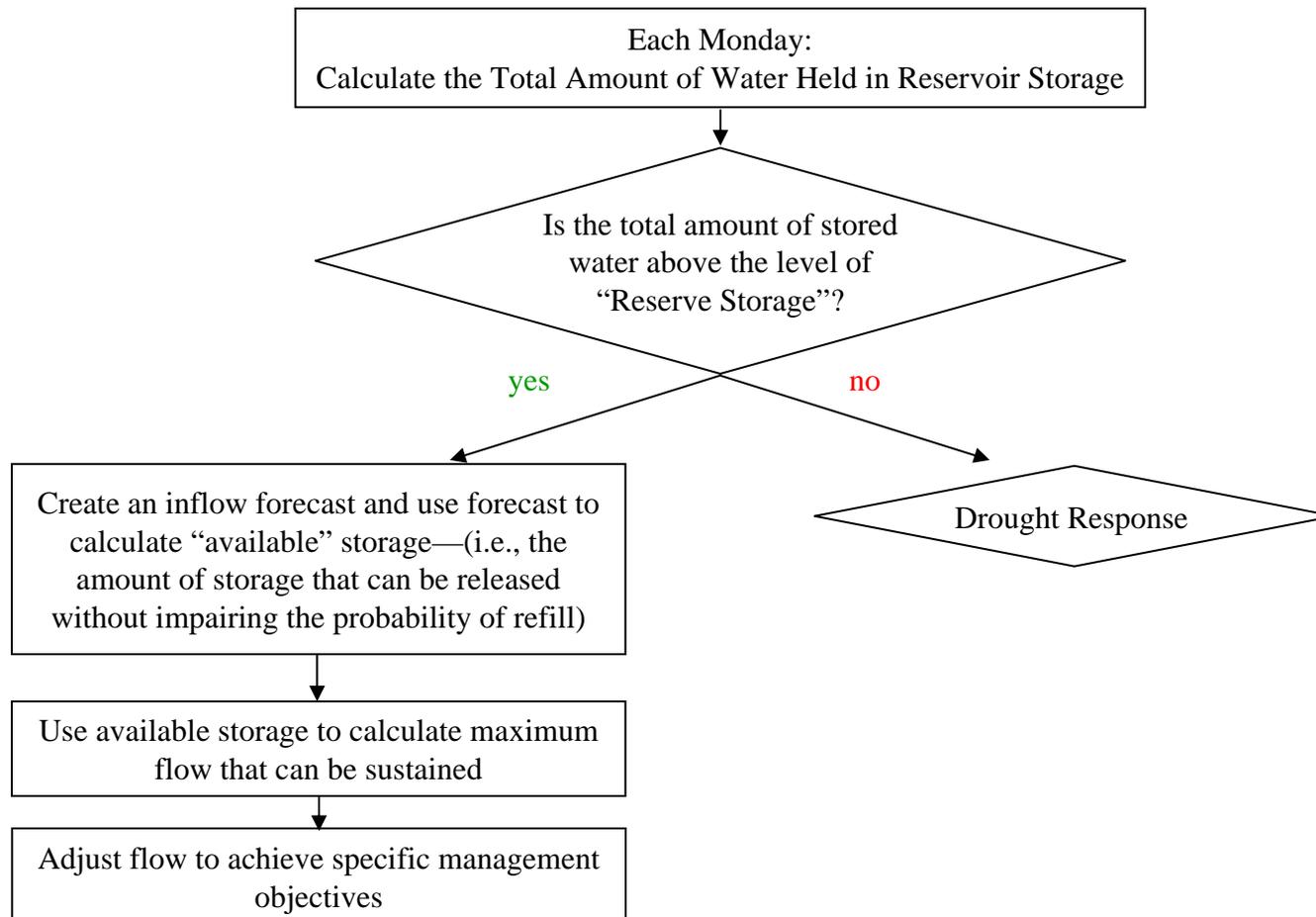
2. Reserve Storages

- “Reserve Storages” provide a failsafe in case the forecasts are wrong
 - The Reserve Storages are storages that must be available at the beginning of a drought to ensure that essential needs can be met throughout the drought.
 - Initiate drought contingency measures (minimum flows) when available storage falls below the level of the Reserve Storages.
 - Rarely be triggered in practice
- To calculate Reserve Storages, follow these steps:
 - Use simulation models to calculate the amount of storage required meet essential needs (water supply as well as minimum environmental flows) throughout a record drought
 - Add an appropriate margin of safety

3. Adjustments To Meet Specific Operational Objectives

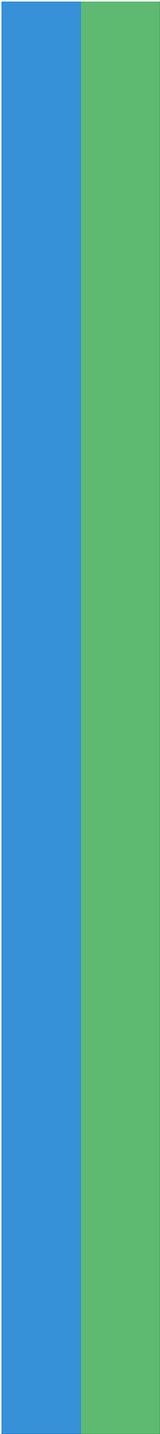
- Adjust operations to meet specific, measurable operational objectives
- Our proposal includes two adjustments in particular:
 1. Releases from reservoir storage should never be used to augment flows at the Chattahoochee gage above 10,000 cfs
 - No apparent value to mussels
 - Little increase in sturgeon spawning habitat
 - Stored water can be budgeted for other purposes, including the support of low summer flows for mussels
 2. Maximum ramping rates (40 cfs/day)
- Our proposed adjustments are just a starting point—operational objectives should be balanced among all stakeholders

Maximum Sustainable Release Rule: Decision Tree



Summary of Results

- Our alternative...
 - Outperforms the IOP/EDO on many important measures, including the key environmental measures, and perform at least as well on all others.
 - Can be improved with input from other stakeholders, but already clearly better than the IOP/EDO.
- Evaluate results using performance measures for the following objectives:
 - Mussel flows (low flows)
 - Sturgeon Habitat
 - Floodplain connectivity
 - Lake levels and system storage
 - Recreation impact
 - Power generation
- The remaining slides compare the MSRR to the IOP on these performance measures.

