Freed, Charles

Page 20 of 21

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Frost, Peter

Page 1 of 2

Douglasville - Douglas County Water and Sewer Authority
Post Office Box 1157
Douglasville, Georgia 30133
Phone: (770) 949-7617
Fax: (678) 486-8974
www.ddcwsa.com

Jack A. Tysor
Chairman

Peter J. Frost
Executive Director

November 27, 2012

Tetra Tech, Inc.
61 St. Joseph Street, Suite 550
Mobile, AL 36602-3521

Re: Master Water Control Manual Update for the Apalachicola-Chattahoochee-Flint River Basin

To Whom It May Concern:

In response to and in accordance with the October 12, 2012 US Army Corps of Engineers (USACE) Federal Register Notice of Intent (NOI) to reopen public scoping for the above referenced project, the Douglasville-Douglas County Water and Sewer Authority (the "Authority") hereby submits its comments of the proposed activities.

1. The Authority is concerned that the update to the Water Control Manual (WCM) may adversely impact the Authority's 7Q10 requirements, necessitating additional releases from our small water supply reservoir(s) to the Chattahoochee River during periods of low flow. Such an impact could place additional demand on our potable water supply in drought periods.

2. The Authority is concerned that the WCM update may adversely impact the Authority's future surface water withdrawal permits by reducing the permitted withdrawal amount or restricting the Authority's ability to locate future withdrawals, further limiting our ability to provide water to the residents and businesses of Douglas County.

3. During times of drought when the Authority's reservoir levels are low, and other times such as large water main breaks and other emergencies, the Authority purchases water from the Cobb County-Marietta Water Authority (CCMWA) to help meet demand in Douglas County. The Authority is concerned that the WCM update may adversely impact the CCMWA's allocated withdrawal capacity and therefore adversely impact the Authority's water supply. This concern also applies to the Authority's future water allocation from the CCMWA included in the Metropolitan North Georgia Water Planning District Long-term Water Supply and Water Conservation Management Plan.

Frost, Peter

Page 2 of 2

4. The Authority is concerned that the WCM update may impact the assimilative capacity of the Chattahoochee River and thereby reduce the Authority's current or future wastewater discharge limits and waste load allocations. Such an impact could also restrict the Authority's ability to locate wastewater treatment plants and discharge points.

5. The Authority is concerned that the WCM update may impact how EPD's Environmental Planning criteria relates to drainage basins upstream of large water supply sources and that future regulations may have an economic impact on the current and/or future properties within the service area of the Authority which is tributary to the Chattahoochee River.

6. The Authority is concerned that the WCM update may impact future water, wastewater, and/or watershed management plans of the Metropolitan North Georgia Water Planning District so as to restrict or place additional unfunded mandates on the Authority's operations.

Please review and consider these comments as part of the scoping process for the WCM update, and please do not hesitate to contact me with any questions.

With regards,

Peter J. Frost
Executive Director

cc: Mike Patton, WSA Deputy Director
Benjamin T. Jones, PE, WSA Deputy Director
Gil Shearouse, PE, WSA Engineering Manager

Fryer, L.

Page 1 of 2

MeadWestvaco Corporation
PO Box 940
Phenix City, AL 36868

+1 334.855.5253 T

January 9, 2013

Colonel Steven J. Roemhildt
Commander, Mobile District
U.S. Army Corps of Engineers
c/o Tetra Tech, Inc.
61 St. Joseph Street, Suite 550
Mobile, Alabama 36602-3521

Re: Scoping for Draft Environmental Impact Statement for Updating the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin

Dear Colonel Roemhildt,

MeadWestvaco Corporation (NYSE: MWV) appreciates the opportunity to provide comments on the U.S. Army Corps of Engineers (Corps) efforts to revise the scope of the Environmental Impact Statement (EIS) for updating the Master Water Control Manual (WCM) for the Apalachicola-Chattahoochee-Flint (ACF) River Basin as made known in the Federal Register Notice of Intent (NOI) on October 12, 2012.

MeadWestvaco Corporation is a global packaging company providing innovative solutions to the world's most admired brands in the healthcare, beauty and personal care, food, beverage, home and garden, tobacco, and agricultural industries. The company also produces specialty chemicals for the automotive, energy, and infrastructure industries and maximizes the value of its land holdings through forestry operations, property development and land sales. MWV's network of 125 facilities and 16,000 employees spans North America, South America, Europe and Asia. The company has been recognized for financial performance and environmental stewardship with a place on the Dow Jones Sustainability World Index every year since 2005. MWV has a vital interest in the ACF River Basin with substantial operations located along the Chattahoochee River near Cottonton, AL that depend on established and adequate river flows for successful functioning.

MWV supports the comments filed pursuant to this NOI, by the TriRivers Waterway Development Association of which MWV is a member organization. MWV also offers the following specific comments.

MWV Facilities in the Middle Chattahoochee Depend on the Corps to Provide Adequate Flows

Although much of the focus in the ACF river system has been on water supply issues in North Georgia and protected species in the Apalachicola River, the ACF System was authorized and constructed for the benefit of all stakeholders in the basin, including those along the middle and lower Chattahoochee River. MWV urges the Corps to acknowledge and address flow needs of these portions of the ACF River System.

a. The Corps Should Provide Agreed-Upon Minimum Flows

MWV has invested many millions of dollars in major industrial facilities along the middle Chattahoochee River. This was done so in reliance upon the Corps' lawful operation of the ACF System and commitment to maintain flows sufficient to serve the congressionally authorized purposes. The future of MWV's facilities depends on continuing, adequate flows to support cooling and process water needs. Also, MWV's NPDES permit limits for wastewater discharges are based on established river flow rates. As a leader in sustainability, MWV has taken substantial and successful steps to reduce the amount of water needed to operate its processes. These efforts were recognized in 2012 when MWV won an American Forest and Paper Association (AF&PA) Sustainability Award for its "Mahrt Mill Water and Energy Reduction Project". This project reduced water use in the paper mill by over 5 million gallons/day.

Fryer, L.

Page 2 of 2

The Corps should explain in the revised manual and corresponding environmental documentation how it plans to provide for the needs of the communities and industries located in the middle Chattahoochee River. The governors of Alabama, Florida, and Georgia in 2003 signed an agreement establishing flow parameters for the ACF River System. In revising the ACF water control manual, the Corps should plan to operate the System in accordance with those agreed-upon flow parameters. MWV points in particular to the middle and lower Chattahoochee flow requirements of 1,350 cubic feet per second ("cfs") daily average and 1,850 cfs weekly average at Columbus, Georgia, and 2,000 cfs daily average at Columbia, Alabama. We believe these flows are sufficient to meet the congressionally authorized purposed of the ACF River System. Additionally, they correspond to the flows needed to meet the water supply and water quality needs of the Columbus Water Works, as well as the operation of industrial facilities on the Chattahoochee River, including those operated by MeadWestvaco.

b. The Corps Should Not Rely on Flint River Flows to Meet Apalachicola River Needs to the Detriment of Chattahoochee River Flows

In the past, the Corps has reduced flows in the Chattahoochee River when Flint River inflow was sufficient to meet requirements for the Apalachicola River. This practice is harmful to those on the middle and lower portions of the Chattahoochee River. MWV urges the Corps not to use the additional flows from uncontrolled sources as a justification to reduce the flows within the Corps' control to the detriment of Middle and Lower Chattahoochee River stakeholders. The minimum flows mentioned above should continue to be maintained during these times.

Sincerely,

L. Scott Fryer
Vice President – Mahrt Operations

Page 2 of 2

Fusaro, Ben

Page 1 of 1

1/12/2013

COMMENTER: Ben Fusaro
379 Rob Roy Trail (Home)
Tallahassee, FL 32312

ORGANIZATION: Apalachicola River Keepers

COMMENTS: Please consider the freshwater flow that will sustain the health of the Apalachicola River and Bay and embed the results in a long-range plan taht will ensure that Woodruff Dam releases will be in synch with the maintenace of the rich bio-reproductive potential of theApalachicola River and Bay.

Gage, Ralph

Page 1 of 1

1/14/2013

COMMENTER: ralph gage
5786 hidden cove road
gainesville, GA 30504

ORGANIZATION:

COMMENTS: As a property owner on lake lanier, it seems to me that by increasing the lake level to 1073 would benfit all water users. When the lake is allowed to drop and then it rains more silt is washed into the lake. With more silt in the lake the amount of storage for water id diminished. It would also make sense to dredge the lake for additional water storage.

Gallant, Peter

Page 1 of 1

1/12/2013

COMMENTER: Peter Gallant
P.O. Box 992
Apalachicola, FL 32320

ORGANIZATION:

COMMENTS: Please note that the fresh water supply and nutrient scarcity in the Apalachicola basin is a seriuos ecological and economic issue for the entire biologic community.

Garner, Keith

Page 1 of 1

10/23/2012

COMMENTER: keith garner
95 jacksons valley
sharpsburg, GA 30277

ORGANIZATION:

COMMENTS: This is the 2nd year we can not duck hunt west point lake because the water is down 10foot. We pay very good money for hunting permits to hunt the corps lakes. This needs to be fixed

Garner, Mary

Page 1 of 1

1/14/2013

COMMENTER: Mrs. Mary Garner
4885 Chestatee Heights Road
Gainesville, GA 30506

ORGANIZATION: Lake Lanier Association Member

COMMENTS: The safety, water quality, and thus economic
influence and enjoyment of Lake Sidney Lanier
for the region built up around the lake has
been deminshed due to fluctuating water levels. Dry coves, stranded and broken docks,
dangerous untectable obstructions in open water contibute to lack of safe and enjoyable
use. I'd personally rather not even have the
lake in the shape it's in now,as river flows cannot keep up with overflow at the dam. This
is poor management. We can't depend on anything, clean water quality or level.
Sincerely, Mary Garner

Gasaway, Philip

Page 1 of 1

12/25/2012

COMMENTER: Philip Gasaway
230 Linda Lane
LaGrange, GA 30240

ORGANIZATION: Homeowner

COMMENTS: My wife and I returned to LaGrange in 1986. We were proud to be moving back to a city with a lake like West Point Lake. We invested in a Lake Lot desiring to raise our children and grandchildren on the water. I invested in a Home, Dock, Pontoon Boat, Two Ports for PWCs,Two Waverunners and a lot of work maintaining our property. We purposely built our Home to retire in. We have enjoyed the lake and have paid higher taxes to live here but unfortunately the lake levels have reduced our Home values and our excitment about Lake West Point has dimished. Please consider the average Home Owner in your decisions concerning lake levels. I have worked all my life to have my home on the lake and cannot afford the reductions in property values with proposed lake level changes.

Please consider the average Lake Home Owner in your decisions to alter your decisions in lake levels for West Point Lake.

Thanks,
Philip W. Gasaway

Gay, Brenden

Page 1 of 2

11/16/12

Tetra Tech
Attention: ACF-WCM
61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

Scoping Comments for ACF Water Control Manual

I submit the following comments in the recently reopened public scoping period:

1) There is a definitive need for additional storage in the ACF Basin; and that storage is readily and safely available in West Point Lake. Recent studies submitted to the USACE demonstrate that West Point Lake (WPL) can be maintained at a minimum 632.5 MSL year round; and if managed differently, the risk of downstream flooding during major rain events can actually be reduced! The trifecta is there to be won: Increased storage + Better management = Reduced flooding!

2) WPL is specifically authorized by Congress for Recreation and Sport Fishing/Wildlife Development in addition to Flood Control, Navigation, and Hydropower. Flood Control can be improved as outlined in the Operations Study referred to in #1 above and which study has been previously submitted to the USACE. Hydropower and Navigation both benefit from the availability of increased storage. The USACE must deliver and honor the Recreation and Sport Fishing/Wildlife Development Authorizations stipulated under law by Congress.

3) In order to accomplish #1 and #2 above, the Rule Curve needs to be adjusted upward to a minimum 632.5 MSL and the Action Zones need to be modified upward as well to a minimum 630.0 at the bottom of Action Zone 4. The parameters of 632.5 and 630.0 MSL are significant because they represent the initial and second recreation impact levels respectively as defined by the USACE.

Gay, Brenden

Page 2 of 2

2.

4) The economic damages to the WPL communities and the lack of economic development due to unnecessarily low and undependable lake levels need to be assessed and stopped. Small businesses have gone bankrupt and others have been stretched to keep their doors open. Major fishing tournaments have been cancelled damaging hotels, restaurants, marinas, and lake related businesses. Visitation is down and campgrounds have been closed. Land specifically set aside for a hotel, conference center, golf course, etc. has never been developed. We are blessed with a moderate climate and WPL should be managed as a 52 week a year lake with the corresponding benefit of a 52 week a year lake related economy! WPL needs a dependable and reliable lake level to provide for economic development and stop the economic harm.

5) Environmental harm to WPL needs to be documented. Due to wildly vacillating lake levels, the fish spawn has suffered significantly in 3 of the last 5 years and the quality of the fishery, specifically the bass and crappie, has declined. Thousands, if not hundreds of thousands of mussels have been killed threatening water quality; erosion has increased the cost of water treatment; and siltation continues to eliminate valuable storage.

6) USFWS needs to be challenged to provide their science and document the need for 5,000 cfs for endangered species. Why 5,000 cfs? Why not 2,000 cfs? How many of each endangered species are there? Do they exist in deeper water than previously thought? What is the Recovery Plan? Are they still endangered, threatened, or neither? Can they be relocated to other areas where water is more plentiful and the economic damages are less. Who is looking out for the welfare of the small businessman? Common sense would seem to dictate that the needs of man should be balanced with the needs of the critters. The RIOP needs close analysis as part of the EIS to see what changes can be made to avoid destroying the economic, environmental, and recreational value of WPL during all times other than "extreme" drought!

I thank you for the opportunity to comment and ask that the above issues be submitted and studied during the EIS period.

Sincerely,

Brenden Gay

Gay, Brian

Page 1 of 2

11/16/12

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61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

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Gay, Brian

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Brian S

Gay, Nichele

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Gay, Nichele

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Gay, Trayten

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Gay, Trayten

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Sincerely,

Trayten Gay

Gentry, Leah

Page 1 of 1

1/14/2013

COMMENTER: Leah Gentry
1220 HALIFAX CT
TALLAHASSEE, FL 32308

ORGANIZATION:

COMMENTS: Please consider the following: 1. An assessment and consideration of the freshwater needs that will sustain the health of the Apalachicola River and Bay. 2 Increased water release from Woodruff Dam at appropriate timing and duration to sustain Apalachicola River and Bay 3. An ACF basin wide sustainable water management plan that protects the Apalachicola River and Bay and equitably shares the water of this basin.

Germano, Trent

Page 1 of 1

1/14/2013

COMMENTER: Trent Germano
4910 Goddard's Ford Rd
None
Gainesville, GA 30504

ORGANIZATION: Homeowner

COMMENTS: We have owned a home on Lake Lanier and whole heartedly support the recommendations of the Lake Lanier Association for fairly treating the lake in light of its original and actual commitments. Thanks for your attention to this matter.

Geske, Normie

1/12/2013

COMMENTER: normie geske
4076 highway 98
st. teresa, FL 32358

ORGANIZATION:

COMMENTS: when we moved to franklin county in 2000, appalachicola bay area was considered one of the most ecologically healthy in the country. those who made a living through it's resources were flourishing...fish,oysters, etc. were plentiful.

sadly, since that time, we have witnessed the demise of this ecologically sound area and the ensual of poverty and desperation in our community. we no longer feel confident that our local oysters are fit for consumption.

it is crucial to the well being of franklin and surrounding counties that policies be considered and implemented to restore these once thriving coastal communities.

thank you for your attention to the dire need for restoration of appalachicola bay.

normie geske
st. teresa, fl

Geske, Tim

1/12/2013

COMMENTER: Tim Geske
4076 highway 98
st teresa, FL 32358

ORGANIZATION:

COMMENTS: This man made issue of water flow in the Apalachicola river has got to be resolved. Destroying habitat, the last pristine eco system in the area, jobs, food sources, the overall environment and local economies is deplorable.

We have set ourselves up like a third world country displaying their ignorance. We are to be an example not the problem.

Gherardi, Martha

Page 1 of 1

1/12/2013

COMMENTER: Martha Gherardi
1667 E Gulf Beach Dr
Saint George Island, FL 32328

ORGANIZATION:

COMMENTS: Dear ACE,

Our local seafood industry's crisis is a symptom of a far greater problem. I am not directly involved in the seafood industry, but as a Franklin county resident I am greatly concerned about the ecological damage caused to the area by not releasing sufficient fresh water into the Apalachicola River. I urge you to include the following provisions in your Water Control Management Plan EIS : 1. An assessment and consideration of the freshwater needs that will sustain the health of the Apalachicola River and Bay. 2 Increased water release from Woodruff Dam at appropriate timing and duration to sustain Apalachicola River and Bay 3. An ACF basin wide sustainable water management plan that protects the Apalachicola River and Bay and equitably shares the water of this basin.

Respectfully yours,
Martha M Gherardi

Giknis, Francis

Page 1 of 1

1/12/2013

COMMENTER: Francis Giknis
657 W. Pine Ave.
Eastpoint, FL 32328

ORGANIZATION:

COMMENTS: I lived in Atlanta for 23 years prior to relocating on St. George Island and was always discouraged that city did little or nothing to plan growth, developed no alternative sources for water and did little to creatively conserve the water they had, such as develop a greywater system or find other sources for golf course and land irrigation. This lack of effort is to the detriment of the river system and the Apalachicola Bay, its ecosystem and the communities which it supports now and in the future. Please assure that your plan includes 1. An assessment and consideration of the freshwater needs that will sustain the health of the Apalachicola River and Bay. 2 Based on that assessment, increased water release from Woodruff Dam at appropriate timing and duration to sustain Apalachicola River and Bay 3. An ACF basin wide sustainable water management plan that protects the Apalachicola River and Bay and equitably shares the water of this basin.
Thank you.

Gillespie, Brian

From: DIV.ACF.EIS
Subject: FW: Water Control Manual

From: Brian Gillespie [mailto:bspaxton@bellsouth.net]
Sent: Monday, January 14, 2013 1:14 PM
To: ACF-WCM
Subject: Water Control Manual

As a property owner on Lake Lanier, it's my hope that the COE can revise our current requirements to be more reflective of today's water and economic demands.

The enormous swings in Lake Levels over the last 5 years appears to be unnecessary and can be manage better for our lake, water demands and our local economy.

- Lanier was never designed to support ALL downstream demands and can't be expected to because the dams originally proposed on the Flint River were never built.

- The Corps' current operating rules require more water to be released from Lanier than is necessary and do not allow as much to be stored as is possible. These draw the lake down more than necessary and make it less likely to refill to full pool under contemporary climatic conditions.

- The Endangered Species Act does not require the Corps to augment Apalachicola River flows above run-of-river levels and the practice should not be required because it depletes Lanier unnecessarily.

- Regular navigation is no longer feasible on the ACF and the Corps should not try to support it in view of the other demands on Lanier as a resource of last resort.

We need real reform that meets today's requirements and not those decided decades ago. Simply, water going out should not exceed water coming into the lake unless the impact to humans cannot be cured with watersheds outside of our district.

In addition, Lanier should be stabilized as a priority over additional watersheds that wouldn't prevent Lanier from being drained to dangerous levels.

Thank you for your consideration.

Brian Gillespie
678-779-2471 (cell)

Glazier, Richard and Debra

11/20/2012

Tetra Tech
Attention: ACF-WCM
61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

Scoping Comments for ACF Water Control Manual

I submit the following comments in the recently reopened public scoping period:

1) **There is a definitive need for additional storage in the ACF Basin; and that storage is readily and safely available in West Point Lake. Recent studies submitted to the USACE demonstrate that West Point Lake (WPL) can be maintained at a minimum 632.5 MSL year round; and if managed differently, the risk of downstream flooding during major rain events can actually be reduced! The trifecta is there to be won: Increased storage + Better management = Reduced flooding!**

2) **WPL is specifically authorized by Congress for Recreation and Sport Fishing/Wildlife Development in addition to Flood Control, Navigation, and Hydropower. Flood Control can be improved as outlined in the Operations Study referred to in #1 above and which study has been previously submitted to the USACE. Hydropower and Navigation both benefit from the availability of increased storage. The USACE must deliver and honor the Recreation and Sport Fishing/Wildlife Development Authorizations stipulated under law by Congress.**

3) **In order to accomplish #1 and #2 above, the Rule Curve needs to be adjusted upward to a minimum 632.5 MSL and the Action Zones need to be modified upward as well to a minimum 630.0 at the bottom of Action Zone 4. The parameters of 632.5 and 630.0 MSL are significant because they represent the initial and second recreation impact levels respectively as defined by the USACE.**

Glazier, Richard and Debra

Page 2 of 2

4) **The economic damages to the WPL communities and the lack of economic development due to unnecessarily low and undependable lake levels need to be assessed and stopped. Small businesses have gone bankrupt and others have been stretched to keep their doors open. Major fishing tournaments have been cancelled damaging hotels, restaurants, marinas, and lake related businesses. Visitation is down and campgrounds have been closed. Land specifically set aside for a hotel, conference center, golf course, etc. has never been developed. We are blessed with a moderate climate and WPL should be managed as a 52 week a year lake with the corresponding benefit of a 52 week a year lake related economy! WPL needs a dependable and reliable lake level to provide for economic development and stop the economic harm.**

5) **Environmental harm to WPL needs to be documented. Due to wildly vacillating lake levels, the fish spawn has suffered significantly in 3 of the last 5 years and the quality of the fishery, specifically the bass and crappie, has declined. Thousands, if not hundreds of thousands of mussels have been killed threatening water quality; erosion has increased the cost of water treatment; and siltation continues to eliminate valuable storage.**

6) **USFWS needs to be challenged to provide their science and document the need for 5,000 cfs for endangered species. Why 5,000 cfs? Why not 2,000 cfs? How many of each endangered species are there? Do they exist in deeper water than previously thought? What is the Recovery Plan? Are they still endangered, threatened, or neither? Can they be relocated to other areas where water is more plentiful and the economic damages are less. Who is looking out for the welfare of the small businessman? Common sense would seem to dictate that the needs of man should be balanced with the needs of the critters. The RIOP needs close analysis as part of the EIS to see what changes can be made to avoid destroying the economic, environmental, and recreational value of WPL during all times other than "extreme" drought!**

I thank you for the opportunity to comment and ask that the above issues be submitted and studied during the EIS period.

Sincerely,

Richard + Debra Glazier
2046 Co Rd 222
Lanett, Al 36863

Gleason, Jack

Page 1 of 3

My perspective and solution offered as a Concerned Citizen, Forsyth County, Georgia, U.S.A

What's happened to-date regarding the legitimacy of any "Temporary" Water Storage Allocation (WSA) or "Hold-Over Contract" granted of "State Waters" by the U.S. Army Corp. of Engineers (ACE) to the City of Cumming inarguably on behalf of ALL People of Forsyth County over 35 years ago then, and no-doubt very-well so through today is the prime example of those direct impact component-factor "causes" inciting that history of the "Tri-State Water Wars" litigation... whereas the 11th Dist. Court of Appeals, having directed You (ACE) to expedite this "review of Authority" in revision of that "Water Control Manual" offers-up the relief of a "New Day" today.

Our problem -- from My perspective as a Concerned Citizen of Forsyth County -- evolved for:

A) The avarice and greed perpetuated of certain "Stewards" from then back in the 70's on being only maintained for what control remains wrested of the People of Forsyth County's "State Waters" Natural Resources today: The continuing parlay of Them by the City of Cumming for an "Enterprise System" construed to operate less in-the-interest of The People of Forsyth County at-large for what monopoly has been created of that "Temporary" Water Storage Allocation granted the City of Cumming in clear oversight for the exclusion of Forsyth County being "Vested" too some 35 years ago.

I believe that should change with ACE granting each their own WSA as a "Municipal Water Service Provider" in consideration of their respective "Service-Delivery Network/Demand"...then the actual withdrawal and delivery -- directly out of Lake Lanier for that commensurate-use granted of the Georgia Environmental Protection District (EPD) via a "Shared" Raw Water (withdrawal) Allocation -- is negotiated "Home Rule" amongst them much more fairly than occurs of-late for that malaise festered to-date, aka "that mess there up in Forsyth County!".

B) Local, State, and the Federal governments at-large ALL harboring an apparently intentional-ignorance of the Clean Waters Act for the short-sighted and irrational management of Our Watersheds and other Natural Resources...They experience "Death by a thousand-stings" for what failures are otherwise expedited by ALL parties charged with Stewardship!

The State EPD, it's "Municipalities" such as both the City of Cumming and Forsyth County, and very-well too the Federal Government via YOU, the Army Corp. of Engineers (ACE) YOU ALL are charged with its stewardship...to then operate in the best-interest of "The People" -- first and foremost with its protection and preservation of Our Natural Resources -- and only secondly then, in most-prudent management of those resources "Consumptive Uses"...yet it seems to operate exactly backwards of that for what consideration is given of the sustainability of Our Natural Resources today against what's "Planned" in terms of Growth and Development by Our "Stewards" tomorrow ?

Today the City of Cumming, being granted a "Temporary" Water Storage Allocation in the interest of providing "State Waters" to ALL Citizens of Forsyth County weild what amounts to nothing-less than a Monopolistic "Enterprise System", and, should it remain status-quo, only continues driving what festering wedge it has manifested into between the members of the County Community at-large...but

Gleason, Jack

Page 2 of 3

for the process mandated of the 11th Dist. Court of Appeals today there is perfect opportunity to right this wrong.

Grant Forsyth County and the City of Cumming each their OWN respective Water Storage Allocation (WSA) based upon whatever methodology employable then best reflects A) Each Municipality's respective "Service Demand" and B) Each Municipality's grade-review of "Watershed Management" ie: Land Stewardship...as neither have been the best of THAT for what documentation I could provide - of THEIR records! - showing the Watersheds continued degradation of Water Quality, and that DESPITE what comprehensive "Watershed Management Plans" are put-forth in what amounts to little-more than Lip-Service to those objectives intended/construed of the Clean Waters Act...which should well-be of SOME consideration(s) to ACE in granting ANY Municipality/End-User a WSA.

Such endeavor best-starts with the replacement of "Should" with "SHALL" everywhere throughout Federal, State, (and damn-well most-importantly!) "Local" Government "Comprehensive Land-Used Planning"...whereas too much "Growth" is often being projected with too little if ANY concern of what finite Natural Resources are available to sustain that growth-trajectory proposed at an acceptable Level-of-Service (LOS) that will procure a desirable Quality of Life...especially when "Minimum Standards" -- imposed as the "benchmark" -- are being perpetually ignored all-together most of the time

ACE can correct/expedite improvement of such "Stewardship" by teaming-up with Georgia EPD in granting additional capacity -- above-beyond a Municipal Water Providers granted WSA -- @ 50% of their Waste Water Discharge when that discharge EXCEEDS an elevated Level of Purity (LOP) over a given Rate Of Discharge/Time BACK into the "Source" ie; The Lake Sidney Lanier/Upper Chattahoochee River corridor-reach but it must be A) Of significantly improved Water Quality over that of the regions overall Water Quality as-found negatively impacted by Growth & Development, and B) Returned-to-Source where it was otherwise treated/discharged as a "Consumptive Loss".

Such a "Balanced Solution" will resolve a variety of "Stakeholders" concerns as follows:

A) Municipalities will find this mechanism provides an invaluable incentive for how it rewards their efforts put-forth in better protecting, preserving, and procuring a viably sustainable Watershed/Water-supply because it then best provides for their desired rate-of-growth trajectory...One construed to procure a more universally acceptable quality-of-life at a more universally desirable Level-of-Service...because "Future Growth & Development" is tied directly to procurement of "Sustainable High Water Quality".

B) Environmental Interests whose endeavors of protecting/preserving/procuring more sustainable Natural Resources are addressed and found met can then relax in relief of what litigation(s) they may have otherwise considered implementing -- ie; Lawsuit Litigation, etc. -- for having every reason to encourage implementing such a "Balanced Solution" to their concerns.

Gleason, Jack

Page 3 of 3

C) ACE and EPD -- both Federal and State -- are then better-than-ever effectively working toward meeting THEIR responsibilities to The People in expediting those fundamental endeavors construed of the intent of the Clean Waters Act of Congress: Procuring an environment that sustains more of a perpetual net-gain than a perpetual net-loss with regard to the protection and preservation of Our Natural Resources...in this case both "Land" and "Water", with "Air" a likely benefactor too

Finally, as an environmentalist "watch-dog" looking out for what I sincerely feel are the best-interest of ALL -- My local, State, and National community -- I think I can document first-hand where time-and-again "Development Interests" have collaborated with both the Public (Co. Planning Dept. and State Regulatory Agencies) and Private ("Prof. Environmental Consultants") in conspiracies that significantly mis-state -- via both intent and omission -- the extent of "State Waters" otherwise present the lands depicted within their "Plat" submissions...please look into this too, as "Prudent Land Stewardship" MUST become a component-factor that ALL Stakeholders revel in the interest of protecting and preserving Our Natural Resources for the future

The predicate construed of finding "balanced solutions" happens only when ALL Stakeholders "Legs" are considered "Cut" if you will at equal-length...to then support what is "tabled".

In closing, please know Your consideration of My perspective is greatly appreciated, thank you

Sincerely,

Jack Gleason

Concerned Citizen

1595 Robins Walk 30005

Forsyth County Dist. Two Friends of Caney Creek.org (AAR/AAS)

SmartGrowth-Forsyth.org (Environmental Compliance Officer)

Metropolitan North Georgia Water Planning District-BAC (Upper Chattahoochee)

"Impossible" is a degree of difficulty...set by imagination for lack of motivation

Goldman, Steven

Page 1 of 1

1/14/2013

COMMENTER: Steven Goldman
9155 Duran Circle
Gainesville, GA 30506

ORGANIZATION:

COMMENTS: - The 5,000 cfs minimum flow required at the state line is not representative of the true lowest historical flows in the ACF and is not sustainable.

- Lanier was never designed to support ALL downstream demands and can't be expected to because the dams originally proposed on the Flint River were never built.

- The Corps' current operating rules require more water to be released from Lanier than is necessary and do not allow as much to be stored as is possible. These draw the lake down more than necessary and make it less likely to refill to full pool under contemporary climatic conditions.

- The Endangered Species Act does not require the Corps to augment Apalachicola River flows above run-of-river levels and the practice should not be required because it depletes Lanier unnecessarily.

- Regular navigation is no longer feasible on the ACF and the Corps should not try to support it in view of the other demands on Lanier as a resource of last resort.

Gordon, Robin

Page 1 of 1

1/13/2013

COMMENTER: Robin Gordon
1081 East Pine
St George Island, FL 32328

ORGANIZATION:

COMMENTS: To protect the Apalachicola River and Bay, I want to advocate for the scope of the Water Control Management Plan EIS to include:

1. An assessment and consideration of the freshwater needs that will sustain the health of the Apalachicola River and Bay.

2 Increased water release from Woodruff Dam at appropriate timing and duration to sustain Apalachicola River and Bay

3. An ACF basin wide sustainable water management plan that protects the Apalachicola River and Bay and equitably shares the water of this basin.

Grace, Patricia

Page 1 of 1

11/9/2012

COMMENTER: Patricia Grace
742 Camellia Drive
LaGrange, GA 30240

ORGANIZATION:

COMMENTS: Lake West Point continues to be managed in a disappointing way. The lake should be allowed to reach full basin so that it can be used in the manner it was mandated to be when it was built.

Granger, Stede

Page 1 of 1

1/14/2013

COMMENTER: Stede Granger
6435 Trudy Drive
Flowery Branch, GA 30542

ORGANIZATION:

COMMENTS: We would like to see more consideration given to the impact of drought conditions on Lake Lanier instead of always favoring the downstream locations in the ACF basin

Greer, Robert

Page 1 of 2

1/14/13

Tetra Tech
Attention: ACF-WCM
61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

Scoping Comments for ACF Water Control Manual

I submit the following comments in the recently reopened public scoping period:

1) There is a definitive need for additional storage in the ACF Basin; and that storage is readily and safely available in West Point Lake. Recent studies submitted to the USACE demonstrate that West Point Lake (WPL) can be maintained at a minimum 632.5 MSL year round; and if managed differently, the risk of downstream flooding during major rain events can actually be reduced! The trifecta is there to be won: Increased storage + Better management = Reduced flooding!

2) WPL is specifically authorized by Congress for Recreation and Sport Fishing/Wildlife Development in addition to Flood Control, Navigation, and Hydropower. Flood Control can be improved as outlined in the Operations Study referred to in #1 above and which study has been previously submitted to the USACE. Hydropower and Navigation both benefit from the availability of increased storage. The USACE must deliver and honor the Recreation and Sport Fishing/Wildlife Development Authorizations stipulated under law by Congress.

3) In order to accomplish #1 and #2 above, the Rule Curve needs to be adjusted upward to a minimum 632.5 MSL and the Action Zones need to be modified upward as well to a minimum 630.0 at the bottom of Action Zone 4. The parameters of 632.5 and 630.0 MSL are significant because they represent the initial and second recreation impact levels respectively as defined by the USACE.

Greer, Robert

Page 2 of 2

2.

4) The economic damages to the WPL communities and the lack of economic development due to unnecessarily low and undependable lake levels need to be assessed and stopped. Small businesses have gone bankrupt and others have been stretched to keep their doors open. Major fishing tournaments have been cancelled damaging hotels, restaurants, marinas, and lake related businesses. Visitation is down and campgrounds have been closed. Land specifically set aside for a hotel, conference center, golf course, etc. has never been developed. We are blessed with a moderate climate and WPL should be managed as a 52 week a year lake with the corresponding benefit of a 52 week a year lake related economy! WPL needs a dependable and reliable lake level to provide for economic development and stop the economic harm.

5) Environmental harm to WPL needs to be documented. Due to wildly vacillating lake levels, the fish spawn has suffered significantly in 3 of the last 5 years and the quality of the fishery, specifically the bass and crappie, has declined. Thousands, if not hundreds of thousands of mussels have been killed threatening water quality; erosion has increased the cost of water treatment; and siltation continues to eliminate valuable storage.

6) USFWS needs to be challenged to provide their science and document the need for 5,000 cfs for endangered species. Why 5,000 cfs? Why not 2,000 cfs? How many of each endangered species are there? Do they exist in deeper water than previously thought? What is the Recovery Plan? Are they still endangered, threatened, or neither? Can they be relocated to other areas where water is more plentiful and the economic damages are less. Who is looking out for the welfare of the small businessman? Common sense would seem to dictate that the needs of man should be balanced with the needs of the critters. The RIOP needs close analysis as part of the EIS to see what changes can be made to avoid destroying the economic, environmental, and recreational value of WPL during all times other than "extreme" drought!

I thank you for the opportunity to comment and ask that the above issues be submitted and studied during the EIS period.

Sincerely,

Robert J Greer, MD

Grove, Anita

Page 1 of 1

From: Anita Grove <Anita@ApalachicolaBay.org>
Sent: Monday, October 22, 2012 10:27 AM
To: ACF-WCM
Subject: comments for the US Army Corp ACF basin

We were unable to submit our comments on the online form.

Apalachicola Bay is one of the last places in the US that harvests wild oysters. We have preserved hundreds of thousands of acres at a great cost to us to ensure the preservation of this great bay and river. Unmitigated growth for decades in the Atlanta/ Lake Lanier are heavily taxing the system and forcing all others downstream to pay the price. Please considered those of us down stream and do not continue to choke one of our state's most valuable resources.

Anita Grove, Executive Director
Apalachicola Bay Chamber of Commerce
122 Commerce Street
Apalachicola, Florida 32320
(850) 653-9419
anita@apalachicolabay.org
www.apalachicolabay.org

1

Gundlach, John

Page 1 of 1

1/14/2013

COMMENTER: John Gundlach
8480 Bullock Ln
Gainesville, GA 30506

ORGANIZATION:

COMMENTS: - The 5,000 cfs minimum flow required at the state line is not representative of the true lowest historical flows in the ACF and is not sustainable.

- Lanier was never designed to support ALL downstream demands and can't be expected to because the dams originally proposed on the Flint River were never built.

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- Regular navigation is no longer feasible on the ACF and the Corps should not try to support it in view of the other demands on Lanier as a resource of last resort.

H. (illegible), D.

Page 1 of 2

12/21/12

Tetra Tech
Attention: ACF-WCM
61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

Scoping Comments for ACF Water Control Manual

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H. (illegible), D.

Page 2 of 2

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4) The economic damages to the WPL communities and the lack of economic development due to unnecessarily low and undependable lake levels need to be assessed and stopped. Small businesses have gone bankrupt and others have been stretched to keep their doors open. Major fishing tournaments have been cancelled damaging hotels, restaurants, marinas, and lake related businesses. Visitation is down and campgrounds have been closed. Land specifically set aside for a hotel, conference center, golf course, etc. has never been developed. We are blessed with a moderate climate and WPL should be managed as a 52 week a year lake with the corresponding benefit of a 52 week a year lake related economy! WPL needs a dependable and reliable lake level to provide for economic development and stop the economic harm.

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6) USFWS needs to be challenged to provide their science and document the need for 5,000 cfs for endangered species. Why 5,000 cfs? Why not 2,000 cfs? How many of each endangered species are there? Do they exist in deeper water than previously thought? What is the Recovery Plan? Are they still endangered, threatened, or neither? Can they be relocated to other areas where water is more plentiful and the economic damages are less. Who is looking out for the welfare of the small businessman? Common sense would seem to dictate that the needs of man should be balanced with the needs of the critters. The RIOP needs close analysis as part of the EIS to see what changes can be made to avoid destroying the economic, environmental, and recreational value of WPL during all times other than "extreme" drought!

I thank you for the opportunity to comment and ask that the above issues be submitted and studied during the EIS period.

Sincerely,

Hale, Mark

Page 1 of 1

1/12/2013

COMMENTER: Mark Hale
185 Drumcliff Ct
Tyrone, GA 30290

ORGANIZATION:

COMMENTS: To Whom it may Concern,
I am a property owner on West Point lake for 5 years now. This is a second weekend type home tht my wife and I along with our 3 young children use for family recreation. When we decided to purchace a lake vacation home we had several options but settled on West Point due to the proximity to metro Atlanta where our primary residence is located. Since the 2nd year of ownership the water levels have dropped throughout the summer months to a point that our dock was unusuable. I have gone to additional expense to give my dock the ability to "chase the water" however the last 2 years it dropped to a level that that could not keep up with. We have friends wo own property on Lake Harding just downstream. They continue to enjoy full lake levels regardless of rain/ flow requirements. This is frustrating to say the least considering the financial commitment we have made to this property. Lake property usually is shielded somewhat from the impact if an economic downturn however if there is no water in the lake then its no longer lake property. We belong to the West Point Coalition and I know they have provided good data supporting higher levels and less overall fluctuation annually. Please strongly consider maintaining a higher level in that West Point Project. There are countless business and property owners in Troup County who depend on it.

Respectfully,

Mark T Hale

Hale, Scott

Page 1 of 1

11/2/2012

COMMENTER: Scott Hale
96 Highland Drivie
West Point, GA 31833

ORGANIZATION:

COMMENTS: The fact that you allow mussels and sturgeon to take precadent over the economic lively hood of Humans is nonsensical. These species were in existance before our rivers were damed and will be there after we are all dead and gone. But, with no scientific proof that these species are being harmed you have destroyed people businesses and lives. Can we have some Common Sense in Gov't? I Built a house on the lake in 1995 and after 7 years of struggling with water levels, I finally sold. Well.... I bought a houseboat ($200,000)thinking I would be immune to the low water. Our dock has over $1,000,000 in Houseboats that are in physical danger of having major damage if the water level continues to drop. We already cannot use them due the the levels but if the water continues to drop, outdrives could be damaged causing boats to sink, costing thousands of dollars and creating a terrible enviromental Hazard. Let's get some common sense and put the lively hood of Humans First over fish.

Hansen, Bruce

Page 1 of 1

1/14/2013

COMMENTER: Bruce Hansen
4380 Cedar Ridge Trail
Stone Mountain, GA 30083

ORGANIZATION:

COMMENTS: The Corps must come to grips with the fact that global warming has changed the climate in north Georgia, and the new climate is LESS rain. The Corps MUST change it's management procedures so that Lake Lanier is no longer drained for all it's worth. The 5000 CFM requirement is no longer maintainable, and MUST change. As climate change gets worse, this problem will get worse.

Lake Lanier is VERY important to North Georgia's well being and economy. Lanier MUST be brought up to full pool, and left there. Lanier is the head of the ACF system, if Lanier is allowed to degrade, the entire system will go with it. Lanier MUST be much better managed than it has been in recent years.

Hanthorn, Joshua

Page 1 of 5

From: Josh Hanthorn <joshhanthorn@vermontlaw.edu>
Sent: Saturday, December 01, 2012 3:05 PM
To: ACF-WCM
Cc: Jessica West
Attachments: Joshua Hanthorn's Public Comment, Assignment 2.docx

To Whom it May Concern:

I am submitting a scoping comment for the allocation of Lake Lanier's water to Atlanta (Billing 3720-58). If there are questions concerning these comments, feel free to contact me at this email address or write to: Joshua Hanthorn at 50 South St. APT 2 South Royalton VT 05068. Thank you.

Joshua Hanthorn
Vermont Law School Student
Prospective J.D. 2014

1

Hanthorn, Joshua

Page 2 of 5

To: Army Corps of Engineers
ACF-WCM@usace.army.mil
From: Joshua Hanthorn
Vermont Law School Student Class 2014
Re: Public Comment on EIS for the Lake Lanier Allocation
Date: November 30, 2012

Public Comment on the Environmental Impact Statement for the Lake Lanier Allocation

This comment addresses the Army Corps of Engineers' (the "Corps") consideration of a broader range of water supply alternatives from Lake Lanier. After the 11th Circuit Court of Appeals ruled Atlanta's water supply was the original intended use of the manmade lake, the Corps decided to take public comment for the production of an Environmental Impact Statement ("EIS") to meet the requirements of the National Environmental Policy Act (the "NEPA"). The EIS will pertain to the allotment of water for Atlanta's use, along with other uses of Lake Lanier. I would like to make a comment on the Corps' action based on my experience as a law school student and my summer internship with the Chattahoochee Riverkeeper.

National Environmental Policy Act

NEPA requires an administrative agency prepare an EIS for any major federal action that will significantly affect the quality of the human environment. 42 U.S.C. § 4332. To satisfy NEPA, the Corps must consider, among other things the degree (1) to which the proposed action affects public health or safety, (2) to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (the "ESA"), and (3) to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. *Id.* Moreover, the Corps must analyze the alternatives to a proposed action. *Id.*

1

Hanthorn, Joshua

Page 3 of 5

A higher allocation of Lake Lanier's water to Atlanta may potentially have adverse effects on public health. Historically, drainage has caused water quality degradation in the particular watershed being drained. Water quality degradation causes bacterial skin infections to recreational water users and makes the water unsafe for drinking. Since higher allocation for Atlanta would severely affect the public health of downstream users, the Corps' EIS should consider an alternative to a higher allocation.

A higher allocation of Lake Lanier's water to Atlanta may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA. The ESA requires formal consultation for federal actions that "may affect" listed species or critical habitats. There are at least three federally listed types of mussels and the Gulf sturgeon within the Apalachicola River that may be affected by the proposed action. Thus, the Corps must initiate formal consultation with the U.S. Fish and Wildlife Service on additional withdrawals. Moreover, because downstream impacts may influence operations extending as far as Apalachicola Bay, the Corps also must formally consult with the National Oceanic and Atmospheric Administration Fisheries Service as to impacts the proposed project may have on the federally listed Gulf sturgeon. Since higher allocation for Atlanta would possibly violate a protected species under the ESA, the Corps' EIS should consider an alternative to a higher allocation.

