

Developed by

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Developed for

**The ACF Stakeholders**

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### Objectives:

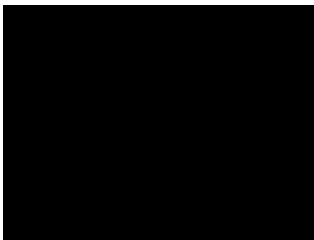
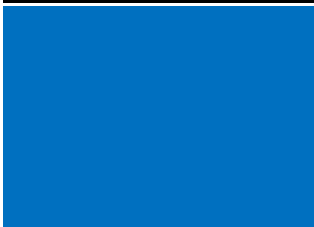


- Establish baseline system conditions
- Assess impacts of net reservoir evaporation
- Assess impacts of reservoir regulation
- Assess impacts of consumptive use (demands)

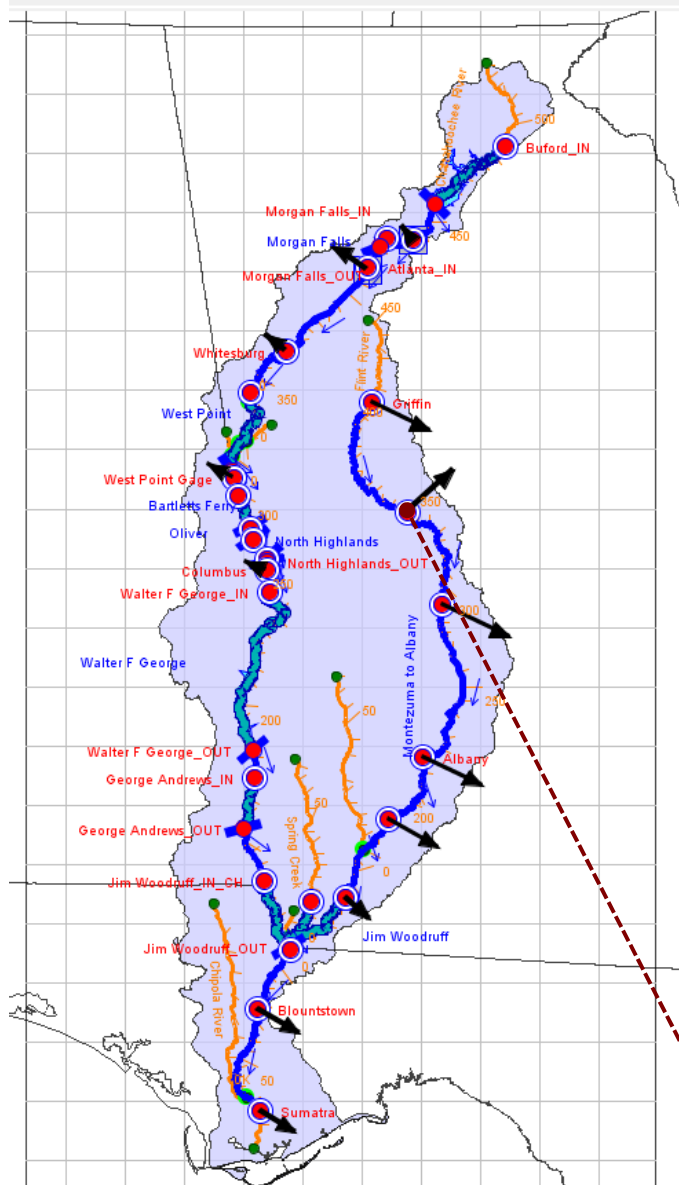
### Approach: Formulate and compare scenarios focusing on above causes/impacts.

- Net evaporation impacts: Compare scenarios UIF and **UIF/Ev.**
- Regulation impacts: Compare scenarios UIF and **RIOP.**
- Consumptive use impacts: Compare scenarios UIF (or **RIOP**) and **RIOP/CU.**