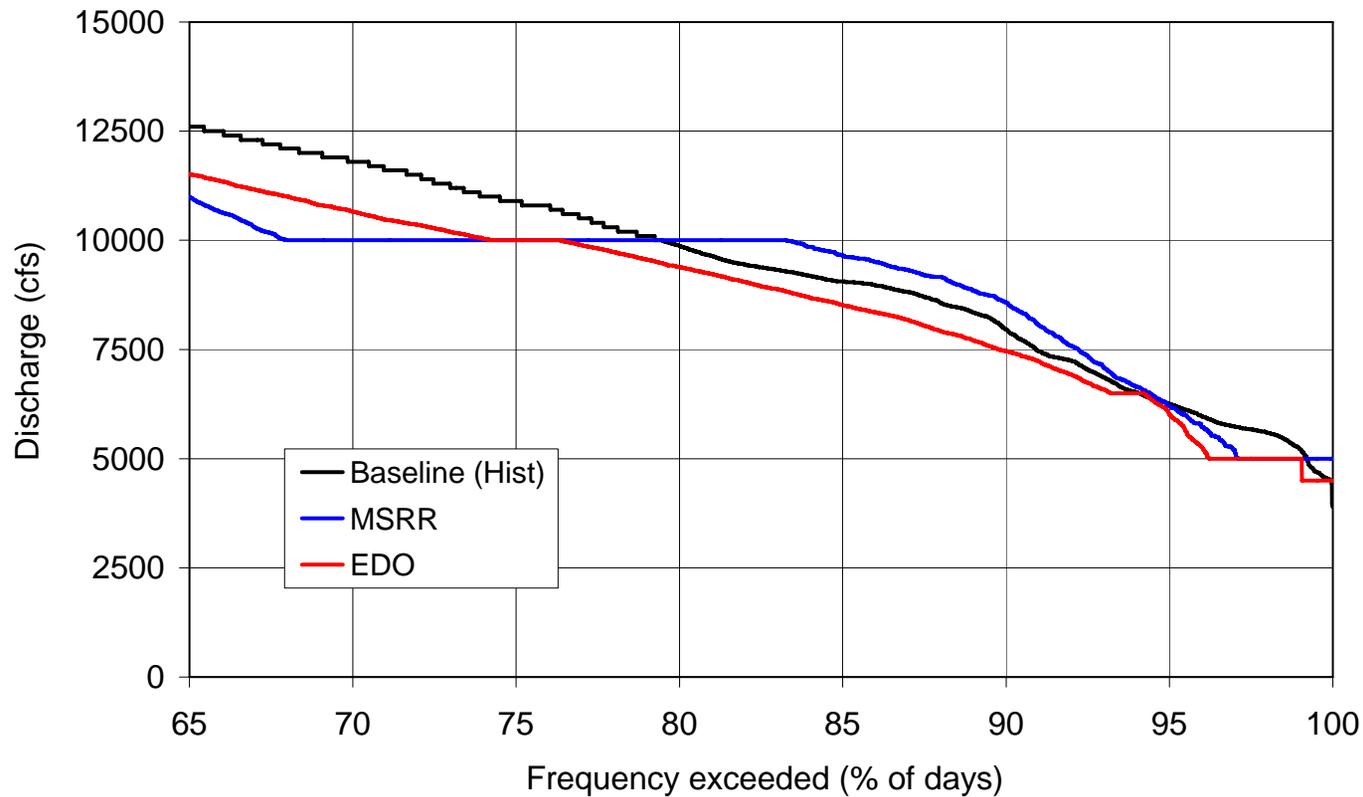


Mussel Flows: The MSRR Outperforms the IOP/EDO

- According to the US Fish & Wildlife Service, endangered and threatened mussels may be adversely affected by Apalachicola River flows less than 10,000 cfs.
- The MSRR has significantly lower frequency of flows less than 10,000 cfs when compared to the IOP/EDO.
- The MSRR is clearly superior based upon this performance measure and better protects the threatened and endangered mussels.

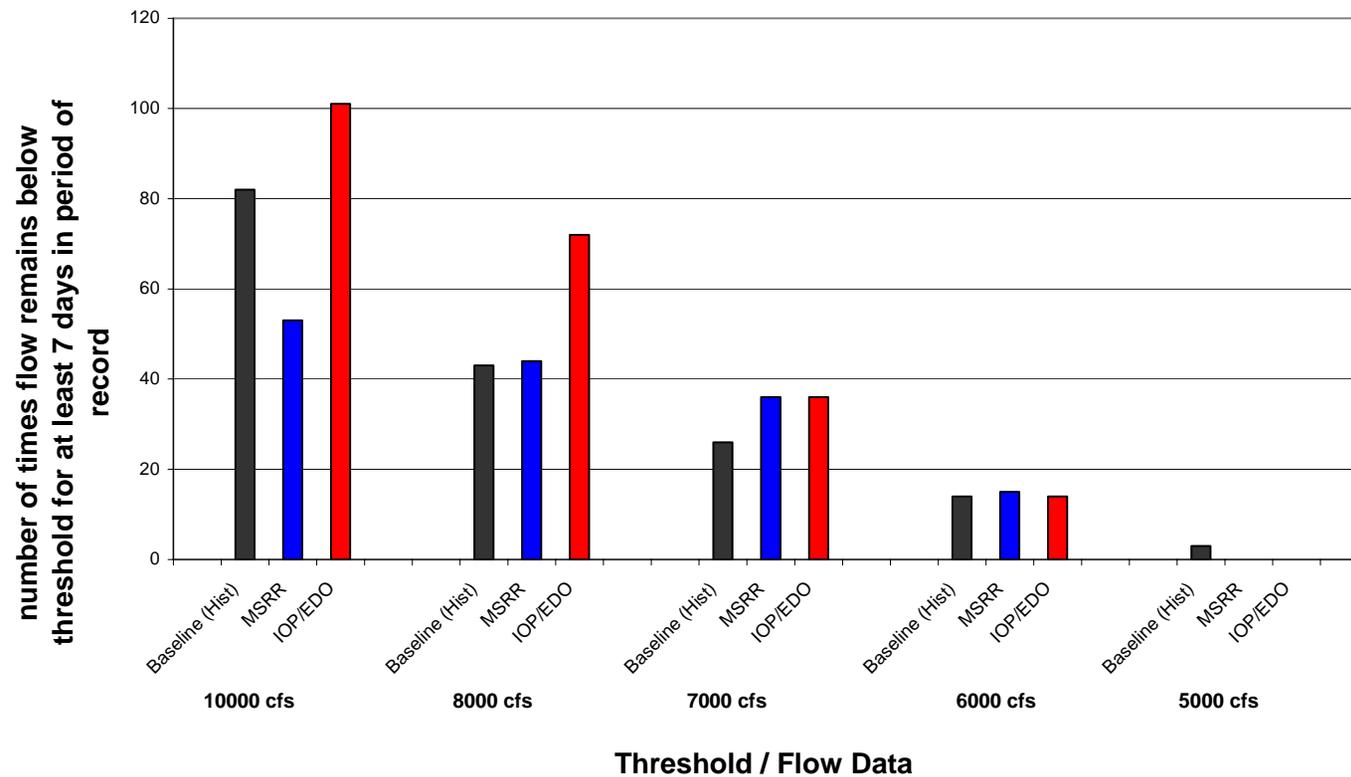
Higher Flows in Critical Range for Mussels