A higher allocation of Lake Lanier's water to Atlanta may have unknown risks and a degree of uncertainty concerning the human environment. Given the uncertainty regarding the potential for future droughts and climate change, the magnitude of impacts downstream may, in fact, prove to be significant. Georgia just had its worst drought in history in 2007 and according to scientists; climate change will continue to have future ill effects on water resources. Therefore,

2

Hanthorn, Joshua

Page 4 of 5

the effects of future droughts and climate change should be considered in the Corps' EIS for a higher allocation of water for Atlanta.

National Environmental Policy Act Alternatives

NEPA requires the government consider alternatives to the proposed action. 42 U.S.C. § 4332. All reasonable alternatives to the action must be described in adequate detail in the EIS for subsequent reviewers and decision makers. *Id.* The scope and goal of the project determines the number of alternatives needed in the statement. *Id.* The agency is not limited to those alternatives that the agency can adopt. *Id.* Long term alternatives must be included unless entirely beyond the scope of the action (see *Portland Cement v. Ruckelhaus*).

Specifically, a no action alternative must be considered. Water conservation is not limited to "dry years." The Chattahoochee River serves 3.5 million Georgians including seventy percent of metro Atlanta, yet the area of the watershed north of Atlanta is among the smallest to serve a major metropolitan area. Using water wisely year round, in wet years and dry years, is common sense. Since water conservation is the most cost-effective and environmentally sound way to control the demands on the rivers and streams, the best alternative to any allocation is to stay with the current allocation for Atlanta. This would force the city to come up with a comprehensive conservation plan and allow for present flow of the watershed.

Conclusion

Atlanta's need for water from Lake Lanier is evident. However, the Corps should ensure the connected watershed is also not severely affected and water is available in the future through conservation. We know we need clean drinking water in order to live, but rivers and lakes provide much more. They water our crops, give us fish to eat, light our homes and bring us

3

Hanthorn, Joshua

Page 5 of 5

joy. Choosing a 'no change of action' alternative is the best choice for the Corps because it is the only choice that ensures the sustained life of the watershed.

JOSHUA HANTHORN
Vermont Law School
South Royalton, Vt. 05068
(808) 392-7817

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4

Hardin, Delores

Page 1 of 1

1/12/2013

COMMENTER: Delores Hardin
130 Herndon Rd
Carrabelle, FL 32322

ORGANIZATION:

COMMENTS: Apalachicola Bay needs MORE WATER in order for the oysters and scallops to survive. My husband and I are a vegetarians who eat local seafood and have friends who rely on it for income. Please help keep our bay alive.

Hartley, William

Page 1 of 1

1/13/2013

COMMENTER: William Hartley
265 W Liberty St
Hernando, FL 34442

ORGANIZATION: Apalachicola Riverkeeper

COMMENTS: As the co-founder of the Apalachicola Riverkeeper organization and having been the Apalachicola Riverkeeper for 5 years, I know well the need to keep adequate fresh water flowing down the Apalachicola River in order to allow the famous Apalachicola oysters to grow and thrive. Please study carefully the amount of fresh water needed to ensure the protection of these oysters and other seafood in this River and Bay. A sustainable plan for the ACF water basin and increased water from Woodruff Day should be on your agenda. Thank you for helping.

Haugdahl, Eric and Melba

Page 1 of 1

1/12/2013

COMMENTER: Eric and Melba Haugdahl
1208 Seminole Drive
Tallahassee, FL 32301

ORGANIZATION:

COMMENTS: Please protect Apalachicola Bay!It is a special place.

Hendrix, James

Page 1 of 1

1/14/2013

COMMENTER: james hendrix
5200 shady grove rd.
cumming, GA 30041

ORGANIZATION:

COMMENTS: flint river dam never built, lanier was never intended to carry the load it is now.to much water released . flow not cut back soon enough to conserve more water when rains do come. water from lanier is used to support 2 basins !

Henry, George

From: DIV.ACF.EIS
Subject: FW: West Point Lake Scoping Comments

-----Original Message-----
From: George Henry [mailto:geohenry@me.com]
Sent: Wednesday, December 26, 2012 2:16 PM
To: ACF-WCM
Subject: West Point Lake Scoping Comments

To: US Army Corps of Engineers
Re: West Point Lake Scoping Comments

Thank you for extending the date for additional scoping comments for West Point Lake in preparation of your updated manual. As a resident of Troup County with home and wildlife habitat adjacent to USACE property at Ringer Access Park, as a retired physician with health and safety concerns for the community, and as a former member of The Georgia Conservancy's board of directors, I am glad to add comments for your serious consideration.

You are aware that managing the release of water from West Point Lake is a most critical issue for residents of our area. With the many competing demands it that USCOE has to address, the most offensive factors from our perspective relate to the relatively simplistic formulas for maintaining Apalachicola mussel beds, commercial navigation for a very few along the lower Chattahoochee, and the continuing "Water Wars" among Georgia, Alabama and Florida. Although these matters relate to statutory matters which you have long held the US Congress must address, and also to infighting among the three state governments , clearly congressional action and litigation resolution are not about to happen in the near future. Consequently, creative regulatory means must be found by you to juggle the demands more equitably in consideration of other binding obligations regarding the original impoundment of West Point Lake, as well as the rational handling of real needs now.

The releases from West Point's dam are much too heavy and too prolonged, to the severe detriment of the economy and life quality in this region; and outrageously now you are even considering greater releases for more months of the year. The water level is far too low for water quality and safety, living conditions, and the economy of this area. You must hold more water within West Point Lake . I ask you to change releasing guidelines accordingly, and also to consider such radical means as removing power company rights to protect full-pool status of its Chattahoochee-derived lakes and dredge-lowering the floor of West Point and Lanier lakes in order that they will better fulfill reservoir capacity.

Furthermore, your help is needed to influence the inflow of water with respect to both quality and quantity. Especially during current and prior severe drought conditions, competing demands for conserving and distributing the Chattahoochee's water make critical the formulas for equitable balance. The USACE should do all in its power to help protect flows into the system from its many sources. Efforts to impound and divert sources from Hall County and above are ill-considered and detrimental for Lake Lanier, Lake West Point, and the river's myriad supply needs both above and below Lake West Point. Furthermore, exchanges among river basins are ill-advised, especially considering the five-basin impact of the Atlanta metro area, which can send it's outflows elsewhere than along the Chattahoochee. Monitoring, regulating, and effectively enforcing water quality from industrial, agricultural, and development projects require strong oversight for which the USACE should provide advocacy and leverage.

George M. Henry, MD
196 Ringer Access Road
Hogansville, GA 30230
706-812-1615

Hinshaw, Mary

From: DIV.ACF.EIS
Subject: FW: Water Control Manual Revision Public comments

From: Hinshaw, Mary [mailto:Mary.Hinshaw@gexpro.com]
Sent: Monday, January 14, 2013 1:10 PM
To: ACF-WCM
Subject: Water Control Manual Revision Public comments

As a current resident on Lake Lanier in Oakwood I'd like to submit comments on why the low levels of Lake Lanier should be maintained at higher than present levels.

- The 5,000 cfs minimum flow required at the state line is not representative of the true lowest historical flows in the ACF and is not sustainable.

- Lanier was never designed to support ALL downstream demands and can't be expected to because the dams originally proposed on the Flint River were never built.

- The Corps' current operating rules require more water to be released from Lanier than is necessary and do not allow as much to be stored as is possible. These draw the lake down more than necessary and make it less likely to refill to full pool under contemporary climatic conditions.

- The Endangered Species Act does not require the Corps to augment Apalachicola River flows above run-of-river levels and the practice should not be required because it depletes Lanier unnecessarily.

- Regular navigation is no longer feasible on the ACF and the Corps should not try to support it in view of the other demands on Lanier as a resource of last resort.

Mary Hinshaw
mary.hinshaw@gexpro.com

Holbrook, Todd

Page 1 of 2

Georgia Wildlife Federation
11600 Hazelbrand Rd, Covington, GA 30014
770 787-7887

January 14, 2013

Steven J. Roemhildt
Colonel, Corps of Engineers
District Commander, USACE, Mobile District
P.O. Box 2288
Mobile, AL 36628

Re: Master Water Control Manual Update, Environmental Impact Statement for the Apalachicola-Chattahoochee-Flint River Basin

Dear Col. Roemhildt:

Thank you for the opportunity to submit comments on Notice of Intent to Revise EIS Scoping - Apalachicola-Chattahoochee-Flint River Basin Master Water Control Manual Update. The management of flows in this system is critical to the communities who withdraw water from it, key to long term economic growth, and vital to the interests and passions of the members of the Georgia Wildlife Federation - namely cold water trout fishermen, warm water river anglers, and reservoir fishing enthusiasts. The Georgia Wildlife Federation offers the following input at this point in the process.

The Chattahoochee River Tailwater above Atlanta was named by Trout Unlimited as one of America's 100 best trout streams. It supports a very popular fishery for naturally reproducing brown trout (Salmo trutta) in addition to the routinely stocked rainbow trout that sustain over 83,000 trout fishing trips annually. Further downstream, as the water warms, the system supports quality fishing for shoal bass, largemouth bass, striped bass, various sunfish species, and other game fish. It would be difficult to overestimate the recreational value or economic impact of sport fishing to the people who live in and travel to this basin.

There are three key threats to maintaining quality fisheries within the Apalachicola-Chattahoochee-Flint River Basin that should be given particular consideration throughout this process. They include adequate flows, dissolved oxygen, and sedimentation from erosion. Flows affect water temperatures, nutrient loads, and other water quality issues. The fish species that are dependent upon flowing water between the impoundments, particularly shoal bass, are very sensitive to flow velocities and shoal inundation, as well as insect and crustacean productivity for their population success. The shoal bass populations on the Chattahoochee River are isolated due to serial damming and their inability to traverse impounded waters. It is important to understand and manage conditions that enhance the success of the fish populations in the flowing waters between these impoundments.

Holbrook, Todd

Page 2 of 2

The Corps should also consider management options for maintaining and/or enhancing dissolved oxygen below the dams of major reservoirs. Minimum DO tolerance levels differ amongst aquatic species. The sections of the Chattahoochee River between impoundments need to be studied closely to determine the needs of these downstream ecosystems and the results of these studies should be used to establish flow requirements downstream of the Buford Dam. Sedimentation is a factor throughout the system that can be aggravated or moderated through water release strategies as they impact bank sloughing. Suspended sediment in water can interfere with feeding for visual feeders such as trout and bass. Sediment can be abrasive to the gill membranes of fish, suffocate fish eggs, destroy foraging and shelter areas and have impacts to small aquatic animals that are food for fish. Water releases must be controlled to minimize erosion and sedimentation in the river.

In addition to the direct impact on sport fish, all of these water quality issues impact the invertebrate biota that are critical to the food chain supporting sport fish populations. We request that modifications to the ACF Master Water Control Manual be comprehensive in nature, recognize the importance of the sport fishery throughout the system, and contemplate management of all water quality issues. The EIS must evaluate all impacts to aquatic ecosystems and species throughout the ACF, particularly threatened and endangered species in the basins. The Corps must be sensitive to any flow regime's effects on fish populations and habitat availability.

Again, thank you for the opportunity to comment. Please keep me informed regarding proposed changes as this process progresses.

Todd Holbrook
President and CEO

Holz, Robert

Page 1 of 1

1/14/2013

COMMENTER: Robert Holz
8125 Rocky Ridge
Gainesville, GA 30506

ORGANIZATION:

COMMENTS: Please consider reducing the 5,00 cm flow. It is seriously reducing our quality of life. We are retired senior citizens who enjoy boating, fishing and the beauty of Lake Lanier. Each year this is eroded presumably for no good or clearly understandable reasons.

Unles a sustainable withdrawal policy is developed the quality of life on Lake Lamier will be ruined

Hooker, Douglas

Page 1 of 18

ARC
ATLANTA REGIONAL COMMISSION
40 Courtland Street, NE
Atlanta, Georgia 30303
atlantaregional.com

January 14, 2012

Via Electronic Mail and U.S. Mail

Tetra Tech, Inc.
Attention: ACF-WCM
61 St. Joseph Street, Suite 550
Mobile, AL 36602–3521

RE: Notice of Intent to Revise Scope of Draft Environmental Impact Statement for Updating the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin To Account for the U.S. Court of Appeals for the Eleventh Circuit Ruling and a June 2012 Legal Opinion of the Corps' Chief Counsel Regarding Authority To Accommodate Municipal and Industrial Water Supply From the Buford Dam/Lake Lanier Project, 77 Fed. Reg. 62,224 (Oct. 12, 2012).

Comments of the Atlanta Regional Commission on behalf of the Water Supply Providers

To Whom It May Concern:

The Atlanta Regional Commission (ARC) submits these comments on behalf of the Water Supply Providers in response to the Corps' October 12, 2012, notice in the Federal Register, which solicits additional public comment concerning the scope of water supply alternatives to be considered as it updates its master water control manual for the Apalachicola-Chattahoochee-Flint (ACF) River Basin. These comments supplement the comments ARC submitted on November 28, 2008 and December 30, 2009.

ARC strongly supports the Water Supply Request submitted by the State of Georgia in 2000. As is explained below, metropolitan Atlanta lacks any economically and environmentally viable alternative source of water supply to replace Lake Lanier.

We are therefore gratified by the Corps' acknowledgment that it must consider metropolitan Atlanta's water supply needs as it updates its master water control plans and manuals for its ACF reservoirs. We hope that the following comments will aid the Corps in establishing its NEPA process for the ACF water control manual update and in preparing an environmental impact statement (EIS) that fully addresses metropolitan Atlanta's water supply needs in conjunction with the Corps' other management considerations for the Basin.

Hooker, Douglas

Page 2 of 18

1. The Corps Should Fully Consider and Evaluate Georgia's Water Supply Request.

a. The purpose and need for the EIS should include meeting Georgia's current and future water supply needs.

The "purpose and need" for the federal action should include meeting metropolitan Atlanta's water supply demands through 2040, as stated in Georgia's Water Supply Request. Multiple studies, including the Metropolitan Atlanta Water Resources Study, the Corps' 1989 Post Authorization Change and Reallocation Reports, and the Metropolitan North Georgia Water Planning District's water resources plans, all have concluded reallocating storage in Lake Lanier and operating Buford Dam to facilitate Chattahoochee River withdrawals is the best available alternative for meeting the region's water needs.

The Eleventh Circuit has established that water supply is a fully authorized purpose of Lake Lanier and that Congress intended for the project to meet the increasing needs of metropolitan Atlanta as the region developed. The opinion issued by the Corps' General Counsel, Earl Stockdale, confirms this broad authority to operate Buford Dam and Lake Lanier for water supply, finding that the Corps has ample authority to accommodate the increased levels of water supply withdrawals contemplated by Georgia's Water Supply Request. Completion of the required NEPA review, therefore, is the final remaining step for the Corps to determine whether and how it will meet metropolitan Atlanta's water needs as Congress intended.

b. Georgia's full Water Supply Request should be an action alternative.

The alternatives analysis for the EIS should include a variety of operating rules designed to meet Georgia's full Water Supply Request.

Georgia and the metropolitan Atlanta region, of course, remain committed to efficient and sustainable use of the water resources within the ACF Basin. As a result of water conservation efforts, per-capita water use in metro Atlanta has been trending downward since the year 2000 even though regional population has increased.[1] Further, a survey of metro areas nationally illustrates that by 2006, the per-capita water use within the Metropolitan North Georgia Water Planning District was lower than most of the areas surveyed.[2] Even with aggressive water conservation, however, additional water supply will be needed from Lake Lanier and the Chattahoochee River as the region continues to add population and jobs, as outlined by the Water Supply Request and updated information provided by Georgia.

Operations that accommodate Georgia's full Water Supply Request, therefore, must be among the action alternatives considered. In analyzing this request, the Corps should evaluate operational rules that accommodate metropolitan Atlanta's future water supply needs to the fullest extent. The Corps' previous NEPA studies show that using Lake Lanier for this purpose carries the fewest environmental impacts and provides the greatest net economic benefits.

[1] Metropolitan North Georgia Water Planning District, Water Metrics Report (Feb. 2011). This report was provided by email from Pat Stevens to Brian Zettle of the U.S. Army Corps of Engineers on June 16, 2011.

[2] Maddaus Water Management & CH2M Hill, National Water Use Per-Capita Survey, 2005-2007 Period at 4. This report was provided by email from Pat Stevens to Brian Zettle of the U.S. Army Corps of Engineers on June 16, 2011.

Hooker, Douglas

Page 3 of 18

c. The Corps should evaluate the economic benefits of granting the request.

The Corps should evaluate the national and regional economic development benefits that would result from granting Georgia's Water Supply Request. In this case, the Corps has repeatedly recognized, through years of study, that supplying water from Lake Lanier to meet the reasonable water supply needs of metropolitan Atlanta is the highest and best use of the resource. Indeed, it is for that reason that the Corps has repeatedly recommended that storage in Lake Lanier be reallocated to provide water supply for metropolitan Atlanta.

ARC has contracted with the firm Industrial Economics to provide an analysis of the relative value of using water from Lake Lanier for water supply compared to other purposes, as well as the national economic development (NED) and regional economic development (RED) benefits of granting the Water Supply Request. This information will be provided to the Corps once it becomes available. It is sufficient for these purposes, however, to state that water supply for metropolitan Atlanta remains by far the most economically beneficial use of Lake Lanier, and that the economic impacts resulting from the Corps' decision on the Water Supply Request must be fully evaluated.

d. The Corps should fully consider the indirect effects of granting anything less than the full Water Supply Request.

The Corps' analysis of water supply operations must include full and complete consideration of the reasonably foreseeable indirect effects of granting anything less than the entire Georgia Water Supply Request. Metropolitan Atlanta relies on Lake Lanier and the Chattahoochee River as its principal source of water supply. Although the region's adoption of aggressive conservation measures has slowed its growth in demand, these demands will continue to increase consistent with the State's Water Supply Request.

There are no reasonable and feasible alternatives to Lake Lanier available to meet these demands. As a result of its geographic location at the headwaters of several major river basins, the geology underlying the region, environmental considerations, and legal prohibitions on large-scale interbasin transfers, metropolitan Atlanta lacks any viable alternative sources of water supply. Metropolitan Atlanta must therefore rely almost exclusively on surface water to meet its reasonable needs, and these withdrawals come primarily from the largest water supply source, Lake Lanier and the Chattahoochee River.

Both the evaluation of the Water Supply Request and the EIS must recognize the absence of reasonable alternative water supply sources. To the extent the Corps was to grant anything less than the entire Water Supply Request, metropolitan Atlanta would have no choice but implement unreasonable, incredibly expensive, and environmentally damaging alternatives to satisfy the needs the Corps declined to meet. This would have serious economic and environmental implications for metropolitan Atlanta, the State of Georgia and the ACF Basin as a whole.

In short, Lake Lanier is the only alternative that will meet the reasonable needs of metropolitan Atlanta in a manner that is safe, reliable, economical, and that does not result in significant environmental impacts. Under NEPA, the Corps must fully evaluate the direct and indirect impacts of requiring metropolitan Atlanta to meet its needs through any other means. The Corps must also fully evaluate the economic, social and public health impacts that would result from any shortages resulting from unmet future needs.

Hooker, Douglas

Page 4 of 18

e. The proper baseline should be continuing existing operations.

ARC believes that the proper no action alternative should be continuing existing operations. This would include continued operations under the Corps' RIOP, as addressed in the U.S. Fish and Wildlife Service's February 2012 biological opinion, and existing levels of water supply withdrawals.

f. The Corps should provide flexibility for a range of water quality flow targets.

The 1989 Water Control Plan states that "discharges from Buford dam, when considered in combination with the contribution of local drainage between the dam and the City of Atlanta and reregulation by the Georgia Power Company's Morgan Falls Dam, are to be sufficient provide a minimum flow rate of 750 cfs at Peachtree Creek." This flow target was originally established by Georgia EPD in the early 1970s as a "design flow" for use in setting effluent limitations in NPDES permits. While this design flow may still be appropriate under normal conditions, more recent analysis by Georgia EPD has shown that water quality standards will still be met at flows less than 750 cfs. Accordingly, Georgia EPD has on several occasions requested that the 750 cfs flow target be temporarily reduced to preserve storage during drought. These requests were ultimately granted, but only after considerable delay.

ARC requests that this issue be addressed in the EIS and the Manual update, and that flexibility be provided for a range of flow targets to meet water quality considerations as determined by Georgia EPD. We believe that the Corps has sufficient authority to address this issue in conjunction with the authority granted to the State of Georgia under the Clean Water Act, and that such flow targets are not "water quality standards" and do not have to be reviewed and approved by the US Environmental Protection Agency.

2. The Corps Should Consider New Performance Measures and Operating Rules to Manage the System More Efficiently.

ARC appreciates the Corps' efforts in revising system operations in the ACF Basin to more efficiently and sustainably manage its limited water resources while, at the same time, meeting the multiple purposes of the projects and stakeholders' needs throughout the basin. The changes adopted in the RIOP and May 2012 revised biological opinion have largely mitigated the unreasonable demands the IOP placed on the system and the risk to metropolitan Atlanta's water supply security that the IOP created. Based on the modeling work and analyses that ARC has undertaken, however, we believe that there is further room to improve operations and management of the ACF Basin. We would encourage the Corps to look beyond the RIOP and to consider creative new operating rules and scenarios that manage the system more efficiently.

In addition, the Corps should identify specific, direct measures of performance based on actual stakeholder needs to evaluate operational alternatives. It should also consider more creative and flexible operational rules that take account of advances in hydrologic forecasting, rather than rigid release schedules that focus merely on the quantity of water delivered downstream.

a. Operating rules should be developed to meet specific objectives and evaluated using direct measures of their performance.

The Corps should use the NEPA process to develop performance measures based on the actual identified needs of stakeholders in the ACF Basin, which would be used to evaluate various operating rules under consideration. This will ensure that the Corps' operating rules are targeted to meet

Hooker, Douglas

Page 5 of 18

identifiable management objectives; identify trade-offs between different management options; and operate efficiently to achieve the best performance based on the identified metrics.

In this process, the performance measures developed should be direct evaluations of impact, rather than indirect, to the greatest extent possible. For example, if lower salinity in Apalachicola Bay is the management objective, operating rules should be evaluated based on their ability (or inability) to alter bay salinities. Flow-based proxies (for example days with discharge above 16,000 cfs) are typically too coarse and often cannot ensure that the actual management objective will be achieved.

Below we have provided examples of some performance measures that should be considered. A complete set of performance measures can only be developed based on the specific, identified needs of the various stakeholders. Nevertheless, we encourage the Corps to use these as a guide for developing performance measures as it develops the EIS for the ACF Basin.

i. Performance measures for water supply and reservoir levels.

We have provided performance measures for metropolitan Atlanta's water supply in Attachment 1. This suite of measures was also submitted to the ACF Stakeholders group in July 2012. Specific performance measures for water supply include:

Probability of Refill and System Reliability. Lake Lanier should be allowed to refill in as many years as possible in order to minimize the possibility of entering a severe, multi-year drought with low reservoir levels and the corresponding risk to water supply security. Indeed, water supply systems of other major metropolitan areas, including the City of New York and the Washington D.C. Metropolitan Region, typically operate their projects such that they refill in at least 90 percent of the years. Performance measures 1 and 2 in the Attachment are intended to evaluate the probability of reservoir refill.

Lake Levels, Sustainable Releases, and Rate of Drawdown. Levels in Lake Lanier should be evaluated against the risk to water supply and other uses in the ACF Basin, all of which rely on Lake Lanier storage during severe drought. Performance measures 3 through 7 in the Attachment provide a number of alternative ways of assessing the lake levels including the minimum stage on each calendar day of the year; the percentage of weeks in which the lake falls below critical levels; the frequency distribution of Lake Lanier stages; and the rate of drawdown.

Equity Among Projects. We believe that equity among the ACF projects in terms of project refill and recreation impacts (as defined by Corps criteria) should be evaluated during the EIS process as seen in performance measures 8 through 10 in the Attachment.

Absence of Shortages. Finally, water supply shortages are extraordinarily disruptive and create public health and safety emergencies. Performance measures 11 and 12 in the Attachment assess the potential that water supply needs in the metropolitan Atlanta region are being met. Operating rules should be evaluated to ensure that no water supply shortages occur (both measures should be zero, such that there are no shortages or minimum water quality flow target deficiencies).

ii. Environmental performance measures.

The Corps should use the NEPA process to work with the U.S. Fish and Wildlife Service (FWS) and other stakeholders to develop direct measures of performance to evaluate impacts to protected species, the health of Apalachicola Bay and other environmental considerations.

Hooker, Douglas

Page 6 of 18

Protected Species. FWS has developed a range of performance measures in its biological opinions to assess potential impacts of operating policies on threatened and endangered species. While some of these are more direct measures of performance, many focus solely on the magnitude of flow and are not sufficiently tied to benefits or impacts to protected species.

For example, 5,000 cfs has been adopted as an important minimum flow threshold without clear evidence that it is actually necessary. The most recent research indicates that protected mussels have the ability to move when flows fall below 5,000 cfs. At the same time, maintaining this minimum flow can require a substantial quantity of storage. For example, maintaining a minimum flow of 5,000 cfs instead of 3,000 cfs requires the use of 444,000 acre-feet of storage during the 2007-2008 drought,[3] which is over 11 feet in Lake Lanier.

Given the demands on storage that they impose, minimum flows must be carefully tailored to meet distinct, actual needs. Without this, a minimum flow, in and of itself, does nothing to ensure that scarce water resources are used efficiently to meet real needs in the ACF Basin.

Apalachicola Bay Salinity. Some stakeholders suggest that Lake Lanier be managed to control salinity in Apalachicola Bay. In the past, the Corps has used a flow-based proxy of 16,000 cfs as a measure of potential salinity impacts to Apalachicola Bay. This should be abandoned in favor of more accurate, direct measures of salinity performance.

Experts working on behalf of ARC have developed a 3-dimensional circulation model of Apalachicola Bay that can be used to evaluate salinity at different locations and depths under different operating rules. That modeling shows that the Corps' reservoir operations make little or no difference in expected salinity. Based on these results, there is no reasonable operation of the ACF projects which can mitigate the impact of drought conditions on salinities in the Bay.

We urge the Corps to utilize salinity models to evaluate the impacts of alternative operating rules on Apalachicola Bay salinity. Through these models, the Corps should examine how its operations could (or could not) alter bay salinities to achieve specific management objectives.

b. More creative and flexible operating rules should be considered.

We urge the Corps to look beyond the RIOP and to consider creative new operating rules and scenarios that manage the system more efficiently. We have shown through our own modeling work in conjunction with the State of Georgia that the system can perform more efficiently and satisfy most of the stakeholders needs through innovative approaches to reservoir operations and system management.

The State of Georgia and ARC have collaborated on one such alternative operating rule, referred to as the Georgia Contemplation, which was presented to the Corps, U.S. Fish and Wildlife Service, and various ACF Basin stakeholders at the FWS workshop held in Eufala, Alabama on November 29-30, 2012 and which is included as part of the State of Georgia's ACF scoping comments and submittal. The Georgia Contemplation performs better than the RIOP across a broad range of performance measures identified by the U.S. Fish and Wildlife Service, and we encourage the Corps to study it as the Corps considers and develops alternative operating plans and rules. Some of these components are discussed in greater detail below.

[3] This was determined with simulation modeling runs removing all operations in the basin with the exception of a constants minimum required releases from Woodruff Dam. The unimpaired flow set from the Corps ACF RES SIM model released in May 2011 were used.

6

Hooker, Douglas

Page 7 of 18

Forecasting. Forecast-based operating rules can improve the benefits derived from reservoir operating rules for all purposes. Forecasts, particularly ensemble forecasts, can and should be used in rules that set real-time variable targets for flows throughout the system. When combined with storage levels, forecasts can be used to determine the appropriate levels of flow support from storage. This will allow better performance for hydropower, navigation, water supply, recreation, environment, and other purposes.

We understand that the Corps is moving forward with a plan to utilize National Weather Service forecasts to improve operations during non-flood periods. We strongly support this effort. It should be noted, however, that these forecasts are biased to be high during low flow events. It is therefore imperative that the Corps employ procedures to correct for and remove this bias, or otherwise explicitly account for the bias in their use of forecasts.

Further, any operating rules that use forecasts should be evaluated using "hindcasts" and simulation modeling. To model forecast-based operating rules over a historic period of record, the Corps should develop a time-series of the forecasts that would have been made given the historical meteorology/hydrology and the current NWS forecasting procedures. This forecast time-series, referred to as a hindcast, can then be used in simulation modeling to test the proposed rules, just as previously proposed, non-forecast based rules have been in the past.

Rule curves and action zones. The Corps should evaluate alternative levels for the rule curves and action zones. It should also consider abandoning rule curves and action zones in favor of setting operating targets that vary continuously based on the values of current storage and inflow forecasts.

Reservoir balancing. The Corps should reconsider its policy of balancing the volume of water stored among the ACF reservoirs so that all of the projects are in the same action zone. Balancing releases of this sort are not the most efficient use of upstream storage and do not adequately account for the disparity in refill potential of the Corps' projects.

Maintaining water in Lake Lanier, the largest and most upstream reservoir in the ACF system, preserves system storage during drought. Water can always be moved downstream, but it cannot be moved upstream once it has been released from Lake Lanier. Thus, in contrast to the lower projects that are replenished both by releases from storage and runoff from their much larger drainage basins, Lake Lanier can only refill through natural inflows from its relatively small drainage basin. For that reason, water should be released downstream only when it is necessary for designated purposes and measurable performance targets other than simply "balancing" action zones, which disproportionately affect Lake Lanier due to its more limited capacity for refill. For example, under the RIOP, Lake Lanier experiences recreation impact 54% of the recreation season days, compared to 27% in West Point Lake and 5% in Lake Eufala.[4]

Woodruff Dam release requirements. The Corps should reconsider its Woodruff Dam release schedules, including a full analysis and evaluation of minimum flow requirements. The Corps' ability to capture and store water is limited and, as a result, over 90% of the unimpaired flow in the ACF Basin will generally be available below Woodruff Dam under any reasonable operating policy. Moreover, in extreme drought periods, the existing operating rules require that essentially all of the unimpaired flow be passed through Woodruff. In May-November of 2007, Woodruff releases averaged 100% of unimpaired inflow. This extraordinary level of flow support came at great cost to

[4] Number of recreation impact days was determined using the results of an RIOP simulation in Res Sim by Georgia EPD and the Water Control Plan definitions of recreation season and recreation impact levels in each lake.

7

Hooker, Douglas

Page 8 of 18

water supply reliability, lake ecology, recreation, and other values throughout the Chattahoochee Basin in Georgia and Alabama.

While we acknowledge the Corps' responsibilities under the Endangered Species Act and its desire to maintain other environmental values in the Apalachicola River, releases to support downstream flows must be balanced against the costs to other users and purposes. It should therefore carefully examine and estimate the tangible benefits of maintaining arbitrary and fixed minimum flows, particularly during extreme droughts, and consider more targeted performance measures as described.

The Corps should also consider new considerations and proposals being put forward by the U.S. Fish and Wildlife Service. Specifically, the FWS is discussing that RIOP ramping requirements could potentially be suspended during low flow periods, and releases made for flow targets could be limited by their draw on storage.

Hydropower. The Corps' remand modeling and our own analyses indicate that modifying operations to improve performance in terms of other objectives usually has an extremely minor impact on hydropower generation and hydropower revenue. We urge the Corps to utilize the methodology employed in the remand modeling to evaluate the impact of alternative rules and system operations on hydropower and to appropriately balance the substantial other benefits that may be achieved against the potentially small impacts on hydropower.

3. Structural Alternatives Should be Evaluated and Considered.

We continue to urge the Corps to consider structural alternatives to reduce release requirements and downstream demands. These structural alternatives are discussed in ARC's earlier comments, and include either closing or installing a lock at Sikes Cut, restoring the channel below Woodruff Dam, refurbishing the intake at Plant Farley, and renovating projects to reduce releases necessitated by head limits.

4. Suggestions Concerning Technical Modeling Assumptions and Considerations

In connection with the authority determination issued after the Eleventh Circuit's decision, the Corps developed a hydrologic model to analyze the potential effects of granting Georgia's Water Supply Request. Some of the assumptions in this modeling potentially overstate the likely impact of increased withdrawals. While this ultimately did not affect the Corps' determination as to its authority, we suggest that the Corps evaluate the following assumptions and inputs for modeling in support of the EIS and Manual update:

- The Corps conservatively assumed that only 76% of the withdrawals from Lake Lanier and the Chattahoochee River would be returned in the Atlanta reach. This is the lowest historical return rate between 1994 and 2007, and is significantly lower than most years during this period. We suggest that the Corps use return rates calculated from the State of Georgia's Water Supply request for modeling to be performed under the EIS and Manual update.
- A review of the RES SIM models released with the Remand Modeling Technical Report suggests that the full river demand is extracted at the Atlanta node. This modeling approach is likely to overstate the impact to Lake Lanier and flows in the Chattahoochee River, because the reuse of return flows by downstream withdrawers within the reach are not taken into account. The Corps should partition the river demands into three, or at the very least two, withdrawal points in order to appropriately evaluate the metropolitan Atlanta reach(es).

8

Hooker, Douglas

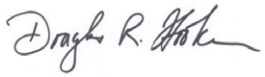
Page 9 of 18

- There appears to be an additional 20 mgd included in the Lake Lanier withdrawals, shown by a sum of two time-series in defining lake withdrawals.
- Some of the simulations reduce system storage below the level of the Exceptional Drought Operations (EDO) zone, but the minimum flow requirement at Woodruff Dam is not reduced to 4500 cfs. While this could be caused by timing, as EDO operations are only changed on the first of the month, the Corps should verify the reason for this discrepancy.

5. Conclusion

In conclusion, we appreciate the Corps' careful consideration of these comments. Please do not hesitate to contact me or my staff if we can provide further assistance to the Corps during this NEPA process.

Sincerely,



Douglas R. Hooker, P.E.
Executive Director

DRH:rlr

9

Hooker, Douglas

Page 10 of 18

ATTACHMENT 1

Performance Measures for Water Supply and Reservoir Levels

Hooker, Douglas

Page 11 of 18

Water Supply Performance Metrics, July 26, 2012

Purpose	#	Title	Format	Comments/Details
Assessing Occurrence of Desirable Lake Conditions	1	Percent of Years Lake Lanier is at Full Pool (1071') by May 1	bar graph	
	2	Percent of Weeks Above 90% Refill Probability Threshold	bar graph	Annual Refill is Defined as Full Pool on I (1070.75') Threshold Varies With Time
Assessing Occurrence of Unacceptable Lake Conditions	3	Minimum Lake Lanier Stage Each Day of the Year	365 day graph	
	4	Percent of Weeks with Critical Levels in Lake Lanier	stacked bar graph	Weeks in WCP/RIOP Zone 4 (red) and Z
Assessing Overall Lake Conditions	5	Lake Lanier Stages	frequency distribution	
Assessing Rate of Drawdown	6	Monthly Rate of Decrease in Lake Lanier	frequency distribution	Lanier should be taken down gradually
	7	Percent of Years with Perceived Critical Conditions	bar graph	Two or More Consecutive Months of Ra ft/month) in Lake Lanier; 1.5 ft/month (2003-2011)
Assessing Equity Among Projects	8	Percent of Years Reservoir is at Full Pool on May 1: Lanier, West Point, W.F. George	bar graph	
	9	Days to refill: Lanier, West Point, W.F. George	frequency distribution	Number of Days between Yearly Minin
	10	Percent of Weeks with Recreation Impact, March 1 to November 30: Lanier, West Point, W.F. George	stacked bar graph	Recreation Impact Levels 1 (yellow), 2 (
Ensuring Water Supply Needs are Met	11	Number of Days with Shortages to the Metro Atlanta Region	bar graph	It is important to verify that demands a
	12	Percent of Days in Violation of the Peachtree Creek Minimum Flow Requirement	bar graph	This metric uses the daily minimum flo (not necessarily 750 cfs)

Hooker, Douglas

Page 12 of 18

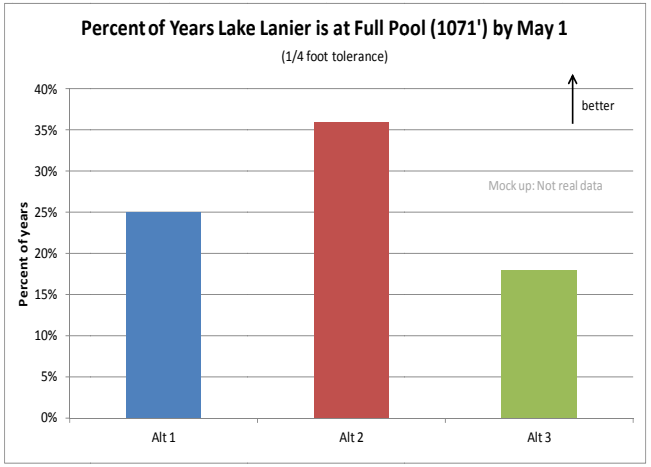


Figure 1. Water supply performance metric #1

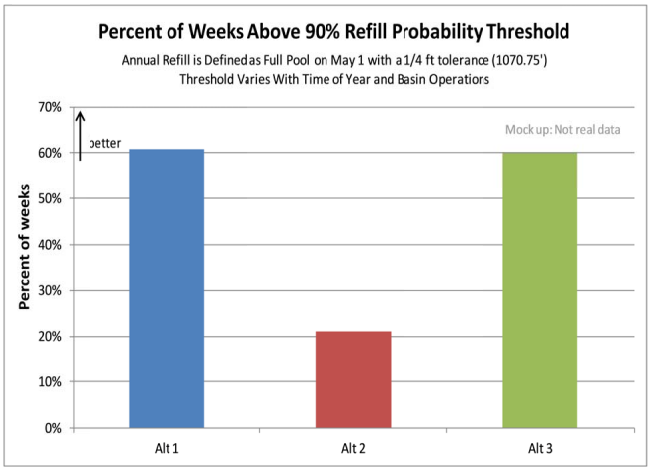


Figure 2. Water supply performance metric #2. See last page for details.