### Criteria/Metrics: All stakeholder defined criteria/metrics associated with:

- Lake Levels and Releases
- Recreation Impacts/Opportunities
- Navigation Opportunities
- Demand Deficits
- Environmental Flow Guidelines (ATKINS, FWS)
- Hydropower

|         |  |  |
|---------|--|--|
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| UIF/Ev  |   | <p>This scenario assumes that all main-stem reservoirs exist and are <b>operated in run-of-river mode</b> with storage kept constant at the mid-point of the conservation zone. This scenario <b>considers net evaporation losses but no consumptive uses.</b></p> |
| RIOP    |   | <p>The reservoirs are <b>regulated according to the Revised Interim Operations Plan</b> currently in effect. <b>No consumptive uses</b> are modeled, but <b>net evaporation losses</b> are considered.</p>   |
| RIOP/CU |  | <p>This scenario is <b>similar to RIOP</b> but <b>includes current consumptive</b> uses as recently compiled by Black &amp; Veatch.</p>  |



The ResSim runs are based on models developed by USACE

- ResSim Version: HEC-ResSim 3.1 RC3, Build 42
- Model Name: ACF\_WCM\_August2010\_Remand\_Final, USACE, Mobile District

**5 Federal Reservoirs:** Lanier, West Point, W.F. George, George Andrews, J. Woodruff

**5 Private Reservoirs:** Morgan Falls, Bartletts Ferry, Goat Rock, Oliver, North Highlands

**13 River Nodes:** Norcross, Atlanta, Whitesburg, Columbus, Griffin, Carsonville, Montezuma, Albany, Newton, Bainbridge, Chattahoochee, Blountstown, Sumatra

The USACE models were altered to include an additional node for Carsonville.

Different scenarios are created by varying **input data** and/or **operational policies**.

## Input Data

Input data represent the configuration and major flows into and out of the system

- Physical System Configuration
- Unimpaired flows (UIFs) and evaporation rates
- Consumptive use targets

## Operational Policy

An operational policy is a set of rules and guidelines that specify how the facilities are to be operated (e.g., RIOP).

- Specification of reservoir zones
- Minimum release requirements
- Hydropower generation rules
- System-wide balancing of reservoir storages

### **Unimpaired Flows:**

Sequences from the most recent **UIF dataset developed by USACE** (ACFCUM\_10.dss) were used at almost all nodes.

**New UIFs were derived for the Carsonville and Montezuma nodes** as described in the addendum to the UIF Assessment report (GWRI, 2012).

### **Evaporation Rates:**

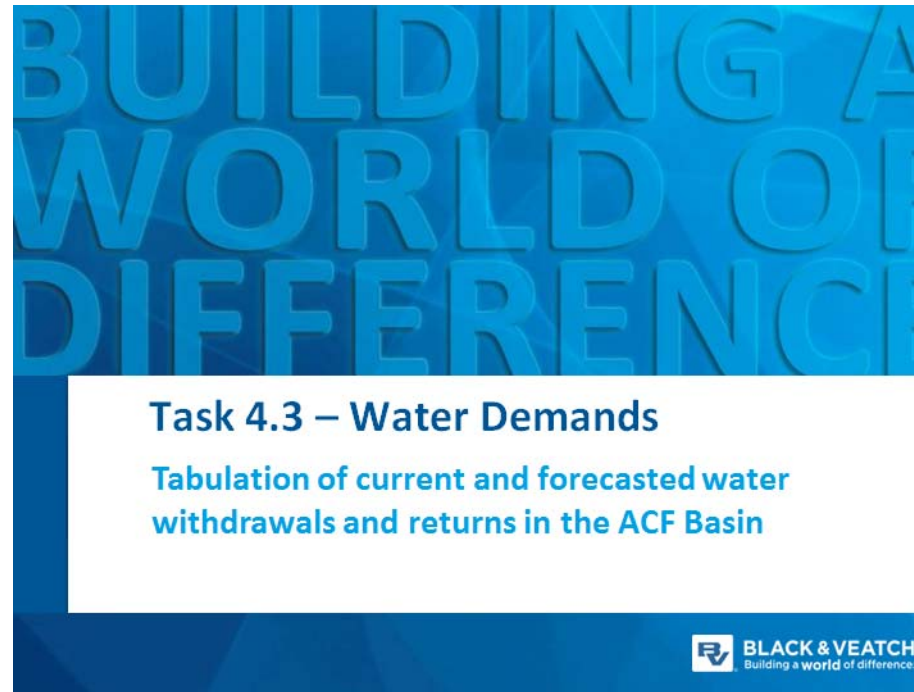
Sequences from **the most recent evaporation dataset developed by USACE** (ACF\_EVAP.dss) were used at each reservoir.