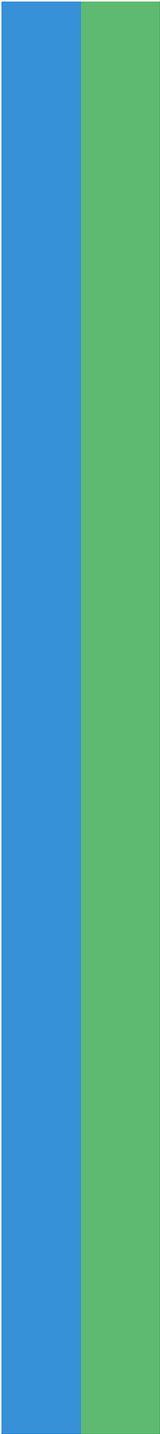
BiOp 4.2.2.A Flow Frequency at the Chattahoochee Gage



Fewer Occurrences of Sustained Low Flows

Frequency of Low Flows



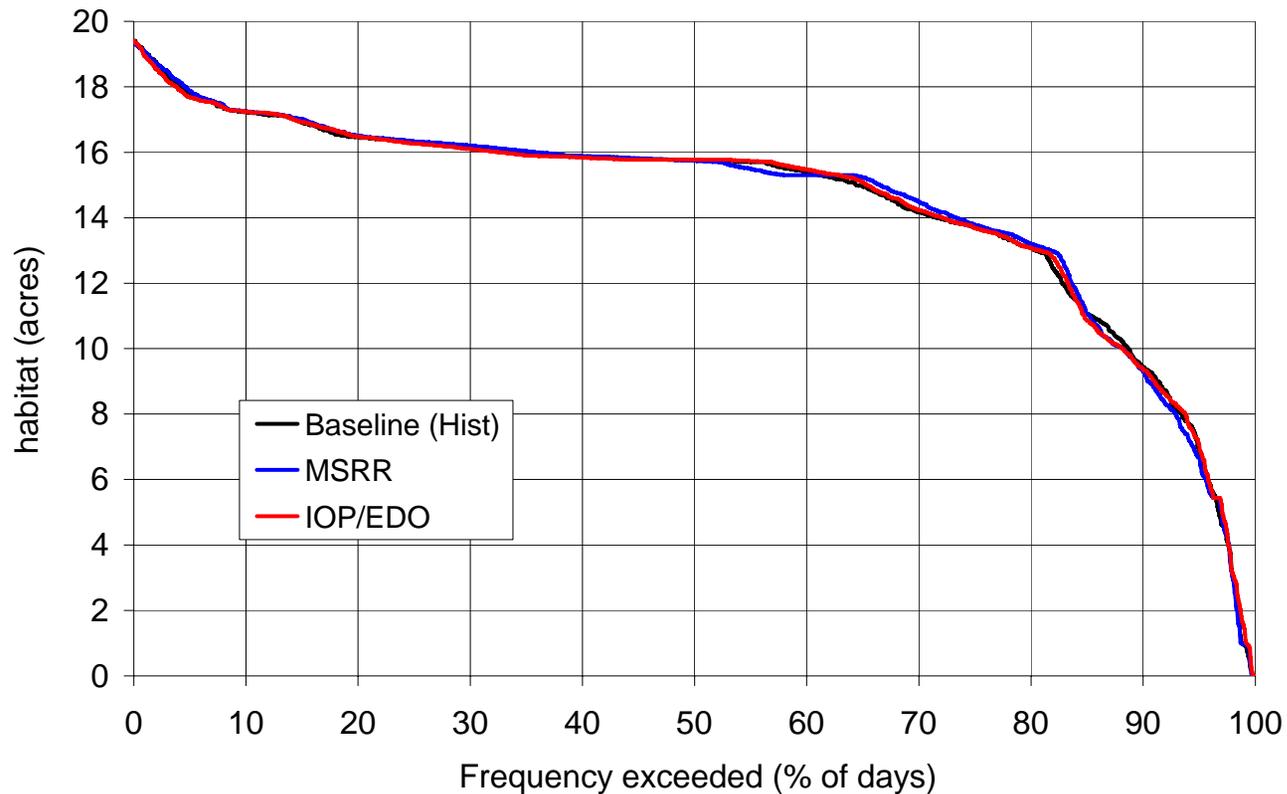


Sturgeon Habitat: The Amount of Available Spawning Habitat is Functionally Equivalent

- The US Fish and Wildlife Service has examined the relationship between river flow and available sturgeon spawning habitat.
- The MSRR performs as well or better than the IOP/EDO in protecting these critical sturgeon spawning areas.

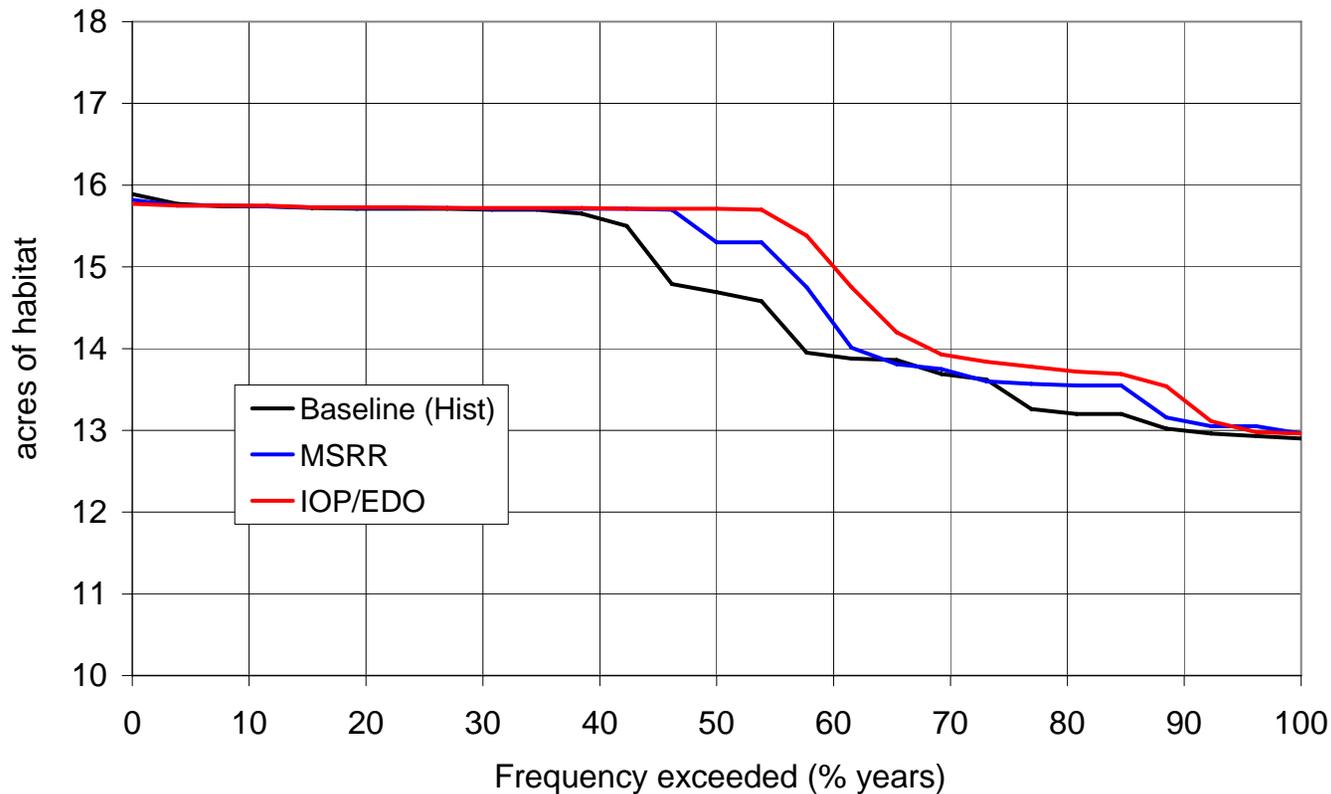
There is no Functional Difference in Available Sturgeon Spawning Habitat