Hooker, Douglas

Page 13 of 18

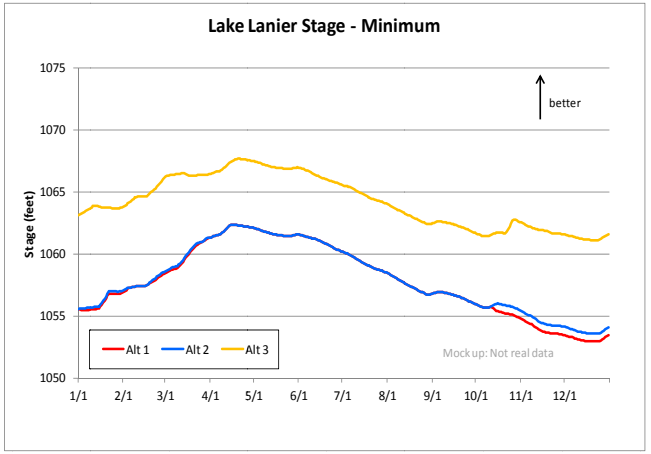


Figure 3. Water supply performance metric #3

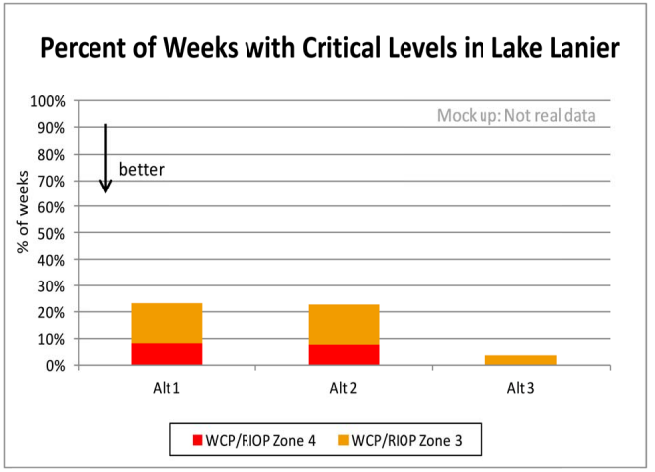


Figure 4. Water supply performance metric #4

Hooker, Douglas

Page 14 of 18

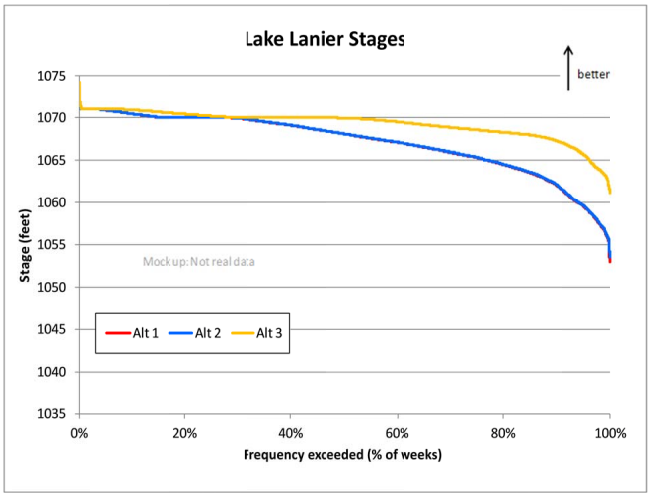


Figure 5. Water supply performance metric #5

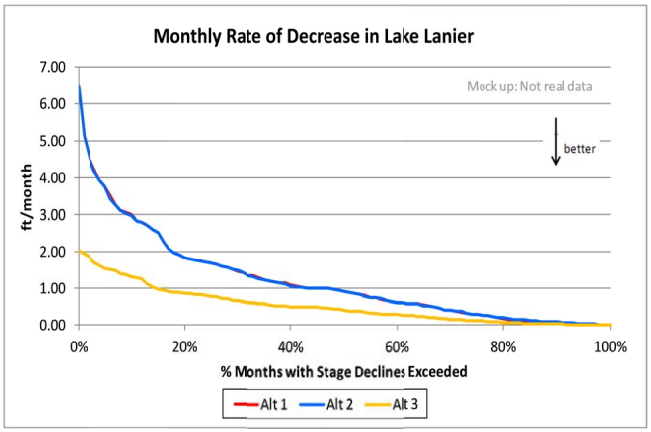


Figure 6. Water supply performance metric #6

Hooker, Douglas

Page 15 of 18

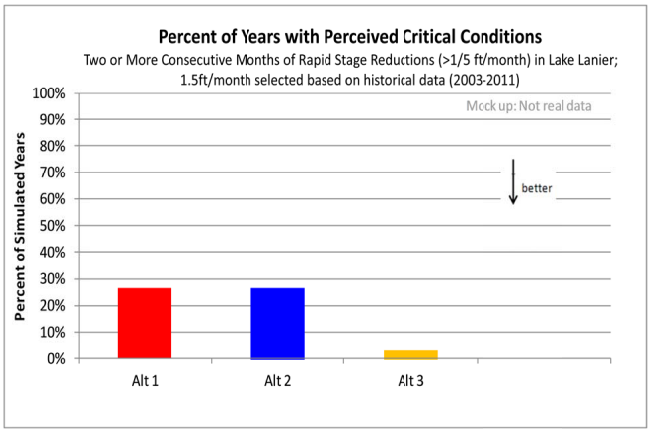


Figure 7. Water supply performance metric #7

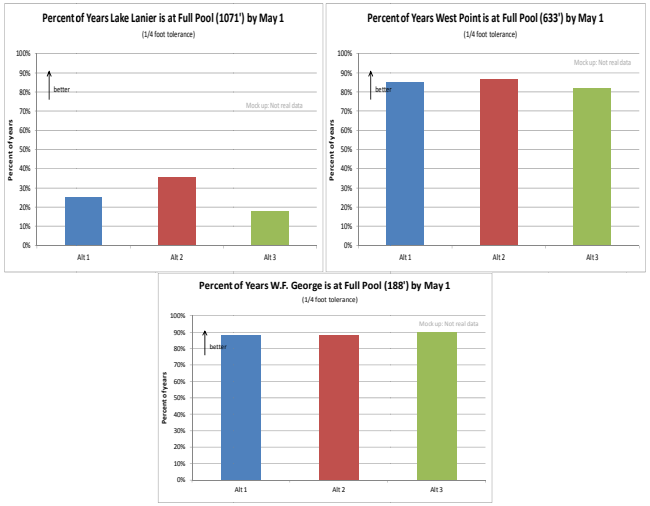


Figure 8. Water supply performance metric #8

Hooker, Douglas

Page 16 of 18

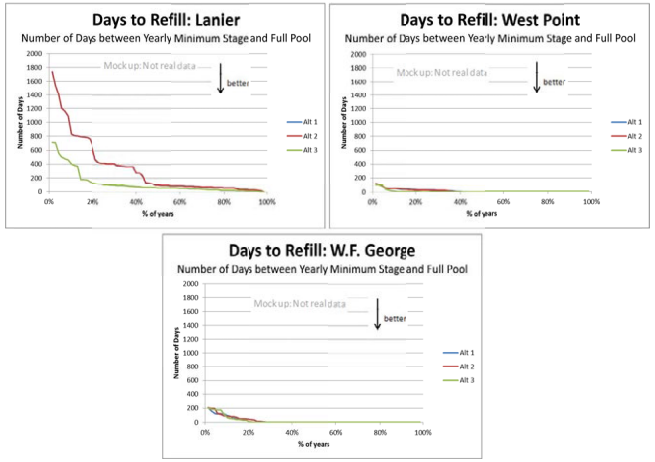


Figure 9. Water supply performance metric #9

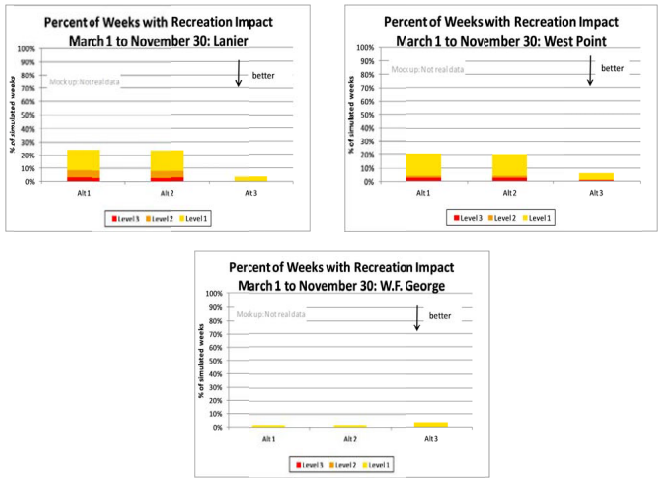


Figure 10. Water supply performance metric #10

Hooker, Douglas

Page 17 of 18

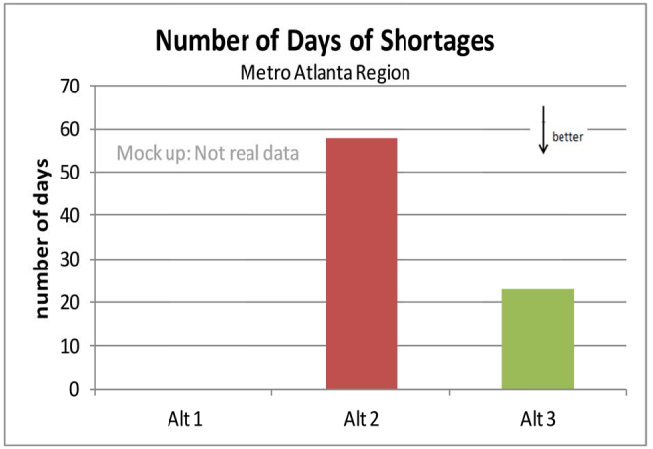


Figure 11. Water supply performance metric #11

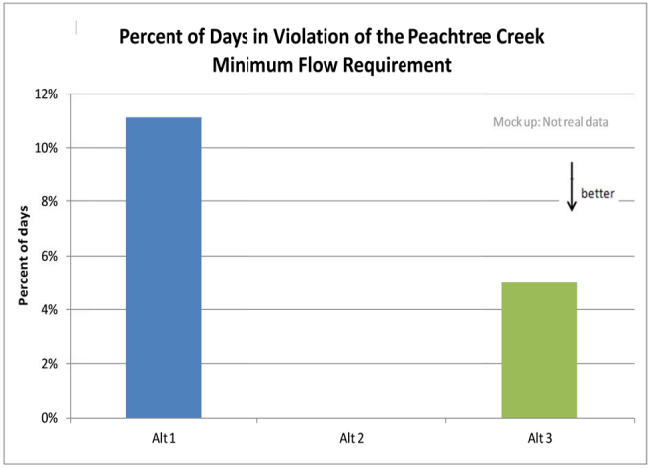


Figure 12. Water supply performance metric #12

Hooker, Douglas

Page 18 of 18

Performance Metric #2 details

A simulation model of the ACF basin under RIOP operations was used to determine the 90% refill probability stage on the first day of each month. This was done by determining the initial conditions stage in Lake Lanier that results in 90% refill under historical hydrology (1940-2008). The resulting curve is shown below.

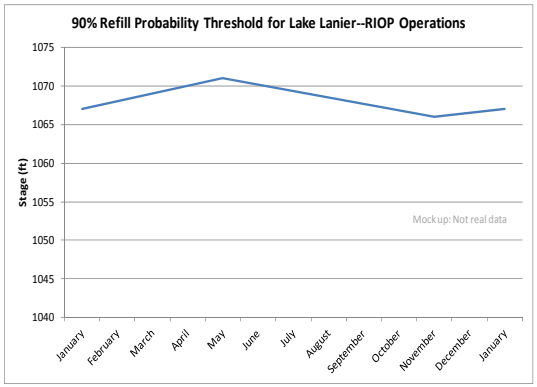


Figure 13. 90% refill probability threshold for Lake Lanier under RIOP operations, used in performance metric #2

If alternatives developed by the stakeholder group result in large changes to the operations of Lake Lanier, this curve should be recreated in a simulation model of the operations in that alternative.

Hornsby, Angela

Page 1 of 2

11/27/12

Tetra Tech
Attention: ACF-WCM
61 St. Joseph Street
Suite 550
Mobile, AL 36602-3521

Scoping Comments for ACF Water Control Manual

I submit the following comments in the recently reopened public scoping period:

1) **There is a definitive need for additional storage in the ACF Basin; and that storage is readily and safely available in West Point Lake. Recent studies submitted to the USACE demonstrate that West Point Lake (WPL) can be maintained at a minimum 632.5 MSL year round; and if managed differently, the risk of downstream flooding during major rain events can actually be reduced! The trifecta is there to be won: Increased storage + Better management = Reduced flooding!**

2) **WPL is specifically authorized by Congress for Recreation and Sport Fishing/Wildlife Development in addition to Flood Control, Navigation, and Hydropower. Flood Control can be improved as outlined in the Operations Study referred to in #1 above and which study has been previously submitted to the USACE. Hydropower and Navigation both benefit from the availability of increased storage. The USACE must deliver and honor the Recreation and Sport Fishing/Wildlife Development Authorizations stipulated under law by Congress.**

3) **In order to accomplish #1 and #2 above, the Rule Curve needs to be adjusted upward to a minimum 632.5 MSL and the Action Zones need to be modified upward as well to a minimum 630.0 at the bottom of Action Zone 4. The parameters of 632.5 and 630.0 MSL are significant because they represent the initial and second recreation impact levels respectively as defined by the USACE.**

Hornsby, Angela

Page 2 of 2

4) **The economic damages to the WPL communities and the lack of economic development due to unnecessarily low and undependable lake levels need to be assessed and stopped. Small businesses have gone bankrupt and others have been stretched to keep their doors open. Major fishing tournaments have been cancelled damaging hotels, restaurants, marinas, and lake related businesses. Visitation is down and campgrounds have been closed. Land specifically set aside for a hotel, conference center, golf course, etc. has never been developed. We are blessed with a moderate climate and WPL should be managed as a 52 week a year lake with the corresponding benefit of a 52 week a year lake related economy! WPL needs a dependable and reliable lake level to provide for economic development and stop the economic harm.**

5) **Environmental harm to WPL needs to be documented. Due to wildly vacillating lake levels, the fish spawn has suffered significantly in 3 of the last 5 years and the quality of the fishery, specifically the bass and crappie, has declined. Thousands, if not hundreds of thousands of mussels have been killed threatening water quality; erosion has increased the cost of water treatment; and siltation continues to eliminate valuable storage.**

6) **USFWS needs to be challenged to provide their science and document the need for 5,000 cfs for endangered species. Why 5,000 cfs? Why not 2,000 cfs? How many of each endangered species are there? Do they exist in deeper water than previously thought? What is the Recovery Plan? Are they still endangered, threatened, or neither? Can they be relocated to other areas where water is more plentiful and the economic damages are less. Who is looking out for the welfare of the small businessman? Common sense would seem to dictate that the needs of man should be balanced with the needs of the critters. The RIOP needs close analysis as part of the EIS to see what changes can be made to avoid destroying the economic, environmental, and recreational value of WPL during all times other than "extreme" drought!**

I thank you for the opportunity to comment and ask that the above issues be submitted and studied during the EIS period.

Sincerely,

Angela D. Hornsby

Houghton, Daniel

Page 1 of 1

11/1/2012

COMMENTER: Daniel Houghton
195 Cereek View Trail
Fayetteville, GA 30214

ORGANIZATION:

COMMENTS: The fish and wildlife people need to take a LONG look at West Point Lake if they are concerned about wildlife. For the past few years I have used my boat in the upper end of the river and seen the deverstation that this lake level has had on all the birds and thier ability to nest. They have never been up there to see what I see because they would have done something about the leael a time long ago. The business people that have been victoms of this current ploicy should be made hole again with federal funds that should come directly from the fish and wildlife budget. The fish and wildlife agency should be ashamed of the current practices that have gone on for the past several years. The current policy for this lake is a disgrace to the people that PAY TAXES and owen homes on this lake. Fish and wildlife has no HARD facts about the 5000 cfm mandate but continue to force this on the people that worked hard for a lifetime and though they might enjoy a lake home in their retirement. They have been fooled by a goverment agency that maes demands without facts and has caused many many people on this river system to go out of busniess. The mussels have been in the bay south of here for a million years before this lake was ever impounded. It is well past the time when we need to inject common sence .

Houston, Billy

Page 1 of 360

TRI RIVERS
Waterway Development Association
630 East Broad Street, Eufaula, Alabama 36027
334 / 688-1000 334 / 695-1878

January 11, 2013

VIA OVERNIGHT DELIVERY AND E-MAIL TO ACF-WCM@usace.army.mil

Colonel Steven J. Roemhildt
Commander, Mobile District
U.S. Army Corps of Engineers
c/o Tetra Tech, Inc.
Attn: ACF-WCM
61 St. Joseph Street, Suite 550
Mobile, Alabama 36602-3521

Re: Scoping for Draft Environmental Impact Statement for Updating the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin

Dear Colonel Roemhildt:

This letter provides the comments of Tri Rivers Waterway Development Association ("Tri Rivers") regarding efforts of the Corps of Engineers ("Corps") to revise the scope of the Environmental Impact Statement ("EIS") for updating the water control manual for the Apalachicola–Chattahoochee–Flint ("ACF") River Basin. *See* 77 Fed. Reg. 62,224 (Oct. 12, 2012). Tri Rivers submitted comments dated November 21, 2008, and December 30, 2009, in response to previous scoping notices. For your convenience, we have enclosed copies of those comments for resubmittal. We have not included extra copies of the enclosures that accompanied our 2009 comments, but we incorporate those enclosures by reference as if reproduced in full herein. Thank you for your consideration of Tri Rivers' views.

Houston, Billy

Page 2 of 360

1. Effect of 11th Circuit Decision and Corps Opinion

a. Navigation Remains an Authorized Project Purpose

The main difference from the time of the Corps' last round of scoping is the June 2011 decision of the U.S. Court of Appeals for the Eleventh Circuit, *In re Tri-State Water Rights Litigation*, 644 F.3d 1160 (11th Cir. 2011) ("11th Circuit Decision"). Also, in response to that case, the Corps in June 2012 issued a legal opinion, namely, *Authority to Provide for Municipal and Industrial Water Supply from the Buford Dam/Lake Lanier Project, Georgia* (June 25, 2012) ("Corps Opinion"). Tri Rivers' previous comments emphasized that the Corps must abide by the Congressionally authorized purposes of the ACF River System, including support of navigation. Neither the 11th Circuit Decision nor the Corps Opinion has in any way diminished the importance or legal effect of navigation among the several project purposes. The Corps must balance the project's authorized purposes in keeping with Congressional intentions and expectations. Corps Opinion at 27–28. ***Tri Rivers urges the Corps to ensure that revisions to the water control manual support navigation and recognize it as a Congressionally authorized purpose of the ACF System.***

b. Navigation Remains Critical to Economic Development for Communities along the Middle Chattahoochee and Flint Rivers

Commercial navigation on the ACF River System has diminished in recent years. However, that is a direct result of the Corps' failure to properly maintain the channel. As recently as 1985, shippers moved well over 1 million tons per year (tpy) of goods on the ACF. Tonnage decreased when the Corps failed to maintain a navigable channel on a reliable basis. For that reason, commercial transportation on the river system has all but ceased. The Corps should not use its own failure to fulfill its statutory duty to maintain the Apalachicola River as a basis for reordering the project purposes; navigation remains a primary project purpose and must be treated as such.

We continue to receive inquiries indicating demand for river traffic on the ACF in volumes that approach or exceed historic highs. Recent examples include the following inquiries:

- Mineral Manufacturing: Barge 400,000 to 450,000 tpy of raw materials to Eufaula, Alabama, and barge out half-finished products, employing 40-50 employees plus 10-15 truck drivers.
- Alcoa: Barge 100,000 to 200,000 tpy of green petroleum coke from Catoosa, OK, and Baton Rouge to Eufaula.
- Continental Carbon Company: Barge 30,000 to 40,000 additional barrels of residual fuel oil for carbon black manufacturing to Phenix City, Alabama.

Houston, Billy

Page 3 of 360

Ergon, Inc., which supplies Florida with a special asphalt blend, is operating at half capacity in Bainbridge, Georgia. That company has indicated readiness to double capacity and expand jobs if barge service is restored.

Other companies in our region work with higher-value products and components that are better suited to barge transportation due to their size weight. The Corps is well aware of the example of Steward Machine in Bainbridge, Georgia. The Corps contracted with Steward Machine to build lock gates for the Corps' own facilities, but without barge service, those components were partially disassembled for shipment at additional cost. Southern Nuclear has had to rely on barge transportation for periodic shipments of oversized components. The known difficulties associated with larger shipments present a continuing barrier to siting larger industrial and manufacturing facilities in the middle portion of the ACF. The lost opportunities for economic development that result are substantial and are not captured by artitrary thresholds developed to measure tonnage or ton-miles shipped.

2. Flow Needs in the Middle and Lower Portions of the ACF System

Although the litigation has focused on water supply issues in North Georgia and protected species in the Apalachicola River, the ACF System was authorized and constructed for the benefit of all stakeholders in the basin, including those along the middle and lower Chattahoochee River and the Flint River. We urge the Corps to acknowledge and address the flow needs of those portions of the ACF River System.

a. Communities in the Middle and Lower Portions of the Basin Depend on the Corps to Provide Adequate Flows

As detailed in our previous comments, the communities and businesses located along the middle portion of the ACF Basin have invested millions of dollars on infrastructure, public works projects, and major industrial facilities. They have done so in reliance upon the Corps' lawful operation of the ACF System and commitment to maintain flows sufficient to serve the Congressionally authorized purposes. Adequate flows are necessary for the survival of existing facilities owned by companies like Georgia Pacific, MeadWestvaco, and Southern Nuclear Company, as well as hope for new economic development, tourism, and fish habitat restoration generated by projects like the 2.5-mile urban whitewater course that is part of the $26 million Aquatic Ecosystem Restoration of the Chattahoochee River at Columbus, Georgia. Flows from the Corps' storage reservoirs provide support for industrial cooling and discharge assimilation, as well as navigation for shipping and recreation. Flows maintain lake levels to support recreation and aesthetic values. ***Tri Rivers reiterates its previous request that the Corps explain in the revised manual and corresponding environmental documentation how it plans to provide for the needs of the communities and industries located in the middle Chattahoochee River and the Flint River.***

Houston, Billy

Page 4 of 360

b. The Corps Should Provide Agreed-Upon Minimum Flows

As detailed in our previous comments, the governors of Alabama, Florida, and Georgia in 2003 signed an agreement establishing flow parameters for the ACF River System. In revising the ACF water control manual, the Corps should plan to operate the System in accordance with those agreed-upon flow parameters. ***Tri Rivers notes in particular the middle and lower Chattahoochee flow requirements of 1,350 cubic feet per second ("cfs") daily and 1,850 cfs weekly at Columbus, Georgia, and 2,000 cfs daily at Columbia, Alabama.*** These minimum flows at the Columbus gage are stated in the license issued in 2004 by the Federal Energy Regulatory Commission for the Middle Chattahoochee Project of Georgia Power Company. While some smoothing of flows can take place in the Georgia Power Company dams between West Point and Columbus, the Corps' flow releases at West Point Dam largely control these flows and those farther downstream. We believe these flows are sufficient to meet the Congressionally authorized purposes of the ACF River System. Additionally, they correspond to the flows needed to meet the water supply and water quality needs of Columbus Water Works, as well as the operation of industrial facilities on the Chattahoochee River, including those operated by Georgia Pacific, MeadWestvaco, and Southern Nuclear Company.

c. The Corps Should Not Rely on Flint River Flows to Meet Apalachicola River Needs to the Detriment of Chattahoochee River Flows

In the past, the Corps has reduced flows in the Chattahoochee River when Flint River inflow was sufficient to meet requirements for the Apalachicola River. This practice is harmful to those on the middle and lower portions of the Chattahoochee River. ***We urge the Corps not to use the windfall of additional flows from uncontrolled sources as a justification to reduce the flows within the Corps' control to below the minimums noted in Part 2.b to the detriment of Middle and Lower Chattahoochee River stakeholders.***

d. The Corps Should Implement Recommendations in the Joint Study of ACF Flows Completed by Tri Rivers and Apalachicola Riverkeeper

(i) Primary Goals and Findings

Tri Rivers and Apalachicola Riverkeeper ("Riverkeeper") recently completed a multi-year research effort with the release of a report titled *An Evaluation of the Common Ground Between Environmental and Navigation Flows in the Apalachicola-Chattahoochee-Flint Basin* ("Joint Report"). The Joint Report was prepared by Steve Leitman as a consultant to Riverkeeper and by Charles Stover and Stacey Graham, working on behalf of Alabama Power Company as consultants to Tri Rivers. ***Tri Rivers urges the Corps to review and use the Joint Report in the updating of the water control manual.*** A copy of the Joint Report is enclosed. We would be pleased to make our consultants available to the Corps for additional information and explanation.

As explained in the Joint Report, our consultants sought to define performance metrics to evaluate model output relative to both the availability of the commercial navigation channel and

Houston, Billy

Page 5 of 360

environmental flows in the Apalachicola River. They also took into account the effects of alternative operations on the Corps' three storage reservoirs in the ACF: Lake Lanier, West Point, and Walter F. George. Once these metrics were defined, our project team evaluated (1) the effects of providing the commercial channel with full maintenance and with no maintenance, (2) the effects of instituting augmentation limits on the reservoirs' support of downstream flow needs to account for the fact that in the ACF Basin we have relatively small storage capacity and a large river, (3) the effects of including releases for Columbus and the Farley Nuclear Plant in the operating rules of the reservoir system, and (4) the effects of increasing all withdrawals on the operations we proposed. All of the model evaluations were done using a daily STELLA (Structural Thinking Experimental Learning Laboratory with Animation) model, and the logic for all of the programming of reservoir operations into the model is included as an appendix to the report.

Our report identifies reservoir management rules that would result in flow regimes that would improve navigation flows in the Chattahoochee River and environmental flows in the Apalachicola River, with manageable and minimal impacts to users in the upper basin. The Corps can include specific releases for navigation and define those releases in a flow range that would be beneficial for the Apalachicola River aquatic ecosystem. When inundation of the floodplain is considered as the performance measure to define environmental acceptability, the flow range to accomplish this would be approximately 16,000 to 18,000 cfs. However, that assumes dredging to maintain the navigation channel; without dredging, the release would be 21,000 cfs. In addition, modification of the Chipola Cutoff could reduce diversions into the Chipola River and increase flows available for multiple purposes in the Apalachicola River.

We recognize that there are limits on the amount of augmentation the Corps can provide from the upper basin. We consciously focused on reasonable options. Sensitivity analyses suggest a range of 2,000 to 3,000 cfs. Therefore, for example, if the intent is to provide the 9-foot channel at a 16,000 cfs flow, but the Corps recognized an augmentation limit of 3,000 cfs, then the suggestion is to provide a release so long as net basin inflow exceeded 13,000 cfs. Sensitivity analyses also show that flows within the range we suggest would not draw composite conservation storage below a level necessary to support minimal operations (e.g., meeting minimum flows required for the Apalachicola River as well as for water supply demands) under the local inflows experienced between 1939 and 2008, assuming consumptive demands equal to those in 2007 and the reservoir operations used in the modeling analyses.

(ii) Demand Issues

As explained further in the Joint Report, changes to those assumptions can change projected outputs. Most notably, if consumptive withdrawals increase in an unrestrained manner (e.g., 40% to 50% for the entire basin above Jim Woodruff), the reservoirs would be drawn to the bottom of their conservation pools. Therefore, consumptive demands cannot continue to increase indefinitely without having an impact on reservoir elevations and flow in the Apalachicola River.

The Corps does not directly control the factors that lead to increases in demand for water withdrawals. However, the Corps is within its rights and authority to define how much upstream

Houston, Billy

Page 6 of 360

consumption the Corps can facilitate while continuing to meet other Congressionally authorized purposes. ***The Corps should explicitly recognize the limits of what it can accomplish given the nature of its facilities and reasonably foreseeable inflows.*** A clear statement to that effect will protect stakeholders throughout the basin and provide guidance to water consumers, so they can develop plans for growth, alternative sources of supply, and conservation. We recognize that local consumption is, in a sense, outside the Corps' direct control. However, that does not mean it must be regarded as completely beyond influence. Where localized demand changes to a degree so as to impact other stakeholders, we urge the Corps to adjust action zone elevations so that the effects of increased demands are borne primarily by the zone responsible for the increases in demand.

The Corps has considered changing the way it calculates return flows, for purposes of calculating permissible withdrawal levels. Identification of the direction and quantity of return flows is a difficult task, and any calculations will be subject to significant uncertainty based on information currently available. However, to the extent calculations are used to justify increases in local withdrawals for consumptive purposes, the effects of such withdrawals are direct, clear, and immediate. ***The Corps should include impacts to downtream stakeholders and resources in its consideration of any possible changes to return flow calculation methods.***

e. The Corps' Efforts to Support Recreational Uses Are Appreciated and Should Continue

Recreational boating, fishing, and other in-stream and lakeshore activities are a part of life along the Middle Chattahoochee River, and they also provide an important source of economic activity in the region. The Corps' Mobile District has consistently shown interest in maintaining and enhancing recreational opportunities. Tri Rivers is grateful for the Corps' efforts in that regard.

Reservoir elevations are critical to maintaining recreational opportunities. ***Tri Rivers urges the Corps to strive to maintain lake elevations under normal conditions of 632.3 to 635 mean sea level ("MSL") at West Point Lake; 187.5 to 190 MSL at Lake Eufaula (Walter F. George); and 76.5 to 77.5 MSL at Lake Seminole (Jim Woodruff) when possible.*** We also recommend that the Corps evaluate alternatives to the rule curves to allow higher elevations during the winter drawdown. Existing rule curves were developed when the information and analytical resources available to the Corps were far more limited than today, such that the Corps should be able to anticipate and manage precipitation more precisely than before. In any event, as a practical matter, pool elevations have routinely been above the rule curve during the drawdown period. Entering the spring with a fuller pool reduces competition between reservoir refill and downstream needs such as navigation and spawning in the Apalachicola River.

We also appreciate the Corps' support for other recreational projects, including especially the new whitewater course at Columbus, Georgia. We are optimistic that the outdoor recreation in and along this part of the Chattahoochee River will provide economic benefits for years to come.

Houston, Billy

Page 7 of 360

Cities along the Middle Chattahoochee and Flint Rivers have pursued other significant projects that are primarily for recreation, but which would provide substantial economic benefits, including especially proposals to develop new marinas. We look forward to working with the Corps and other stakeholders on projects of that nature. However, a navigation channel to the Gulf of Mexico is necessary to maximize the potential benefits associated with recreational boating.

3. The Corps' Duty to Maintain the Navigation Channel

In addition to providing sufficient flows to support navigation, the Corps is also obligated to maintain the channel to achieve that project purpose. As discussed in our previous comments, the Corps has justified its failure to do so by citing a decision of the Florida Department of Environmental Protection to deny state-level authorizations for channel maintenance activities. ***The Corps should exercise its federal statutory preemptive authority to maintain the channel for navigation, even if the state refuses to grant approval on a reasonable basis.*** As Tri Rivers has explained previously, the Corps is authorized to dredge the channel regardless of state-level permitting procedures. In another setting, the Corps recently has taken a position consistent with that of Tri Rivers, and the federal courts have upheld and approved that interpretation of the law. *Del. Dep't of Natural Res. & Envtl. Control v. U.S. Army Corps of Eng'rs*, 685 F.3d 259, 278–286 (3d Cir. 2012) (holding Corps' invocation of "maintain navigation" exemption in Clean Water Act section 404(t) relieved it from permitting requirement with respect to dredging project in Delaware River).

Tri Rivers continues to believe we can develop a consensus-based plan to reopen the Apalachicola River to navigation. We are not suggesting that the Corps ignore the State of Florida or any other stakeholder. However, at the same time, the Corps is not bound by state efforts to thwart the Corps' statutory mission or impose unreasonable requirements as a condition of approval. For purposes of the immediate proceeding, we urge the Corps to include navigation maintenance among the issues to be included in the scope of its Environmental Impact Statement and fully accounted for in any revisions of its water control manual for the ACF River Basin.

Thank you for this opportunity to comment. Please feel free to contact Billy Houston at (334) 668-1000 if you have any questions.

Sincerely,

Greg Elmore
President

Billy V. Houston
Executive Director

Enclosures

Houston, Billy

Page 8 of 360

TRI RIVERS
Waterway Development Association
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November 21, 2008

SUBMITTED VIA E-MAIL TO COMMENTS@ACF-WCM.COM

Col. Byron Jorns, District Engineer
Mobile District, U.S. Army Corps of Engineers
107 Saint Francis Street, Suite 1403
Mobile, Alabama 36602-9986

Re: **Scoping Comments for Revisions of the Water Control Manual for the Apalachicola-Chattahoochee-Flint River Basin**

Dear Colonel Jorns:

This letter provides the comments of Tri Rivers Waterway Development Association ("TRWDA") regarding the scoping process of the Corps of Engineers ("Corps") to update its water control manual for the Apalachicola-Chattahoochee-Flint ("ACF") River System. Thank you for your consideration of TRWDA's views.

1. TRWDA's Interest in the ACF River Basin

TRWDA represents many stakeholders who rely on the ACF River System for a variety of uses, including navigation, hydropower generation, water supply, wastewater treatment, economic development, environmental enjoyment, tourism, and recreation. The members of TRWDA include the cities of Eufaula, Dothan, and Phenix City, Alabama, and Columbus and Bainbridge, Georgia; most of the counties in the three states along the federal navigation project; the Coalition of Alabama Waterway Associations; Columbus Water Works; Georgia Pacific; Lake Seminole Association; MeadWestvaco; Middle Chattahoochee Water Coalition; Riverway South; Southeast Water Alliance; and Southern Nuclear Company.

TRWDA seeks to partner with business, municipal, industrial, environmental, agricultural, and recreational interests, and with local, state and federal agencies to seek

Houston, Billy

Page 9 of 360

scientific, technical and economic solutions to the obstacles which have prevented a full realization of the benefits of the ACF River System in recent years. We have engaged experts in business development and economic analysis from Troy University to quantify the economic value and potential of the system, including impacts to industrial development, agriculture, municipal revenues, and tourism. We have also entered into direct discussions with representatives in the ACF river basin from Lake Lanier and the greater Atlanta area in the north to the Apalachicola Bay in the south, and we intend to continue to participate in those mutually cooperative efforts.

2. The Corps Must Operate the ACF Projects for Their Congressionally Authorized Purposes.

a. The Corps Should Acknowledge the Statutory Authorized Purposes for the ACF Reservoirs.

Congress enacted several federal statutes which provide the Corps' authority for its initial construction and subsequent operation of the ACF reservoirs. Any revision to the water control manual for the ACF River System must comply with those laws as well as with the Corps' regulations. TRWDA understands the federal reservoirs' primary Congressionally authorized purposes to be as follows:

- **Lake Lanier: Hydropower, downstream navigation, and flood control.** Sources: Pub. L. No. 79-525, 60 Stat. 634, 635 (1946) (referencing H.R. Doc. 80-300 (1946)).
- **West Point: Flood control, hydropower, fish and wildlife recreation, general recreation, and navigation.** Sources: Pub. L. No. 87-874, 76 Stat. 1173, 1180, (1962) (referencing H.R. Doc. No. 87-570 (1962)).
- **Walter F. George: Navigation and hydropower.** Sources: Pub. L. No. 79-14, 59 Stat. 10, 11, 17 (1945) (referencing H.R. Doc. No. 76-342 (1939)); Pub. L. No. 79-525 (referencing H.R. Doc. 80-300); Resolution of House Public Works Committee (May 19, 1953).
- **George W. Andrews: Navigation.** Sources: Pub. L. No. 79-14; Pub. L. No. 79-525; Resolution of House Public Works Committee (May 19, 1953).
- **Jim Woodruff: Navigation and hydropower.** Sources: Pub. L. No. 79-14; Pub. L. No. 79-525.

The laws cited above are the primary sources of the Corps' authority with respect to the ACF reservoirs. They provide the legal basis for how the Corps should operate the

Houston, Billy

Page 10 of 360

ACF reservoirs. To demonstrate compliance with these applicable laws and authorities, TRWDA urges the Corps to provide a clear explanation of the primary Congressionally authorized purposes for each reservoir in its revised manual and in the accompanying environmental documentation.

b. The Federal Action Is: Reservoir Operations for their Congressionally Authorized Purposes.

TRWDA urges the Corps to include in its environmental documentation a clear explanation of the federal "action" which the Corps is evaluating for purposes of complying with the National Environmental Policy Act. That "action" should be defined as the operation of the ACF reservoirs in accordance with their Congressionally authorized purposes.

Events leading to the development of the Corps' present Interim Operations Plan ("IOP") and Revised Interim Operations Plan ("RIOP") for the ACF river basin illustrate our concerns. In our view, the Corps never clearly defined the federal action which was the subject of its Section 7 consultation with the U.S. Fish and Wildlife Service ("FWS") under the Endangered Species Act ("ESA"). Under ESA Section 7(a)(2), federal agencies are required to consult with FWS to insure a proposed action does not (1) jeopardize the continued existence of a listed species, or (2) destroy or adversely modify the species' designated critical habitat. 16 U.S.C. § 1536(a)(2). If the action would cause jeopardy or adverse critical habitat modification, FWS is authorized to propose reasonable and prudent alternatives and reasonable and prudent measures. However, in developing the Corps' IOP and RIOP, the federal action constituting the basis for consultation was never clear. Rather than presenting to FWS its standard operating procedures under the authorizing statutes, the Corps entered into open-ended negotiations with FWS and developed what amounts to a freestanding conservation agreement for the Apalachicola River. The resulting RIOP now drives the Corps' operations for the rest of the ACF system.

TRWDA urges the Corps not to repeat that inappropriate model as it revises its manual. The Corps should begin by setting forth a set of operations that fulfills the authorized purposes of the reservoirs, according to the primary Congressional authorities. To the extent any manual revisions allow for alternative operations—such as operations to serve secondary project purposes or to comply with the ESA and other federal laws—the Corps should consider such alternatives only on the following terms:

(1) Any alternative that differs from optimal operation of the reservoirs for their primary Congressionally authorized purposes should be clearly identified as such.

(2) The need and/or legal basis to deviate from operation of the reservoirs for optimal fulfillment of the primary Congressionally authorized purposes should be clearly explained.

Houston, Billy

Page 11 of 360

(3) The Corps should clearly explain applicable limitations on any deviation from operations for primary Congressionally authorized purposes, such as a time limit and the circumstances under which the Corps will restore primary operating parameters.

c. Revisions to the Manual Must Recognize Navigation as a Primary Congressionally Authorized Purpose and Reflect Statutory Intent to Support Downstream Communities.

A central and consistent Congressionally authorized purpose of all the ACF reservoirs as enacted by Congress is to support navigation. Commercial navigation on the Chattahoochee and Apalachicola Rivers has been historically limited to points between the Gulf of Mexico and the fall line at Columbus, Georgia. Most of the ACF projects also support hydropower; however, the lowermost hydropower facility (Woodruff) is a run-of-river project with no storage capacity, as is Andrews, the nearest upstream reservoir. If navigation is limited to points below the fall line, and the hydropower project farthest downstream is run-of-river, the inevitable conclusion is that Congress intended for the Corps to operate the upstream storage reservoirs, and especially the reservoir with the most storage capacity, substantially for purposes that would be realized in the lower regions of the ACF Basin, including navigation. Any revisions to the manual must be consistent with that clear demonstration of Congressional intent.

TRWDA is well aware of the reduction in commercial navigation which has occurred in the ACF River System in recent years. However, a major contributing factor was the failure of the Corps to properly maintain the channel, and the Corps must not ignore its statutory obligation to provide navigation as it revises its water control manual. The critical limitation on navigation is the lack of proper maintenance of a few small stretches of the Apalachicola River, which blocks access from the upstream Chattahoochee and Flint Rivers south to the Gulf of Mexico. However, channel maintenance is the Corps' responsibility under federal law.[1] The primary hindrance to navigation in the ACF system is the Corps' failure to provide it. The Corps must not and cannot lawfully use its own failure to perform its statutory duty to maintain the Apalachicola River for navigation as a basis to unilaterally reorder the project purposes without first obtaining Congressional approval to do so.

To justify its own failure to maintain the navigation channel, the Corps has cited a 2005 decision of the Florida Department of Environmental Protection ("FDEP") to deny certain state environmental authorizations for the Corps' channel maintenance activities. TRWDA remains concerned and disappointed that the Corps would so easily place itself

[1] TRWDA provided a thorough explanation of the Corps' obligation to maintain the Apalachicola River for navigation in a petition to the District Engineer and the Chief Engineer dated March 2, 2006, asking the Corps to resume navigation maintenance pursuant to Section 404(t) of the Clean Water Act. We trust that document remains available to the Corps, but we will be pleased to provide the Corps additional copies if needed.

Houston, Billy

Page 12 of 360

in a subservient position to a state and allow a state agency to veto the Corps' federal authority and activities. TRWDA shares the concerns of FDEP and environmental groups with respect to the environmental impacts of certain dredging and disposal practices which were utilized in the past. However, TRWDA is convinced there are practical solutions for the Corps to be able to resume its channel maintenance activities in a manner acceptable to FDEP and all affected parties. In any event, the Corps should exercise its federal statutory preemptive authority to maintain the channel for navigation.

Aside from the direct interest of TRWDA and its members in navigation, we believe the Corps' provision of water flow sufficient to support navigation would also support industrial and municipal requirements, which are discussed further in Part 3 below. In addition, flows in the Chattahoochee and Apalachicola Rivers sufficient to support navigation will be beneficial to aquatic species and the natural resources of the Apalachicola River and Apalachicola Bay. A minimum flow of 5,000 cfs at Woodruff Dam has been established to benefit certain species protected under the ESA. However, it is the position of Apalachicola Bay and River Keeper and the Franklin County Seafood Workers that those minimum flows do not adequately protect the Bay and its other resources, including commercial fisheries and other ecological resources, on a sustained basis. TRWDA believes flows sufficient to meet Middle and Lower Chattahoochee requirements would increase the frequency of instances when flows below Woodruff Dam would exceed 5,000 cfs to benefit the Bay, particularly when combined with inflow contributions from the Flint River.

d. Water Supply Is Not a Primary Congressionally Authorized Purpose.

Congress has established the primary purposes of the ACF reservoirs, as described more fully above. All other purposes, including local water supply, are secondary. The Corps may not allow any secondary use of the ACF reservoirs that would interfere with those primary purposes without further Congressional approval. Specifically, according to the statutes governing the Corps' reservoir operations:

> Modifications of a reservoir project heretofore authorized, surveyed, planned, or constructed to include storage . . . which would seriously affect the purposes for which the project was authorized, surveyed, planned, or constructed, or which would involve major structural or operational changes shall be made only upon the approval of Congress as now provided by law.

43 U.S.C. § 390b(d). The Corps has interpreted this statutory provision to limit allocation of storage for water supply to the lesser of 15% of a project's total storage or 50,000 acre-feet. ER 1105-2-100, ¶ 3.8.b(5). The statute and the Corps' regulations are consistent with longstanding federal policy to view water supply as primarily a local and not a federal responsibility. Because local water supply is not among the primary project purposes established by Congress, federal law imposes strict limits on the Corps' authority to allow water diversions for local consumption.

Houston, Billy

Page 13 of 360

3. The Corps Must Acknowledge and Address the Needs of the Middle Portions of the ACF River System.

Water shortages in North Georgia and endangered species in the Apalachicola River have dominated the public discourse on ACF operations in the past two years, due to the drought in the Southeast. However, Congress authorized and instructed the Corps to build and operate the ACF reservoirs substantially for the benefit of those located in between those two ends of the ACF River System. For example, as explained above, Congress authorized the three storage reservoirs, including Lake Lanier, primarily for navigation support and hydropower production below the fall line. West Point is subject to Congressional authorizations for additional purposes, namely, flood control, fish and wildlife recreation, and general recreation for those in the La Grange area. As the Corps develops revisions to its ACF water control manual, it must ensure its operations serve the communities and businesses of the ACF River System's middle regions.

a. Communities in the Lower Portions of the Basin Depend on the Corps' Provision of Adequate Flows.

Communities and businesses located and grew in cities like Dothan, Eufaula, and Phenix City, Alabama, and Bainbridge, Columbus, and La Grange, Georgia, with the full expectation that the Corps would operate the ACF reservoirs according to the laws authorizing their construction and operation. Those communities spent millions of dollars to build public works projects as well as infrastructure including the Eufaula Inland Dock, the Phenix City Inland Dock, and the Columbia Inland Dock in Alabama and the Port of Columbus and Port Bainbridge in Georgia. Those facilities made it possible for local communities to sell and ship agricultural, silvicultural and mineral products in bulk and to receive large deliveries of fuels and fertilizers by barge. Companies including TRWDA members Georgia Pacific, MeadWestvaco and Southern Nuclear Company sited and built major industrial facilities on the Chattahoochee River based in large part on the federal commitment that flows sufficient to serve the Congressionally authorized purposes would provide for their industrial cooling and discharge assimilation. They also expected to reap the benefits associated with barge transport of fuel and bulk products provided by a reliable navigation channel.

Not only have these communities and businesses acted and invested in reliance on the Corps' lawful operation of the ACF reservoirs in the past, but they are counting on adequate flows for their future survival. Industry and commerce will continue to grow in southeastern Alabama and southwestern Georgia with adequate flows and channel maintenance. Several new economic opportunities which depend on flows in the Chattahoochee and Apalachicola Rivers have recently been developed or are under serious consideration. The Corps and the cities of Columbus, Georgia, and Phenix City, Alabama, have been working on a river restoration project involving the removal of two small, historic dams to improve habitat and create a whitewater recreation course. Riverway South—an organization extending across all three ACF states—is actively promoting eco-tourism, and its success depends on the assurance of a safe and reliable

Houston, Billy

Page 14 of 360

navigation channel from Columbus, Georgia, south to the Gulf of Mexico. Longleaf Energy Associates has a permit to site a new energy production facility on the Chattahoochee River in Early County, Georgia, and the company plans to begin construction next year. Several projects which include marinas or other river-based recreational opportunities have recently opened, are under development, or are in serious consideration, including a new marina which recently opened in Bainbridge, Georgia; the Trail's End Resort and Marina on Lake Seminole; a proposed new marina near the National Infantry Museum in Columbus, Georgia; a proposed marina and nature trail in Quitman County, Georgia; and a kayak venture proposed for Chattahoochee, Florida.

Without adequate flows and safe and reliable navigation, these opportunities for economic growth and business development will be subject to difficult challenges. TRWDA urges the Corps to explain in its revised manual and the accompanying environmental documentation how it intends to provide for the needs of the communities and industries located in the middle and lower portions of the ACF River System.

b. The Corps Must Continue to Provide Agreed-upon Minimum Flows in the Middle and Lower Chattahoochee River.

As you know, in recent years, representatives of Alabama, Florida, and Georgia attempted to develop a mutually agreeable allocation of water in the ACF River System. In that context, on July 22, 2003, the three governors signed an agreement which set flow parameters, including the following:

- "On the Chattahoochee River above its confluence with Peachtree Creek, a flow of 750 cfs will be maintained on a daily basis, with the understanding that the State of Georgia is entitled to a variable flow regime that requires no less than 650 cfs in winters. . . ."
- "On the Chattahoochee River at Columbus, Georgia, a flow of 1350 cfs will be maintained on a daily basis at all times, and a flow of 1850 cfs will be maintained on a weekly basis provided that the top of the storage pool in West Point Reservoir is above 621.6 feet."
- "On the Chattahoochee River at Columbia, Alabama, a flow of 2000 cfs will be maintained on a daily basis."
- "On the Apalachicola River at Chattahoochee, a minimum flow of 5000 cfs will be maintained on a weekly basis at all times. . . ."

Memorandum of Understanding Regarding Initial Allocation Formula for the ACF River Basin, ¶ 4 (July 22, 2003) (emphases added). Those flow figures were to be included in any allocation formula agreed to by the parties, and they were "intended to be met by the combined actions of maintaining water uses consistent with the allocation formula, and

Houston, Billy

Page 15 of 360

by the Corps operating the federal reservoirs consistent with the allocation formula." *Id.* (emphasis added). The license issued by the Federal Energy Regulatory Commission for the Middle Chattahoochee Project, a privately owned, run-of-river project located between West Point reservoir and Columbus, Georgia, includes flow targets which depend on the Corps' releases from the West Point Dam upstream. Those targets reference the same flow levels for Columbus, Georgia, which are included in the tri-state agreement. Specifically, the targets are 1,350 cfs daily average, 1,850 cfs weekly average, and 800 cfs instantaneous when the Corps provides flows at or above those levels or, when the project's inflow is less than those levels, outflow equal to inflow. *See* 109 FERC 62,246, at Article 402 (2004).