Off-stream demands were modeled as consumptive use:

$$\text{Consumptive Use} = \text{Withdrawals} - \text{Returns}$$

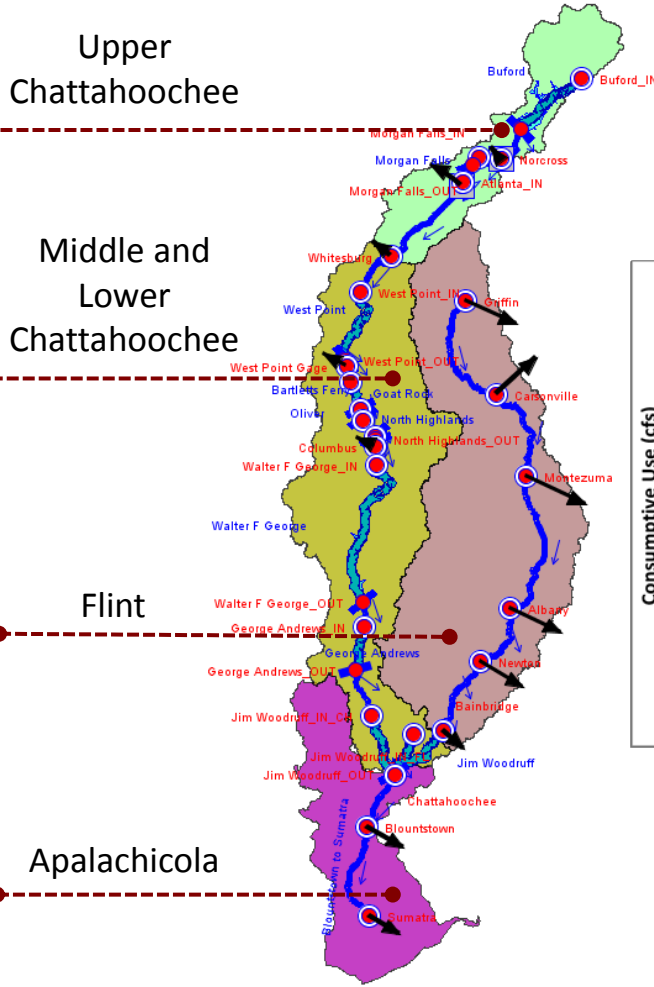
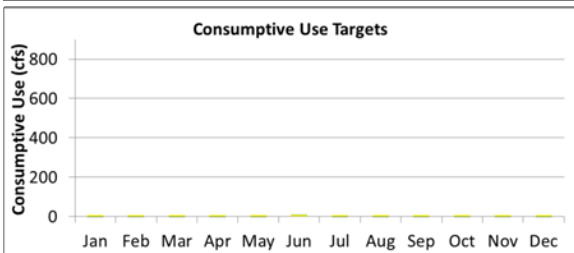
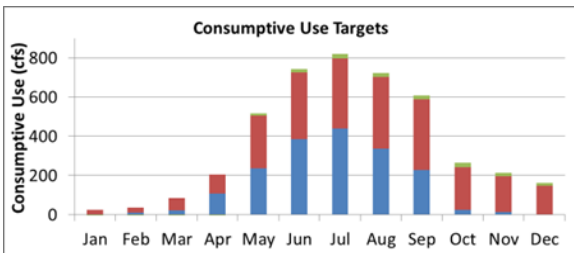
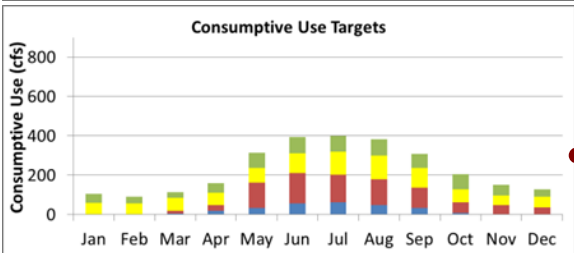
Data collection efforts are detailed in *Task 4.3 – Water Demands: Tabulation of current and forecasted water withdrawals and returns in the ACF Basin.*

The assessments are based on **current** consumptive uses.