BiOp 4.2.3.A Frequency of Spawning Habitat Availability



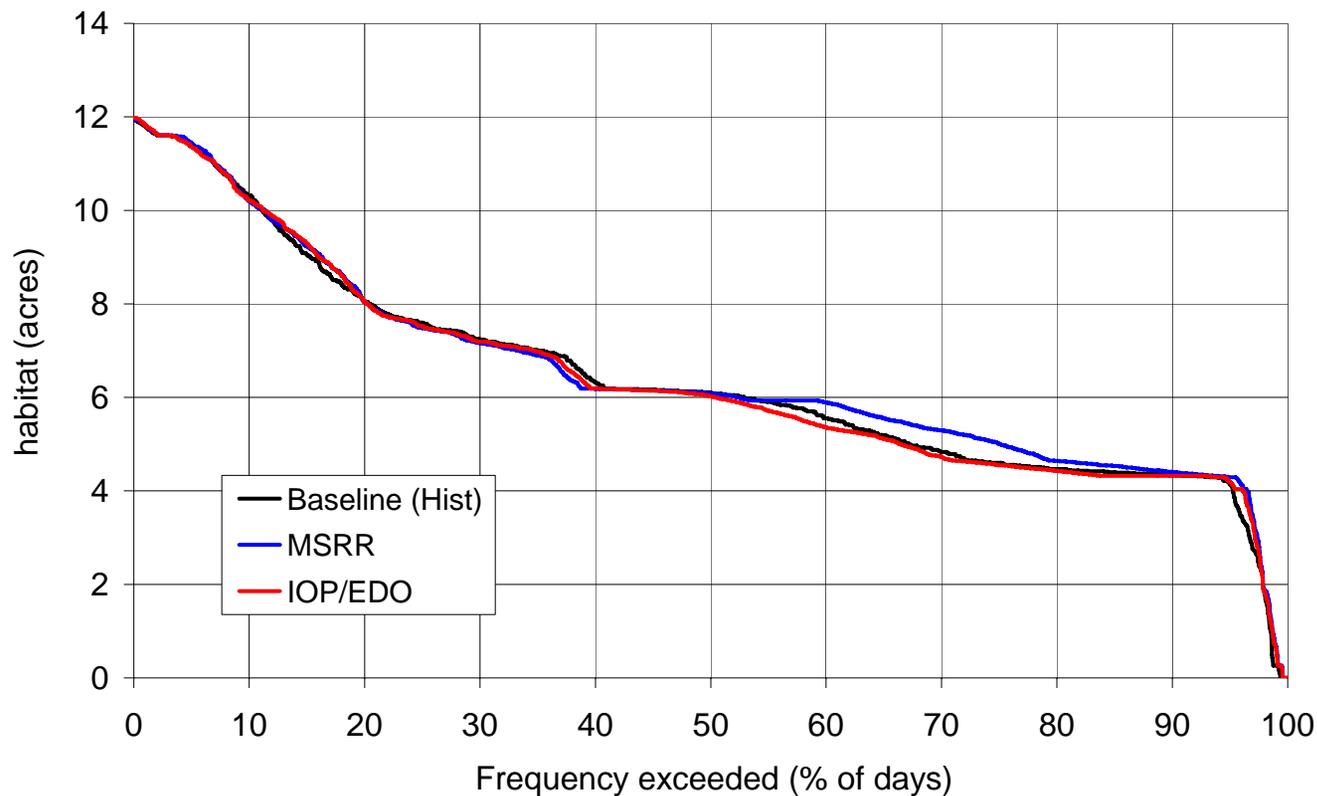
Little Reduction in Total Sustained Sturgeon Spawning Habitat

BiOp 4-2-3-B Max Habitat Sustained for at least 30 days during Spawning



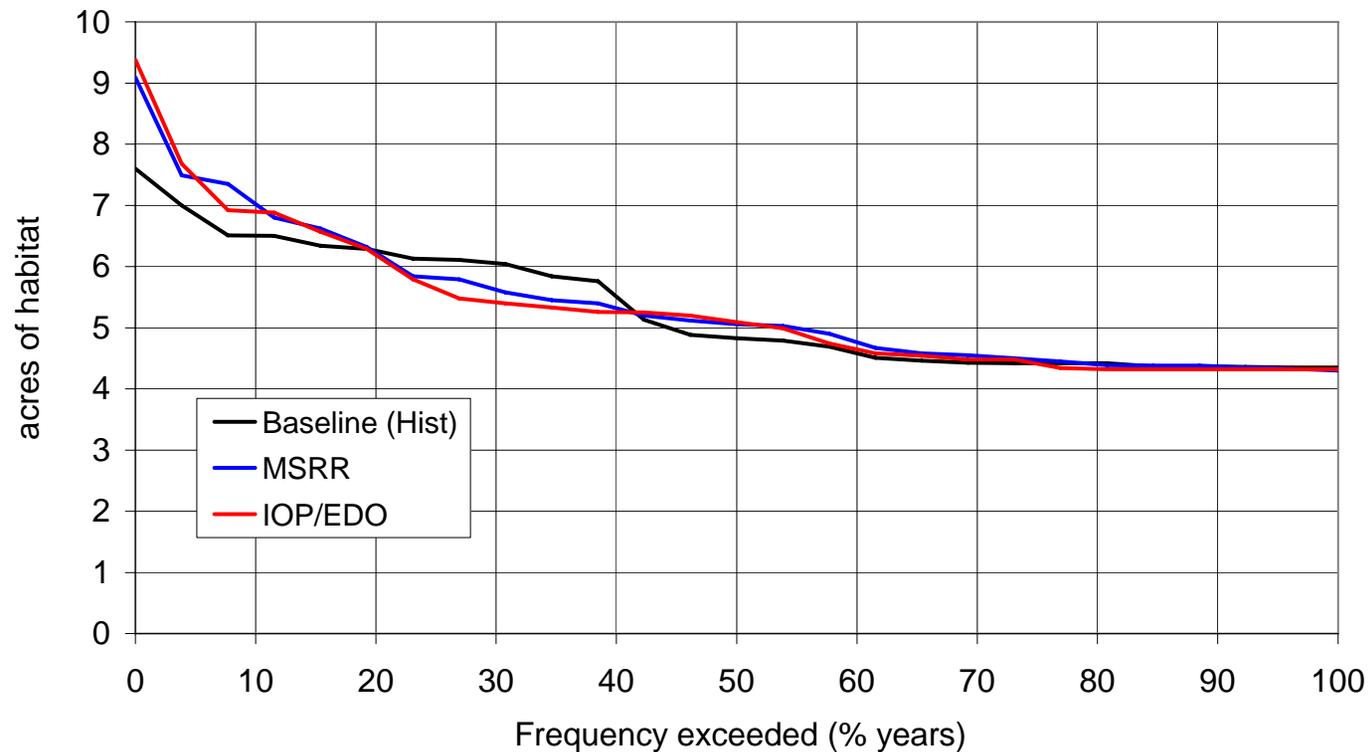
The MSRR Performs As Well or Better Than the EDO/IOP for the Most Important Sturgeon Spawning Habitat