In revising its manual, the Corps should develop its operation plan to satisfy the flow parameters agreed to by all three states. TRWDA in particular calls the Corps' attention to the Middle and Lower Chattahoochee flow requirements, namely, 1,350 cfs daily and 1,850 cfs weekly at Columbus, Georgia, and 2,000 cfs daily at Columbia, Alabama. We believe those flow levels are generally sufficient to meet the Congressionally authorized purposes of the ACF River System. They also correspond to the flows that are necessary to meet the water supply and water quality needs of Columbus Water Works, as well as the operation of industrial facilities on the Chattahoochee River, including those facilities operated by Georgia Pacific, MeadWestvaco, and Southern Nuclear Company.

c. The Corps Should Not Rely on Flint River Flows to Meet Apalachicola River Needs to the Detriment of Flows in the Middle and Lower Chattahoochee River.

Recently, increased flows from the Flint River have contributed to the Corps' release of water from Woodruff Dam to provide for the 5,000 cfs minimum flows at Chattahoochee. Like all stakeholders in the basin, TRWDA is grateful for any inflows that help meet system needs. However, the Corps must not rely on Flint River flows to meet Apalachicola River requirements to the detriment of the Middle and Lower Chattahoochee River communities. Contributions from the Flint River should provide no rationale for the Corps to reduce flows in the Middle and Lower Chattahoochee River below those levels necessary to support Congressionally authorized purposes and industrial and municipal needs.

As noted above, the primary Congressionally authorized purposes of the ACF federal reservoirs include hydropower, navigation, and flood control. The Corps' ability to fulfill the reservoirs' purposes for the benefit of the communities located along the ACF River System from Dothan, Alabama, to Gainesville, Georgia, depends exclusively on conditions in the Chattahoochee River. The Flint River has absolutely no effect at any point on the Chattahoochee River above its confluence with the Chattahoochee just above the Jim Woodruff Dam. Because Flint River conditions are independent from Chattahoochee River conditions, there is no logical basis to alter operations at the Corps'

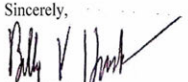
Houston, Billy

Page 16 of 360

Chattahoochee River projects to the detriment of Middle and Lower Chattahoochee River stakeholders in response to conditions in the Flint River.

Thank you again for this opportunity to comment. Please feel free to contact me at (334) 668-1000 if you have any questions.

Sincerely,



Billy V. Houston
Executive Director

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Page 17 of 360

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December 30, 2009

VIA OVERNIGHT DELIVERY AND ELECTRONIC SUBMISSION AT
http://www.sam.usace.army.mil/pa/acf-wcm/mail_list.htm

Col. Byron Jorns, District Engineer
Mobile District, U.S. Army Corps of Engineers
c/o Tetra Tech, Inc.
107 Saint Francis Street, Suite 1403
Mobile, Alabama 36602-9986

Re: **Revisions to the Scope of Draft Environmental Impact Statement for Updating the Water Control Manuals for the Apalachicola-Chattahoochee-Flint River Basin**

Dear Colonel Jorns:

This letter provides the comments of Tri Rivers Waterway Development Association ("TRWDA") regarding efforts of the Corps of Engineers ("Corps") to revise the scope of the Environmental Impact Statement ("EIS") for revisions to the water control manuals for the Apalachicola-Chattahoochee-Flint ("ACF") River Basin. *See* 74 Fed. Reg. 59,965 (Nov. 19, 2009). According to the Corps:

> Any comments previously submitted will be reviewed and addressed in any scoping revisions. There is no need to resubmit comments previously provided during the 2008 scoping effort, unless in your opinion the above-cited district court decision necessitates additional comments from you.

Id. at 59,966. TRWDA submitted comments dated November 21, 2008, and we have enclosed an additional copy of those comments which are hereby incorporated by reference. This letter provides additional comments in light of Judge Magnuson's July 17, 2009, memorandum and order in the Tri-State Water Rights litigation. *In re Tri-State Water Rights Litigation,* Case No. 3:07-md-01 (M.D. Fla. July 17, 2009). This letter hereinafter refers to the Court's memorandum and order as "Court Order."

Houston, Billy

Page 18 of 360

1. The Corps Must Determine Project Purposes with Reference to the Original Authorizing Statutes.

TRWDA's previous comments emphasized that the Corps must abide by the Congressionally authorized purposes of the ACF River System, and TRWDA set forth the lawful project purposes for all five of the Corps' ACF reservoirs. The Court Order demonstrates that TRWDA applied the correct method to identify the Congressionally authorized purposes for the Corps' ACF projects.

TRWDA cited the original statutes authorizing the construction of the reservoirs, as well as the specific Corps documents referenced in those statutes. For example, in the case of Lake Lanier, TRWDA cited primarily the 1946 Rivers and Harbors Act, Pub. L. No. 79-525, 60 Stat. 634, 635 (1946), and House Document No. 80-300 (1946). From those documents, TRWDA concluded that the three Congressionally authorized purposes of Lake Lanier are flood control, navigation, and hydropower. The Court cited the very same documents under the sub-heading of "Authorization," as well as additional legislative history. Court Order at 6-9. The Court then concluded that the primary purposes of Lake Lanier are flood control, navigation, and hydropower. Court Order at 72-74. Therefore, the Court Order confirms that TRWDA has used the correct method to determine the lawful purposes of the Corps' reservoirs in the ACF River System.

TRWDA's prior comments explained that water supply is not a Congressionally authorized purpose of Lake Lanier. The Court agreed as follows:

> Having thoroughly reviewed the legislative history and the record, the Court comes to the inescapable conclusion that water supply, at least in the form of withdrawals from Lake Lanier, is not an authorized purpose of the Buford project.

Court Order at 77. The Court Order went on to explain that additional Congressional authorization would be required before the Corps could lawfully reallocate Lake Lanier storage for water supply regardless of what has been done in the past. Court Order at 88.

2. The Corps Must Support Navigation.

a. The Corps Is Obligated to Operate the ACF Reservoirs to Support Navigation.

Application of the correct methodology to determine the Congressionally authorized purposes of the ACF River System yields the inescapable conclusion that navigation is a primary authorized purpose of all five of the Corps' ACF reservoirs. TRWDA described the lawfully authorized project purposes for the remaining four reservoirs in the ACF River System in its previous comments and reiterates them here:

Houston, Billy

Page 19 of 360

- **West Point: Flood control, hydropower, fish and wildlife recreation, general recreation, and NAVIGATION.** Sources: Pub. L. No. 87-874, 76 Stat. 1173, 1180 (1962) (referencing H.R. Doc. No. 87-570 (1962)).

- **Walter F. George: NAVIGATION and hydropower.** Sources: Pub. L. No. 79-14, 59 Stat. 10, 11, 17 (1945) (referencing H.R. Doc. No. 76-342 (1939)); Pub. L. No. 79-525 (referencing H.R. Doc. 80-300); Resolution of House Public Works Committee (May 19, 1953).

- **George W. Andrews: NAVIGATION.** Sources: Pub. L. No. 79-14; Pub. L. No. 79-525; Resolution of House Public Works Committee (May 19, 1953).

- **Jim Woodruff: NAVIGATION and hydropower.** Sources: Pub. L. No. 79-14; Pub. L. No. 79-525.

The Corps cannot lawfully rely on its own past failure to maintain the ACF River System for navigation as an excuse not to operate the reservoirs in a manner that supports navigation today and in the future. The Corps' failure to maintain the navigation channel is not some externality beyond the Corps' control. Rather, it is the Corps' own statutory responsibility to do so. Therefore, in accordance with the Court Order, the Corps should revise the scope of its EIS to ensure that reliable, year round navigation on the ACF system is a required alternative and is fully provided for in the revision of its water control plans and manuals. The Corps may not consider any alternative that does not fully account for navigation.

b. The Corps Has Adequate Navigation Maintenance Authority Regardless of State Approval.

The Corps cannot lawfully blame its failure to maintain the ACF River System for navigation on the action by the Florida Department of Environmental Protection ("FDEP") to deny state permit approval more than four years ago. TRWDA has engaged FDEP staff as well as environmental interests to explore the necessity of resuming maintenance dredging. Based on those discussions and the knowledge and experience of TRWDA members, we remain convinced that there are appropriate and environmentally responsible methods to perform all the tasks necessary to maintain a safe and reliable navigation channel. However, the Corps must exercise its mandated responsibilities. Unfortunately, the Corps has undertaken no apparent effort to identify navigation maintenance options which may be agreeable to FDEP and other interests. TRWDA urges the Corps to restore safe and reliable commercial navigation in the ACF River System.

Houston, Billy

Page 20 of 360

In developing a plan for navigation maintenance, TRWDA urges the Corps to work cooperatively with FDEP and other appropriate stakeholders, including navigation interests, environmental interests, and local governments. However, regardless of whether FDEP approval is obtained, the Corps has sufficient federal preemptive authority to maintain the federal navigation project, including specifically the ACF River System, regardless of state objections. TRWDA has previously explained the legal basis for the Corps' authority in a petition to maintain the ACF navigation project, which TRWDA submitted on March 2, 2006, and which these comments shall reference as the "404(t) Petition." A copy of that petition is enclosed and hereby incorporated in these comments.

TRWDA's petition focused on Sections 404(t) and 511(a) of the Clean Water Act ("CWA"). As recently as November of 2009, in the context of the Corps' efforts to dredge the Delaware River over the objections of the State of Delaware and others, the Corps acknowledged that those statutes and others authorize the Corps to conduct maintenance dredging for a federal navigation project over the objection of a state. According to the Corps, "Congress has exempted certain Federal construction projects from regulation under the CWA, thereby retaining for itself the authority to determine whether such projects should proceed." Brief for Federal Defendants at 21, *State of Del. Dep't of Nat. Res. & Envtl. Control,* Case No. 09-cv-821-SLR (D. Del. filed Nov. 20, 2009) (hereinafter "Corps' Brief").

Generally, the federal government is immune from state regulation. However, the CWA waives sovereign immunity for certain limited purposes under the CWA, which means some federal actions may be subject to state water quality regulation. Corps' Brief at 24-25. However, this waiver of sovereign immunity is limited. The Corps' Brief correctly explains that the CWA "'shall not be construed as . . . affecting or impairing the authority of the Secretary of the Army . . . to maintain navigation.'" Corps' Brief at 27 (quoting CWA § 511(a), as codified at 33 U.S.C. § 1371(a)). The intent of Section 511(a) was to ensure the Corps "has the authority to proceed with measures necessary to maintain navigation" in the event "State requirements relating to the disposal of dredged spoil may not be compatible with the responsibility of the Corps of Engineers to maintain navigation." 404(t) Petition at 19 (quoting remarks of Rep. Ray Roberts, 123 Cong. Rec. 38,970 (1977)).

CWA Section 404 specifically governs discharges of dredged or fill materials into areas subject to CWA jurisdiction. Section 404 generally authorizes states to "'control the discharge of dredged or fill material in any portion of the navigable waters within the jurisdiction of such State, including any activity of any Federal agency.'" Corps' Brief at 25 (quoting CWA 404(t), as codified at 33 U.S.C. § 1344(t)). States are authorized to add substantive and procedural requirements. *Id.* However, Section 404(t) also includes the following qualification: "'This section shall not be construed as affecting or impairing the authority of the Secretary to maintain navigation.'" Corps' Brief at 25 (quoting CWA 404(t), as codified at 33 U.S.C. § 1344(t)).

Houston, Billy

Page 21 of 360

The Corps also has stated that it may engage in dredging on the Delaware River notwithstanding Delaware's objection pursuant to the Coastal Zone Management Act ("CZMA"). According to the Corps, a direct action by a federal agency (as opposed to a private action taking place pursuant to a federal permit) "may proceed even if a state objects to a Federal consistency determination." Corps' Brief at 36 (citing 15 C.F.R. § 930.43(d)). Therefore, Delaware was "incorrect as a matter of law" that the Corps' dredging activities required state concurrence. *Id.* Thus, the Corps has amply demonstrated, and TRWDA agrees, that a state's refusal to concur under the CZMA is no bar to the Corps' maintenance of a federal navigation project, including the navigation channel in the ACF river basin.

The Corps has sufficient federal authority to maintain the navigation channel in the ACF river basin without regard to a state's action. The Corps' exercise of this navigation maintenance responsibility should be included in the scope of its EIS and fully accounted for in any revisions of its water control manuals for the ACF river basin.

Thank you for this opportunity to comment. Please feel free to contact me at (334) 668-1000 if you have any questions.

Sincerely,

Billy V. Houston
Executive Director

Enclosures

Houston, Billy

Page 22 of 360

An Evaluation of the Common Ground Between Environmental and Navigation Flows in the Apalachicola-Chattahoochee-Flint Basin

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Houston, Billy

Page 23 of 360

TABLE OF CONTENTS

Houston, Billy

Page 24 of 360

Houston, Billy

Page 25 of 360

Houston, Billy

Page 26 of 360

EXECUTIVE SUMMARY AND CONCLUSIONS

This report was prepared under a contract with Apalachicola Bay and River Keeper, Inc. (AR) to fulfill a Rural Development Rural Business Enterprise grant from the U.S. Department of Agriculture. The intent of this project was to examine the common ground between providing commercial and recreational navigation in the Apalachicola-Chattahoochee-Flint river basin (ACF) and sustaining the ecosystem of the Apalachicola River and estuary in an effort to stimulate employment opportunities in the ACF basin. A basic supposition behind this work is that if a tradeoff between having a seasonally available navigation project and the environmental effects of providing such a channel could be negotiated, then the navigation project could stimulate both commercial and recreational use of the project, thereby increasing employment opportunities in the ACF basin without jeopardizing the current jobs of those whose livelihoods depend on a healthy ecosystem. The economics of barge transportation as opposed to truck transportation could better position existing industries in the area, as well as attract potential new industry. Much of the region suffers from a lack of employment opportunities and the water way in its current state is an economic asset that could provide more jobs if a common ground was found between navigation and environmental interests and the volume of commercial navigation traffic was increased. In an era of increasing energy costs, barge transportation is a more energy efficient means of moving bulk commodities.

For more than the past 50 years, the U.S. Army Corps of Engineers has attempted to provide a year-round (defined by them as 95% of the time), 9 x 100 foot channel for navigation interests through 1) the construction of multiple storage reservoirs in the Chattahoochee River and at the junction of the Flint and Chattahoochee River to augment flows needed to provide a navigation channel, 2) the implementation of extensive channel improvement work (e.g., initial dredging, cutoffs, dike fields, etc.) on the Apalachicola River to lessen maintenance needs for the project, and 3) an annual maintenance dredging program. Despite all of this effort, the Corps has been unable to provide this channel on a year round basis. When the project was originally designed, the Corps projected that it could provide the authorized 9 x 100 foot channel dimensions at a design flow of 9,300 cfs and that the channel would be available at least 95% of the time. In combination, this meant that the Corps expected the 9,300 cfs design flow to be available at least 95% of the time (it does take time to actually maintain the channel so that it will be available at this flow)(COE, 1986; COE, 2002). Unfortunately in the last 50 years, the flow that has been available 95% of time is only about 6,500 cfs, far less than the 9,300 cfs design flow. Furthermore, the flow needed to provide the channel after it is maintained is currently about 14,000 cfs, which is far greater than the 9,300 cfs design flow. In combination, this means that it was not possible for the Corps of Engineers to provide the authorized channel dimensions to the extent expected (e.g. 95%) and the channel was therefore destined to be unreliable. From 1990 to 2001, when the navigation channel was being maintained on a regular basis in only four years was the desired 9-foot channel depth available for more than 50% of the year (COE, 2002).

In addition to problems associated with insuring the necessary flow to provide the authorized federal navigation channel, the navigation industry's problems were compounded by the fact

Houston, Billy

Page 27 of 360

that environmental interests in Florida have been at odds with navigation interests for decades over environmental effects associated with efforts to maintain the commercial navigation channel. Some of Florida's antagonism towards the navigation project arose from the fact that although most of the navigation project's benefits went to Georgia and Alabama interests on the Flint and Chattahoochee Rivers, most of the channel constrictions and most of maintenance work were in the Florida portion. Furthermore, a lack of upland dredge disposal areas or beneficial use of the dredge material led to the practice of in-bank disposal which had its own set of consequences such as the burial of productive aquatic habitat and the subsequent conversion of this habitat into a less productive, sand bar habitat. Research has shown that the annual maintenance dredging has been responsible for the increase of the expanse of this least productive of the riverine bank habitats by 25 miles (Leitman, Ager and Mesing, 1991).

Since the channel in the Alabama and Georgia portion of the ACF project could not be accessed except through the Florida portion, problems associated with channel depth in the Florida portion affected the entire ACF project. The combination of not having adequate water to provide the channel on a year round basis and the negative environmental impacts which led to continued problems with Florida environmental interests proved to be a recipe for more problems. In 1985, the waterway moved 1.2 million tons of cargo but by 2007, traffic was all but non-existent. Shipments that must move by water, such as the huge gate structures made by Stewart Machine in Bainbridge, can be stranded until adequate water is available to provide the desired channel dimensions.

Ultimately the issue came to a head in 2005, when the State of Florida denied the Corps of Engineers' a Water Quality Certification to maintain the federal navigation channel. After that maintenance dredging of the project was terminated. The Corps had abandoned dredging completely or severely reduced the dredging season during several of the years in the early 2000s in reaction to a severe drought. In response to the State's permit denial, the Corps of Engineers ceased making releases to support the federal navigation channel because there essentially was no federal navigation channel available to shippers.

At the time the permit denial was made, the reservoirs in the ACF basin were managed in accordance with the Corps of Engineers' draft 1989 Water Control Manual (COE, 1989). Under this management approach, providing the federally authorized navigation project was a major determinant in defining reservoir releases to the Apalachicola River when the conservation pools of Lake Lanier, West Point and W.F. George were not at full conservation pool. Since the navigation water quality certification was denied, a new reservoir management approach has been adopted in response to the Endangered Species Act. In 2006, the Corps submitted the Interim Operating Plan (IOP) to the U.S. Fish and Wildlife Service for consideration under the Endangered Species Act and in 2008 they submitted the Revised Interim Operating Plan (RIOP). Under the IOP and RIOP the major determinants for making downstream releases are time of the year, available reservoir storage, basin inflow and the flow needs in the Apalachicola River (defined by outflow from Jim Woodruff Dam) based on the flow needs of the several species of mussels and the Gulf Sturgeon listed under the Federal Endangered Species Act as agreed to with the U.S. Fish and Wildlife Service (USFWS, 2006; USFWS, 2007). Under the IOP and RIOP, no releases are specifically required to support the federal navigation project.

Houston, Billy

Page 28 of 360

In recent years, the Apalachicola River has not been receiving as much water as it received when releases were defined under the previous draft 1989 Water Control Plan which included support for the navigation project both in drought and non-drought years. Under the RIOP, however, when the federal storage reservoirs are not at full conservation pool, releases are defined by the perceived needs of the listed species, but not by the ecosystem at large. In essence, environmental interests are left with three distinct choices with regard to the current situation:

1) To amend the project authorization so that flows can specifically be made to address the overall environmental needs of the Apalachicola River and estuary, not just listed species, so that additional flow can be obtained from the federal reservoir system. This step would require both defining those needs and getting the Congressional authorization of the project amended;

2) To find common ground with navigation interests so that additional flows can be obtained from the federal reservoirs to support both environmental and navigation interests' management needs while limiting the environmental problems noted above. This step would not require having the Congressional authorization amended since all of the storage reservoirs are already authorized to support the Federal navigation project;

3) To accept the current situation and to accept the loss of economic and ecosystem services provided by flows that sustain a healthy ecosystem and the economic benefits associated with a commercial navigation channel.

In this report we are examining the possibilities under the second option. Interest in focusing on this option is bolstered by the fact that navigation releases are an authorized project purpose for managing the federal storage reservoirs in the ACF basin. As a result of ongoing lawsuits in the ACF basin, the issue of project authorization is a matter of concern and it is our belief that attempting to change the project's authorization in the current political atmosphere would prove to be extremely challenging. To date, no serious attempt has ever been made by the State of Florida to actually amend the ACF project's authorization so that the basin's reservoir system would be required to make releases to support the environmental flow needs of the Apalachicola River and estuary.

The focus of this document is not to ask questions about what happened in the past, but instead to look toward the future and to ask whether there is common ground between providing a commercial navigation channel and protecting the ecosystem of the Apalachicola River. If there is such common ground, how can the federal projects be managed to accomplish this goal? At the root of this effort is a belief by the authors that:

1) Environmental interests are not opposed to navigation per se. They are opposed to environmental impacts associated with how maintenance for the navigation project was being provided, and

Houston, Billy

Page 29 of 360

2) That navigation interests realize that having a year-round channel is not possible and that the best that can be achieved is a seasonal channel. Therefore, they would be willing to accept a commercial channel dimensions available for use part of the year rather than essentially not having the channel available at all.

APPROACH TO PROJECT

The general approach taken in this project is:

1) To define performance measures that will be used to distinguish between acceptable and unacceptable alternatives and to define the system attributes included within system models for which performance measures will be developed,
2) To develop base models for the system to be used to evaluate alternative approaches to reservoir management in both ResSim and STELLA,
3) To define the base conditions which were to be used for the base model against which alternative management options can be compared,
4) To calibrate the two models at base conditions,
5) To revise the RIOP release logic to incorporate navigation releases,
6) To define the range of variables for which sensitivity analyses would be run, and
7) To do the sensitivity runs to evaluate augmentation limits, capacity of the reservoir system to support navigation/environmental releases, sensitivity of results to meeting other instream flow targets in the Chattahoochee River and sensitivity of the results to increases in consumptive demands.

The term "sensitivity analyses" refers to a series of alternative model runs which evaluates specific changes to model input settings. For example, for consumptive withdrawals a series of model runs were done evaluating current demands and current demands increased by a factor of 10%, 20%, 30%, 40% and 50%. In these sensitivity analyses the only change made to the model settings was to revise the consumptive demands. Model output was then compared against the performance measures so that the sensitivity of the operations relative to the specific changes could be evaluated.

A performance measure is simply a metric which can be used to define what is acceptable in terms of output. It is the defining of performance measures that puts meaning into and allows the interpretation of the model output based on perceived societal values. It is through the selection of performance measures that a set of model runs can be ranked in terms of which output sets are preferable. Because of the output provided by the models used in this study, performance measures must be linked to flows and/or reservoir elevations at selected locations which are available in the model output. For purposes of this project, performance measures had to be developed both for defining what is an acceptable level of availability for the federal navigation channel and what are acceptable environmental conditions in the Apalachicola River. It was realized, however, that performance measures also had to be developed for other stakeholder interests in the basin such as reservoir elevations and minimum flows at certain checkpoints on the Chattahoochee River upstream of Jim Woodruff Dam. Our overall general approach was that performance measures should be defined by the stakeholders representing their interests, not by the technical analysts.

8

Houston, Billy

Page 30 of 360

Specific performance measures used to compare output in the array of sensitivity analyses done include 1) frequency of availability of the 7-foot and 9-foot navigation channel, 2) flow at Jim Woodruff outflow both for the period of record (median, 75% exceeded and 90% exceeded) and for selected individual years, 3) availability of specified flow thresholds for inundating the Apalachicola River floodplain, 4) reservoir elevations at Lake Lanier, West Point and W.F. George reservoirs(median elevations, 75% exceeded elevations, 90% exceeded elevations and minimum elevations) both for the period of record and for selected individual years and 5) number of occurrences of not exceeding minimum flow thresholds at Peachtree Creek, Columbus and Farley Nuclear Plant on the Chattahoochee River. A 9-foot channel represents the desired depth of the channel and a 7-foot channel the "break-even" depth in terms of economics. In the barge industry, for many of the commodities shipped, the cost of moving the commodity is roughly the same whether a barge is full (9-foot channel) or partially full (7-foot channel) so a profit is realized by lowering the unit-cost per ton-mile shipped.

In using simulation models in this project a decision was made to use two models, ResSim and STELLA. This decision was made because: 1) Using multiple models allowed us to cross check each of the model's output with another model, 2) each of the models has attributes which are helpful to this project, and 3) project staff had expertise in both models. Both the STELLA model and ResSim model are organized in a similar manner and both models were developed as part of the ACF Comprehensive Study and used in the ACF Compact negotiations (actually the predecessor to ResSim, HEC-5, was developed during the Comprehensive Study).

All comparisons made in our analyses compare model runs with model runs. Use of real world observed data was ruled out for the base conditions because observed data had variable consumptive demands and periods of time with and without the storage reservoirs, whereas the modeled data had a constant demand and reservoirs are in existence over the entire modeled period. We chose to use 2007 demands and current reservoir operations (RIOP) as the base conditions for model operations. As discussed above, we choose to approach this project by utilizing two simulation programs, ResSim and STELLA. One of the reasons for doing this was to take advantage of the features of both programs, as well as to utilize the models to cross check results from each other to insure that we were making coding changes correctly. Our findings from calibration runs between the two models (see Chapter 2 in the main body of the report) confirmed that the base runs for the two models were calibrated.

Unfortunately after the two models were calibrated under the RIOP operations, the Corps made additional modifications to the ResSim model and at the date of completing the report, the Corps was continuing to make modifications to the ResSim model. Project staff, are therefore left with the unenviable task of calibrating with a moving object under a project with a fixed timeline.

Therefore, we eventually chose to go forward with a calibrated version of the STELLA model in our analyses. We did not see the need to re-calibrate the two models at the end of the project since the current version of ResSim was no longer calibrated with the STELLA model. Since all of our comparisons are model run to model run and what we are focusing on are the relative changes of flow and elevation to operational changes, we do not believe this will lessen the

9

Houston, Billy

Page 31 of 360

utility of our results. The relative differences should hold up even if the hydrological data at the base of the model (the unimpaired flow set) are changed and the absolute differences change.

As was noted above, the RIOP was originally designed to protect several listed species in the Apalachicola River. Consequently, the release rules in the RIOP are based on meeting the needs of the listed species within the storage capacity of the federal reservoirs. Our logic in revising reservoir operations incorporates this fact and is designed to preserve the releases required by the RIOP, but to also adjust the releases to account for flow needs navigation, when such releases can be made within the limitations of the federal storage reservoir's capacity to support them. This logic is based on our belief that for much of the time (at medium to higher flow) there is ample water in the ACF basin so that no specific releases to augment flows in the Apalachicola River are is needed and at other times (e.g., low flows) there is so little water available that management options are severely confined to just protecting the available storage in the federal reservoirs. Therefore, the portion of the flow regime where management becomes important is not at low flow where much of the ACF negotiations have focused, but at median to median-low flows when reservoirs are either being used to augment flows or when reservoir storage is being refilled.

After setting up and calibrating the models, the next issue which we had to confront was which variables should be tested for sensitivity and what ranges should be considered in these analyses. The specific variables for which sensitivity analyses were run are: releases made to provide a 9-foot and 7-foot navigation channel, augmentation thresholds for navigation and environmental releases, changing consumptive demands in the model, and making upstream flow targets active targets (e.g. the model is coded to specifically make a release for the target instead of relying on incidental releases to meet the target).

The relationship between channel availability and flow is defined by the maintenance dredging level and the extent of structural modifications made to the channel. These are exactly the variables which led to long-term historical confrontation between the States over provision of the navigation channel. Based on HEC-RAS analyses of recent channel surveys done by the Corps of Engineers and the Coast Guard, it was determined that with no dredging the authorized 9-foot commercial navigation channel can be provided with a flow of 21,000 cfs. The HEC-RAS analyses further showed that with an annual average of 215,000 cubic yards of dredging annually in the Chipola Cutoff reach, the authorized 9-foot channel can be provided with a flow of 14,000 cfs. The analyses also showed that a 7-foot channel can be provided with 10,000 cfs flow and the associated dredging. The volume of dredging in the Chipola Cutoff reach translates to an annual average of 650,000 cubic yards for the entire Apalachicola River[1]. These two flow levels provided the boundaries of our sensitivity analyses and we chose to set the navigation/environmental release target at 1000 cfs increments between the 14,000 cfs and 21,000 cfs values.

[1] The value of 650,000 is only an estimate based on historical dredging and the source of this estimate is further explained in Chapter 3 of the report. Our HEC RAS channel modeling was confined to the Chipola Cutoff reach which is the controlling depth for the entire river.

10

Houston, Billy

Page 32 of 360

FINDINGS FROM SENSITIVITY ANALYSES

As noted earlier, a series of sensitivity analyses were conducted with regard to 1) the capacity of the reservoir system to augment flows, 2) the volume of flow needed to provide a 9 foot channel, 3) whether instream flow targets in the Chattahoochee River were met actively or passively and 4) the effects of increasing consumptive demands. It is through these sensitivity runs that the range of acceptable options with regard to the tradeoffs between navigation channel availability can be selected. The actual selection of the best option is a value judgment that should not be based solely on scientific and/or engineering analyses, but should also include public values. Therefore in this project our intent is to lay out the range of acceptable options in terms of scientific and engineering analyses and to have stakeholders decide which option to choose within the range. All sensitivity runs were compared with a base model run using the RIOP as the reservoir operating system with 2007 consumptive demands being extracted from the basin to provide a perspective on the effects of changes relative to current conditions. Model output was compared both with output from the base model settings and with pre-dam flows in the Apalachicola River per the request of Apalachicola Riverkeeper.

With regard to the federal navigation channel, a major issue is the extent of maintenance dredging and disposal is necessary to provide the needed channel dimensions. With regard to the federal reservoirs, avoiding emptying the conservations pool, even in the worst drought situations, was considered necessary because loss of all storage could lead to a failure to meet all minimum flow requirements. The first set of sensitivity analyses were for the augmentation limits which began with an augmentation limit of 1,000 cfs and was increased in 1,000 cfs increments until the reservoirs could no longer support augmentation. The volume of flow needed to support the 9-foot channel in evaluating the augmentation limits was set at a 14,000 cfs flow and a 21,000 cfs flow (full dredging to no dredging). The second set of sensitivity analyses were between the full dredging option (14,000 cfs to provide the 9-foot channel) and the no dredging option (21,000 cfs to provide the 9-foot channel) in 1,000 cfs increments. Implicit to this sensitivity analysis is that the volume of dredging would range from an annual average of 650,000 cubic yards for the entire Apalachicola River for the full dredging option to no dredging. Due to funding and time limitations, HEC RAS analyses could not be done to better define the changes in the volume of dredging for the entire Apalachicola River. Sensitivity analyses for consumptive demands evaluated operation from the base demands (2007 demands) to an increase in these demands of 150% in 10% increments. The increases were done for all demands above Jim Woodruff outflow (M & I demands, thermal demands and agricultural demands).

In general, the major conclusions drawn from Chapter 7 which contains an evaluation of augmentation limits were:

1. The limit of augmentation that can be sustained by the ACF basin's reservoirs when balancing effects on the availability of the navigation channel, floodplain inundation and reservoir elevations is about 2,000 to 3,000 cfs.
2. In analyzing the response of performance measures to increasing the volume of flow needed to provide a 9-foot navigation channel it was found that the volume of augmentation which could be tolerated by the reservoir system was greater for the

11

Houston, Billy

Page 33 of 360

option with no dredging than for the option with dredging.. The conservation pools of the storage reservoirs were emptied with an augmentation limit of only 4,000 cfs for the with-dredging option whereas the limit of augmentation before the reservoir conservation pools were emptied with no dredging was 5,000 cfs. Although this appears counter-intuitive, it makes sense when it is realized that the volume of augmentation release is the same regardless of whether the release is being made to provide the channel with no dredging (21,000 cfs release) or with full dredging (14,000 cfs release). With the lower release option, however, the frequency of augmentation events will be increased because over the period of evaluation flows occur more frequently in lower flows associated with the full dredging option (10,000 cfs - 14,000 cfs) than with the no dredging option (17,000 cfs - 21,000 cfs).

3. Providing a 9-foot channel at 14,000 cfs with dredging increases the availability of the navigation channel relative to the no dredging option but does not improve the environmental performance measures.
4. Most of the impacts from decreased reservoir elevations occur at Lake Lanier. Elevation differences at West Point and W.F. George are limited.

The major conclusions drawn from Chapter 8 which contains an evaluation of release requirements to provide the 9-foot channel were:

- With regard to the availability of the federal navigation channel, the greater the amount of dredging (and hence the lower the flow needed to provide a 9-foot channel) the greater the availability of the federal navigation channel within the context of the operation considered. In all instances the availability of the navigation channel increased in frequency relative to the availability under the RIOP.
- As the volume of flow needed to provide the federal navigation channel increased, the volume of low flows (75% exceeded and 90% exceeded flows) at Jim Woodruff outflow decreased.
- So long as flow exceeds critical threshold elevations for inundating the floodplain, the lesser the flow needed to provide a 9-foot channel, the greater the duration of floodplain inundation. In all instances, once the threshold for inundating the floodplain was exceeded, the duration of floodplain inundation was greater than under the RIOP.
- Elevations at Lake Lanier are lower than they would be under the RIOP and the largest effect is at median elevations. As the release needed to provide the 9-foot channel and the level of the augmentation limit increases, elevations at Lake Lanier are lowered.
- Elevations at West Point Lake are lower than under the RIOP and the largest effects are at median elevations. Differences at the 75% exceed, 90% exceeded and minimum elevations show much less sensitivity to changing the releases needed to provide a 9-foot channel than at Lake Lanier.
- Elevations at W.F. George are lower than under the RIOP and the largest effects are at median elevations. Differences at the 75% exceed, 90% exceeded and minimum elevations show much less sensitivity to changing the releases needed to provide a 9-foot channel than at Lake Lanier.

Houston, Billy

Page 34 of 360

Chapter 9 reviews the effects on the system from actively meeting minimum flow requirements in the Chattahoochee River by making releases from the storage reservoirs to support these instream flow targets for Columbus and Andrews outflow (Plant Farley). The Peachtree Creek minimum required flow was met 100% of the time because it was already written into the release rules for Lake Lanier and there was always water remaining the Lanier's conservation pool to support meeting this minimum flow target. In this Chapter it was found that:

1. When providing active releases from Lanier and W.F. George to meet the minimum flow targets for Columbus and Plant Farley and a supplemental release of 300 cfs from Lake Lanier whenever the elevation at West Point is below 622 NGVD, these minimum requirements could be met more than 99.9% of the time over the 70 year model run period.
2. These supplemental releases did not have a major effect on the availability of the 9-foot or 7-foot channel. Likewise, these changes had little effect on flow at the Chattahoochee gauge on the Apalachicola River or the extent of inundation of the Apalachicola River's floodplain.
3. Figures for the elevations at Lake Lanier in the period of record show minor differences in the median elevations but much greater differences in the 75% exceeded, 90% exceeded and minimum elevations which is when the supplemental releases required to support the Chattahoochee River minimum flow requirements would be released.
4. West Point and W.F. George elevations had limited sensitivity to meeting the Chattahoochee River in-stream flow minimum targets with the greatest sensitivity at the minimum elevations.

In reviewing the effects on the system from changing the consumptive withdrawals in the ACF basin above Jim Woodruff (Chapter 10) it was found that:

1. Increasing consumptive demands has a limited effect on the availability of the navigation channel, the frequency of exceeding floodplain inundation thresholds, and on reservoir elevations at West Point and W.F. George.
2. The major impacts associated with increasing consumptive demands were on reservoir elevations at Lake Lanier.
3. Low and extreme low flows at the Jim Woodruff outflow showed sensitivity to increasing consumptive demands.
4. With regard to the minimum flow targets on the Chattahoochee River, it was found that as consumptive demands were increased 40% and 50% that there was an increase in the number of incidents in which the minimum flow targets could not be met

AVAILABILITY OF THE NAVIGATION CHANNEL

From these sensitivity analyses, it was found that all of the options resulted in an improvement in the availability of the federal navigation channel over the RIOP, which is not surprising since no navigation releases are included in the RIOP release rules. None of the options, however, provided the desired year round availability of the navigation channel.

Houston, Billy

Page 35 of 360

In general, it was found that the extent of availability of the 7-foot and 9-foot navigation channel is dependent on the flow needed to provide the channel and the limit of augmentation provided from the federal reservoir system. The lower the flow needed to provide the navigation channel (and consequently the more dredging), the greater the availability. The higher the level of augmentation provided from the federal storage reservoirs, the greater the availability of the channel. The effects generally are more pronounced in the latter half of the year when flows tend to be lower and it is necessary to make specific releases from the federal storage reservoirs to augment the available flow in order to provide the navigation channel. The volume of flow needed to provide the 9-foot channel has a greater effect on the availability of the channel than does the augmentation limit. It was found that there was a limited difference in the availability of the navigation channel whether or not supplemental releases were made to meet Chattahoochee River minimum flow targets. Increasing consumptive demands by as much as 50% had a minimal effect on the availability of the navigation channel when releases are required to support the channel.

JIM WOODRUFF OUTLFOW

Two separate measures of environmental performance measures were used in our evaluation of model output: one which is flow based and another which considers the extent of inundation of the Apalachicola River floodplain. The reason for doing two separate measures for environmental flows is that the Apalachicola Riverkeeper's chose to use the flow based criteria and we had agreed to utilize the performance measures defined by the stakeholders. However, because of long-term river bed degradation in the Apalachicola River, the relationship between flow and the floodplain ecosystem has changed over time and it was decided that another performance measure which accounted for exceeding key flow thresholds associated with floodplain inundation was also necessary.

Detecting changes to the outflow at Jim Woodruff Dam is challenging because of the high degree of variability that is inherently experienced at this gauge site. When the level of flow augmentation was evaluated it was found that for median and 90% exceeded flows there were minimal changes in the flow for Jim Woodruff outflow in response to changing the level of flow augmentation. But for the 75% exceeded flow level, in the latter half of the year, there were changes in Jim Woodruff outflow in response to changing the level of augmentation. When the volume of augmentation flows which are released to provide the navigation channel was evaluated, the greatest sensitivity was again found in the 75% exceeded flows. For the 75% exceeded flow for the full dredging option (14,000 cfs to provide the 9-foot channel), the average annual outflow at Jim Woodruff outflow was nearly 400 cfs greater than the 75% exceeded outflow for the no dredging option (21,000 cfs to provide the 9-foot channel). This compares with a difference of about 270 cfs for the 90% exceeded option. The reason that Jim Woodruff outflow was greater as the flow needed to provide the navigation channel was less is that the 21,000 cfs requirement is well above the median flow (e.g. 16,600 cfs) and hence there are many more occurrences that flows are augmented when 14,000 cfs is needed to provide the 9-foot channel than when 21,000 cfs is needed to provide the channel.

Limited changes in the Jim Woodruff outflow were found when the Chattahoochee River minimum flow targets were actively met and when consumptive demands were increased.

Houston, Billy

Page 36 of 360

Outflow at Jim Woodruff Dam was found to change the most when in-stream minimum flow requirements were actively required for the 75% exceeded and 90% exceeded flow volumes, in the latter half of the year, when flows are of a lesser magnitude.

INUNDATION OF THE APALACHICOLA RIVER FLOODPLAIN

Changes in the amount of floodplain inundation were evaluated at three different flow levels: 15,000 cfs, 17,000 cfs and 29,000 cfs. These three levels were used to account for different volumes of flows needed to inundate the floodplains in the lower, middle and upper river. Because of the magnitude of flows necessary to cause flooding in the upper river (e.g. 29,000 cfs) none of the management options had any effect on the frequency of floodplain inundation. However, for the floodplain thresholds for the middle and lower river (e.g. 15,000 cfs and 17,000 cfs) there was a high degree of sensitivity so long as the level necessary to inundate the floodplain was exceeded by the release level required for the navigation channel. The extent of floodplain inundation was not sensitive to differences in the whether the Chattahoochee River minimum flow requirements were met passively or actively and there were only minor differences with increasing consumptive demands.

RESERVOIR ELEVATIONS

In all of the model runs, the entire conservation pool of the federal storage reservoirs was available to meet reservoir release requirements and consumptive withdrawals, although when the reservoirs were in composite zone 4 as defined in the release rules, reservoir releases were much more conservative as compared to release requirements when there was more storage in the conservation pools of the storage reservoirs (e.g. less water is released when the composite storage is in Zone 4). Therefore, the only constraint applied to the major federal storage reservoirs other than those provided by the reservoir release rules was that they had water available in their storage pool to meet the release requirements required by the operations which were included in the model. As the uppermost reservoir in the basin and the reservoir with the largest volume of water in its conservation pool, Lake Lanier is where the greatest changes from increased release requirements were experienced. This occurs largely because West Point Lake and W.F. George reservoir do not have much more additional water to contribute to increasing downstream flows and therefore the only source of water to address the majority of increased downstream flow needs or increased consumptive withdrawals is Lake Lanier.

LAKE LANIER

In evaluating the effects of increasing the augmentation limit to meet flow requirements in the Apalachicola River it was found that when no dredging is done (i.e., flow target to provide a 9-foot channel = 21,000 cfs) once the augmentation limit reached the 4,000 cfs to 5,000 cfs range, elevations at Lake Lanier were severely drawn down. When the augmentation limit exceeded 5,000 cfs, the conservation pool ran out of water. In all of the augmentation limits evaluated, the elevations at Lake Lanier are lower than they would have been under the RIOP. When full dredging was done (i.e., flow target to provide the 9-foot channel = 14,000 cfs) the maximum augmentation limit that could be done without Lanier running out of water in its conservation

Houston, Billy

Page 37 of 360

pool was 4,000 cfs. The reason that the augmentation limit was less when the flow needed to provide the 9-foot channel was lower (e.g. 14,000 cfs vs. 21,000 cfs) is that the frequency of augmentation occurrences is far greater as the flow needed to provide the 9-foot channel is lower. The flow volume for the maximum release with full dredging, 10,000 cfs (i.e., 14,000 cfs to provide the channel - 4,000 cfs augmentation limit), is exceeded 80% of the time in the historical flow record whereas the flow volume for the maximum release with no dredging, 16,000 cfs (21,000 cfs to provide the channel - 5,000 cfs augmentation limit) is exceeded only 52% of the time. The greatest sensitivity for the no dredging and dredging option to changes in the augmentation limit was at the 90% exceeded elevations (lower elevations).

In evaluating the effects of changing the release to provide the 9-foot channel, the greatest degree of sensitivity is seen at median elevations and at minimum elevations. This is due to the fact that there is a greater frequency of augmentation releases made at median release levels. This is also due to the fact that because of the augmentation limits and release rules are "hard-coded" into the operations, releases required from Lanier are less in the 75% and 90% exceeded elevations so long as there is water in West Point and W.F. George, but once the lower reservoirs do not have ample conservation storage to support downstream requirements, Lake Lanier is forced to support these needs. Under all of the options, the elevations at Lake Lanier for the modeled operations were lower than the elevations under the RIOP. At median elevations, this difference was about an annual average of one foot lower than the RIOP elevation when the flow needed to provide the 9-foot channel was 14,000 cfs and about two feet when the flow needed to provide the 9-foot channel was 21,000 cfs. For the 90% and minimum elevations the average annual differences between the RIOP and modeled elevations are greater when 14,000 cfs is the flow needed to provide the 9-foot channel.