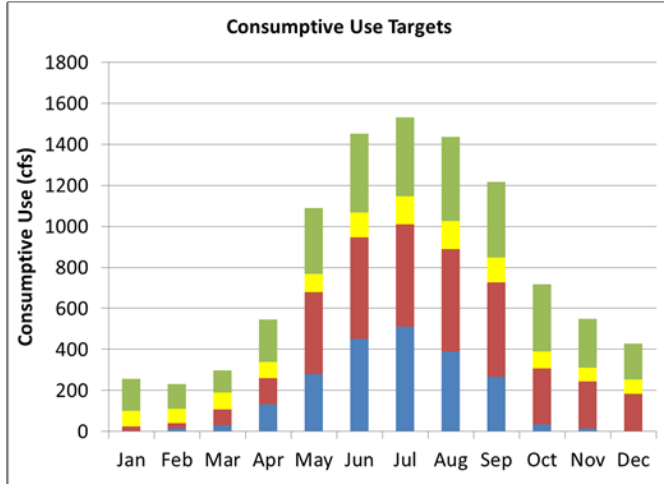


# Input Data- 3

## Current Consumptive Use Targets



### Entire ACF Basin



Annual Average: 812 cfs

■ Agriculture (Surface water)    
 ■ Agriculture (Groundwater)    
 ■ Thermoelectric    
 ■ Municipal and Industrial



Three operational policies were considered.

### **No Regulation: UIF**

No reservoirs are considered and no operational policies are modeled.

### **Run-of River: UIF/Ev**

The reservoirs are operated such that **net inflows (inflows-net evaporation) are equal to outflows**. Such an operation policy results in storages remaining constant. For this scenario, the storage was kept constant at the mid-points of the conservation zones of each reservoir.

### **Revised Interim Operations Plan: RIOP, RIOP/CU**

The Revised Interim Operations Plan (RIOP) represents the operational plan currently in effect in the ACF Basin. The **RIOP** scenario does not consider consumptive uses while the **RIOP/CU** scenarios does.

The system reservoirs are operated for a variety of different purposes.

### Local objectives:

- Flood control downstream of locations
- Hydropower generation
- Minimum in-stream flows downstream of locations
- Fish spawning within rivers and reservoirs
- Water supply

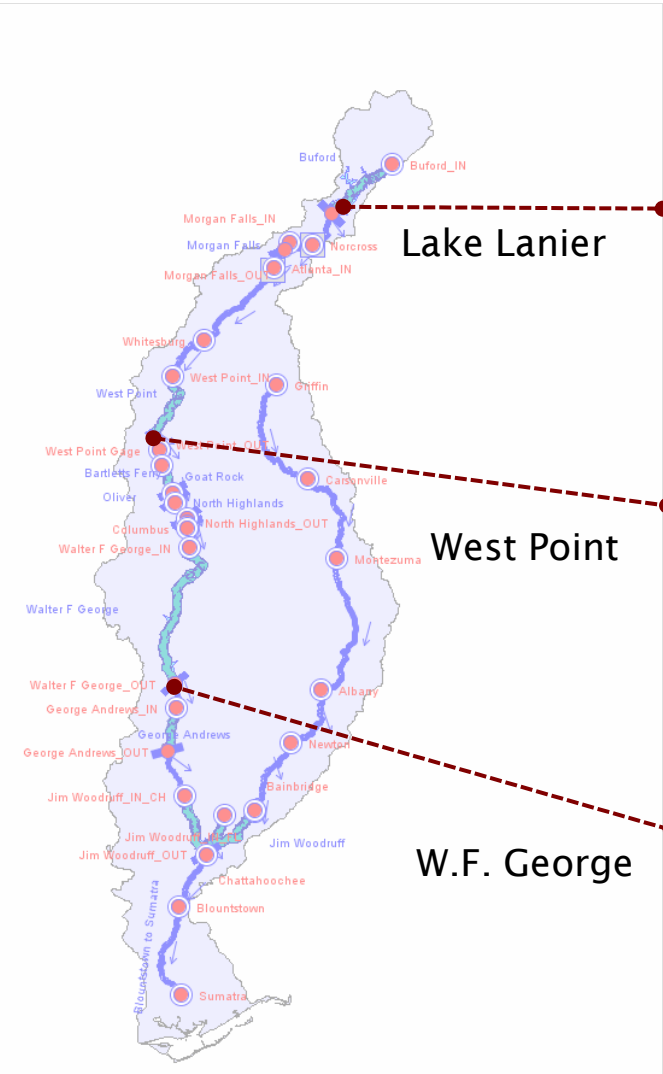
Local operations can vary according to which zone of a particular reservoir the storage is in.