BiOp 4.2.3.A Frequency of Spawning Habitat Availability RM 105



The MSRR Performs As Well or Better Than the EDO/IOP for the Most Important Sturgeon Spawning Habitat

BiOp 4-2-3-B Max Habitat Sustained for at least 30 days during Spawning
RM 105



This is Due to the Relationship Between Spawning Habitat and Flow

Biological Opinion for Woodruff Dam Interim Operations Plan September 5, 2006

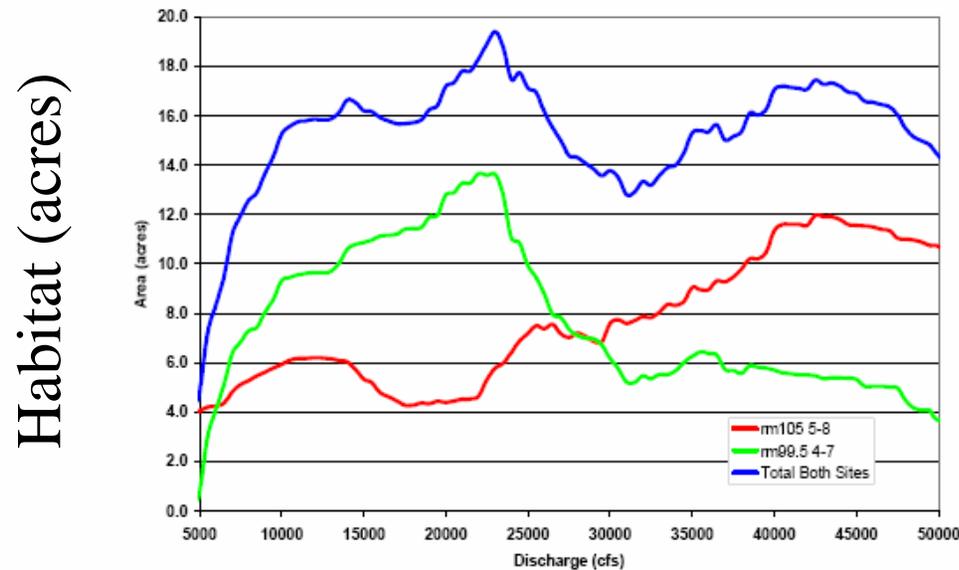


Figure 3.6.1.4.C. Area (acres) of hard substrate inundated to depths of 8.5 to 17.8 ft deep at the two known Gulf sturgeon spawning sites on the Apalachicola River (RM 105 and RM 99) at flows of 5,000 to 50,000 cfs, based on the cross sections located closest to egg collections during 2005 and 2006.

Flow (cfs)

Given this relationship between habitat and flow...

It is important to assess operations based on *performance measures* rather than volumes of water

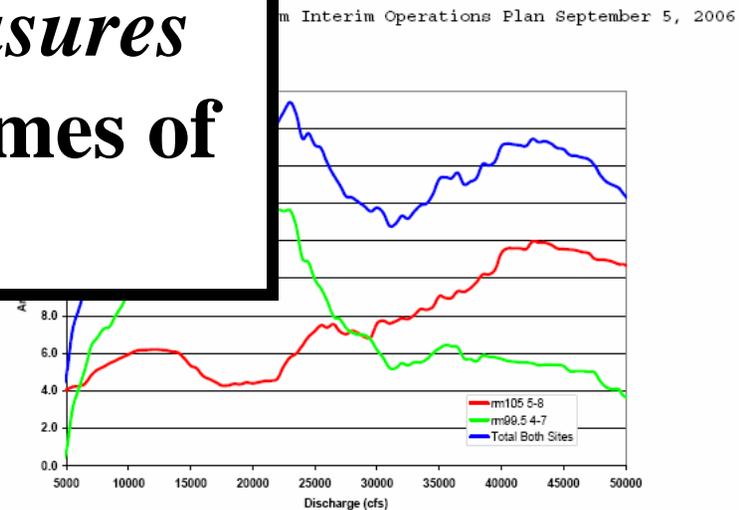
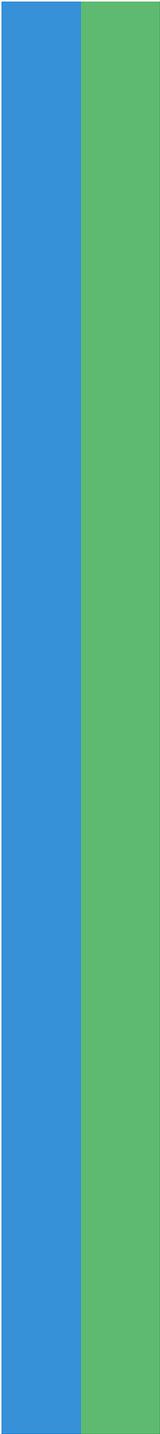