In evaluating the effects of having the Columbus and Farley Nuclear Plant releases actively supported by upstream reservoirs, there were minor differences in the median elevations, but much greater differences in the 75% exceeded, 90% exceeded and minimum elevation figures which was expected since the condition at which Lanier augments West Point storage was during period of lower flows.

Evaluating the effects of increasing consumptive demands above the Jim Woodruff Dam shows large effects as the level of consumption increased. At median elevations on Lanier these differences were about three feet with a 50% increase in demands in the first half of the year. For the 75% exceeded elevations the differences were comparable to those at median elevations, but they extended throughout the entire year. The 90% exceeded and minimum elevations showed even greater differences.

WEST POINT

In evaluating the effects of increasing the augmentation limit to meet flow requirements in the Apalachicola River, it was found that at median elevations there are not many differences between elevations at West Point when the level of augmentation is changed before June. After June, however, there are major differences with the augmentation runs with several feet of difference as the level of augmentation is increased. Median elevations are either equal to

16

Houston, Billy

Page 38 of 360

or less than elevations under the RIOP. The sensitivity of West Point elevations to changes in augmentation levels are far less for the 75% exceeded and 90% exceeded elevations, with modeled elevations either being equal to or less than elevations under the RIOP. Minimum elevations were greater than under the RIOP for the summer months. West Point showed limited sensitivity to changing the augmentation limits when the 14,000 cfs release was the flow needed to provide a 9-foot channel.

In evaluating the effects of changing the release to provide the 9-foot channel, variations are greatest for the median elevations from April through December, with the range of variation being nearly three feet and elevations at West Point were lowered relative to the RIOP elevations. Changes for the 75% exceeded and 90% exceeded figures were not as large as those for the median elevations. From the minimum elevation figure, it can be seen that for much of the time from July to December, West Point was drawn down to the bottom of its conservation pool during the model run period.

In evaluating the effects of having the Columbus and Farley Nuclear Plant releases actively supported by upstream reservoirs, the greatest sensitivity is at the minimum elevations and minimal differences are evident in the median and 75% exceeded elevation figures.

In evaluating the effects of increasing consumptive demands above the Jim Woodruff outflow there was only a minor degree of sensitivity to changing the consumptive demands in the basin. The greatest differences in elevations in response to changing the volume of consumptive demands were in the latter half of the year.

W.F. GEORGE (LAKE EUFAULA)

In evaluating the effects of increasing the augmentation limit to meet flow requirements in the Apalachicola River, it was found that for the no dredging option, median elevations at W.F. George were identical under alternate levels of augmentation releases and under the RIOP until May, but are sensitive to augmentation levels and navigation releases for the balance of the year. Similar reactions are evident at the 75% exceeded elevation, but the differences are not as large. Differences between the RIOP elevations and elevations under alternative augmentation levels are not as pronounced for the 90% exceeded and minimum elevations. For the with dredging option, W.F. George showed limited variations in elevations for the median, 75% exceeded, 90% exceeded and minimum elevations as the augmentation limits were changed.

In evaluating the effects of changing the release to provide the 9-foot channel for the period of record figures large differences in W.F. George elevations are evident after early May in the median elevations, with differences of over two feet occurring. When it is considered that the depth of the conservation pool at W.F. George is only 8 feet, these differences are major. Differences for the 75% exceeded, 90% exceeded and minimum elevations show a lot less sensitivity to changes in releases needed to provide the 9-foot channel with the minimum elevations showing that the reservoir does get lowered to the bottom of its conservation pool. Median and 75% exceeded elevations are lower than those for the RIOP.

17

Houston, Billy

Page 39 of 360

When releases are specifically made to meet the Chattahoochee River in stream flow targets, the effects on elevations at W.F. George are minimal. When consumptive withdrawals are increased , the period of record figures show the most sensitivity at the median elevations in the latter half of the year, with a reduced level of sensitivity in the 75% exceeded, 90% exceeded and minimum elevation figures.

CONCLUSIONS

In doing this sensitivity evaluation to find the common ground between increasing the availability of the 9 x 100 foot commercial navigation channel and enhancing environmental flows in the Apalachicola River, it was found that it is possible to improve the existing situation. To accomplish this, it would be necessary to revise the RIOP release rules to include specific releases for navigation (already an authorized project purpose) for managing the federal reservoir system and to define navigation releases in a flow range which would be beneficial for the Apalachicola River aquatic ecosystem. When inundation of the floodplain is considered as the performance measure to define environmental acceptability, the flow range to accomplish this would be in the 16,000 to 18,000 cfs range. If the intent is to have no dredging, the release would be 21,000 cfs, unless the Chipola Cutoff is modified is reduce the water flowing from the Apalachicola River to the Chipola River (COE, 1986). Because of the small storage capacity of the federal storage reservoirs relative to flow in the Apalachicola River, it is further recommended that there needs to be a limit on the volume of augmentation which would be provided by the federal reservoirs. Sensitivity analyses suggest that this range should be in the 2,000 cfs to 3,000 cfs range. Therefore, if the intent is to provide the 9-foot channel at a 16,000 cfs flow, then the reservoir system would support such a release so long as net basin inflow exceeded 13,000 cfs if the augmentation limit was 3,000 cfs. Sensitivity analyses show that although the federal storage reservoirs would be drawn down, with demands at the 2007 levels, composite conservation storage in the basin is never drawn down to a level that would suggest no water would be available for minimal operations (e.g. meeting minimum flows required for the Apalachicola River as well as for water supply demands) under the local inflows experienced between 1939 and 2008, the 2007 consumptive demands and the reservoir operations used in the modeling analyses. If the level of demands increase, local inflows are reduced or the reservoir operations are changed the reservoirs obviously could be drawn down to the bottom of their conservation pool. It was further found that if consumptive withdrawals were allowed to increase in an unrestrained manner, (e.g. 40% to 50%) this operational approach would result in Lake Lanier being drawn down to the bottom of its conservation pool, thus its conservation storage pool and consequently the storage pools at West Point and W.F. George would also be drawn down to the bottom of their conservation pools. Therefore, consumptive demands cannot continue to increase indefinitely without having an impact reservoir elevations and flow in the Apalachicola River.

It is not the place of the technical analysts on this project to decide among the range of viable options. It is just our role to define the range of viable options. From this viewpoint we recommend that representatives of navigation and environmental interests meet to define which of the options is mutually acceptable.

Houston, Billy

Page 40 of 360

ADDITIONAL WORK WHICH NEEDS TO BE DONE

- Conducting an environmental flows study to better define environmental performance measures
- Conducting additional HEC-RAS studies to define dredging needs associated with different flow volumes for the Apalachicola River (e.g. volume of dredging needed to provide the channel at a 17,000 cfs flow
- Formulating a dredge disposal plan for various volumes of dredging (this would clarify environmental tradeoffs associated with various approaches)
- Finalizing the calibration of ResSim and STELLA models and revising input data in STELLA model to match finalized input into ResSim model once it is decided upon.
- Analyzing the dredging and environmental impacts of modifying the Chipola Cutoff to understand the tradeoffs associated with reducing the flow loss from the Apalachicola River through the cutoff and consequently reducing the volume of dredging in that course of the river.
- Conducting an analysis of the effects of modifying the reservoir action zones on meeting performance measures.
- Defining changes in both the volume of dredging and flow needed to provide the authorized channel dimensions by alternative weir construction designs for the Chipola Cutoff.
- Analyzing reservoir yields and the effects of increasing consumptive demands in the Metro Atlanta region on reservoir elevations at Lanier, West Point and W.F. George.
- Analyzing causal factors for the lowering of Lake Lanier during droughts.
- Providing a detailed analysis of potential navigation/ecological flows to create jobs
- Continued analysis of the augmentation limits from the reservoirs which includes varying the augmentation limits over the year.

Houston, Billy

Page 41 of 360

CHAPTER 1 – INTRODUCTION

This report is being prepared under a contract to Apalachicola Bay and River Keeper, Inc. (AR) to fulfill a Rural Development Rural Business Enterprise grant from the U.S. Department of Agriculture. The intent of this project was to examine the common ground between providing commercial and recreational navigation in the Apalachicola-Chattahoochee-Flint river basin (ACF) and sustainment of the ecosystem of the Apalachicola River and estuary in an effort to stimulate employment opportunities in ACF basin. Through this project reservoir operations at the Federal reservoirs in the ACF basin were evaluated through simulation models with a focus on developing management approaches to maximize navigation/ecological flow criteria. Project staff included Steve Leitman (independent contractor for AR) and Stacey Graham and Charles Stover (Alabama Power).

The ACF basin drains nearly 20,000 square miles in Florida, Georgia and Alabama. Figure 1-1 shows the location of the ACF basin. About ¾ of the basin is in Georgia, 1/8 in Florida and 1/8 in Alabama. The basin extends from the Blue Ridge Mountains in Northern Georgia to the Gulf of Mexico. The Apalachicola River is the largest river in Florida with an average flow at the mouth of the Apalachicola River of about 25,000 cfs. There is great variation in flow in the Apalachicola River both within individual years and among different years. Average annual flow can vary by more than a factor of 2 and in a typical year flow in the Apalachicola River can range from greater than 100,000 cfs to well below 10,000 cfs and in the extreme over 200,00 cfs and less than 5,000 cfs. Flow in the basin is typically greatest in the winter months and least in the late summer months. Figure 1-2 shows an annual hydrograph for a drought year and figure 1-3 an annual hydrograph for a normal year.

The ACF basin is home to a multitude of biological resources ranging from endangered species such as the Atlantic sturgeon and several species of mussels, to striped bass, robust reservoir based fisheries based on bass and bream, and a seafood industry in its estuary which yields 10% of the nation's oyster harvest. The Apalachicola River floodplain has a large bottomland hardwood swamp with vast areas of cypress and tupelo. Most of the floodplain has been purchased by the State of Florida and the federal government for conservation purposes.

Houston, Billy

Page 42 of 360

Figure 1- 1. THE APALACHICOLA-CHATTAHOOCHEE-FLINT BASIN

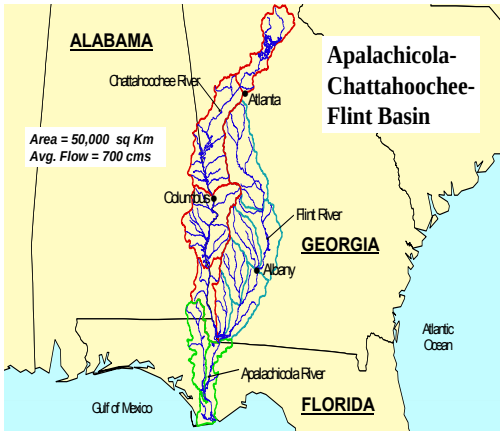
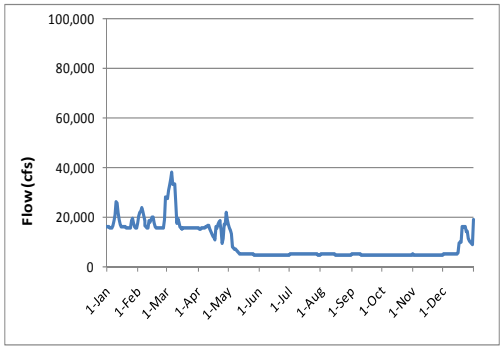


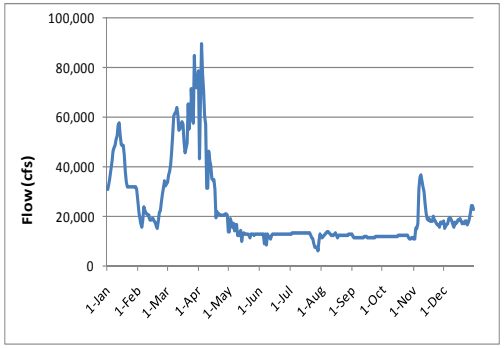
Figure 1- 2. ANNUAL HYDROGRAPH FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR A DROUGHT YEAR (2007)



Houston, Billy

Page 43 of 360

Figure 1- 3. ANNUAL HYDROGRAPH FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR A NORMAL YEAR (1977)



The basin's waters are used by humans for drinking water, hydropower generation, cooling water for coal and nuclear power plants, agricultural irrigation, industrial activities, commercial navigation and recreational activities at both the reservoirs and in the rivers themselves. The river system also supports a diverse aquatic ecosystem and provides fresh-water into a large estuary which provides oysters, shrimp and finfish as well as serving as an important nursery grounds for the Gulf of Mexico. During several droughts in the past several decades the water users of the basin have found themselves in competition for the water resources of the basin, but during periods of normal rainfall there are more than adequate water resources for all users.

The two rivers which form the Apalachicola River, the Flint and Chattahoochee, are very different in nature and in usage. The Chattahoochee's source of flow is primarily surface water, and multiple storage reservoirs allow the basin's water resources to be managed. The Flint River, on the other hand, has a large groundwater flow and almost no reservoir storage capacity. Therefore, flow in the Chattahoochee basin can be managed by regulating both supply and demand, whereas flow in the Flint can be managed only through demand. Management of the Flint is also complicated by the surface–groundwater interactions in the mid to lower Flint basin. At median flow the Chattahoochee River typically provides slightly more water to the Apalachicola than does the Flint, but during low flow, the spring-fed Flint typically makes a greater contribution.

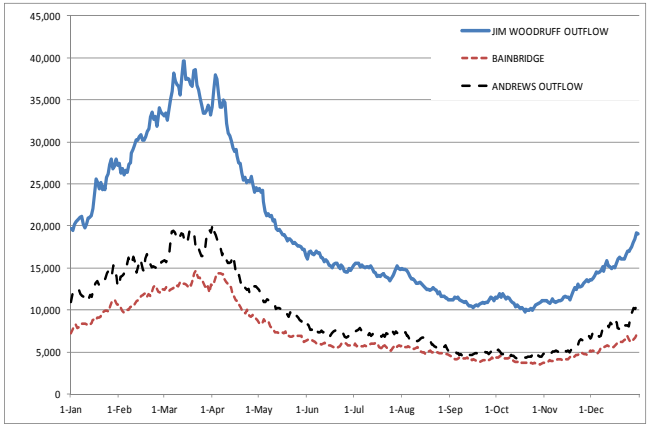
As figures 1-4 and 1-5 show, the contribution of flow in the Chattahoochee and flow in the Flint to Jim Woodruff outflow varies depending on whether it is median or low flow. In figure 1-4 it can be seen that for virtually every day of the year median flow for the Chattahoochee River at the Andrews outflow (the gage closest to Jim Woodruff outflow) is greater than the median flow for the Flint River at Bainbridge. In contrast, figure 1-5 shows that for the 90% exceeded

Houston, Billy

Page 44 of 360

flows the reverse is true: for every day of the year 90% of the flow for the Chattahoochee River at the Andrews outflow is less than 90% exceeded flow for the Flint River at Bainbridge. This phenomenon is the result of the large spring flow contribution to the Flint River and suggests that the role of the Flint River in contributing to meeting minimum flow thresholds is important during drought events.

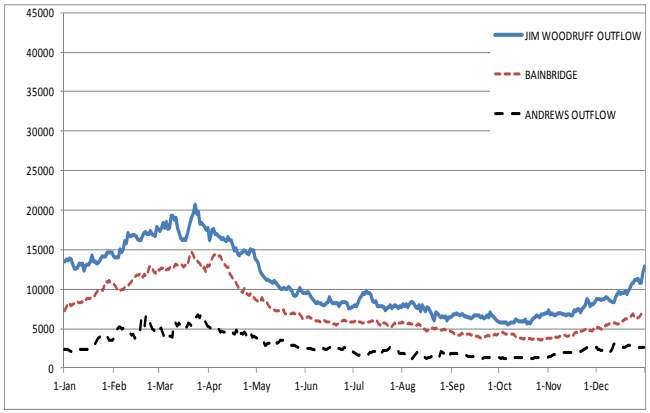
Figure 1- 4. COMPARISON OF MEDIAN FLOWS FOR THE JIM WOODRUFF OUTFLOW, BAINBRIDGE GAUGE ON THE FLINT RIVER AND ANDREWS OUTFLOW ON THE CHATTAHOOCHEE RIVER



Houston, Billy

Page 45 of 360

Figure 1- 5. COMPARISON OF 90% EXCEEDED FLOWS FOR THE JIM WOODRUFF OUTFLOW, BAINBRIDGE GAUGE ON THE FLINT RIVER AND ANDREWS OUTFLOW ON THE CHATTAHOOCHEE RIVER



In 1939 Congress authorized the federal government to provide a 9 x 100 foot channel from the mouth of the Apalachicola River to Columbus, Georgia on the Chattahoochee River and Bainbridge, Georgia on the Flint River. Federal efforts to maintain a navigation channel in the ACF basin, however, extend back to 1828. From the early 1950s to about the year 2000 considerable efforts were made to provide the authorized navigation channel including the construction of storage reservoirs, annual maintenance dredging, the construction of dike fields in the Apalachicola River, annual removal of snags from the navigation channel, several cutoffs and rock removal projects in the Apalachicola River and extensive studies and negotiations with the State of Florida in an effort to provide a commercial navigation channel and to minimize environmental impacts from the project. Nevertheless, there remained a dilemma: the majority of the benefits from the project went to interests in Georgia and Alabama while the majority of the environmental impacts went to Florida. This dilemma resulted in Alabama and Georgia interests being advocates for maintaining the navigation channel and Florida interests being in opposition to providing a navigation project.

Commercial traffic in the basin never reached its forecasted potential both due to problems in providing the authorized project channel on a year-round basis and with the seemingly perpetual problems between Florida and navigation interests. When the project was initiated it was anticipated that the authorized navigation channel could be provided 95% of the time at a design flow of 9,300 cfs at the Blountstown gage on the Apalachicola River. Unfortunately things did not work out as they were forecasted to occur. First off, the 95% exceeded flow over the period of record at the Blountstown gage (1955 – present) has been a little greater than 6,500 cfs instead of the anticipated 9,300 cfs and simultaneously the flow needed to provide a 9

Houston, Billy

Page 46 of 360

X 100 foot channel has been far greater than the anticipated 9,300 cfs. In essence, when navigation interests needed more water to provide the year-round authorized channel a combination of climate and increased consumptive losses resulted in there being far less flow. Consequently, there has been no way that the authorized channel could be provided on a consistent basis. Other problems with providing the channel have included: 1) limited funding to maintain the channel, 2) lack of mutually acceptable dredge disposal sites, and 3) environmental impacts associated with the channel.

After decades of disagreement, declining traffic and environmental problems in 2005 the State of Florida ultimately chose to not issue a water quality certification to the Corps of Engineers to maintain the federal channel and the ACF navigation project was essentially shut down. The focus of this document is not to ask questions as to what happened in the past, but instead it is to look toward the future and ask the questions of whether there is common ground between providing a commercial navigation channel and protecting the aquatic ecosystem of the Apalachicola River? And, if there is such common ground, how can the federal projects be managed to accomplish this project? At the root of this effort is a belief by project staff that:

1) Environmental interests were not opposed to navigation per se, what they were opposed to is how the navigation project was being provided, and
2) That navigation interests realize that having a year-round channel is not possible and that the best that can be achieved is a seasonal channel.

The approach used in this report will be to first provide a chapter (Chapter 2) which details the background on the document including a description of modeling tools, input data for the models, methods used to evaluate output data, a description of how the modeling tools were calibrated and what were the base conditions used in the models.

The next chapter (Chapter 3) will focus on the federal navigation project and the development of navigation performance measures to evaluate alternative model output. The following chapter (Chapter 4) will focus on environmental issues in the Apalachicola River and the development of environmental performance measures to evaluate alternative model output. The following chapter (Chapter 5) will focus on federal storage reservoirs and the performance measures used to decide whether alternative management approaches have an acceptable impact on the reservoirs. Chapter 6 will then focus on instream flow performance measures which are above Jim Woodruff Dam. Chapters 7, 8, 9 and 10 will then conduct sensitivity analyses on responses of the system to alternative levels of augmentation limits on the federal reservoirs, alternative releases to provide a 9-foot navigation channel, having passive or active requirements to meet minimum flow requirements on the mid-Chattahoochee River and the response of the system to changes in consumptive demands. The final chapter (Chapter 11) will summarize the conclusions from the document.

Houston, Billy

Page 47 of 360

CHAPTER 2 – APPROACH TO THE PROJECT

The general approach taken in doing this project was:

1) To define performance measures that will be used to distinguish between acceptable and unacceptable alternatives and system attributes for which performance measures will be developed,
2) To develop base models for the system to be used to evaluate alternative approaches to reservoir management in both ResSim and STELLA,
3) To define the base conditions which were to be used for the base model,
4) To calibrate the two models at base conditions,
5) To revise the RIOP release logic to incorporate navigation releases,
6) To define the range of variables for which sensitivity analyses would be run,
7) And to do the sensitivity runs.

Each of these conditions is discussed in the balance of this chapter.

DEFINING OF PERFORMANCE MEASURES

A performance measure is simply a metric which can be used to define what is acceptable in terms of output. It is the defining of performance measures that puts meaning into and allows the interpretation of the model output based on perceived societal values. It is through the selection of performance measures that a set of model runs can be ranked in terms of which output sets are most preferable. Because of the output provided by the models used in this study, performance measures must be linked to flows and/or reservoir elevations at selected locations which are available in the model output.

For purposes of this project performance measures had to be developed both for defining what is an acceptable level of availability for the federal navigation channel and what is an acceptable flow regime for the Apalachicola River. We realized, however, that performance measures also had to be developed for other stakeholder interests in the basin such as reservoir elevations and minimum flows at certain checkpoints on the Chattahoochee River upstream of Jim Woodruff Dam if there was to be any chance of our recommendations ultimately being implemented. The specific performance measures developed for all of these interests are discussed in detail in chapters 3, 4 and 5.

Our overall philosophy was that performance measures should be defined by the stakeholders representing their interests, not by the technical analysts. Consequently the specific performance measures used for both navigation channel availability and environmental/ecosystem sustainability were derived in collaboration with stakeholders. For the environmental performance measures this meant the Apalachicola River Keepers and for the navigation performance measures this meant the Tri-Rivers Waterway Development Association. In contrast, no performance measures were developed for reservoir elevations, but output sheets which illustrate resulting elevations are provided. The only criteria used to screen alternative model runs was whether there was water in the conservation storage pools

Houston, Billy

Page 48 of 360

of the federal reservoirs. The minimum flow standards used to evaluate flows at Columbus and Andrews outflow were developed in consultation with stakeholders from that region who are also involved with the Tri Rivers Waterway Development Association.

MODELS USED IN ANALYSIS

In using simulation models in this project a decision was made to use two models, ResSim and STELLA. This decision was made because: 1) Using multiple models allowed us to cross check each of the model's output with another model, 2) each of the models has attributes which are helpful to this project, and 3) project staff had expertise in both models. Both the STELLA model and ResSim model are organized is a similar manner.

At the base of both models is an unimpaired flow data set. Unimpaired flow sets are synthesized data sets which adjusts observed flows to account for human influences in the form of consumptive withdrawals, reservoir operations and changes in evaporation rates as a result of reservoir's existence (e.g., greater evaporation and greater accumulation of in situ precipitation). The unimpaired data set used in both the STELLA and ResSim models is the data set released by the Corps of Engineers in Spring of 2011. The unimpaired flow set was originally released in 1997 (COE, 1997b) and the data in the set included 1939 to 1993. Since then, the unimpaired set has been extended multiple times and currently ranges from 1939 to 2008. Both STELLA and ResSim aggregate local inflows from the unimpaired data set and consumptive demands and returns and reservoir operations on a reach by reach basis.

The nodal points used in the models are the same, except that some of the nodal points in the ResSim model were aggregated into a single point in the STELLA model. The nodal points on the Chattahoochee River in the ResSim model are Buford, Norcross, Atlanta, Whitesburg, West Point Dam, West Point gage, Bartlett's Ferry, Goat Rock, Oliver, North Highlands, Columbus, W.F. George and Andrews. In the STELLA model the Norcross and Atlanta gauges are aggregated as Peachtree Creek. The West Point gauge, Bartlett's Ferry, Goat Rock, Oliver, North Highlands and Columbus nodes are aggregated as Columbus. The nodal points on the Flint River in the ResSim model are Griffin, Montezuma, Albany, Newton and Bainbridge. In the STELLA model the Griffin and Montezuma nodes were aggregated into a single node at Montezuma. The nodal points on the Apalachicola River in both models are Woodruff Dam, Chattahoochee, Blountstown and Sumatra. The identical consumptive demand data set was used in both models.

ACF STELLA MODEL

The STELLA model or ACF Shared Vision model was initially created as part of the ACF Comprehensive Study. The initial Shared Vision Models for the Apalachicola-Chattahoochee-Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) basins were developed by the University of Washington under contract with the Corps of Engineers Institute for Water Resources and the ACT/ACF Comprehensive Study, and were delivered to the study partners as final products in September, 1996. The primary components of these models were demand spreadsheets to calculate withdrawals and returns for each river reach simulated, and separate monthly time step reservoir models for the ACF and ACT basins, each containing the unimpaired flow data created by the Mobile District Corps of Engineers for the Comprehensive Study. These models,

which were coded in Excel and STELLA version 3.07, were configured to allow a simulation of the status quo and a number of alternative operating plans devised by the study partners during the study (Hamlet and Leitman, 2000).

While the monthly time step model was sufficiently detailed for many purposes, the Northwest Florida Water Management District recognized a need for a more refined time step version of the model and a daily time step model was developed. This daily time step model was designed to incorporate as many features and controls as possible from the earlier monthly time step model, while providing the additional elements needed for meaningful daily time step simulations. The newer model also incorporates a number of alternative operating plans that have been developed between 1996 and 2000. Initially the reservoir operation logic used in the model was the 1989 Water Control Plan and then in 2006-2007 this logic was modified by Steve Leitman under contract with the U.S. Fish and Wildlife Service to represent the Interim Operating Plan. This modeling logic was revised on this project to represent the Revised Interim Operating Plan and for the approach used to release additional flows for navigation and the environment.

ResSim MODEL

HEC-ResSim, the precursor to HEC-5, was chosen by the Mobile District Corps of Engineers Water Control Manual Update team to model reservoir operations in the ACF basin. To calibrate the HEC-ResSim model, the Hydrologic Engineering Center (HEC) and Mobile District entered conditions from 1977, 1995, and 2006 in both HEC-ResSim and HEC-5. The three HEC-5 models hold significance as the tools "of record" used for analyses concerning the previous Environmental Impact Statement, the 1990's Comprehensive Study, and the Revised Interim Operating Plan (RIOP). After ensuring that the corresponding ResSim models could effectively reproduce the HEC-5 results, Mobile District and HEC created another ResSim model that captured the most significant operations as of 2008, including the Revised Interim Operating Plan rules and head limits constraints.

The complete ACF watershed model extends from the headwaters of the Chattahoochee River above Lake Lanier to the Apalachicola River at Sumatra (downstream of Lake Seminole). The 70-year period of record that was modeled with ResSim includes calendar years 1939-2008. The unimpaired incremental local flows, evaporation and diversion data were obtained from the Corps of Engineers Mobile District. The ACF model uses a daily time-step to simulate operations. The selection of a daily time step was made based on previous models, available input data, and compute time considerations. This interval provides consistency with previous HEC-5 modeling activities in the basin.

BASE CONDITIONS USED IN MODELING

The base conditions in the model are the conditions which will be used to compare all modifications and sensitivity analyses. For several reasons it was decided that observed flows are not a good standard for base conditions. Included in our logic are the facts that: 1) in the real world consumptive demands vary whereas in the models consumptive demands are held at a set level for the 70-year model run period and 2) in the real world the federal storage reservoirs were constructed at various times during the 1939 to 2008 model run period and

their operation varied over time whereas in the model the reservoirs exist for the entire model run period and the operations are held constant. Consequently all comparisons made in our analyses compare model runs with model runs.

With the real world observed data ruled out as the base conditions, we choose to use 2007 demands and current reservoir operations (RIOP) as the base conditions for model operations. A summary of the 2007 demands on a reach by reach basis may be found in Appendix 1. The RIOP operations were developed to incorporate concerns related to the federal Endangered Species Act into the management of the federal reservoirs in the ACF basin. Table 2-1 summarizes operations under the RIOP. From Table 2-1 it can be seen that there are three

Table 2- 1. REVISED INTERIM OPERATING PLAN (RIOP) CRITERIA

Months	Composite Storage Zone	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)	Basin Inflow Available for Storage
March - May	Zones 1 and 2	>= 34,000	>= 25,000	Up to 100% BI > 25,000
		>= 16,000 and < 34,000	>= 16,000 + 50% BI > 16,000	Up to 50% BI > 16,000
		>= 5,000 and < 16,000	>= BI	
		< 5,000	>= 5,000	
	Zone 3	>= 39,000	>= 25,000	Up to 100% BI > 25,000
		>= 11,000 and < 39,000	>= 11,000 + 50% BI > 11,000	Up to 50% BI > 11,000
		>= 5,000 and < 11,000	>= BI	
		< 5,000	>= 5,000	
June - November	Zones 1,2, and 3	>= 24,000	>= 16,000	Up to 100% BI > 16,000
		>= 8,000 and < 24,000	>= 8,000 + 50% BI > 8,000	Up to 50% BI > 8,000
		>= 5,000 and < 8,000	>= BI	
		< 5,000	>= 5,000	
December - February	Zones 1,2, and 3	>= 5,000	>= 5,000 (Store all BI > 5,000)	Up to 100% BI > 5,000
		< 5,000	>= 5,000	
At all times	Zone 4	NA	>= 5,000	Up to 100% BI > 5,000
At all times	Drought Zone	NA	>= 4,500	Up to 100% BI > 4,500

factors which define reservoir releases from the ACF system under the RIOP: 1) month of the year, 2) composite storage zone, and 3) basin inflow. The RIOP defines releases only from Jim Woodruff Dam. The reservoir behind Jim Woodruff Dam (Lake Seminole), however, does not have ample storage capacity to support the releases called for in the RIOP. To meet the requirements of the RIOP, water must be released from the upstream major storage reservoirs (Lake Lanier, West Point Lake, and W. F. George Lake). Therefore the RIOP is a management plan for the entire ACF basin.

Another provision of the RIOP, not included in Table 2-1, is ramping rates. Ramping rates are the vertical drops in river stages (water surface elevations) that occur over a given period. The fall rates or ramping rates are expressed in units of feet per day (ft/day), and are measured at the Chattahoochee gage as the difference between the daily average river stages of consecutive calendar days. Rise rates (*e.g.,* today's average river stage is higher than yesterday's) are not addressed in the RIOP. Unless otherwise noted, fall rates under the drought contingency operation would be managed to match the fall rate of the basin inflow.

COMPOSITE STORAGE TRIGGER

Reservoir pools are divided into three general pools: the flood pool, the conservation pool and the inactive storage pool. The flood pool is for the temporary holding of flood waters. The

Houston, Billy

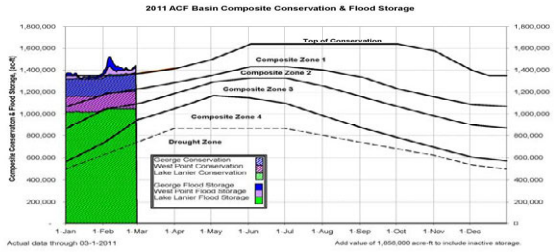
Page 51 of 360

conservation storage pool is the active management pool. The inactive storage pool is the area below the conservation pool whose waters cannot be managed due to physical constraints from the reservoir and dam design. In the ACF basin the conservation pool is further divided into four zones. These zones are determined by the operational guide curve for each project. These zone elevations were first defined in the 1989 proposed Water Control Plan for the ACF basin and there exists no supporting documentation explaining how these zone elevations were determined. In the RIOP composite storage utilizes the same "four zones" approach as is used for managing Lake Lanier, West Point Lake and W.F. George Lake. The volume of storage in each zone is simply defined as the sum of the storage for all three reservoirs; (i.e., Zone 1 of the composite storage represents the combined storage available in Zone 1 for each of the three storage reservoirs). Figure 2-1 shows the division of composite zone storage volume for the ACF basin and the composite storage in the basin in 2011 (shown in color) and Figure 2-2 the composite storage in the basin in 2008. In reviewing these figures it should be noted that in Figure 2-1, the composite storage chart shows water in both the conservation pool and in the flood pool, whereas in Figure 2-2, the composite storage chart only shows water in the conservation. As was noted above, the conservation pool is the main portion of the reservoir that is actively used to manage a reservoir whereas the flood pool is a portion of the reservoir that is normally intended to be used to buffer the effects of flood flows. Therefore, the Corps of Engineers has stated that they only consider water which is in the conservation pool at the three projects when calculating the composite storage. The State of Florida recommends that all water in the reservoirs, whether in the flood pool or in the conservation storage pool, should be counted toward the composite storage in the basin.

Houston, Billy

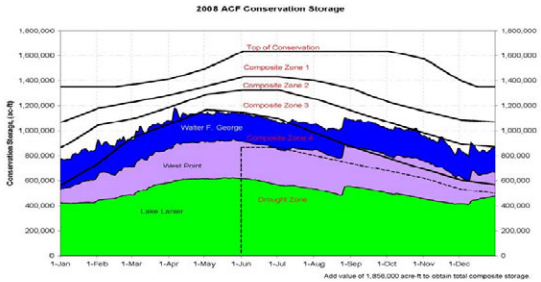
Page 52 of 360

Figure 2- 1. COMPOSITE STORAGE IN THE ACF BASIN FOR 2011



SOURCE: U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT WEB PAGE
http://water.sam.usace.army.mil/

Figure 2- 2. COMPOSITE STORAGE IN THE ACF BASIN FOR 2008



SOURCE: U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT WEB PAGE
http://water.sam.usace.army.mil/

Table 2-2 shows the percent of time for each month that the surface elevation of water at West Point and W.F. George reservoirs were above the top of the conservation pool (e.g. in the flood

pool) between 2001 and 2010. According to the definitions of flood pool and conservation pool it should be expected that water would be in the flood pool infrequently, perhaps 5 to 10 percent of the time over a ten year period. From this table, however, it can be seen that from December through April the surface elevation of the water was in the flood pool about 75 percent of the time. In other words, the Corps of Engineers has routinely used the flood pool as part of the conservation pool between 2001 and 2010, not as a pool to temporarily store flood waters. Since the Corps is utilizing the flood pool such a high percentage of the time, it seems appropriate that the flood pool storage should be included in the calculation of the composite storage or that the zone curve elevations which divide the conservation pool from the flood storage pool should be changed to reflect actual operations.

Table 2- 2. PERCENT OF TIME THAT THE ELEVATIONS IN WEST POINT AND W.F. GEORGE RESERVOIRS WERE ABOVE THE TOP OF THEIR CONSERVATION POOL STORAGE ELEVATION: 2001 – 2010

	WEST POINT	W.F. GEORGE
JAN	86.1	82.9
FEB	82.5	88.2
MAR	71.9	85.5
APR	70.0	86.3
MAY	57.1	47.1
JUN	24.0	11.7
JUL	35.8	8.7
AUG	26.5	2.9
SEP	18.3	3.3
OCT	0.0	0.0
NOV	59.3	43.0
DEC	81.0	66.8

Counting or not counting water in the flood storage as water in composite storage can make a significant difference on which composite zone the basin is in and therefore on the water released from Jim Woodruff Dam. For example, it is conceivable that there will be a situation in the future where Lake Lanier's elevation has been lowered during a drought while the storage pools at West Point and W.F. George are above the top of their conservation pool elevation. Whether or not the water in the flood pool is included in the calculation of composite storage could then make a difference on the composite zone of the ACF basin and upon the release called for under Table 2-1. In the models used in this analysis, no water is stored in the flood pool for extended periods of time.

BASIN INFLOW TRIGGER

Basin Inflow (BI) refers to the calculation of the 7-day inflow from the drainage basin above Jim Woodruff Dam. It is important to recognize that basin inflow is a calculated value, not an actual measured value. Basin inflow for a given reach of the river above a dam is calculated by: 1) measuring the outflow from the storage reservoir (Lake Lanier, West Point Lake, W.F. George Lake (Lake Eufaula)), 2) measuring the change in elevation at the reservoir 3) converting the elevation change to a volume and 4) calculating basin inflow by subtracting outflow from the

volume change at the reservoir. The reason for this approach is that it is far less expensive and complicated to calculate basin inflow in this manner rather than to gauge and monitor inflow sources, consumption and evaporation from each reservoir.

Therefore, what is called basin inflow is somewhat misleading because it represents actual basin inflow minus depletions from the system by human influences including depletions by municipal and industrial, agricultural and thermal water users as well as by evaporative losses from the reservoirs. A more accurate term for basin inflow would be "net basin inflow" since the value represents basin inflow after consumptive depletions. This is significant for two reasons:

1. A false impression is created that basin inflow is a true representation of all available water flowing into the reservoirs from upstream, but in reality it is not,
2. Increased consumptive depletions in the future can effectively reduce basin inflow which in turn can reduce downstream releases called for by the RIOP.

CALIBRATION OF ResSim AND STELLA MODELS

As discussed above, we chose to approach this project by utilizing two simulation programs, ResSim and STELLA, and one of the reasons for doing this was to take advantage of the features of both programs as well as to utilize the models to cross check results from each other to insure we were making coding changes correctly. One of the advantages of the STELLA program is that it can run the 70-year simulation period in less than 5 minutes versus over two hours to run the ResSim model. Consequently, we chose a strategy in approaching this project in which we first would calibrate the two models using the base line settings for consumptive demands and RIOP reservoir operations. And then, in order to take advantage of the faster run-time in the STELLA model, all of the sensitivity analyses would be done using STELLA. Once the sensitivity analyses were done in STELLA then the reservoir management options which appear most favorable relative to the performance measures will be run in ResSim and a second round of sensitivity analyses will be run. Figures 2-3A, 2-3B and 2-3C show the results of the initial calibration analysis for Lake Lanier, figures 2-4A, 2-4B and 2-4C for West Point reservoir, figures 2-5A, 2-5B and 2-5C for W.F. George and figures 2-6A, 2-6B and 2-6C for Jim Woodruff outflow. These analyses compare the output for the two models with RIOP operations. From these figures it can be seen that there was an acceptable level of calibration in the operation of the two models for this scenario for both elevations and flow at Jim Woodruff Dam outflow.