### System-wide objectives:

- Keep storages at different reservoirs balanced
- Provide minimum flows downstream of J. Woodruff reservoir

System-wide operations can vary according to which zone the combined (*composite*) storage of the major reservoirs (Buford, West Point, and W. F. George) is in, the magnitude of the basin inflows, as well as the relative differences between the individual storages at the major reservoirs.

Additional details are provided in USACE (2012).



### Hydropower Generation

| Zone | Peaking Hours |
|------|---------------|
| 1    | 3             |
| 2    | 2             |
| 3    | 2             |
| 4    | 0             |

### Minimum Flows and Flood Control

>750 cfs at Atlanta (Peachtree Creek)  
 < 11,000 cfs at Norcross  
 < 13,200 cfs at Atlanta

### Fish Spawning

Limitations on how rapidly level can be decreased.

| Zone | Peaking Hours |
|------|---------------|
| 1    | 4             |
| 2    | 2             |
| 3    | 2             |
| 4    | 0             |

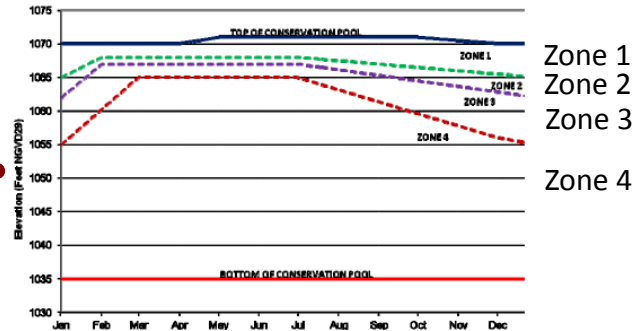
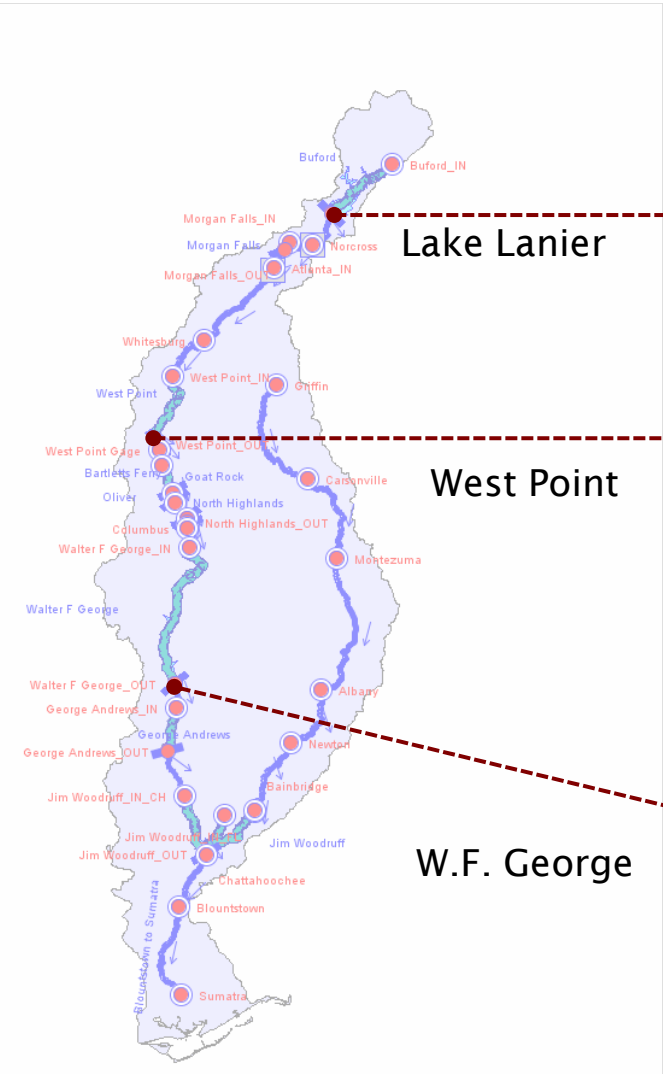
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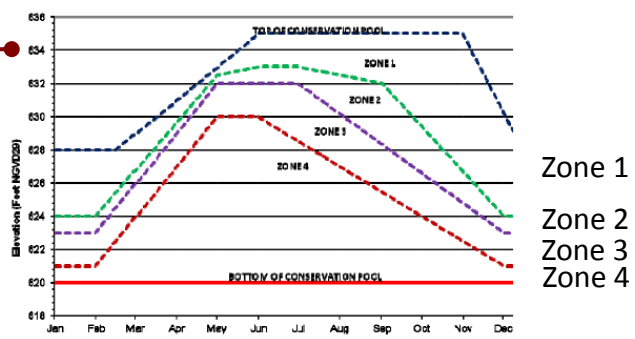
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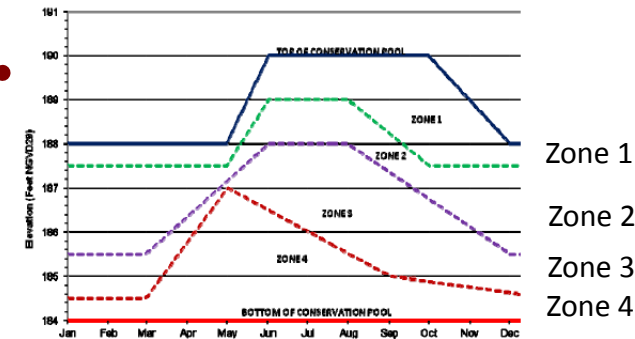
### Individual Reservoir Zones