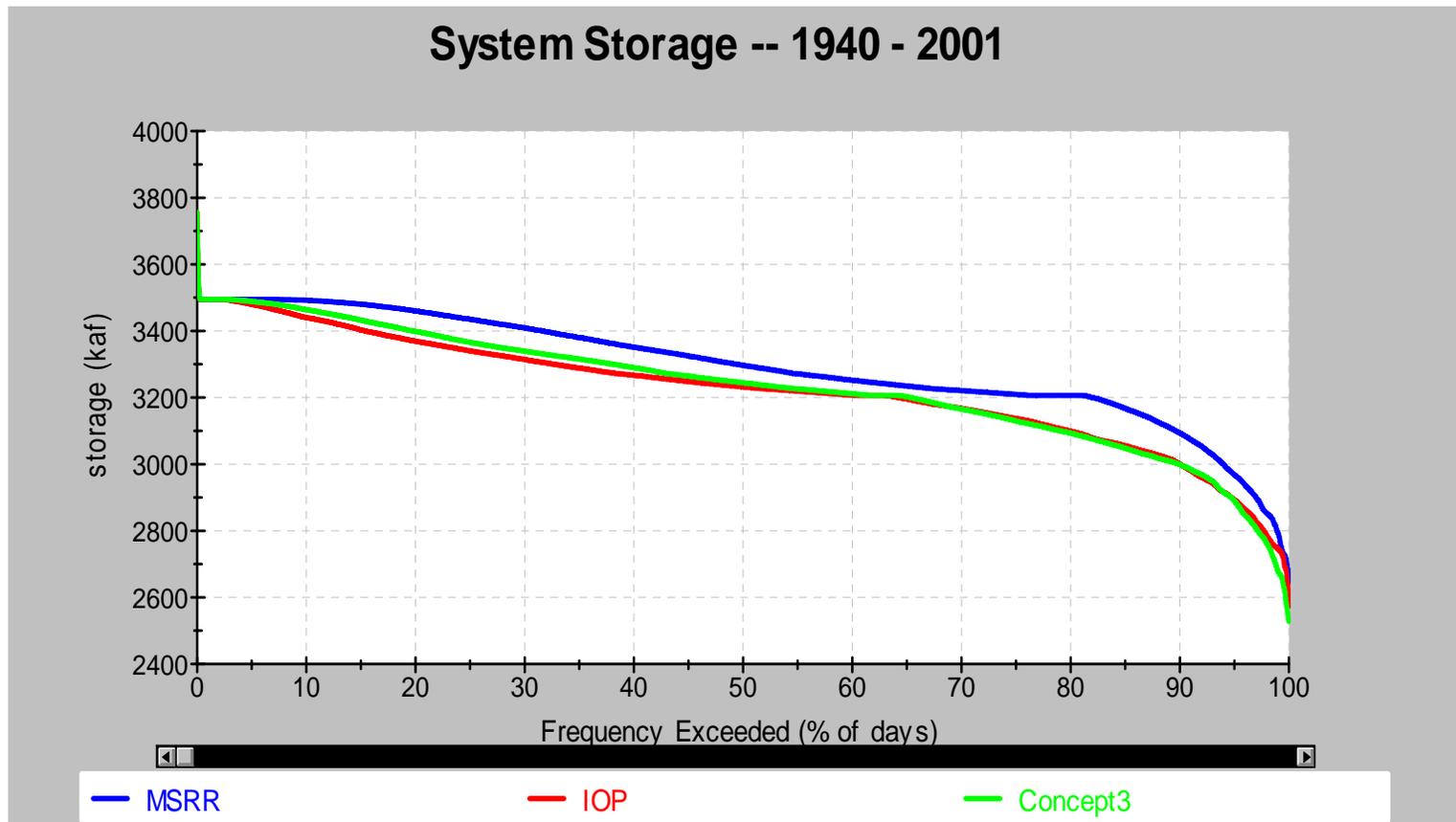
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Lake Levels and System Storage: The MSRR Maximizes Both River Flows and Reservoir Storage

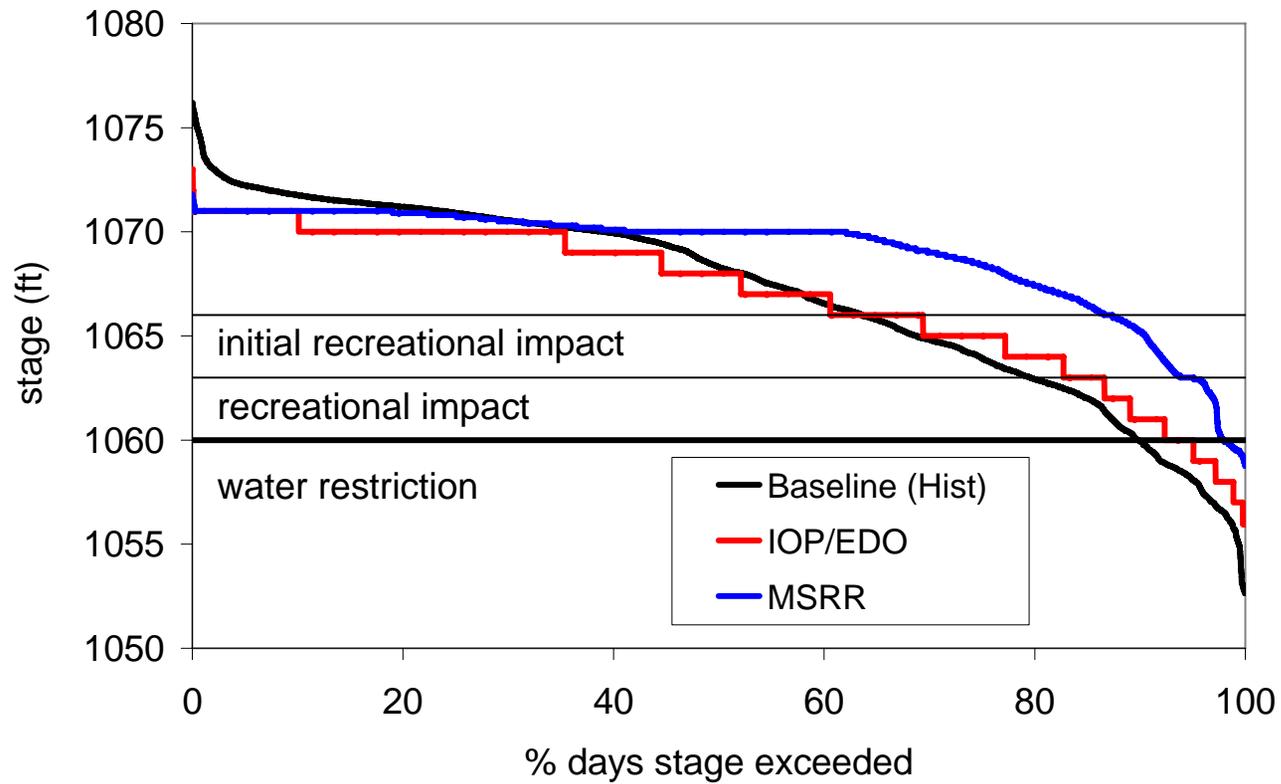
- The MSRR produces consistently higher reservoir levels under nearly all operating conditions while providing sufficient flows to meet other identified purposes.
- Higher reservoir levels increase management flexibility and help to ensure system integrity under extreme drought conditions.