Houston, Billy

Page 55 of 360

Figure 2-3 A. CALIBRATION OF STELLA AND ResSim MODEL ELEVATIONS FOR LAKE LANIER (1939 - 1962)

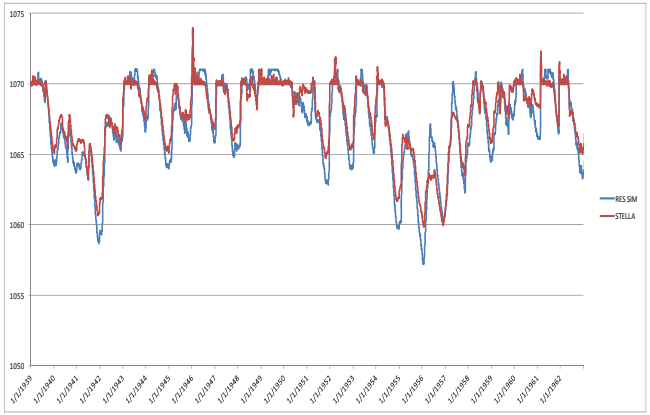
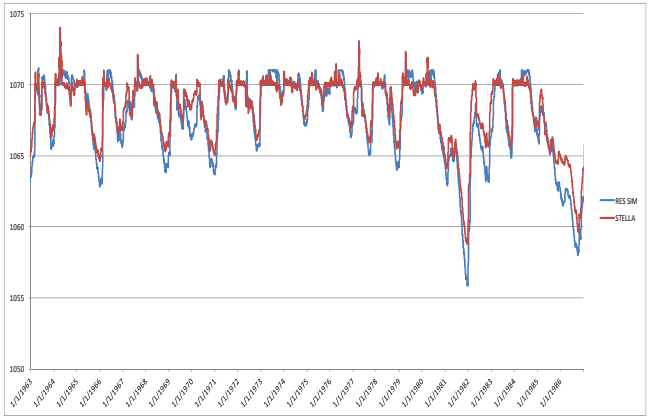


Figure 2-3 B. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR LAKE LANIER (1963 - 1986)

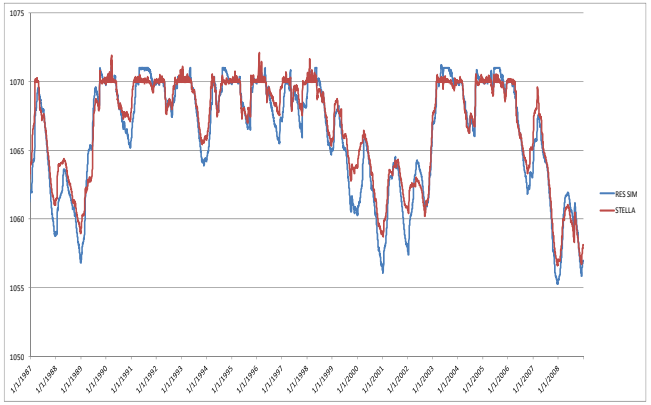


34

Houston, Billy

Page 56 of 360

Figure 2-3 C. CALIBRATION OF STELLA AND ResSim MODEL ELEVATIONS FOR LAKE LANIER (1987 - 2008)



35

Houston, Billy

Page 57 of 360

Figure 2-4 A. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR WEST POINT LAKE (1939 - 1962)

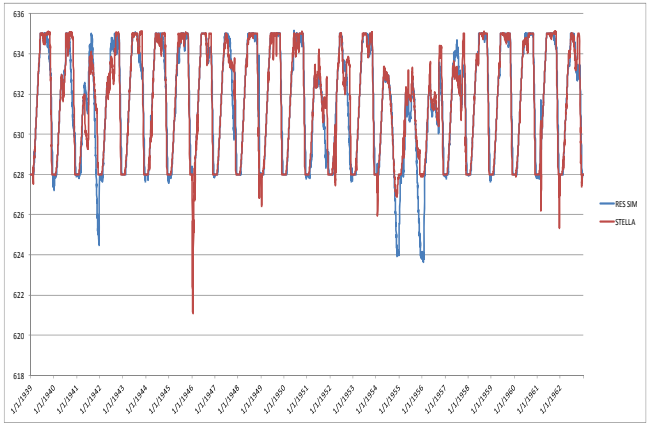
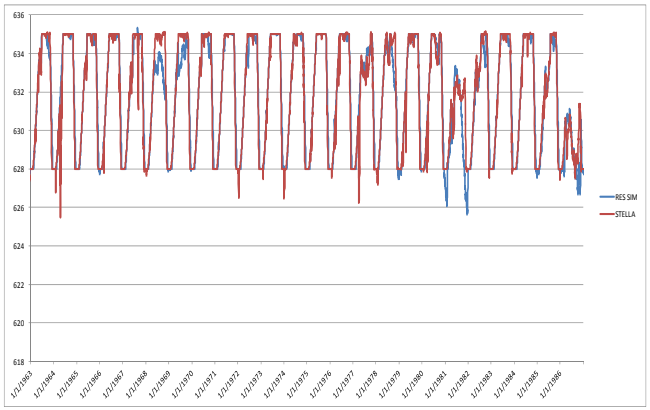


Figure 2-4 B. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR WEST POINT LAKE (1963 - 1986)



Houston, Billy

Page 58 of 360

Figure 2-4 C. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR WEST POINT LAKE (1987 - 2008)

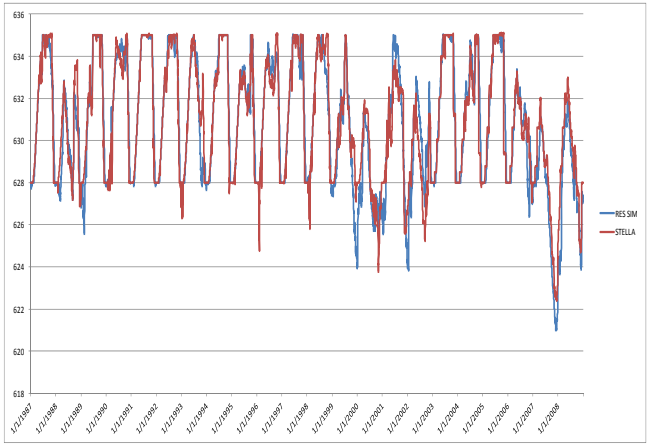
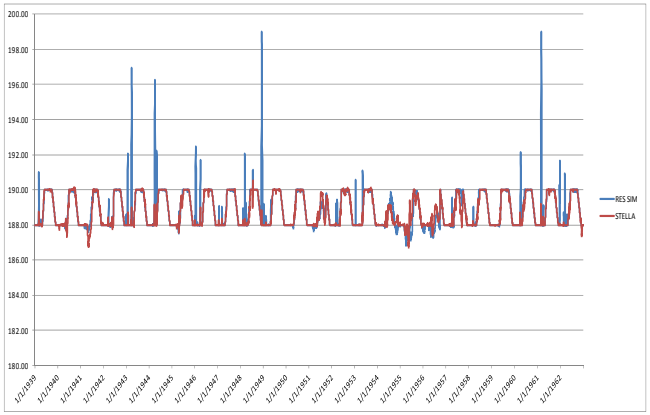


Figure 2-5 A. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR W.F. GEORGE LAKE (1939-1962)



Houston, Billy

Page 59 of 360

Figure 2-5 B. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR W.F. GEORGE LAKE (1963-1986)

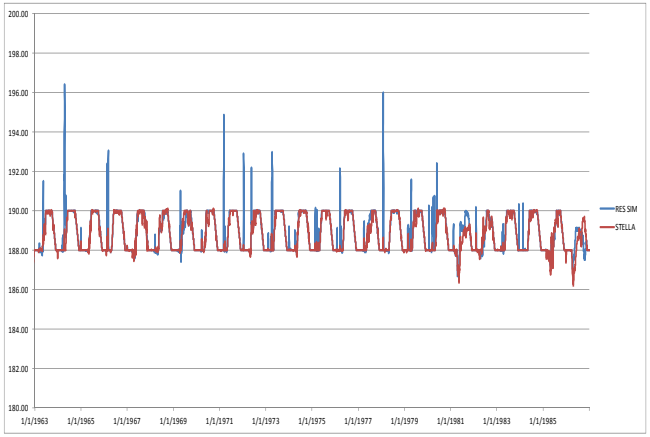
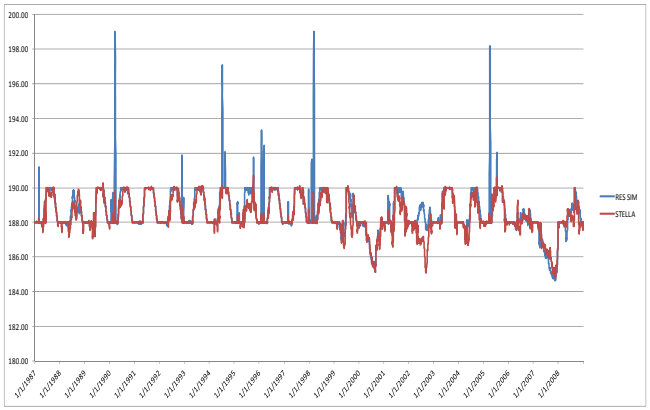


Figure 2-5 C. CALIBRATION OF STELLA AND ResSim ELEVATIONS FOR W.F. GEORGE LAKE (1987-2008)



38

Houston, Billy

Page 60 of 360

Figure 2-6 A. CALIBRATION OF STELLA AND ResSim MODEL FLOW FOR WOODRUFF OUTFLOW (1939 - 1962)

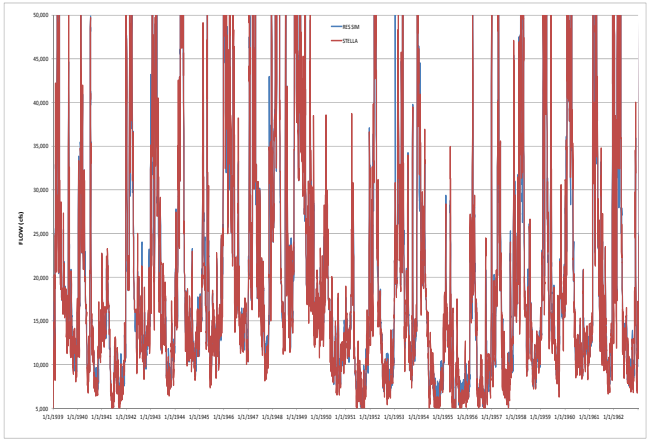
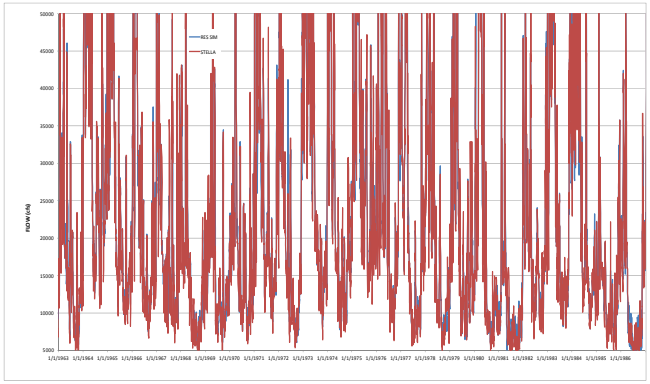


Figure 2-6 B. CALIBRATION OF STELLA AND ResSim MODEL FLOW FOR WOODRUFF OUTFLOW (1963 - 1986)

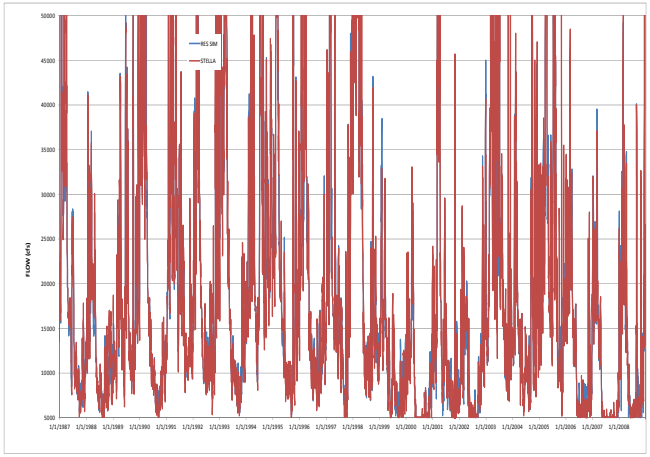


39

Houston, Billy

Page 61 of 360

Figure 2-6 C. CALIBRATION OF STELLA AND ResSim MODEL FLOW FOR WOODRUFF OUTFLOW (1987 - 2008)



Unfortunately after the model runs were calibrated the Corps made additional modifications to the ResSim model and at the date of completing the report the Corps was continuing to make modifications to the ResSim model. Project staff was therefore left with the unenviable task of calibrating with a moving object. Figures 2-7 to 2-10 show the resultant changes to the ResSim model. Because of funding and time limitations on this project we cannot wait until all of the changes in the ResSim model are completed.

Therefore, we choose to go forward with calibrated version of the STELLA model in our analyses. Since all of our comparisons are model run to model run and what we are focusing on is the relative changes of flow and elevation to operational changes we do not believe this will lessen the utility of our results. The relative differences should hold up even if the unimpaired flow set is changed and the absolute differences change.

Houston, Billy

Page 62 of 360

Figure 2-7 A. COMPARISON OF ResSim MODEL ELEVATIONS FOR LAKE LANIER (1939 - 1962)

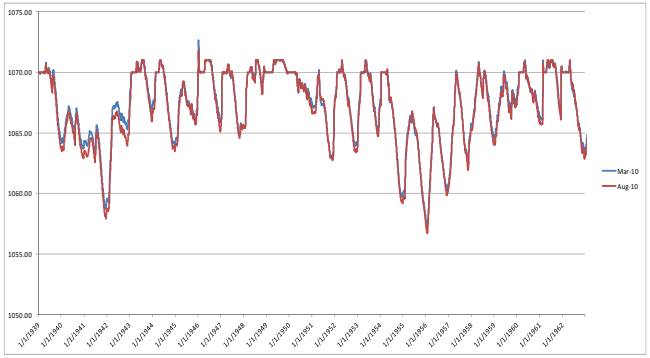
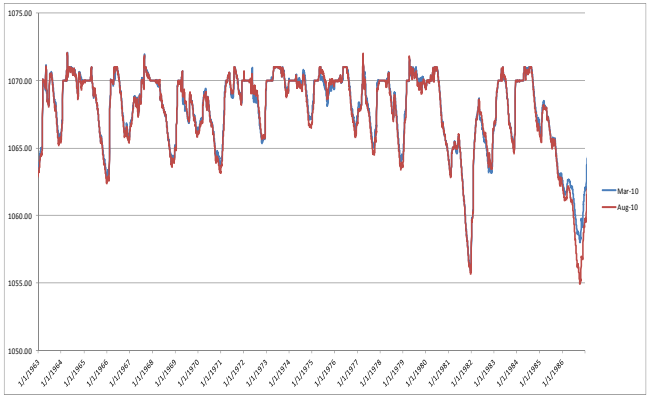


Figure 2-7 B. COMPARISON OF ResSim MODEL ELEVATIONS FOR LAKE LANIER (1963 - 1986)



Houston, Billy

Page 63 of 360

Figure 2-7 C. COMPARISON OF ResSim MODEL ELEVATIONS FOR LAKE LANIER (1987 - 2008)

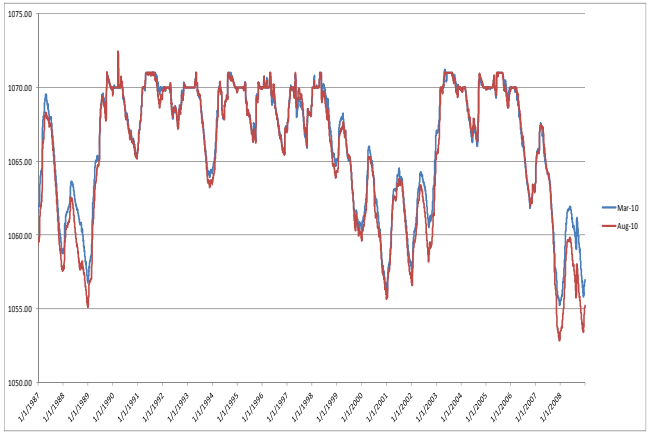
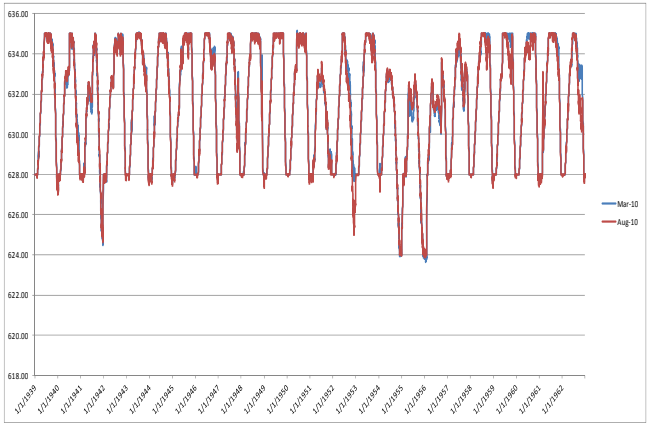


Figure 2-8 A. COMPARISON OF ResSim MODEL ELEVATIONS FOR WEST POINT (1939 - 1962)



42

Houston, Billy

Page 64 of 360

Figure 2-8 B. COMPARISON OF ResSim MODEL ELEVATIONS FOR WEST POINT (1963 - 1986)

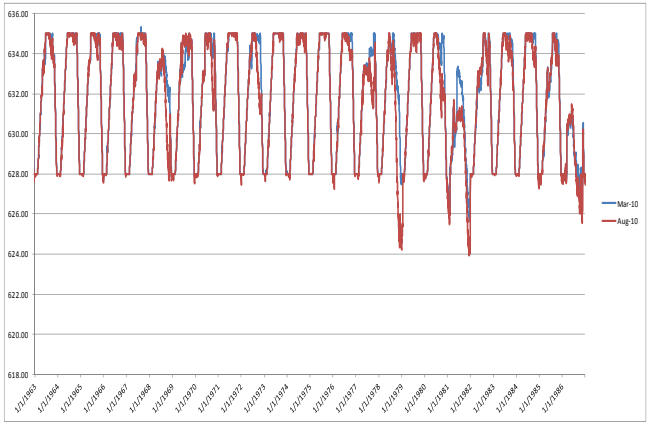
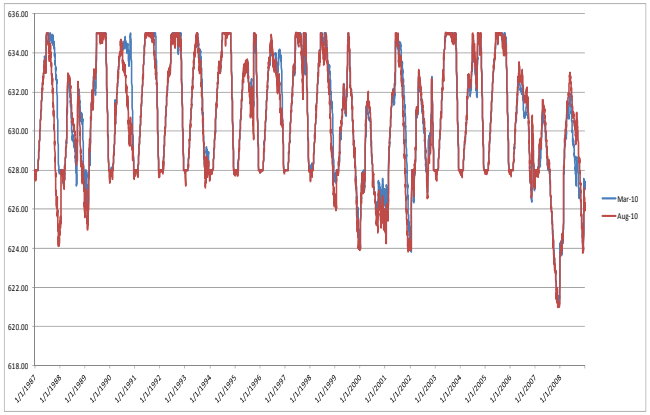


Figure 2-8 C. COMPARISON OF ResSim MODEL ELEVATIONS FOR WEST POINT (1987 - 2008)



43

Houston, Billy

Page 65 of 360

Figure 2-9 A. COMPARISON OF ResSim MODEL ELEVATIONS FOR W.F. GEORGE (1939 - 1962)

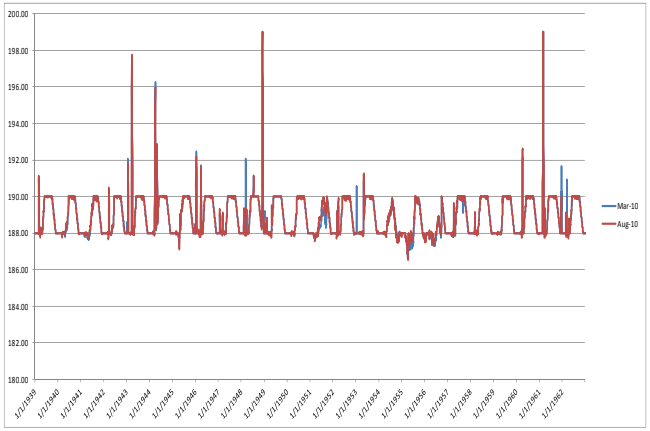
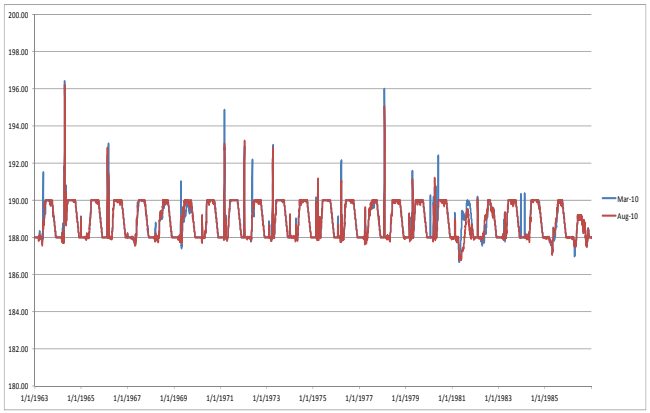


Figure 2-9 B. COMPARISON OF ResSim MODEL ELEVATIONS FOR W.F. GEORGE (1963 - 1986)



44

Houston, Billy

Page 66 of 360

Figure 2-9 C. COMPARISON OF ResSim MODEL ELEVATIONS FOR W.F. GEORGE (1987 - 2008)

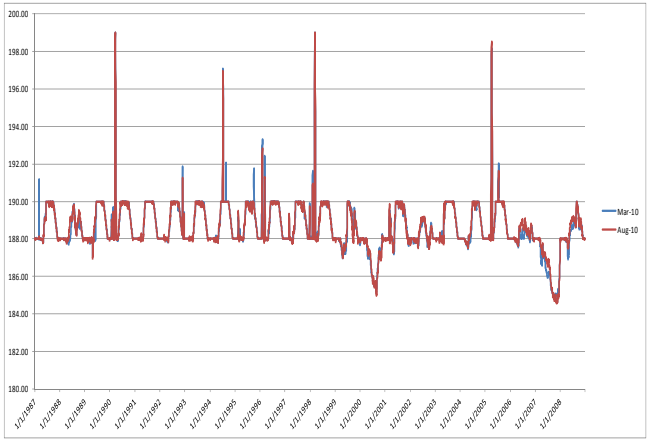
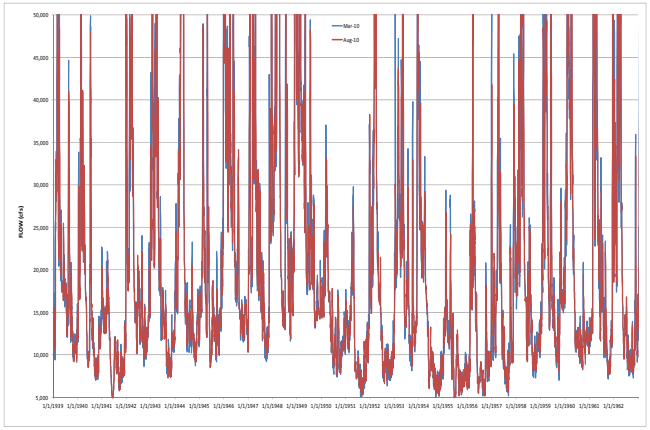


Figure 2-10 A. COMPARISON OF ResSim JIM WOODRUFF OUTFLOW (1939 - 1962)



45

Houston, Billy

Page 67 of 360

Figure 2-10 B. COMPARISON OF ResSim JIM WOODRUFF OUTFLOW (1963 - 1986)

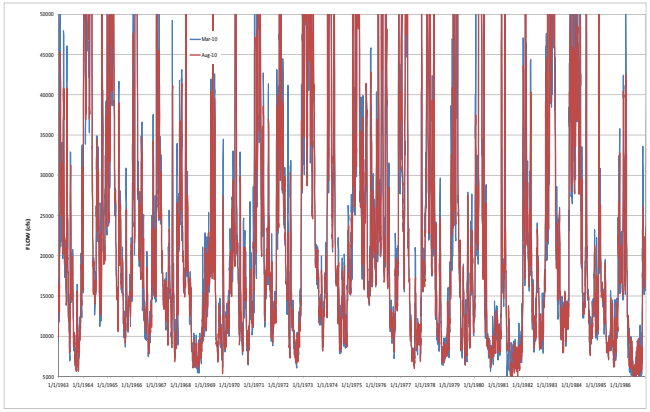
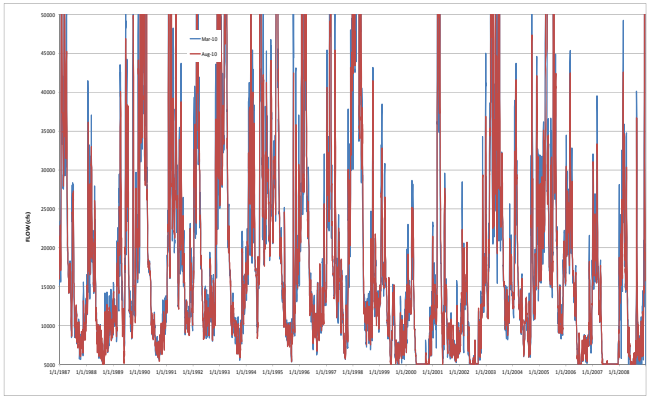


Figure 2-10 C. COMPARISON OF ResSim JIM WOODRUFF OUTFLOW (1987 - 2008)



REVISION OF RIOP RELEASE LOGIC TO INCLUDE NAVIGATION RELEASES

As was noted above, the RIOP was originally designed to protect several listed species in the Apalachicola River. Consequently the release rules in the RIOP are based on meeting the needs of the listed species within the storage capacity of the federal reservoirs. Our logic in revising reservoir operations considers this fact and was designed to preserve the releases in the RIOP,

Houston, Billy

Page 68 of 360

but to adjust the releases to also account for navigation, when such releases can be made within the limitations of the federal storage reservoir's capacity to support them. This logic was based on our belief that for much of the time either there is either ample water in the ACF basin so that no management is needed or so little water that management options are severely confined to just protecting the storage in the federal reservoirs. Therefore, the portion of the flow regime where management becomes important is not at low flow where much of the ACF negotiations have focused, but when reservoirs are either being used to augment flows or when reservoir storage is being refilled. Appendix 1 provides the model coding logic used to both represent the RIOP and to represent inserting navigation releases and augmentation thresholds into the RIOP in STELLA.

RANGE OF VARIABLES FOR WHICH SENSITIVITY ANALYSES WERE CONDUCTED

After setting up and calibrating the models, the next issue which we had to confront was which variables should be tested for sensitivity and what ranges should be considered in these analyses. The specific variables for which sensitivity analyses were run include: releases made to provide a 9-foot and 7-foot navigation channel, augmentation thresholds for navigation and environmental releases, changing consumptive demands in the model, and making upstream flow targets active targets and modifying reservoir action zones. Each of these variables is discussed below. In the sensitivity analyses the model output were compared with navigation, environmental, reservoir elevation and instream flow target performance measures.

The relationship between channel availability and flow is defined by the maintenance level and extent of structural modifications made to the channel. These are exactly the variables which led to long-term historical confrontation between the States over provision of the navigation channel. Based on analyses which will be discussed in greater depth in a following chapter it was determined that with no dredging the authorized 9-foot commercial navigation channel can be provided with a flow of 21,000 cfs and with 215,000 cubic yards of dredging annually in the Chipola cutoff reach the authorized channel can be provided with a flow of 14,000 cfs. These two flow levels provided the boundaries of our sensitivity analyses and we choose to set the navigation/environmental release target at 1000 cfs increments between the 14,000 cfs and 21,000 cfs values.

One of the major management dilemmas in the ACF basin is that reservoir storage in the basin is quite limited relative to flow in the Apalachicola River. Consequently, there is a limit to the extent of augmentation that can be provided by the reservoirs on a sustaining basis. For example, if the reservoir system was asked to augment 15,000 cfs per day for a sustained period of time then the reservoirs would empty quite rapidly whereas if the reservoir system was asked to augment 500 cfs per day this could be done for a much longer period of time. So as part of our sensitivity analyses we evaluated a range of augmentation thresholds between 1,000 and 10,000 cfs or until the conservation storage in the basin was exhausted relative to the effects on the performance measures.

Another critical variable is consumptive withdrawals. Current demands (2007 demands) were used as the default value in the base model. We recognize, however, that demands will most likely increase in the future, but that there are multiple variables which will determine what

Houston, Billy

Page 69 of 360

future demands will be including population growth, technological changes, the economy, and political decisions such as the level of conservation required. Consequently, we would consider forecasting future demands as a highly speculative endeavor. Therefore, to examine the sensitivity of operations to changes in consumptive depletions we choose to alter current demands by increments of 10% between current demands and a 50% increase in current demands. We recognize that demands would not change uniformly either in terms of geographical area or by use category, but to do a complete analysis of the vast array of possible changes to consumptive demands is beyond the scope of this project. Another issue for which we did sensitivity analyses was that of instream flows. The performance measure for this brought up by mid-Chattahoochee interests were that of minimum flows both at Columbus, Georgia and at the Andrews Dam outflow. Neither of these uses are authorized project purposes. The sensitivity analysis that was done for these performance measures was on the option of whether meeting these minimum flows should be done as part of meeting other required releases or whether meeting these minimum criteria should be actively coded into the releases in the models.

Houston, Billy

Page 70 of 360

CHAPTER 3 – THE FEDERAL NAVIGATION PROJECT

BACKGROUND ON ACF NAVIGATION PROJECT

In 1939, Congress authorized the federal government to provide a 9 x 100 foot channel from the mouth of the Apalachicola River to Columbus, Georgia on the Chattahoochee River to Bainbridge, Georgia on the Flint River. Federal efforts to maintain a navigation channel in the ACF basin, however, extend back to 1828 to the days of steam powered river boats. From the early 1950s to about the year 2000 considerable efforts were made to provide the authorized navigation channel dimensions on a year round basis including the construction of storage reservoirs, annual maintenance dredging, the construction of dike fields in the Apalachicola River, annual removal of snags from the navigation channel, several cutoffs and rock removal projects in the Apalachicola River. In addition there were multiple extensive studies and negotiations with the states of Alabama, Florida and Georgia in an effort to provide a commercial navigation channel and to minimize environmental impacts from the project. In spite of the federal authorization to provide the navigation channel, there remained a dilemma in providing the navigation channel: the majority of the benefits from the project went to interests in Georgia and Alabama while the majority of the environmental impacts went to Florida. This dilemma resulted in Alabama and Georgia interests being advocates for maintaining the navigation channel and Florida interests being in opposition to extensive modifications and maintenance efforts needed to provide the authorized navigation project. Commercial traffic in the basin has never reached its forecasted potential both due to physical problems in providing the authorized project on a year-round basis and with the seemingly perpetual problems between Florida and navigation interests.

There is a direct relationship between channel depth in the river, flow in river and the availability of the authorized navigation channel in the Apalachicola River. In order to increase the period of time a navigable channel is available, a combination of flow augmentation from upstream storage reservoirs and annual maintenance dredging is necessary. The level of availability of the navigation channel is based on:

1) Rainfall and available flow in the basin,

2) Funding provided for dredging, the availability of dredges to maintain the channel and the availability of mutually acceptable disposal sites, other environmental impacts, and

3) Flow augmentation provided by releases from the federal storage reservoirs to supplement flows in the Apalachicola River.

Of these factors, rainfall cannot be readily influenced by human activities whereas funding, availability of mutually acceptable disposal areas, dredging and reservoir management can. According to the Corps of Engineers, historically the authorized 9-foot channel was available about 43% of time between 1990 and 2001 (USACOE 2002). In 2000, the Corps did not dredge

Houston, Billy

Page 71 of 360

the channel because the water was so low that the funded amount of dredging would have been insufficient and therefore would have not provided a navigable channel depth. Since channel availability was severely affected by the drought in 1999 and dredging the following two years was limited by the drought and other factors, the 43% channel availability value is somewhat misleading. If the years affected by drought are removed from the calculation and the calculation is made for the time period between 1990 and 1998, the channel availability is about 54% of the time. From 1990 to 1998 an 8-foot channel was available about 67% of the time and a 7 1/2-foot channel about 79% of the time (Leitman 2005). This overall low level of the availability of the authorized channel dimensions can be attributed to:

- Flow in the river is less than originally anticipated when the project was authorized;
- The volume of flow necessary to provide the authorized channel dimension is greater than was anticipated when the project was authorized;
- The level of support from federal reservoirs is less than was expected when the project was authorized;
- Physical changes to the river which have altered the relationship between flow and channel dimensions;
- The full navigation project features envisioned when the project was authorized have not been constructed; and
- Droughts that occurred in the 1980's and 1990's (Leitman, 2005)

Engineering studies in the early 1950s concluded that a 9 x 100 foot channel on the Apalachicola River could be provided on a year round basis with a flow of 9,300 cubic feet per second (cfs) at the Blountstown gage on the Apalachicola River, in association with prescribed maintenance work (USACOE, 1986). The term "year round basis" is operationally defined as 95% of the time because it was understood by the Corps that during severe drought events there will not be ample flow to provide the navigation channel (USACOE 2002). Concurrent with the expectation that the channel will be available 95% of the time was an expectation that the 9,300 cfs flow would also be available 95% of the time.

When historically observed flows for the Apalachicola River at Blountstown, Florida are examined it can be seen that for the period of record (October 1, 1957 to November 30, 2010) the 95% exceeded flow was 6,436 cfs and the 9,300 cfs design flow was exceeded about 86.5% of the time. However, it should be recognized that since 2001 the Corps of Engineers has not been making releases from the federal storage reservoirs to support the navigation project and that the 95% exceeded flow from October 1, 1957 to December 31, 2001 is 7,508 cfs and the 9,300 cfs flow was exceeded 90% of the time.

A longer period of record (January 1, 1922 to October 1, 2011) is available for the Apalachicola River at Chattahoochee which is about 30 miles upstream of Blountstown, with no major inflow between the two gauges. At this gauge, the 95% exceeded flow is 6,495 cfs and the 9,300 cfs flow was exceeded about 83.5% of the time. Consequently, the design flow has never been available 95% of the time and there was no possible way the navigation channel could have

Houston, Billy

Page 72 of 360

been available 95% of the time, even if the 9-foot channel could have been provided at that flow.

Unfortunately, the flow needed to provide a 9 X 100 foot channel has been far greater than the anticipated 9,300 cfs discussed above. Estimates of how much flow is needed to provide a 9-foot channel have ranged from 13,000 cfs to 16,000 cfs flow at Blountstown after the channel is maintained (COE, 1986, COE 1989, COE, 1997a, COE 2002). Even if it is assumed that the project could be maintained before the flow dropped below these thresholds (totally unrealistic assumption) observed flows for the Apalachicola River at Blountstown show that the 13,000 cfs flow was available 66% of the time from 1957 to 2010 and the 16,000 cfs flow was available only about 51% of the time.

In total, navigation interests were left in a situation, when they needed more water to provide the year-round authorized channel a combination of climate and increased consumptive losses resulted in there being far less flow. Consequently, there has been no way that the authorized channel could be provided on a consistent basis. Other problems with providing the channel have included: 1) limited funding to maintain the channel, 2) lack of mutually acceptable disposal sites, and 3) environmental impacts associated with the channel.

INCLUSION OF NAVIGATION INTO THE MODELING

As noted earlier, the current reservoir operations being used in the ACF basin and the base operations used in our modeling effort is the RIOP. Navigation releases were not included in the RIOP because the RIOP operations were developed in response to the Endangered Species Act and because navigation releases were not being actively provided at that time because Florida had rejected the permit to maintain the channel. Without channel maintenance the Corps chose not to make releases from the federal reservoirs to support a project purpose which could not be supported.

Therefore, to evaluate the common ground between environmental releases and navigation releases we had to alter the model code to include navigation releases within the RIOP release logic. The approach we chose to take was to conserve all of the release attributes of the RIOP and to integrate navigation support into the transition periods between average to high flows where no navigation support was necessary and low flows when augmentation from the reservoirs was necessary. An important concept also integrated into our approach was that there is a limit to the amount of augmentation which can be supported by the ACF federal reservoirs. We recognized that the volume of storage could support an augmentation threshold of 200 to 300 cfs indefinitely, but that if the reservoirs were asked to support an augmentation threshold of 20,000 cfs per day the storage pools would soon be emptied. As the chapter on sensitivity analysis will show in detail, we did sensitivity analyses to define what level of augmentation releases could be supported by the reservoir system.

Another question we faced with regard to evaluating navigation releases was the relationship between the condition of the channel and the level of maintenance conducted. In the following section of this chapter there is a detailed discussion of how we defined the relationship between flow and navigation channel availability. For now it is sufficient to note that in

preparing our model coding we allowed for the flexibility of evaluating a range of flows to represent the flow needed to provide the channel ranging from conditions which included extensive dredging to no dredging. The specific model coding which we used to define navigation releases can be found in Appendix 3.

It was concluded through this work that a 9-foot navigation channel could be provided with a flow of 14,000 cfs and 215,000 cubic yards of dredging between NM 28.7 and NM 42. Table 3-1 shows the total dredging on the Apalachicola from 1987 to 2001 and the total dredging in the reach evaluated under HEC-RAS. From these figures it can be seen historically that this reach accounted for about 1/3 of the dredging which occurred in the Apalachicola River and consequently the 215,000 cubic yards of dredging could be translated into about 650,000 cubic yards per year for the entire river to provide a 9-foot channel at 14,000 cfs.

Table 3- 1. COMPARISON OF DREDGING (CUBIC YARDS) IN THE CHIPOLA CUTOFF REACH AND THE ENTIRE APALACHICOLA RIVER 1987 TO 2001

	CHIPOLA CUTOFF REACH (N.M. 28.7 - N.M. 42)	TOTAL RIVER	RATIO
1987	312,000	1,384,885	22.53%
1988	196,000	689,861	28.41%
1989	106,000	460,230	23.03%
1990	206,844	767,468	26.95%
1991	155,326	524,554	29.61%
1992	171,684	745,609	23.03%
1993	410,678	1,549,266	26.51%
1994	242,472	909,264	26.67%
1995	484,729	1,004,915	48.24%
1996	336,967	640,391	52.62%
1997	194,350	553,505	35.11%
1998	526,508	1,161,909	45.31%
1999	319,088	786,713	40.56%
2000		0	
2001	132,106	164,078	80.51%
TOTAL PERIOD	3,794,752	11,342,648	33.46%

SOURCE: USACOE 1997, USACOE 2002.

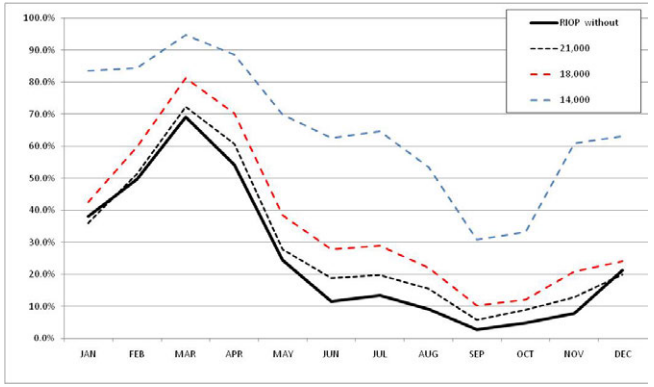
Another factor which has been discussed over the years regarding the quantity and volume of dredging in the Apalachicola River is Chipola Cutoff. Chipola cutoff is a man-made feature (constructed in mid-1800's) which connects the Apalachicola River to the Chipola River near Navigation Mile (NM) 41.5. A significant portion of the flow of the Apalachicola River (roughly 30%, but the percentage depends on flow in the Apalachicola River) flows from the Apalachicola River to the Chipola and then re-enters the Apalachicola River near NM 28. The problem at the Chipola Cutoff is that although flow from the Apalachicola River is diverted down the cutoff, the bed load of the Apalachicola River continues down the main channel and ultimately settles out in the reach of the river below the cutoff caused this to be the reach of the river which has the most dredging (about 1/3 of the average annual historical dredging over

1/10 of the river). The Corps of Engineers has stated in the Navigation Maintenance Plan for the river (USACOE, 1986) that through the construction of weir across the Chipola Cutoff it would be possible to both reduce the volume of dredging needed to provide the 9-foot channel and decrease the flow necessary to provide the channel. Obviously the details of both decrease in dredging and the decrease in the volume of flow depend on the design of the weir. The details associated with the weir are beyond the scope and timing of completing this project.

NAVIGATION CHANNEL AVAILABILITY PERFORMANCE MEASURES

Navigation performance measures were developed in consultation with representatives of the Tri-Rivers Waterway Development Association. In general the parameters which were decided upon to evaluate alternatives include: consecutive days of channel availability, and time of the year when a channel is available. The relationship between navigation and flow was defined by flow at Chattahoochee gauge on the Apalachicola River, which for all practical purposes is the same as Jim Woodruff outflow. In developing performance measure charts and sheets to compare alternative operations we chose to evaluate this relationship at both an authorized 9-foot channel depth and a 7-foot depth which represents the minimal channel depth at which the navigation project can function from an economic perspective. Figure 3-1 and figure 3-2 show an example of the figures used to compare alternative navigation performance measures. These charts were prepared by comparing the volume of flow needed to provide the channel (e.g. 21,000 cfs) with the release provided from the operating rules. These charts actually overstate the availability of the channel because they do not account for the time needed to maintain the navigation channel so that it would be available at that flow level.

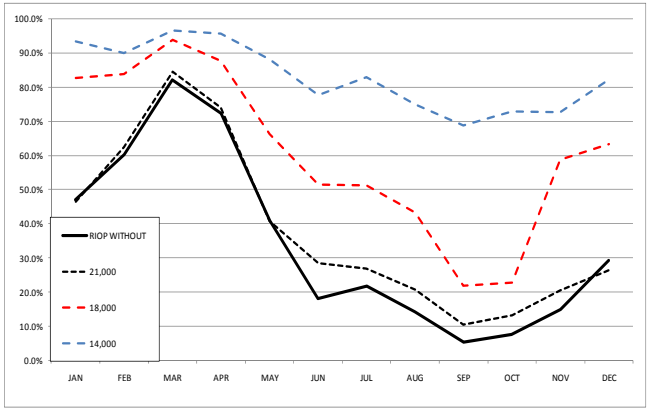
Figure 3- 1. EXAMPLE OF NAVIGATION PERFORMANCE MEASURE SHEET FOR A 9-FOOT CHANNEL DEPTH



Houston, Billy

Page 75 of 360

Figure 3- 2. EXAMPLE OF NAVIGATION PERFORMANCE MEASURE SHEET FOR A 7-FOOT CHANNEL DEPTH



Houston, Billy

Page 76 of 360

CHAPTER 4 – ENVIRONMENTAL PERFORMANCE MEASURES

INTRODUCTION

Exploring the common grounds between the provision of the federal navigation project and the sustainability of the Apalachicola River ecosystem was a major focus of our work on environmental performance measures. Although we recognize that there are other flow oriented environmental issues in the ACF basin outside of this geographical limitation, examining all environmental issues in the entire ACF basin was beyond the scope of this project. The defining of environmental performance measures was coordinated with the Apalachicola Riverkeeper's and one set of performance measures used to define acceptance of flows to the environment was specified by them.

Impacts associated with actions necessary to provide the federally authorized navigation project include: 1) the reduction of the habitat range for anadromous species such as the Atlantic sturgeon, 2) the transformation of riverine fisheries to lacustrine fisheries at the storage reservoirs, 3) a disruption in the relationship between the river and its floodplain both through inducing river-bed degradation and through blocking and burying habitats, 4) the burial and replacement of productive riverine habitat with low-productivity sandbar habitat through the disposal of dredged material, 5) the removal of environmentally important structure in the main channel through snagging activities and 6) secondary impacts such as the washing of dredged disposal material into sloughs after it was disposed (Leitman, Ager and Mesing, 1991).

In spite of all these problems we have taken an approach in this document that many of the issues between protecting the Apalachicola River ecosystem and the provision of the federal navigation project are the result of how the project was being provided, not necessarily with the existence of a navigation project per se. We also recognize that there are also some benefits to the Apalachicola River's ecosystem from providing a commercial navigation channel such as requiring the Corps of Engineers to make releases to the Apalachicola River to support the federal navigation project and that these releases would increase flows in the river at certain times of the year and benefit both environmental interests and navigation interests.

Therefore, with regard to environmental performance measures an important question is whether all of the actions required to provide a navigation channel would have a net positive or negative impact on the riverine ecosystem given the current situation. We have also assumed that if the current situation of not seeking to provide a navigation project continues that the Corps of Engineers will not make releases from the federal storage reservoirs to provide for a navigation channel given the increasing competition for the water resources of the basin.

THE DEVELOPMENT OF ENVIRONMENTAL PERFORMANCE MEASURES

The environmental concerns in the ACF basin focus both on issues in the Apalachicola River and in the Apalachicola estuary. In this project we have made the hypothesis that flows which improve the situation in the Apalachicola River will also improve the situation in the estuary and therefore we have focused our performance measures on the Apalachicola River. This assumption was made because of the complexity of defining and developing performance

Houston, Billy

Page 77 of 360

measures for the estuary and because of the scope and limited funding available for this project.

In considering the flow needs for the Apalachicola River we have considered both the flow needs for endangered species and flow needs for all species. We have taken this step because the current operating approach for the ACF reservoir system was designed in response to the designation of several species of mussels and the Atlantic sturgeon under the federal Endangered Species Act. The U.S. Fish and Wildlife Service has prepared several Biological Opinions (USFWS, 2006; USFWS, 2007) in response to the RIOP and has issued two Planning Assistance letters detailing how they will evaluate flows in the Apalachicola Basin relative to the listed species. In revising the current operations to enhance environmental flows and navigation channel availability we recognized that we must maintain the flow attributes agreed to by the Corps of Engineers and U.S. Fish and Wildlife Service which were deemed acceptable under the Endangered Species Act consultations.

Another important issue with regard to environmental performance measures is the use of the natural flow paradigm to understand environmental impacts to the river system. This paradigm has been at the foundation of the State of Florida's negotiating positions for several decades. The natural flow paradigm essentially states that flow is a major variable in defining the riverine aquatic ecosystem and the ecosystem of a river is a product of the flow regime which the river has experienced over time (Poff and others, 1997). In this context, flow regime refers to the magnitude, frequency, duration, timing and rate of change of flow. The natural flow paradigm therefore contends that if future flow can be similar to historical flow in terms of magnitude, frequency, duration, timing and rates of change then the ecosystem should endure from a perspective of volume of flow. Obviously if a river is grossly polluted then protecting the flow regime is not as important.

One problem with this simplification of comparing historical and future flows is the meaning of "similar". What amount of change can be tolerated over the long-term? One thing is certain, if a species could not tolerate large variations it would not have survived in the basin based on variability which occurs both within and among the years in the Apalachicola River and estuary. Nevertheless, it is not known how the system will respond to more frequent stresses or a major alteration in stresses as a result of a modified flow regime. Another important attribute of the natural flow paradigm is the acknowledgement of the need to consider a multitude of flow variables to understand the relationship of flow and a riverine ecosystem, not just to consider minimum flow. Richter and others (2011) found that a high level of ecological protection will be provided when daily flow alterations are no greater than 10% of the pre-alteration flows. They defined a high level of protection as when the natural structure and function of the riverine ecosystem would be maintained with minimal changes. They further found that a moderate level of protection is provided when flows are altered 11-20% and that alterations greater than 20% will likely result in moderate to major changes in natural structure and ecosystem functions, with greater risks associated with greater levels of alterations of daily flows. It should be noted that use of this "presumptive standard" is intended for sites where more detailed and system specific data is not available, not in lieu of using more detailed information. In the Apalachicola River detailed information on the relationship between the

Houston, Billy

Page 78 of 360

river and its adjacent floodplain is available (Light and others 1998; Light and others 2006) and this information can be used to supplement flow conclusions drawn from the presumptive standard approach.