Zone 1  
Zone 2  
Zone 3  
Zone 4



Zone 1  
Zone 2  
Zone 3  
Zone 4



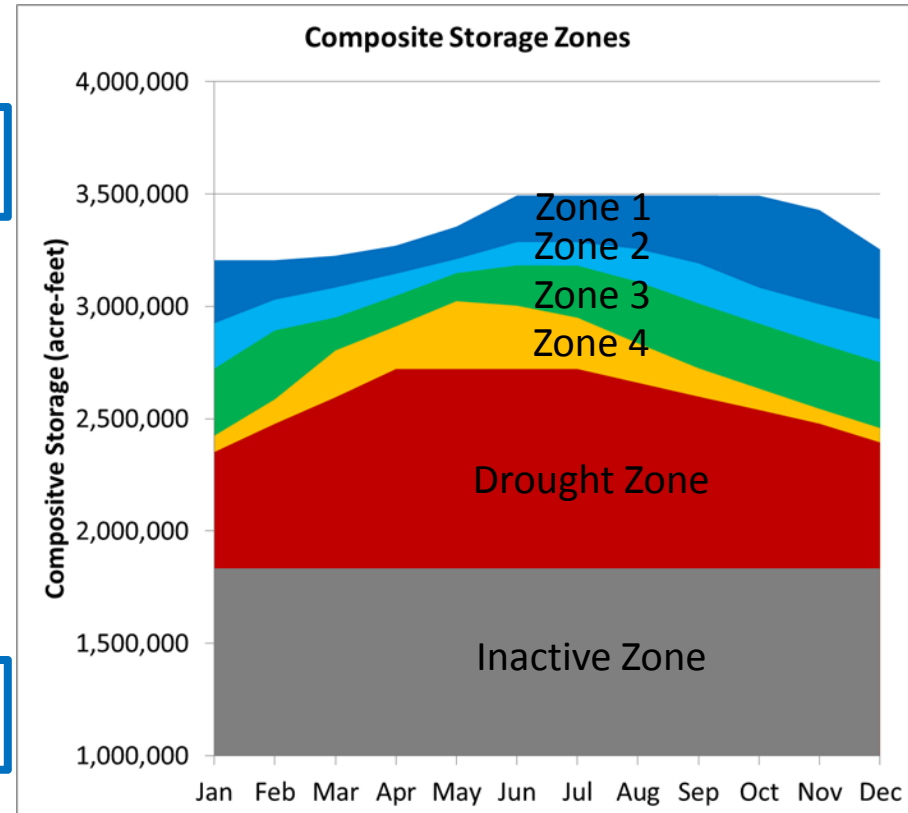
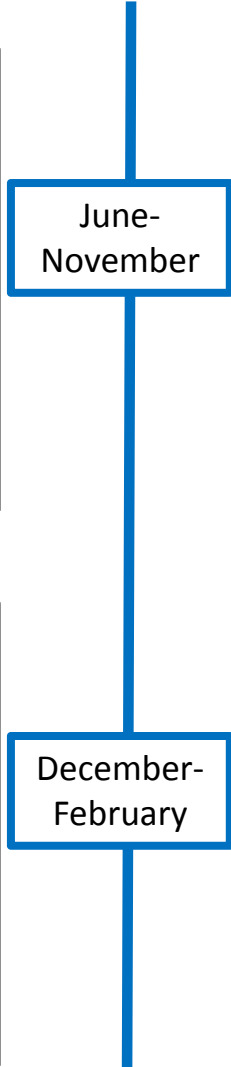
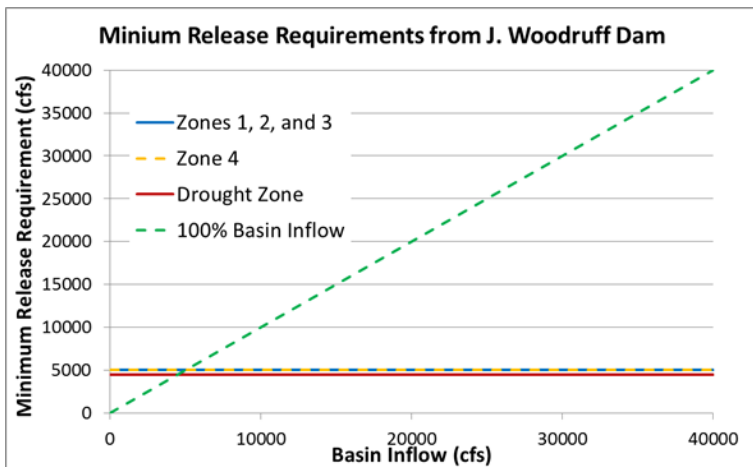
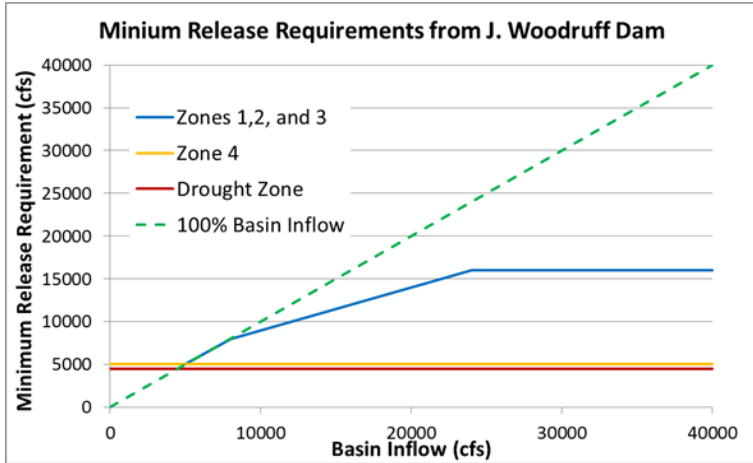
Zone 1  
Zone 2  
Zone 3  
Zone 4

The levels at different reservoirs should **remain balanced.**

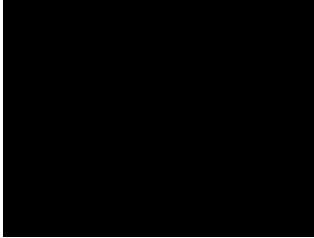



Avoid situations where one reservoir is in Zone 3 and another is in Zone 1.

## RIOP and RIOP/CU Scenarios-J. Woodruff Release Requirements

Minimum release requirements from J. Woodruff Dam depend on Basin Inflows and Composite Storage.



Composite Storage = Lake Lanier + West Point + W.F. George

|         |  |  |
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All simulations were performed using UIFs from 1939-2008.

The metrics were computed by considering all of the years, as well as a few select dry years.

## All Years Run:

1939 – 2008

## Dry Years Run:

1941 ▪ 1951, 1955 ▪ 1981, 1985, 1986, 1988 ▪ 1999, 2000, 2002 ▪ 2006,  
2007, 2008