More water in system storage

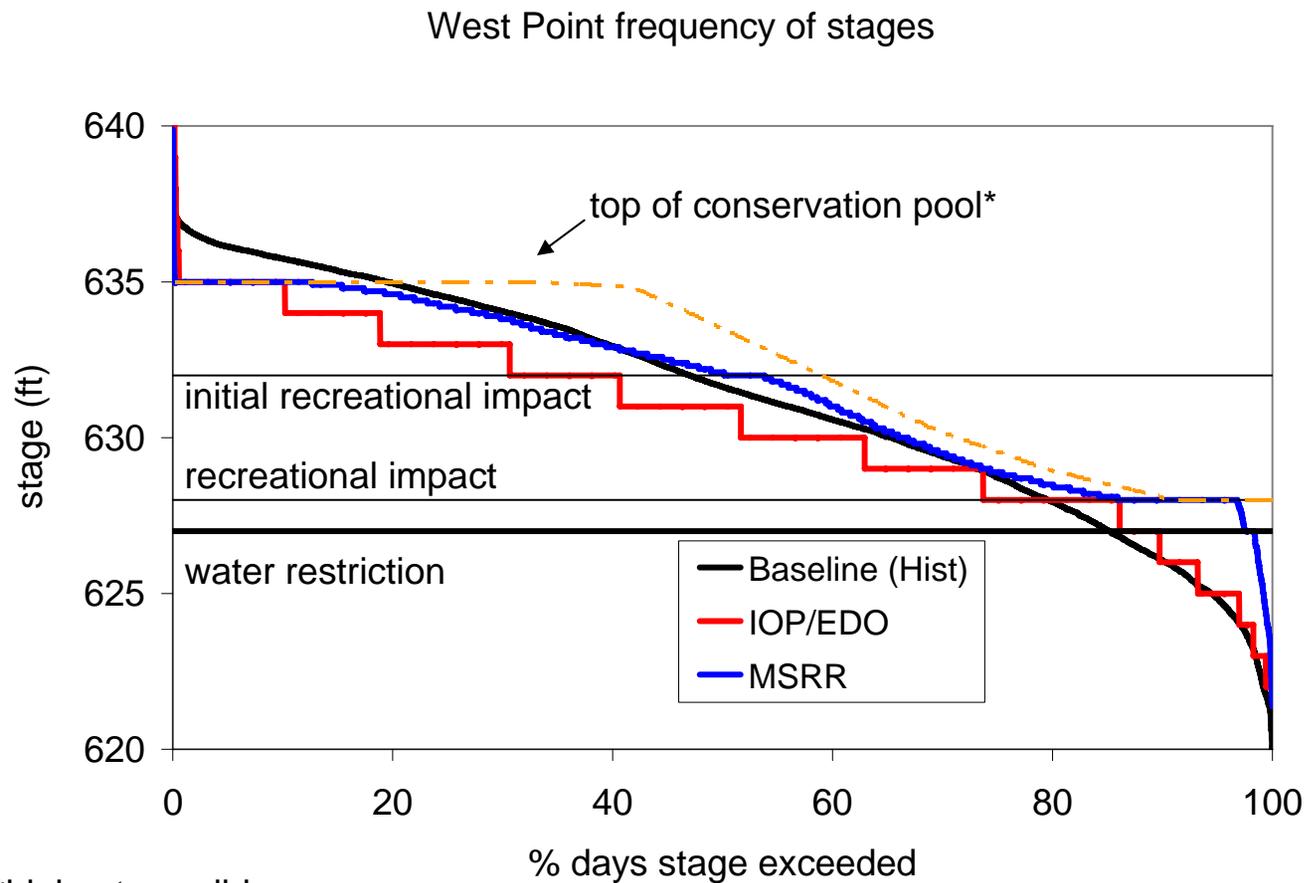


More water in Lanier

Lanier frequency of stages



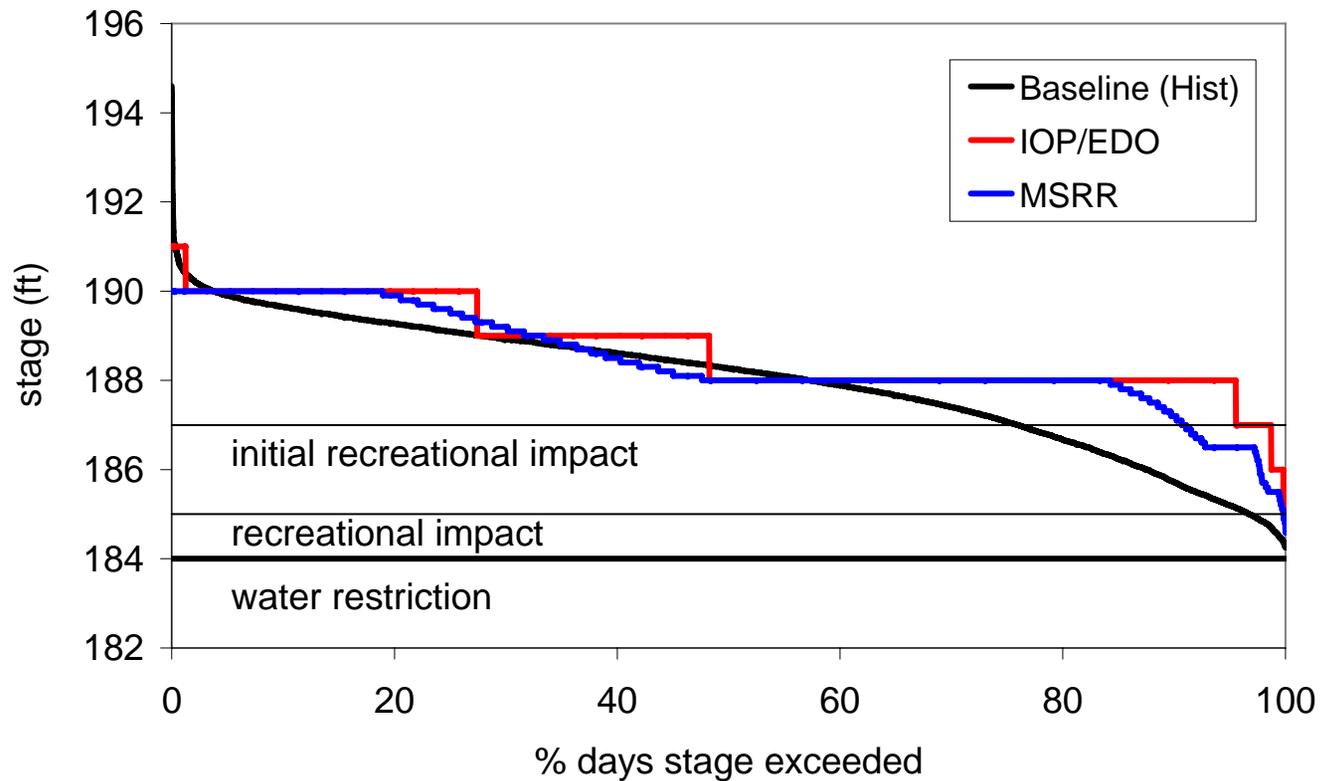
More water in West Point

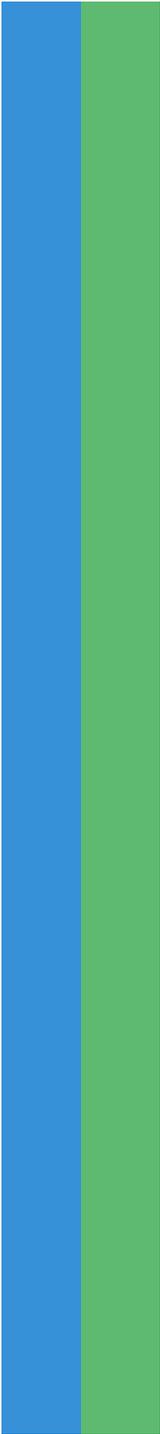


*highest possible stages under current flood control rules

More water in WF George than historical

WF George frequency of stages



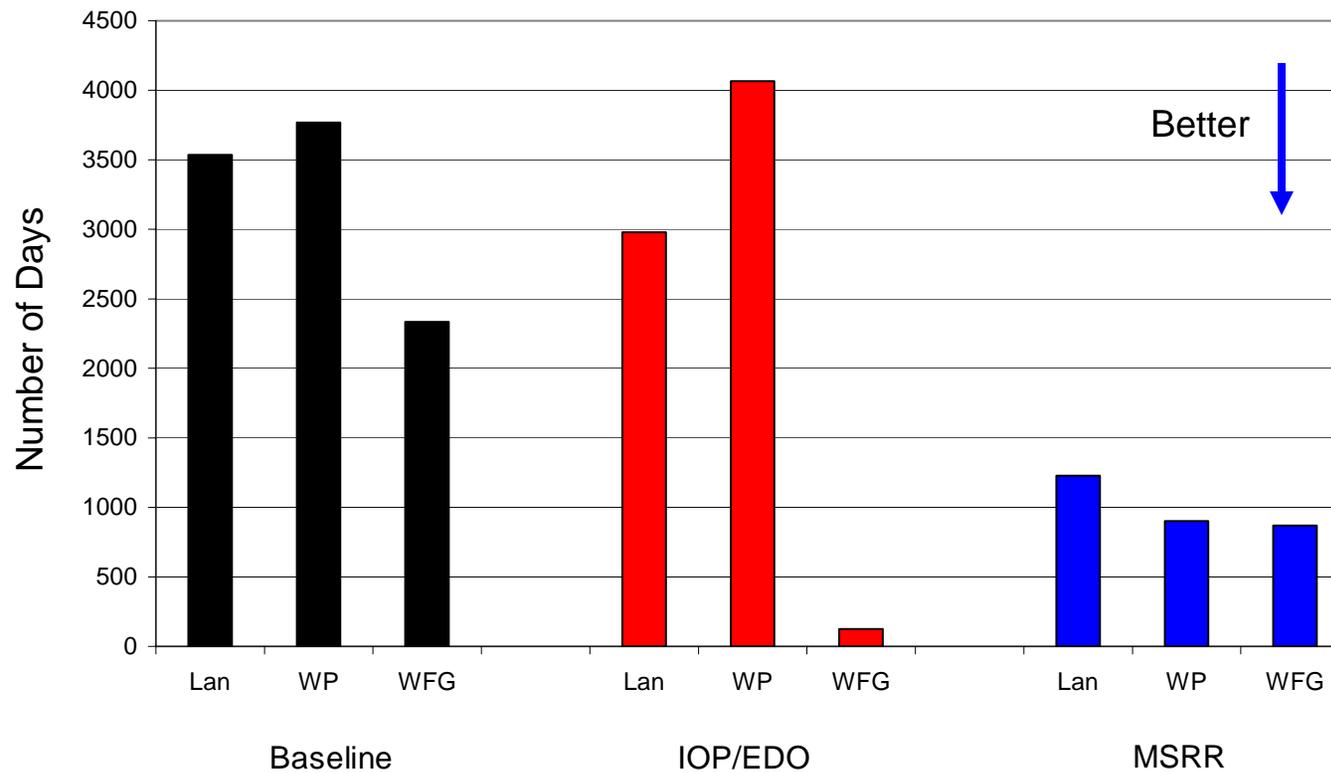


Recreation

- Recreation on the federal reservoirs in the ACF Basin is “big business.”