One issue with using the natural flow paradigm as a representation of the relationship between the volume of water and the ecosystem is that inherent to using the natural flow paradigm is an assumption that the river's morphology is stable over time. In other words, it is assumed that the ecological relationship between flow and the ecosystem is the same in pre-human disturbance and post-human disturbance periods. This has not been the case for the Apalachicola River (Light and others, 2006). The Apalachicola River has been experiencing what is termed river-bed degradation. River-bed degradation refers to a condition where the bed of a river is entrenching or lowering over time, not the degradation in the environmental quality of the river. This is not the same as the normal cut-and-fill activities of an alluvial river in that river bed degradation happens over a long reach of the river. At a gauging station where there is a long-term flow and gage height records it is quite straight-forward to gage the amount of river bed degradation over time. To do this one simply has to plot the stage-discharge relationship at a given gage over time. Figure 4-1 shows the stage discharge relationship for the Apalachicola River gage at Chattahoochee for flows up to 30,000 cfs and figure 4-2 shows the relationship for flows between 40,000 and 60,000 cfs.

From these two figures it is evident that there has been a considerable change in the relationship between flow and the elevation of the surface of the water in the Apalachicola River in the last 70 years and that this change extends from low flows to high flows. In terms of the riverine ecosystem this change is important because this means that duration, frequency and timing of floodplain inundation are also changed.

Figure 4-3 shows similar data for the Apalachicola River at Blountstown, Florida for flows less than 30,000 cfs and figure 4-4 for flows between 40,000 and 60,000 cfs. From these two figures it is evident that river-bed degradation persists to the Blountstown gage location which is about 30 miles downstream from the Chattahoochee gage although the magnitude of the degradation has declined somewhat.

Houston, Billy

Page 79 of 360

Figure 4- 1. RELATIONSHIP BETWEEN FLOW AND GAGE HEIGHT FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR FLOWS BELOW 30,000 cfs

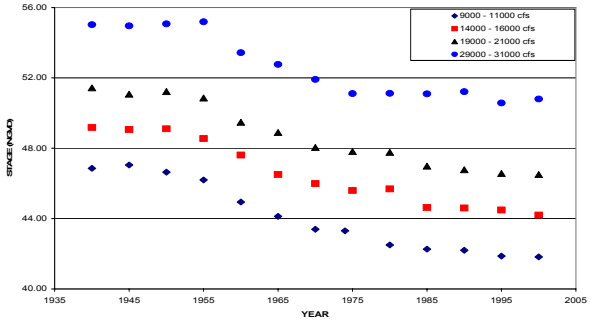
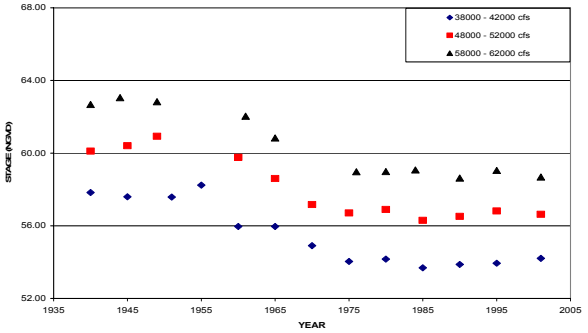


Figure 4-5 shows the same relationship for the Apalachicola River at Sumatra for flows below 30,000 cfs and on this figure it can be seen that signs of degradation are still evident when flow was in the 9,000 to 11,000 cfs range. This gage site is located about 85 miles below Jim Woodruff Dam.

Figure 4- 2. RELATIONSHIP BETWEEN FLOW AND GAGE HEIGHT FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR FLOWS BETWEEN 40,000 AND 60,000 cfs



58

Houston, Billy

Page 80 of 360

Figure 4- 3. RELATIONSHIP BETWEEN FLOW AND GAGE HEIGHT FOR THE APALACHICOLA RIVER AT BLOUNTSTOWN FOR FLOWS BELOW 30,000 cfs

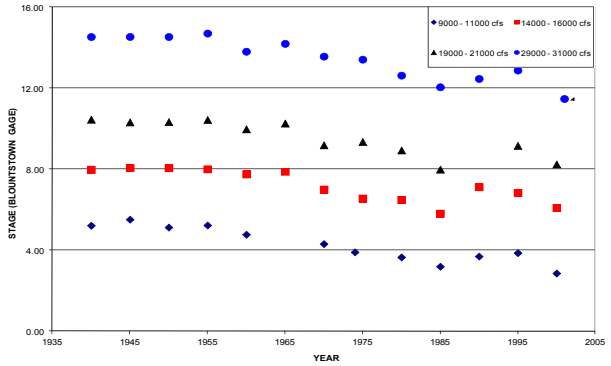
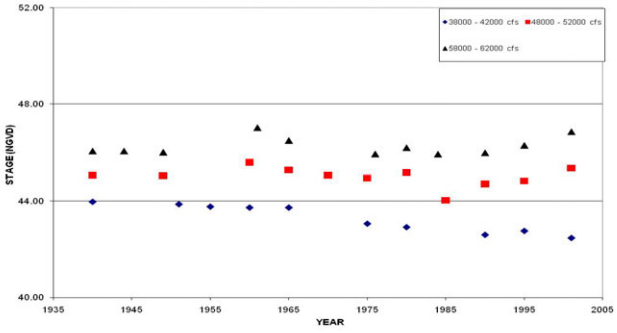


Figure 4- 4. RELATIONSHIP BETWEEN FLOW AND GAGE HEIGHT FOR THE APALACHICOLA RIVER AT BLOUNTSTOWN FOR FLOWS BETWEEN 40,000 AND 60,000 cfs

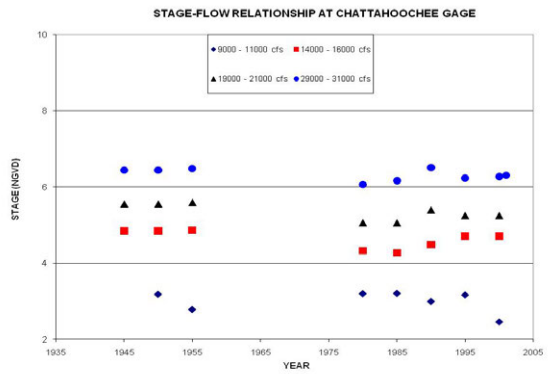


59

Houston, Billy

Page 81 of 360

Figure 4- 5. RELATIONSHIP BETWEEN FLOW AND GAGE HEIGHT FOR THE APALACHICOLA RIVER AT SUMATRA FOR FLOWS BELOW 30,000 cfs



Light and others (2006) concluded that the river-bed degradation was caused by both the resultant blocking of sediment flow from above Jim Woodruff Dam and by navigation channel improvement activities of the Corps of Engineers.

APALACHICOLA RIVER ENVIRONMENTAL PERFORMANCE MEASURES

Pursuant to the above discussions, two approaches to defining performance measures to gauge the acceptability of alternatives from an environmental perspective have been chosen. First, a flow based measure will be used which accounts for the performance measures defined by the Apalachicola Riverkeeper as we agreed to do at the initiation of this project. This measure will also encompass some of the criteria defined by the U.S. Fish and Wildlife Service in their planning aid letters since responding to the needs of Federally listed species is at the foundation of the RIOP. In addition, we are using the most current information we have regarding the relationship between floodplain inundation and river flow because the literature has made it clear that the health of floodplain is at the foundation of ecosystem vitality and because the relationship between river flow and floodplain inundation has changed over time.

FLOW BASED MEASURE

As was noted above, the Apalachicola Riverkeeper's were the party responsible for deciding upon which a performance measure to be used in this study. In selecting these performance measures, AR has made it clear that the flow needs defined as their performance measure and used in this study should not be construed as applying to any other efforts requiring them to define a performance measure in the future. Instead they reserve the right to continue working on defining their performance measures and revising any and all values used in this project.

Houston, Billy

Page 82 of 360

To determine which flow based performance measure to use in our analyses we conducted a comparison of multiple performance measures including: a) the U.S. Fish and Wildlife Service Planning Aid Letter guidelines, b) the percentile exceeded in the unimpaired flows both for the pre-dam period (1939-1955) and for the entire unimpaired time period (1939 – 2008), c) the rank order for observed flow pre-dam period (1923 – 1955) and d) the pre-dam flows approach which is described below and e) the percentile exceeded approach for the observed flow.

On April 2, 2010 and on March 1, 2011 the U.S. Fish and Wildlife Service sent Planning Aid Letters (PAL) for the proposed Water Control Manual updates for the ACF River Basin to the U.S. Army Corps of Engineers. The purpose of the PAL was to identify resource values and issues, identify endangered species issues and propose preliminary changes to facilitate the Corps' decision-making for the Water Control Manual updates as they related to fish and wildlife resources. The second letter was an addendum to the first PAL based on recent analyses done by the USFWS to further address ecosystem flow guidelines included in the first PAL.

In reviewing the low flow guidelines it is important to understand that the USFWS guidelines are intended to serve as guidelines against which to compare output, not as minimum standards which cannot be exceeded. As such, it is not expected that we can produce a model run whose output will exceed these guidelines. Instead the guidelines are to be used as a standard which we seek to approach. This philosophy will apply to all of the flow measures discussed below.

The USFWS PAL letter proposed to calculate monthly 7Q10 values for the Apalachicola River at Chattahoochee for the pre-dam period (1923-1955) and then to conduct statistical analyses on the set of monthly 7Q10 values to define the 90% exceeded, 75% exceed, 50% exceeded and 25% exceeded and 10% exceeded values.

The percentile flows approach for the unimpaired data set consisted of taking each day of the year in the unimpaired data set (1939 – 2008) and calculating the 90% exceeded, 75% exceeded, 50% exceeded and 25% exceeded and 10% exceeded values for that day. At the request of AR, this analysis was done for both the pre-dam period (1939-1955) and for the entire data set (1939-2008). Since the unimpaired data set has the effects of reservoir operations and consumptive demands removed from the observed flow data, the distinction between pre-dam and the total data set does not distinguish two different periods in the management of the basin. Instead the only difference between the two periods is the hydrology of the basin.

The pre-dam flow approach utilized observed pre-dam flows (1923-1955) based on ranking average annual flows to determine relative driest to wettest years and averaging daily flows to specify drought (driest 3 years), dry (driest 11 years), normal (middle 11 years) and wet (wettest 11 years) years. The rank order approach utilized the approach proposed by AR but modified the method in two distinct ways: 1) the ranking of the years was based only on Spring flows (April to June) rather than average annual flows and 2) the data were first sorted into rank order by month and the data was parsed as suggested by AR above.

Houston, Billy

Page 83 of 360

Figures 4-6, 4-7, 4-8 and 4-9 compare these methods for drought flows, low flows, normal flows and high flows.

Figure 4- 6. COMPARISON OF ENVIRONMENTAL FLOW GUIDELINES FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE: EXTREME LOW FLOWS

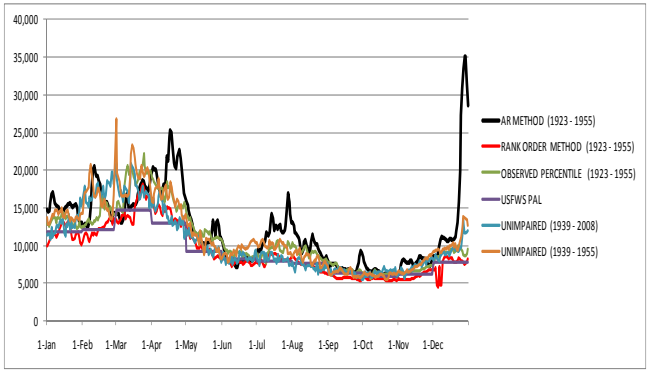
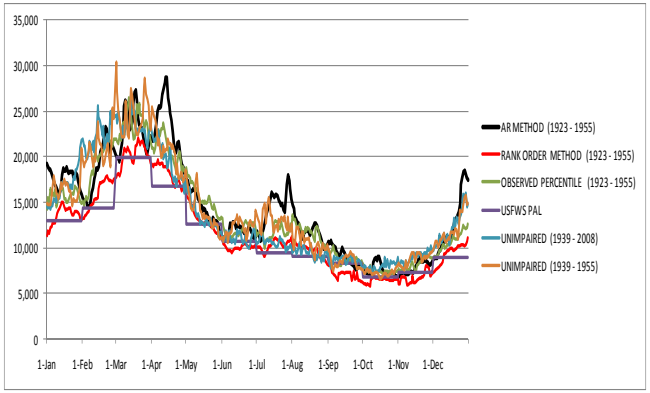


Figure 4- 7. COMPARISON OF ENVIRONMENTAL FLOW GUIDELINES FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE: LOW FLOWS



62

Houston, Billy

Page 84 of 360

Figure 4- 8. COMPARISON OF ENVIRONMENTAL FLOW GUIDELINES FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE: NORMAL FLOWS

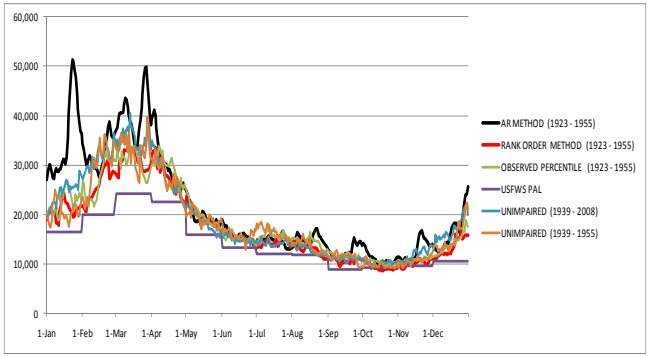
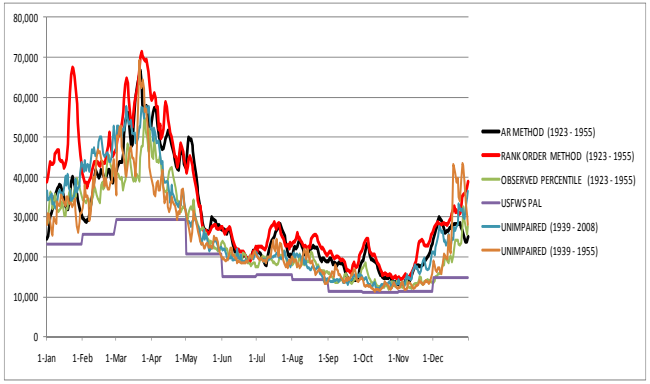


Figure 4- 9. COMPARISON OF ENVIRONMENTAL FLOW GUIDELINES FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE: HIGH FLOWS



In reviewing the previous figures all of the approaches resulted in similar flows in the extreme low and low flow ranges, which are the flows ranges at which reservoir operations can significantly influence downstream flow. In reviewing the data above the AR chose to utilize the unimpaired flow/percentile approach. Since there is no distinction between pre-dam and post-dam conditions in the unimpaired flow set, the longest data set for the unimpaired flow

63

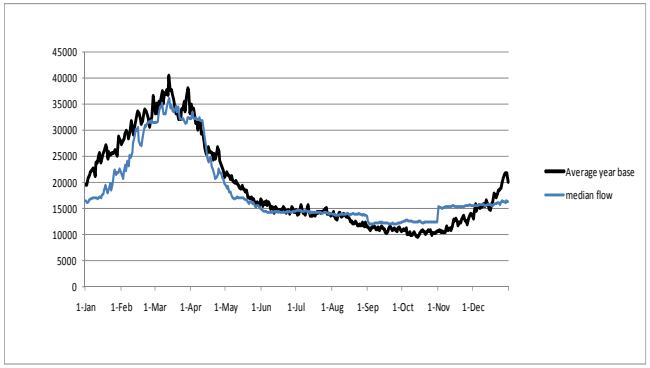
Houston, Billy

Page 85 of 360

set should be used since this data set contains the greatest range of hydrological conditions to serve as a guideline.

We chose to evaluate the flow guidelines in two ways. First, results will be compared for extreme low flow (90% exceeded), low flow (75% exceeded) and normal flow (50% exceeded or median flow) for the period of record. In addition, the extreme low flow, low flow and median flows will be compared to annual time series data for selected years. The individual years were chosen by comparing spring flows (April – June) for all 70 years and selecting representative years for median or typical flow, low flow and extreme low flow years. The representative years for extreme low flow are 2002 and 2007, the representative years for low flow are 1981 and 1988 and the representative years for median flow are 1970 and 1977. In preparing these charts, a single value is used for each month since the USFWS guidelines only provides a single value for each month. Figures 4-10, 4-11 and 4-12 show examples of these comparisons for the normal (median), 75% exceeded and 90% exceeded flows for the period of record and figures 4-13, 4-14 and 4-15 show examples of these comparisons for the individual years noted above.

Figure 4- 10. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR MEDIAN FLOWS



64

Houston, Billy

Page 86 of 360

Figure 4- 11. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR LOW FLOWS

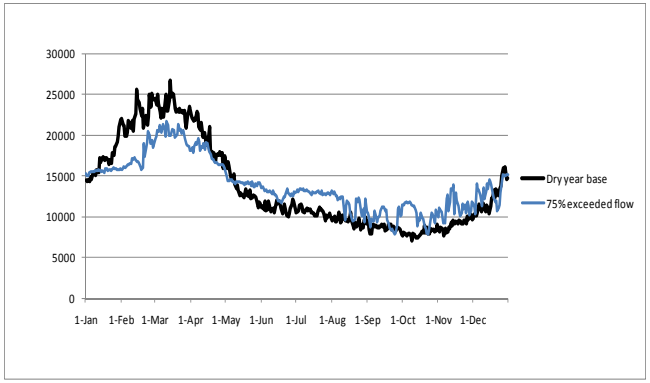
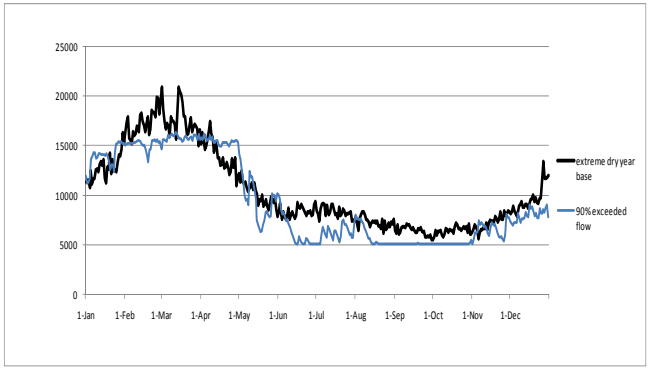


Figure 4- 12. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR EXTREME LOW FLOWS



65

Houston, Billy

Page 87 of 360

Figure 4- 13. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR MEDIAN FLOWS IN SELECTED YEARS

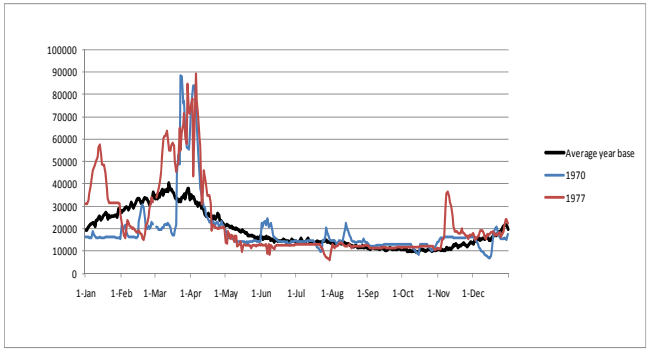
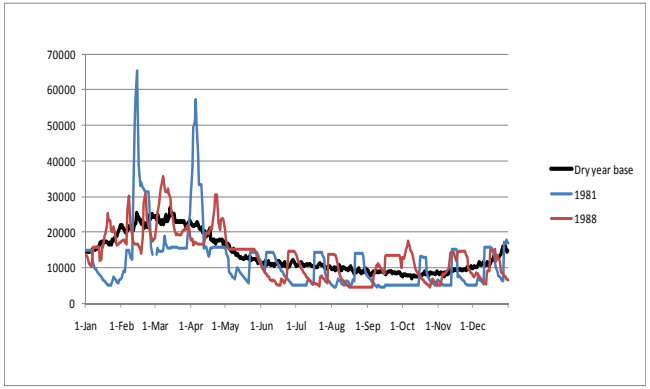


Figure 4- 14. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR LOW FLOWS IN SELECTED YEARS

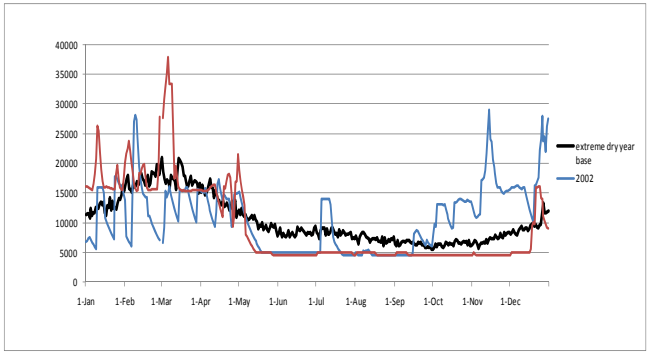


66

Houston, Billy

Page 88 of 360

Figure 4- 15. COMPARISON OF MODEL RESULTS FOR RIOP TO FLOW PERFORMANCE MEASURE GUIDELINES FOR EXTREME LOW FLOWS IN SELECTED YEARS



FLOODPLAIN INUNDATION MEASURE

In defining performance measures for the river/floodplain relationship the data and information produced by Light and others (1998) was essential. In their work, the relationship between river flow and acres of inundated floodplain was defined for the upper, middle and lower Apalachicola River. These relationships are shown in figures 4-16, 4-17 and 4-18. From these three figures it can be seen that the volume of flow necessary to inundate the upper, middle and lower floodplains changes. In each of the figures it can also be seen that there is a point where the slope breaks and more acres of floodplain are inundated per unit volume of flow. This is because the levee has been topped. On each of these charts there is a line called "threshold for floodplain inundation". This marks the flow where there is clear break in the slope.

67

Houston, Billy

Page 89 of 360

Figure 4- 16. THE RELATIONSHIP BETWEEN FLOW AND ACRE S OF FLOODPLAIN FOR THE UPPER APALACHICOLA RIVER

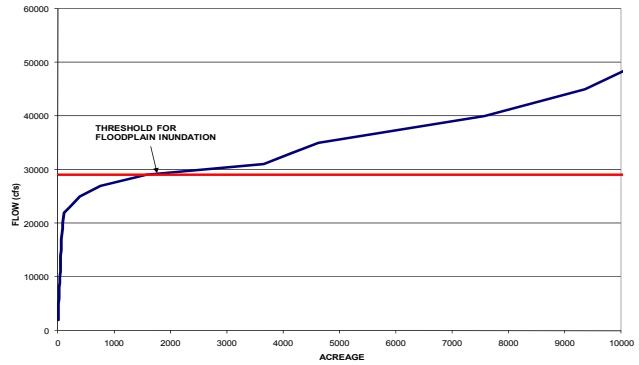
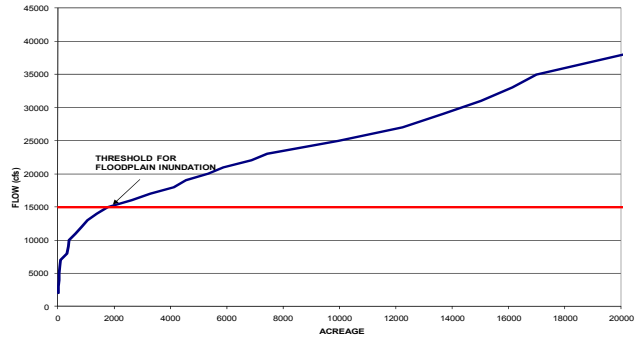


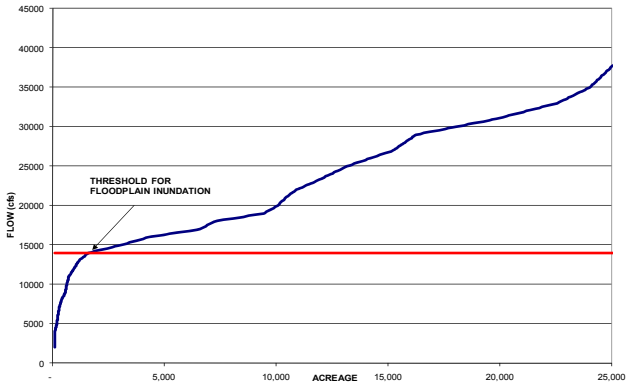
Figure 4- 17. THE RELATIONSHIP BETWEEN FLOW AND ACRES OF FLOODPLAIN FOR THE MIDDLE APALACHICOLA RIVER



Houston, Billy

Page 90 of 360

Figure 4- 18. THE RELATIONSHIP BETWEEN FLOW AND ACRES OF FLOODPLAIN FOR THE LOWER APALACHICOLA RIVER



Therefore, we chose to add a performance measure which gauges the amount certain threshold flows are exceeded by month to provide an insight on the extent and differences in floodplain inundation under alternative approaches. In utilizing these charts we evaluate the number of times 15,000 cfs, 17,000 cfs and 29,000 cfs are exceeded for each month. The 15,000 cfs flow value represents a minimum threshold for topping the levee in the middle and lower river. The 17,000 cfs value represents a value that is well above the minimum threshold and the 29,000 cfs value represents the value which floods the upper flood plain and which is also close the elevation believed necessary to inundate the major spawning site for the gulf sturgeon in the upper Apalachicola River.

Houston, Billy

Page 91 of 360

CHAPTER 5 – CONSIDERATION OF RESERVOIRS IN PERFORMANCE MEASURE EVALUATIONS

INTRODUCTION

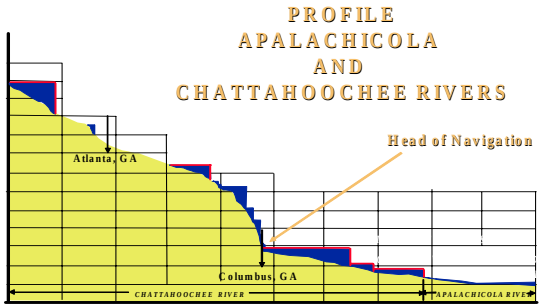
In addition to considering the availability of the navigation channel and environmental performance measures in defining acceptable management options, it is important to also consider the effect on reservoir elevations from alternative reservoir management approaches. If our intent is to develop implementable options, the operations must result in acceptable reservoir elevations. For this project, acceptable reservoir elevations essentially means leaving adequate water in the reservoirs so there is not a risk of running out of active reservoir storage. We are not representing that these elevations are necessarily acceptable to stakeholders at the various reservoirs, defining the performance measures for these stakeholders in addition to the navigation and environmental stakeholders was beyond the scope and funding of this project.

Reservoir pools are divided into three general pools: the flood pool, the conservation pool and the inactive storage pool. The flood pool is for the temporary holding of flood waters. The conservation storage pool is the active management pool. The inactive storage pool is the area below the conservation pool whose waters cannot be managed due to physical constraints from the reservoir and dam design. In the ACF basin the conservation pool is further divided into four zones. These zones are determined by the operational guide curve for each project. These zone elevations were first defined in the 1989 proposed Water Control Plan for the ACF basin and there exists no supporting documentation explaining how these zone elevations were determined. In considering the capacity of the reservoirs in the ACF basin to store water and augment flow it is important that this capacity be considered in context to the watershed. As Figure 5-1 shows, the topography of the ACF basin is relatively flat, especially in the lower half of the basin. Consequently, the reservoir system has a limited capacity to store water relative to flow in the lower river and the capacity of the reservoir system to retain or augment flows is limited, especially when compared to other river systems in the western U.S. where flow is less and storage capacity greater. It is important that citizens and water managers have expectations from the ACF reservoir system that are consistent with the basin's capacities.

Houston, Billy

Page 92 of 360

Figure 5 - 1. PROFILE OF APALACHICOLA & CHATTAHOOCHE RIVERS



Source: U.S. Army Corps of Engineers

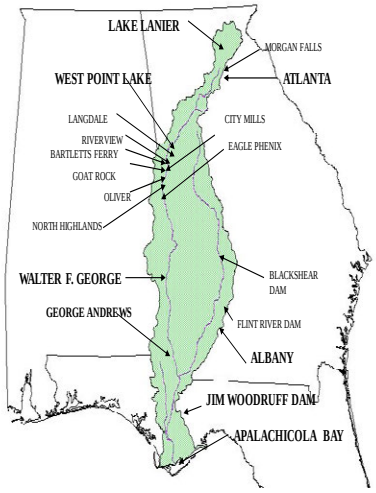
Figure 5-2 shows the location of the main stem reservoirs in the ACF basin and Table 5-1 provides background data on these reservoirs. In addition to these reservoirs, there are impoundments on tributary streams as well as off-channel impoundments affecting tributaries.

From the Table 5-1 and Figure 5-2 it can be seen that there are 13 reservoirs on the main stem of the Chattahoochee River, another two on the Flint River, and Jim Woodruff Dam is located at the confluence of the Flint and Chattahoochee Rivers. From a surface area perspective, there are over 168,000 acres of impounded water on the main stem of the Chattahoochee and Flint Rivers when the reservoirs are at full pool. As the pool elevation in the reservoirs declines, this surface area value will also decline. Of this acreage, nearly 90% is in the federal reservoirs and 10% in the private reservoirs. Virtually all of the storage capacity is at the federal reservoirs.

Houston, Billy

Page 93 of 360

Figure 5 - 2. LOCATION OF MAINSTEM RESERVOIRS IN THE ACF BASIN



Houston, Billy

Page 94 of 360

Table 5 - 1. AN OVERVIEW OF THE MAINSTEM STORAGE RESERVOIRS IN THE ACF BASIN

Reservoir name	Owner		Construction date	Surface Area at Full Pool		Storage capacity	
				ACRES	% OF TOTAL	CFS-DAYS	% OF TOTAL
CHATTAHOOCHEE RIVER							
LANIER	COE		1957	38,542	22.9%	548,332	66.4%
WEST POINT	COE		1975	25,864	15.3%	154,341	18.7%
NORTH HIGHLANDS	Ga Power		1900	131	0.1%		0.0%
OLIVER	Ga Power		1959	2,150	1.3%		0.0%
BARTLETTS FERRY	Ga Power		1926	5,850	3.5%		0.0%
GOAT ROCK	Ga Power		1912	1,050	0.6%		0.0%
LANGDALE	Ga Power		1860	152	0.1%		0.0%
MORGAN FALLS	Ga Power		1903	580	0.3%		0.0%
RIVERVIEW	Ga Power		1902	75	0.0%		0.0%
CITY MILLS	City Mills		1963	110	0.1%		0.0%
EAGLE-PHENIX	Consolidated Hydro		1834				
W.F. GEORGE	COE		1964	45,181	26.8%	123,219	14.9%
ANDREWS	COE		1963	1,540	0.9%		0.0%
SEMINOLE	COE		1954	37,500	22.2%	18,234	2.2%
		SUBTOTAL		**158,725**	94.1%	**825,892**	100.0%
FLINT RIVER							
LAKE BLACKSHEAR	Crisp County		1903	8,525	5.1%		
LAKE WORTH	Ga Power		1920	1,400	0.8%		
		SUBTOTAL		**9,925**	**5.9%**	**0**	
		TOTAL		**168,650**		**825,892**	

SOURCE: Georgia Department of Natural Resources, Chattahoochee River Basin Plan 1997 and Flint River Basin Plan 1997

When looking at the volume of water stored in a reservoir, the volume may be expressed in units such as acre-feet or cfs-days. In rough terms, two acre-feet are the same as 1 cfs-day. Although people can visualize the concept of an "acre-foot" of water better than they can visualize a "cfs-day", the unit "cfs-day" is mainly used this report because it much easier to relate volume in this unit to flow values which are provided in units of cfs. For instance, a storage volume of 100,000 cfs-days means that there is storage to augment flows by 1000 cfs for 100 days or 2,000 cfs for 50 days assuming no additional refilling of storage.

From Table 5-1 it can be seen that there are over 825,000 cfs-days of water in storage in the basin when all of the reservoirs are at full pool. About two-thirds of this storage is at Lake Lanier. This table also shows that although Lanier, W.F. George and Seminole have comparable surface areas at full pool, the storage volumes in the conservation pools of the reservoirs are quite different. It can also be seen that although West Point has a smaller surface area than George or Seminole, it has a greater capacity to store water.

Only the four federal storage reservoirs have significant storage capacity. The remaining reservoirs are what are called "run-of-the-river facilities". This term refers to the fact that at these facilities flow entering into the reservoir is essentially the same as that flowing out. This term, however, is a relative term and is dependent both on the volume of water entering the reservoir and the time scale at which the storage is managed. Although a reservoir may have some storage capacity, it can also be considered a "run-of-the-river" facility when its augmentation capacity is considered negligible over a period of time that reflects reservoir operations. For instance, Lake Seminole is essentially operated as a run-of-the-river facility by the Corps of Engineers in their operations for the ACF basin because over the period of a week, total flow into Seminole will generally equal total flow out. On a daily basis, however, this may

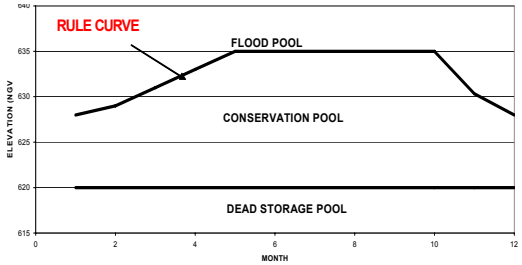
Houston, Billy

Page 95 of 360

not be true and storage may be increasing or decreasing. It is important to recognize this fact because the RIOP defines only releases from Lake Seminole; however, because of the limited storage capacity at the reservoir the RIOP essentially defines reservoir operations for the entire ACF reservoir system, not just Lake Seminole.

Figure 5-3 provides a general diagram of the three basic zones of a storage reservoir. These are the flood pool, the conservation pool and the dead storage pool. The flood pool is generally operated to handle flooding situations, the conservation pool to augment or retain flow on an everyday basis and the dead storage pool is water that is in the reservoir, but is below the outflow elevation and is typically not available for operations unless emergency procedures such as pumping the water are done.

Figure 5 - 3. THE GENERAL DIVISION OF POOLS IN A STORAGE RESERVOIR

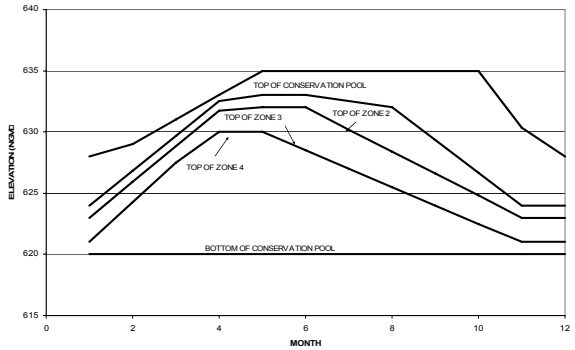


In the ACF basin, the Corps of Engineers has taken the additional step of dividing the conservation pools of Lake Lanier, West Point Lake and W. F. George Lake, the principal federal storage reservoirs, into zones which each have different operational requirements. The reason for dividing the conservation pool into zones is to allow the Corps to have operational flexibility within the conservation pool. The general philosophy behind the zones is to have operational requirements more biased toward downstream augmentation when the reservoirs are full and more biased toward conservation of water in the reservoirs as they become less full. Figure 5-4 shows how this concept was implemented at West Point reservoir. From this figure it can be seen that zone elevations are defined by month and the reservoirs are divided into four zones. The conservation pool at Woodruff was not divided into zones because the depth of the conservation pool is only one-foot at Lake Seminole and because Woodruff is operated more as a run-of-the-river facility than as a storage facility.

Houston, Billy

Page 96 of 360

Figure 5 - 4. GENERAL DIVISION OF THE CONSERVATION POOL INTO ZONES



As noted in Chapter 2, the reservoir operating plan currently being used to manage the ACF reservoir system is the RIOP (Revised Interim Operating Plan). The RIOP operations were developed to incorporate concerns related to the federal Endangered Species Act into the management of the federal reservoirs in the ACF basin. Table 5-2 summarizes operations under the RIOP. From Table 5-2 it can be seen that there are three factors which define reservoir releases from the ACF system under the RIOP: 1) month of the year, 2) composite storage zone, and 3) basin inflow. The RIOP defines releases only from Jim Woodruff Dam. The reservoir behind Jim Woodruff Dam (Lake Seminole), however, does not have ample storage capacity to support the releases called for in the RIOP. To meet the requirements of the RIOP, water must be released from the upstream major storage reservoirs (Lake Lanier, West Point Lake, and W. F. George Lake). Therefore the RIOP is a management plan for the entire ACF basin.

Houston, Billy

Page 97 of 360

Table 5 - 2. REVISED INTERIM OPERATING PLAN (RIOP) CRITERIA

Months	Composite Storage Zone	Basin Inflow (BI) (cfs)	Releases from JWLD (cfs)	Basin Inflow Available for Storage
March - May	Zones 1 and 2	>= 34,000	>= 25,000	Up to 100% BI > 25,000
		>= 16,000 and < 34,000	>= 16,000 + 50% BI > 16,000	Up to 50% BI > 16,000
		>= 5,000 and < 16,000	>= BI	
		< 5,000	>= 5,000	
	Zone 3	>= 39,000	>= 25,000	Up to 100% BI > 25,000
		>= 11,000 and < 39,000	>= 11,000 + 50% BI > 11,000	Up to 50% BI > 11,000
		>= 5,000 and < 11,000	>= BI	
		< 5,000	>= 5,000	
June - November	Zones 1,2, and 3	>= 24,000	>= 16,000	Up to 100% BI > 16,000
		>= 8,000 and < 24,000	>= 8,000 + 50% BI > 8,000	Up to 50% BI > 8,000
		>= 5,000 and < 8,000	>= BI	
		< 5,000	>= 5,000	
December - February	Zones 1,2, and 3	>= 5,000	>= 5,000 (Store all BI > 5,000)	Up to 100% BI > 5,000
		< 5,000	>= 5,000	
At all times	Zone 4	NA	>= 5,000	Up to 100% BI > 5,000
At all times	Drought Zone	NA	>= 4,500	Up to 100% BI > 4,500

Another provision of the RIOP, not included in Table 5-1, is ramping rates. Ramping rates are the vertical drops in river stages (water surface elevations) that occur over a given period. The fall rates or ramping rates are expressed in units of feet per day (ft/day), and are measured at the Chattahoochee gage as the difference between the daily average river stages of consecutive calendar days. Rise rates (*e.g.*, today's average river stage is higher than yesterday's) are not addressed in the RIOP. Unless otherwise noted, fall rates under the drought contingency operation would be managed to match the fall rate of the basin inflow.

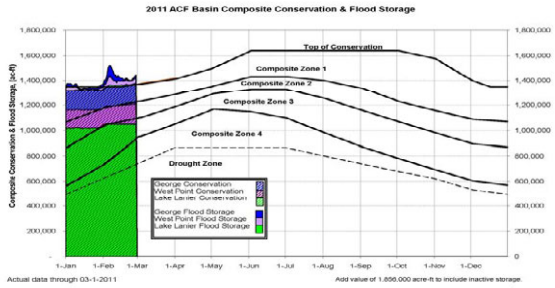
COMPOSITE STORAGE TRIGGER

In the RIOP composite storage utilizes the same "four zones" approach as is used for managing Lake Lanier, West Point Lake and W.F. George Lake. The volume of storage in each zone is simply defined as the sum of the storage for all three reservoirs; (i.e., Zone 1 of the composite storage represents the combined storage available in Zone 1 for each of the three storage reservoirs). Figure 5-5 shows the division of composite zone storage volume for the ACF basin and the composite storage in the basin in 2011 (shown in color) and Figure 5-6 shows the composite storage in the basin in 2008. In reviewing these figures it should be noted that in Figure 5-6, the composite storage chart only shows water in the conservation pool, whereas in Figure 5-5, the composite storage chart shows water in both the conservation pool and in the flood pool. As was noted above, the conservation pool is the main portion of the reservoir that is actively used to manage a reservoir whereas the flood pool is a portion of the reservoir that is normally intended to be used to buffer the effects of flood flows. Therefore, the Corps of Engineers has stated that they only consider water which is in the conservation pool at the three projects when calculating the composite storage. The State of Florida recommends that all water in the reservoirs, whether in the flood pool or in the conservation storage pool, should be counted toward the composite storage in the basin.

Houston, Billy

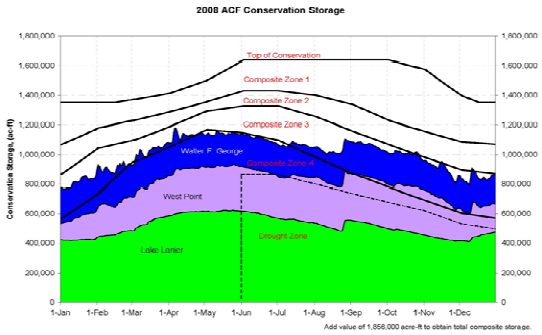
Page 98 of 360

Figure 5 - 5. COMPOSITE STORAGE IN THE ACF BASIN FOR 2011



SOURCE: U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT WEB PAGE
http://water.sam.usace.army.mil/

Figure 5 - 6. COMPOSITE STORAGE IN THE ACF BASIN FOR 2008



SOURCE: U.S. ARMY CORPS OF ENGINEERS, MOBILE DISTRICT WEB PAGE
http://water.sam.usace.army.mil/

Table 5-3 shows the percent of time for each month that the surface elevation of water at West Point and W.F. George reservoirs were above the top of the conservation pool (e.g. in the flood pool) between 2001 and 2010. According to the definitions of flood pool and conservation pool it should be expected that water would be in the flood pool infrequently, perhaps 5 to 10

Houston, Billy

Page 99 of 360

percent of the time over a ten year period. From this table, however, it can be seen that from December through April the surface elevation of the water was in the flood pool about 75 percent of the time. In other words, the Corps of Engineers has routinely used the flood pool as part of the conservation pool between 2001 and 2010, not as a pool to temporarily store flood waters. Since the Corps is utilizing the flood pool such a high percentage of the time, it seems appropriate that the flood pool storage should be included in the calculation of the composite storage or that the zone curve elevations which divide the conservation pool from the flood storage pool should be changed to reflect actual operations.

Table 5 - 3. PERCENT OF TIME THAT THE ELEVATIONS IN WEST POINT AND W.F. GEORGE RESERVOIRS WERE ABOVE THE TOP OF THEIR CONSERVATION POOL STORAGE ELEVATION: 2001 – 2010

	WEST POINT	W.F. GEORGE
JAN	86.1	82.9
FEB	82.5	88.2
MAR	71.9	85.5
APR	70.0	86.3
MAY	57.1	47.1
JUN	24.0	11.7
JUL	35.8	8.7
AUG	26.5	2.9
SEP	18.3	3.3
OCT	0.0	0.0
NOV	59.3	43.0
DEC	81.0	66.8

Counting or not counting water in the flood storage as water in composite storage can make a significant difference on which composite zone the basin is in and therefore on the water released from Jim Woodruff Dam. For example, it is conceivable that there will be a situation in the future where Lake Lanier's elevation has been lowered during a drought while the storage pools at West Point and W.F. George are above the top of their conservation pool elevation. Whether or not the water in the flood pool is included in the calculation of composite storage could then make a difference on the composite zone of the ACF basin and upon the release called for under Table 5-2. In the models used in this analysis, no water is stored in the conservation pool for extended periods of time.