- The economic impact of Lake Lanier alone has been estimated at more than \$5 billion.
- The MSRR enhances these economic benefits by maximizing reservoir levels and thus increasing recreational opportunities while providing sufficient flows to meet other identified purposes.

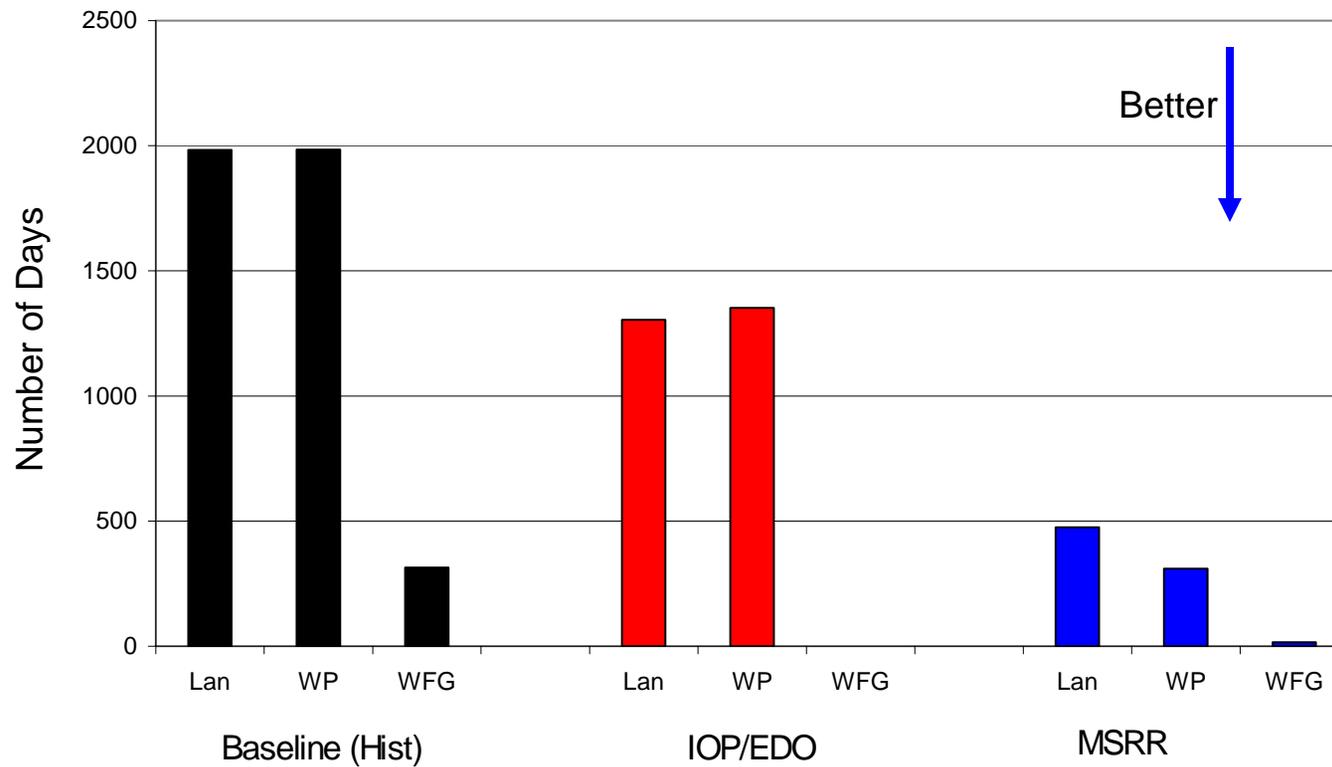
Fewer Days of Initial Recreation Impact

Recreation Impact (1975-2001) -- Impact Level 1 (Initial Impact)



Fewer Days of Recreation Impact

Recreation Impact (1975-2001) -- Impact Level 2 (Rec Impact)



Fewer Days of Severe Rec. Impact