BASIN INFLOW TRIGGER

Basin Inflow (BI) refers to the calculation of the 7-day inflow from the drainage basin above Jim Woodruff Dam. It is important to recognize that basin inflow is a calculated value, not an actual measured value. Basin inflow for a given reach of the river above a dam is calculated by: 1) measuring the outflow from the storage reservoir (Lake Lanier, West Point Lake, W.F. George Lake (Lake Eufaula)), 2) measuring the change in elevation at the reservoir 3) converting the elevation change to a volume and 4) calculating basin inflow by subtracting outflow from the volume change at the reservoir. The reason for this approach is that it is far less expensive and complicated to calculate basin inflow in this manner rather than to gauge and monitor inflow sources, consumption and evaporation from each reservoir.

Houston, Billy

Page 100 of 360

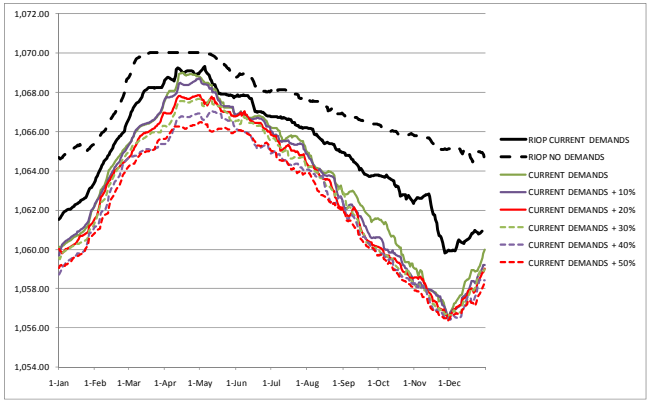
Therefore, what is called basin inflow is somewhat misleading because it represents actual basin inflow minus depletions from the system by human influences including depletions by municipal and industrial, agricultural and thermal water users as well as by evaporative losses from the reservoirs. A more accurate term for basin inflow would be "net basin inflow" since the value represents basin inflow after consumptive depletions. This is significant for two reasons:

1. A false impression is created that basin inflow is a true representation of all available water flowing into the reservoirs from upstream, but in reality it is not,
2. Increased consumptive depletions in the future can effectively reduce basin inflow which in turn can reduce downstream releases called for by the RIOP.

RESERVOIR ELEVATION PERFORMANCE MEASURES

In evaluating impacts upon individual reservoir elevations we choose to evaluate elevations both from the vantage point of the entire 70-year run and for selected individual years. In evaluating reservoir elevations for the 70-year time period we chose to compare the operations for a given alternative with the elevations from running the current RIOP operations with 2007 demands. Figure 5-7 shows an example of how we evaluated reservoir elevations for the entire 70-year period. In this example we compared median flows at Lake Lanier. Similar charts were also prepared for 75% exceeded elevations as a representation of low elevations and 90% exceeded elevations as a representation of extreme low elevations.

Figure 5 - 7. EVALUATION APPROACH FOR 70-YEAR MODEL RUNS FOR MEDIAN FLOWS AT LAKE LANIER



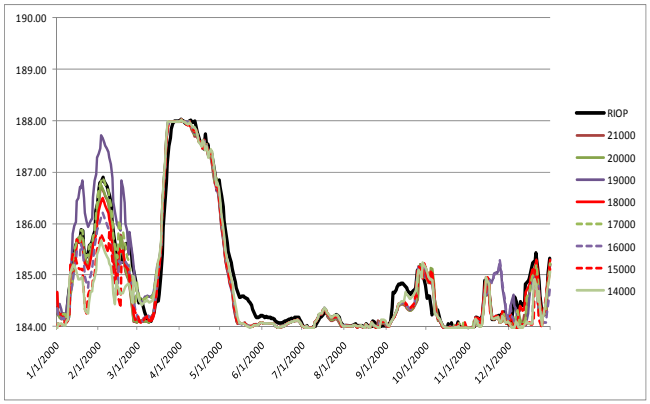
In addition to examining statistics for the 70-year period of record we decided to also examine statistics for individual years. Obviously examining the elevations at the three reservoirs for the entire 70-year time frame for each model run would be excessive. Therefore, we chose to evaluate the result in six years and chose the years based on average annual flows at Jim

Houston, Billy

Page 101 of 360

Woodruff outflow. We examined two years at a flow close to the median flow, two years a flow close to the 75% exceeded flow as a representation of a low flow year and two years at extreme low flow years. The six years we choose to include in this analysis were: 1970, 1977, 1981, 1988, 2000 and 2007. Figure 5-8 is a representation of an output sheet used for this part of the analysis.

Figure 5 - 8. EXAMPLE OF COMPARISON OF ANNUAL RESERVOIR ELEVATIONS FOR W.F. GEORGE RESERVOIR



80

Houston, Billy

Page 102 of 360

CHAPTER 6 – CHATTAHOOCHEE RIVER INSTREAM FLOW MINIMUM TARGETS

The final set of performance measures to be considered in this evaluation are those associated with meeting minimum flow requirements on the Chattahoochee River. There are three checkpoints at which minimum flow requirements will be considered: the Chattahoochee River at Peachtree Creek, the Chattahoochee River at Columbus, and the Chattahoochee River at Andrews outflow.

The first of these checkpoints is intended to meet the minimum daily flow required for water quality purposes and this flow requirement is hard-wired into the model, meaning that a part of the release rules for Buford Dam are to provide for this minimum flow requirement. The minimum flow requirement for Peachtree Creek is 750 cfs.

The other two checkpoints, Columbus and Andrews outflow, are intended to satisfy the minimum flow requirements for the City of Columbus' water inflow and for Farley Nuclear Plant's inflow. The minimum flow requirements for the Columbus daily flow and for the Andrews outflow are 1,350 cfs (7-day average flow) and 2,000 cfs respectively. Since flow releases for Columbus and Andrews are not authorized project purposes for management of the Corps reservoirs the approach taken to include these two checkpoints is to see how often they are met with existing operations without explicitly providing support from the reservoir system to meet these performance measures. However, if a significant number of failures for meeting either of these checkpoints occur, model runs will be done which will require the storage reservoir upstream of the checkpoint to make releases to meet the minimum flow requirement. For Columbus that would be West Point reservoir and for Andrews' outflow that would be W.F. George since Andrews does not have any storage to use for management purposes.

The minimum flow requirements for Columbus to be used in this analysis is a 7-day average flow of 1,350 cfs and the minimum flow to be used for Andrews outflow is 2,000 cfs.

81

Houston, Billy

Page 103 of 360

CHAPTER 7 - SENSITIVITY ANALYSIS OF THE AUGMENTATION LIMITS OF THE FEDERAL RESERVOIRS

INTRODUCTION

In Chapter 3 it was explained that the HEC-RAS evaluation of the existing channel dimensions concluded that with an average of about 215,000 cubic yards of dredging in the Chipola Cutoff reach a nine-foot channel could be provided with about 14,000 cfs at the Chattahoochee gage on the Apalachicola River and with no dredging a 9-foot channel could be provided with 21,000 cfs. It was also noted that with flows of 17,000 cfs and no dredging a 7-foot channel could be provided and with 10,000 cfs and dredging a 7-foot channel could be provided. In conducting the first series of sensitivity analyses examining the common ground between navigation releases and environmental releases the question which will be addressed is:

What level of augmentation can be sustained by the federal storage reservoirs?

Considering the fact that the ACF basin has a small ratio of storage capacity relative to flow in the lower river and that the majority of the storage (65%) is at Lake Lanier which only impounds about 6% of the basin, the question of the augmentation capacity of the federal storage reservoirs certainly warrants a close examination.

As was also noted in Chapter 3, when the RIOP release logic was modified within our models, this modification included a capacity to put a limit on the amount of augmentation provided by the storage reservoirs. In doing the sensitivity analysis a series of augmentation limits were placed on releases from the storage reservoirs to augment navigation and environmental flow needs. The range of limits analyses in this sensitivity analysis was from 1,000 cfs to 10,000 cfs in 1,000 cfs increments or until the system could no longer sustain augmenting downstream flow, where no longer sustain is defined by the reservoir system running out of water. The limit on augmentation was decreased as storage in the reservoir was depleted. For example, for a 10,000 cfs augmentation limit for composite Zone 1, the limit on composite Zone 2 was set at 9,500 cfs and for composite Zone 3 the limit was 9,000 cfs. The same changes were made as the augmentation limit was changed. No augmentation is provided in composite Zone 4 except to reach the minimum values in the RIOP. In this first set of sensitivity analyses the same threshold is provided over the entire year, but in more advanced analyses thresholds could be varied so that the augmentation releases in critical periods of the year are greater than in other times of the year.

In this chapter a sensitivity analysis of augmentation limits relative to the performance measures discussed in Chapters 3, 4, 5 and 6 will be performed for both the condition of having annual dredging and having no dredging.

ANALYSES OF THE NO DREDGING OPTION

Under this option, based on the results of the HEC-RAS analysis releases of 21,000 cfs were made to provide a 9-foot channel, 19,000 cfs to provide an 8-foot channel and 17,000 cfs to provide a 7-foot channel. No changes were made to the model input data except to modify the volume of augmentation which the federal reservoirs would release to meet releases required

Houston, Billy

Page 104 of 360

to support the navigation channel/sustain the aquatic ecosystem. In doing this set of sensitivity analyses it was found that the limit of augmentation which the reservoir system could sustain with a 21,000 cfs release was 5,000 cfs.

NAVIGATION PERFORMANCE MEASURES

Figure 7-1 shows the availability of the 9-foot navigation channel with no dredging (21,000 cfs release) at differing levels of augmentation limits ranging from 1,000 to 5,000 cfs and also for the RIOP. As explained earlier, in all of our analyses we have chosen to use current operations as the baseline against which to compare changes. The current operations do not include releases for either navigation or environmental flows except as provided for in the RIOP. Figure 7-2 shows the availability of a 7-foot channel.

From these two figures it can be seen that for providing a 9-foot channel there is little difference among the various operational changes for the reservoirs from January through May, but for the rest of the year the availability of the channel is sensitive to the level of augmentation provided, with higher levels of availability provided as augmentation releases are increased. The same relationship is evident with a 7-foot channel except that the differences become evident earlier in the year. The availability of the 9-foot and 7-foot channel is greater when navigation releases are specifically provided for when compared with the RIOP releases where releases are incidental with the RIOP operations. The figures also show that the larger the volume of augmentation, the greater the availability of the channel. The average annual availability of the 9-foot channel ranges from less than 32% with 1,000 cfs augmentation to 35.2% with 5,000 cfs augmentation compared with 26.5% for the RIOP. The average annual availability of the 7-foot channel ranges from 39.4% with 1,000 cfs augmentation to 44.8% with 5,000 cfs augmentation compared with 35.5% with the RIOP. These findings occur because the flows needed to provide the navigation channel would be provided by naturally occurring local inflow much more regularly in the first half of the year and that augmentation would be needed to provide the channel more frequently in the latter six months of the year.

Houston, Billy

Page 105 of 360

Figure 7 - 1. AVAILABILITY OF A NINE-FOOT CHANNEL WITH VARYING LEVELS OF AUGMENTATION AND NO DREDGING

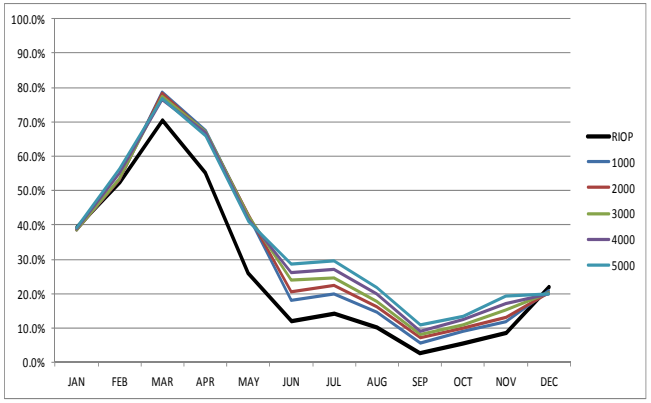
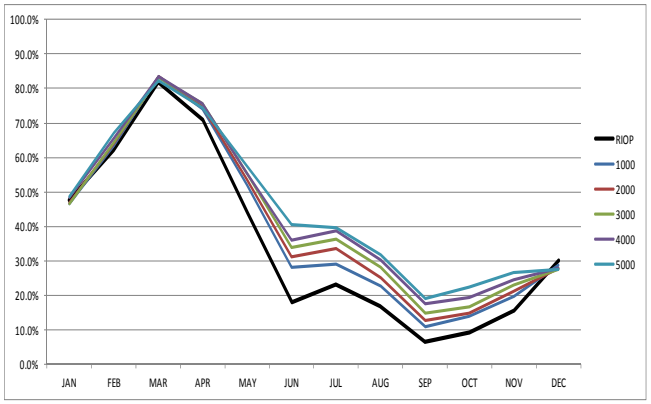


Figure 7 - 2. AVAILABILITY OF A SEVEN-FOOT CHANNEL WITH VARYING LEVELS OF AUGMENTATION AND NO DREDGING



ENVIRONMENTAL PERFORMANCE MEASURES

Chapter 4 discusses the basis of the environmental performance measures. In chapter 4 it was concluded that two separate environmental performance measures will be used in our

Houston, Billy

Page 106 of 360

evaluation of model output: one which is flow based and another which considers the extent of inundation of the Apalachicola River floodplain. In this section the flow based performance measures will be considered first and then the floodplain inundation performance measure will be evaluated. Figures 7-3, 7-4 and 7-5 show the comparisons of median, 75% exceeded flows and 90% exceeded flows for model runs relative to the RIOP for the entire model run period (1939 – 2008) and figures 7-6, 7-7, 7-8, 7-9, 7-10 and 7-11 show the same data for individual years chosen to represent normal flows, low flows and extreme low flows.

Figures 7-3, 7-4, and 7-5 show that at median and 90% exceeded flows there were minimal variations with different augmentation limits, but that larger differences were evident at the 75% exceeded flows in the latter half of the year. During the time of the year that there was the greatest variations flows were less than under the RIOP , but they were greater in the spring months showing the effects of targeting a release level of 21,000 cfs when basin inflows and augmentation limits allow for it. For the median and 90% exceeded flows releases were generally comparable with releases under the RIOP.

For the annual time series flows in figures 7-6, 7-7, 7-8, 7-9, 7-10 and 7-11 there were limited variability in flows among the individual years and large variations at certain times from Apalachicola Riverkeeper's performance measure baseline. Time lags in the phasing of flows are evident in some of the figures as the level of augmentation is changed. Minimal differences are evident between the RIOP values and the values for navigation releases with augmentation.

Figure 7 - 3. MEDIAN FLOWS FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING FOR THE PERIOD OF RECORD (1939 – 2008)

Houston, Billy

Page 107 of 360

Figure 7 - 4. 75% EXCEEDED FLOWS FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING FOR THE PERIOD OF RECORD (1939 – 2008)

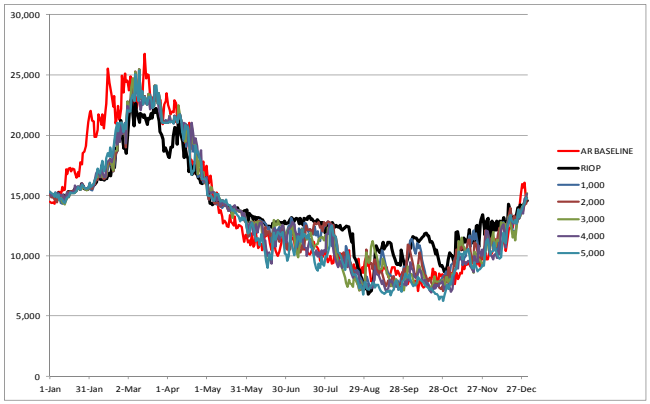
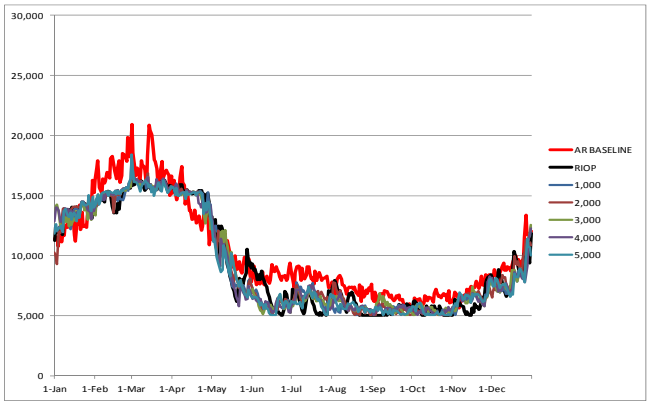


Figure 7 - 5. 90% EXCEEDED FLOWS FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING FOR THE PERIOD OF RECORD (1939 – 2008)



86

Houston, Billy

Page 108 of 360

Figure 7 - 6. ANNUAL TIME SERIES FOR NORMAL FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1970)

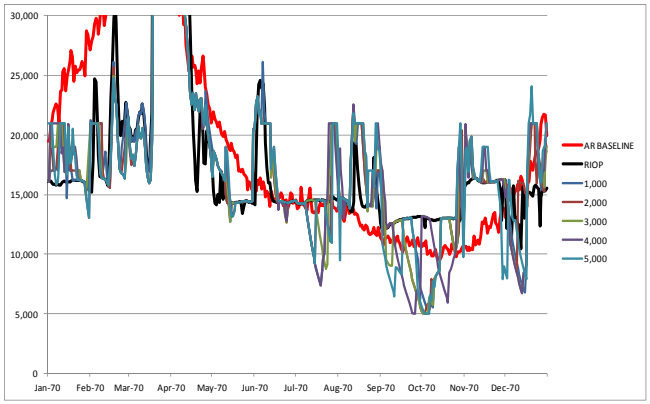
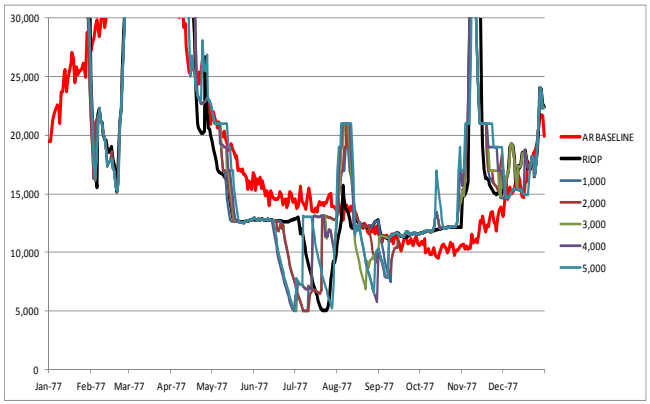


Figure 7 - 7. ANNUAL TIME SERIES FOR NORMAL FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1977)



87

Houston, Billy

Page 109 of 360

Figure 7 - 8. ANNUAL TIME SERIES FOR LOW FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1981)

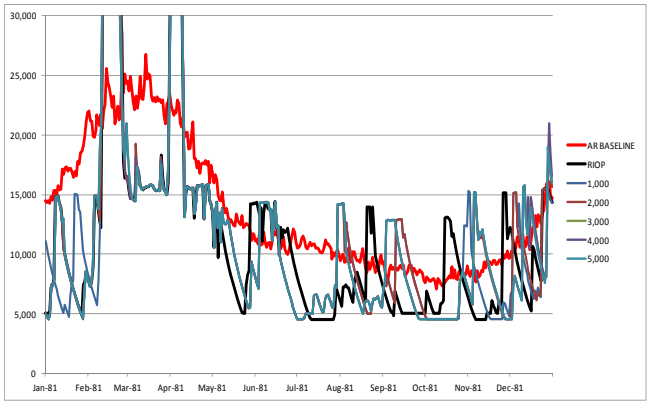
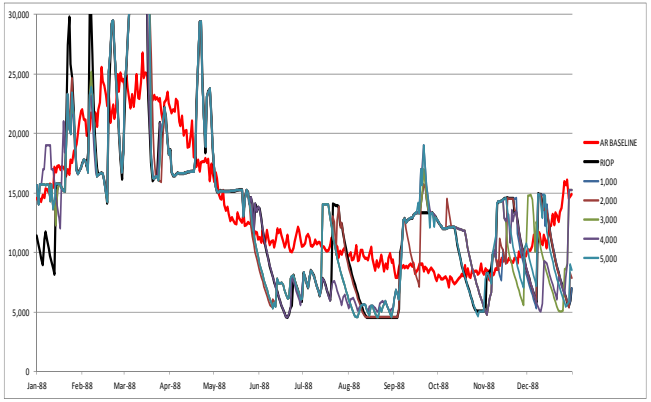


Figure 7 - 9. ANNUAL TIME SERIES FOR LOW FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1988)



88

Houston, Billy

Page 110 of 360

Figure 7 - 10. ANNUAL TIME SERIES FOR EXTREME LOW FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (2002)

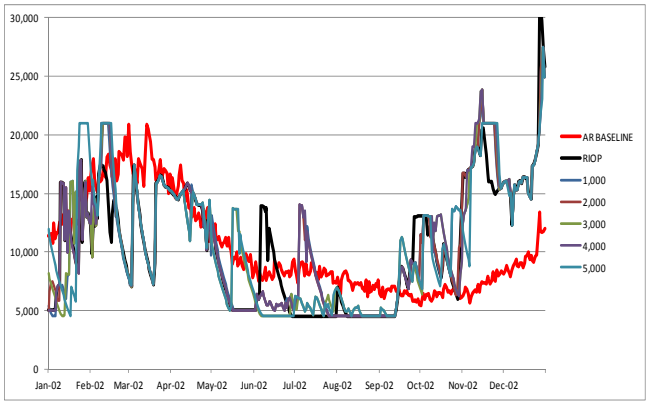
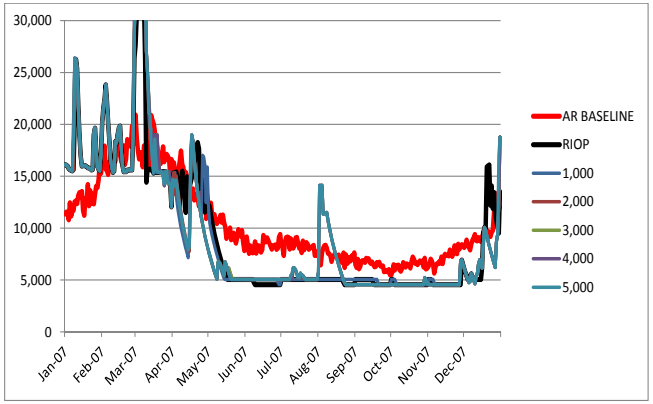


Figure 7 - 11. ANNUAL TIME SERIES FOR EXTREME LOW FLOW YEAR FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (2007)



The other performance measure defined in Chapter 4 was the extent of flooding in the Apalachicola River floodplain. This was defined by amount of time that flow exceeded three flow thresholds which were keyed to floodplain inundation based on data from Light and others (1998). Figure 7-12 shows the amount of time 15,000 cfs was exceeded, figure 7-13 the

89

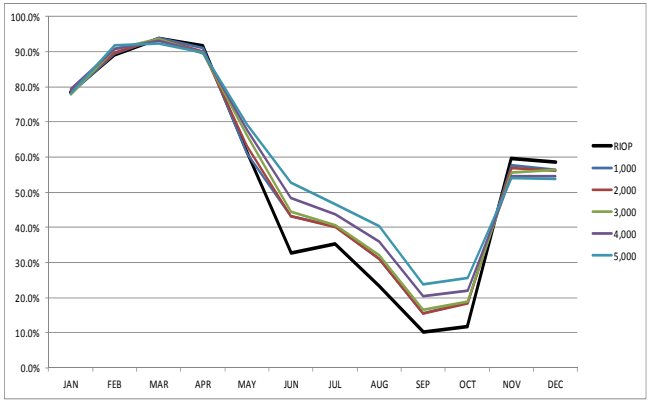
Houston, Billy

Page 111 of 360

amount of time 17,000 cfs was exceeded and figure 7-14 the amount of time 29,000 cfs was exceeded.

From these three figures it can be seen that for the 15,000 cfs and 17,000 thresholds for May through November the extent of inundation is sensitive to the amount of augmentation release provided with greater frequency of inundation as augmentation releases are increased. Minimal differences are evident for the 29,000 cfs threshold. Figure 7-14 shows little variation at the 29,000 cfs threshold which was expected because this flow value is beyond the range of being affected to any great extent by reservoir operations. For the comparison with the 15,000 cfs and 17,000 cfs thresholds the frequency of inundation is either comparable with or greater than the frequency with RIOP operations. For the 15,000 cfs exceeded threshold the flow threshold was exceeded 53.9 % of the time under the RIOP, 56.4% of the time with 1,000 cfs augmentation and 59.9% of the time with 5,000 cfs augmentation. For the 17,000 cfs threshold the flow threshold was exceeded 38.5 % of the time under the RIOP, 42.3% of the time with 1,000 cfs augmentation and 49.5% of the time with 5,000 cfs augmentation.

Figure 7 - 12. PERCENT OF TIME 15,000 cfs WAS EXCEEDED FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



90

Houston, Billy

Page 112 of 360

Figure 7 - 13. PERCENT OF TIME 17,000 cfs WAS EXCEEDED FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING

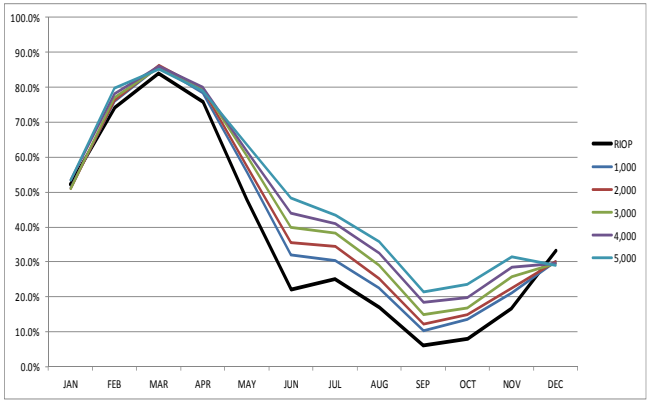
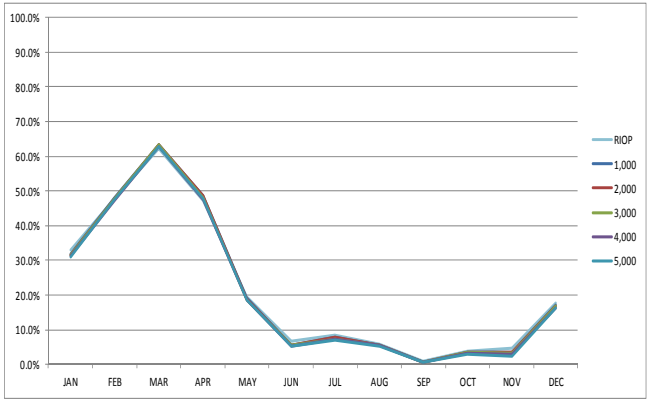


Figure 7 - 14. PERCENT OF TIME 29,000 cfs WAS EXCEEDED FOR THE APALACHICOLA RIVER AT CHATTAHOOCHEE FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



91

Houston, Billy

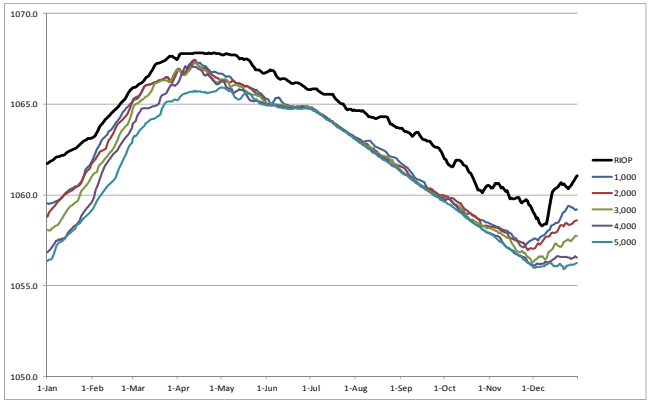
Page 113 of 360

RESERVOIR PERFORMANCE MEASURES

LAKE LANIER

Figures 7-15, 7-16, 7-17 and 7-18 show the elevations at Lake Lanier for the period of record and figures 7-19, 7-20, 7-21, 7-22, 7-23 and 7-24 show annual time series charts comparing the elevations at Lake Lanier for various levels of augmentation. Figures 7-15, 7-16 7-17 and 7-18 show a great variation in reservoir elevations at Lake Lanier as the amount of augmentation is increased. From figure 7-15 it can be seen that median elevations in the first half of the year the elevation at Lake Lanier is sensitive to level of augmentation provided, but these differences to away in the latter half of the year. Minimal differences are evident in the 75% exceeded elevations, but for the 90% exceeded elevations more sensitivity is evident. The 4,000 cfs and 5,000 cfs augmentation levels begin to show evidence of reaching the limits of augmentation. For the minimum elevations the same is true only to a greater extent. In all of the charts elevations at Lake Lanier are lower than they would have been under the RIOP. For median elevations the average annual elevation under the RIOP was 1064.1, with 1,000 cfs augmentation 1062.6 and with 5,000 cfs augmentation 1061.5. For the 75% exceeded elevations the average annual elevation under the RIOP was 1060.35, with 1,000 cfs augmentation 1059.9 and with 5,000 cfs augmentation 1059.6. For the 90% exceeded elevations the average annual elevation under the RIOP was 1058.6, with 1,000 cfs augmentation 1058.15 and with 5,000 cfs augmentation 1057.3. For minimum elevations the average annual elevation under the RIOP was 1054.5, with 1,000 cfs augmentation 1054.0 and with 5,000 cfs augmentation 1050.6. Figures 7-19 to 7-24 show that in some individual years elevations with augmentation are comparable to those under the RIOP with the exception of elevations for the higher levels of augmentation.

Figure 7 - 15. MEDIAN ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



92

Houston, Billy

Page 114 of 360

Figure 7 - 16. 75% EXCEEDED ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING

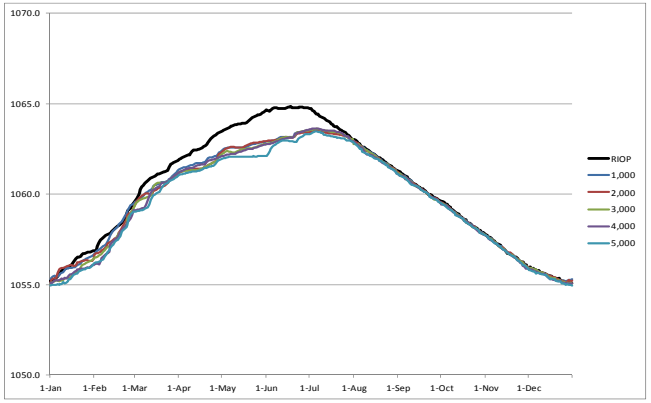
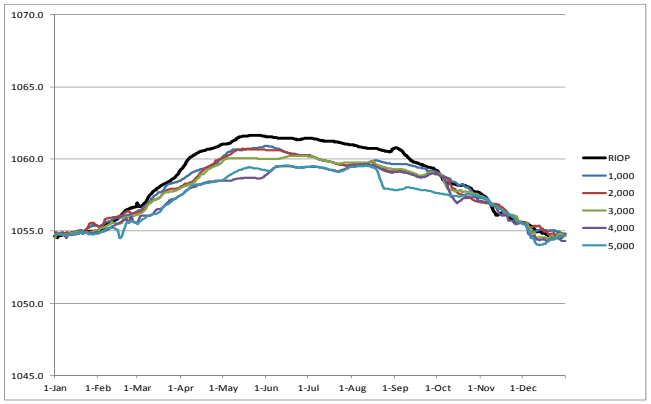


Figure 7 - 17. 90% EXCEEDED ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



93

Houston, Billy

Page 115 of 360

Figure 7 - 18. MINIMUM ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING

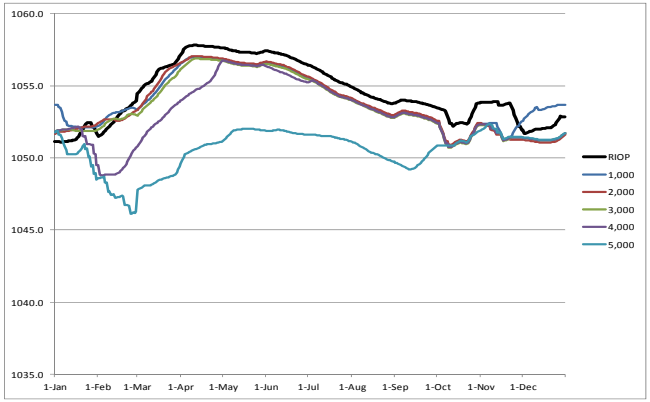
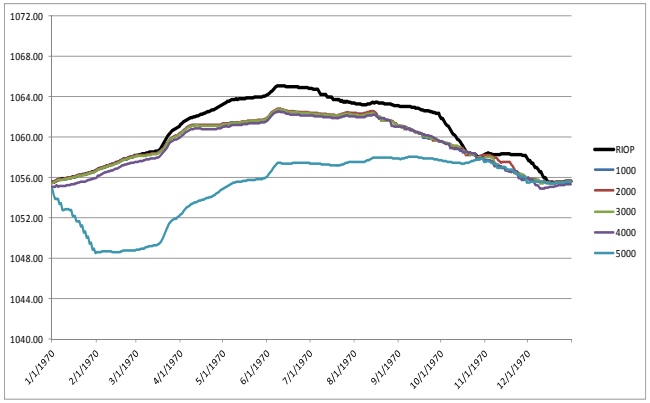


Figure 7 - 19. ANNUAL TIME SERIES OF NORMAL FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1970)



Houston, Billy

Page 116 of 360

Figure 7 - 20. ANNUAL TIME SERIES OF NORMAL FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1977)

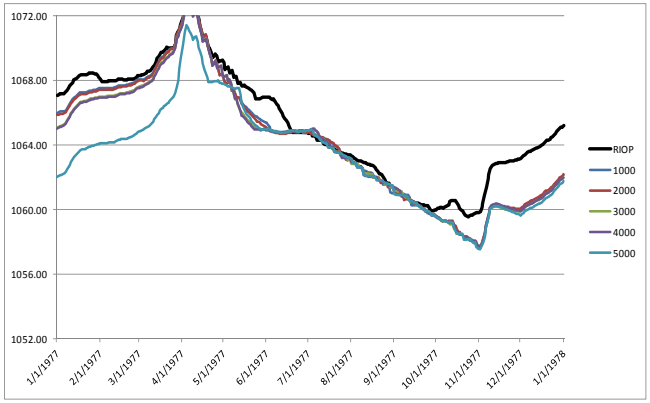
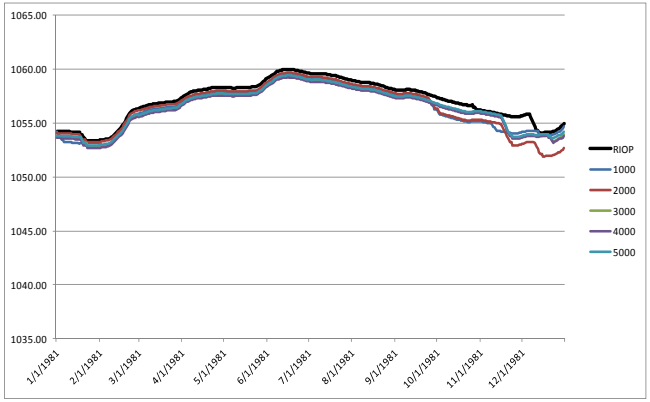


Figure 7 - 21. ANNUAL TIME SERIES OF LOW FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1981)



Houston, Billy

Page 117 of 360

Figure 7 - 22. ANNUAL TIME SERIES OF LOW FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (1988)

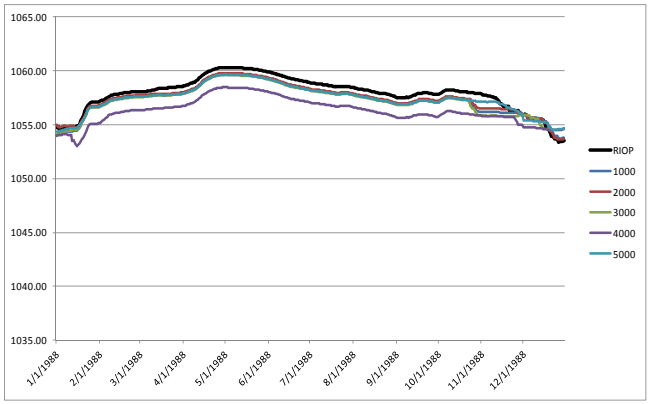
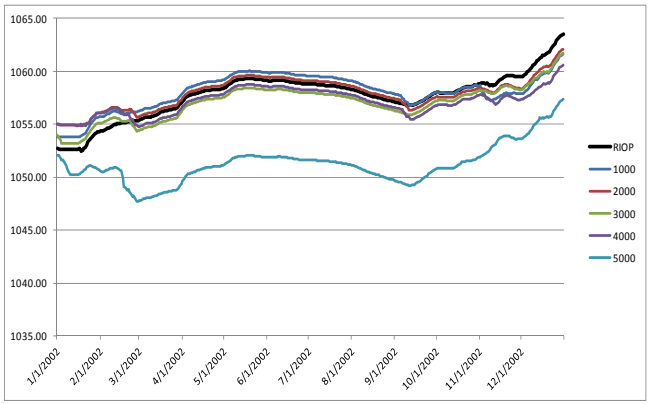


Figure 7 - 23. ANNUAL TIME SERIES OF EXTREME LOW FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (2002)

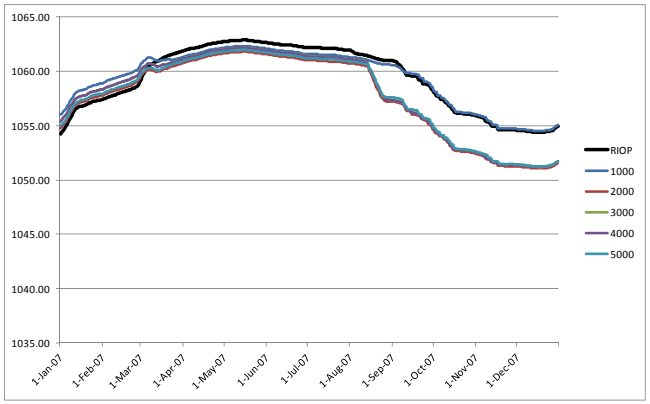


96

Houston, Billy

Page 118 of 360

Figure 7 - 24. ANNUAL TIME SERIES OF EXTREME LOW FLOW YEAR ELEVATIONS AT LAKE LANIER FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING (2007)



WEST POINT

Figures 7-25, 7-26, 7-27 and 7-28 show the period of record data for West Point elevations and Figures 7-29, 7-30, 7-31, 7-32, 7-33 and 7-34 show the annual time series data for selected years for elevations at West Point reservoir.

Figure 7-25 shows that at median elevations there are not many differences between elevations at West Point as the level of augmentation is changed before June, but after June there are major differences with the augmentation runs with several feet of difference as the level of augmentation is increased. Median elevations are either equal to or less than elevations under the RIOP. The sensitivity of West Point elevations to changes in augmentation levels are far less for the 75% exceeded and 90% exceeded elevations with the elevations in the 75% exceeded either being equal to or less than elevations under the RIOP. In the September through December, elevations under the navigation release operations were greater than those under the RIOP for the 90% exceeded elevations. Minimum elevations were greater than under the RIOP for the summer months. For the median elevations the average annual elevation for the RIOP was 630.3, whereas for the 1,000 cfs augmentation option the average annual elevation was 629.11 and for the 5,000 cfs augmentation option the average annual elevation was 628.26. For the 75% exceeded elevations the average annual elevation for the RIOP was 627.4, whereas for the 1,000 cfs augmentation option the average annual elevation was 626.8 and for the 5,000 cfs augmentation option the average annual elevation was 626.5. For the 90% exceeded elevations the average annual elevation for the RIOP was 625.2, whereas for the 1,000 cfs augmentation option the average annual elevation was 624.8 and for the 5,000 cfs augmentation option the average annual elevation was 624.7. For the minimum elevations the average annual elevation for the RIOP was 622.3, whereas for the 1,000 cfs augmentation

97

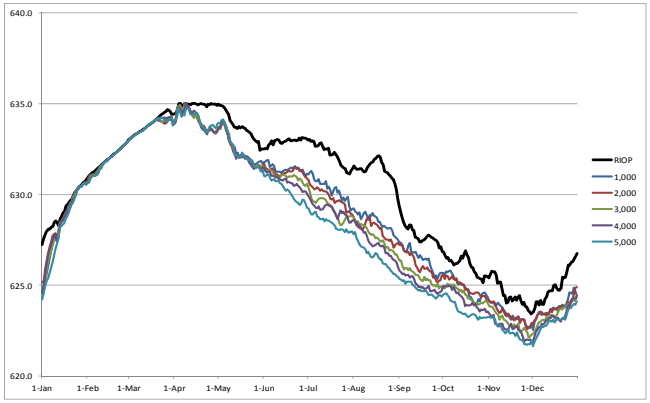
Houston, Billy

Page 119 of 360

option the average annual elevation was 622.4 and for the 5,000 cfs augmentation option the average annual elevation was 622.3.

Figures 7-29 to 7-34 show larger variations in the individual years that had median flows (1970 and 1977) and much less sensitivity to changing the level of augmentation in the low flow years. This was expected since the flow levels being provided for to provide a 9-foot channel was 21,000 cfs which is greater than median flow and therefore augmentation in low flow years would be limited.

Figure 7 - 25. MEDIAN ELEVATIONS AT WEST POINT FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



98

Houston, Billy

Page 120 of 360

Figure 7 - 26. 75% EXCEEDED ELEVATIONS AT WEST POINT FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING

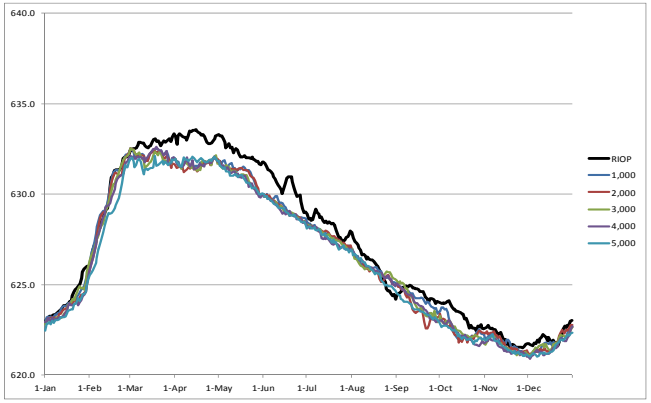
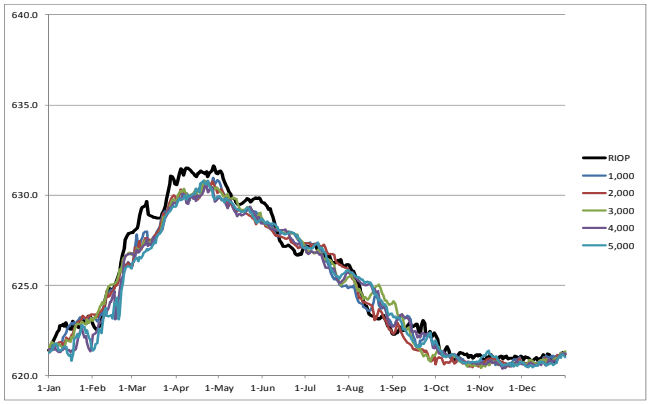


Figure 7 - 27. 90% EXCEEDED ELEVATIONS AT WEST POINT FOR VARYING LEVELS OF AUGMENTATION AND NO DREDGING



99