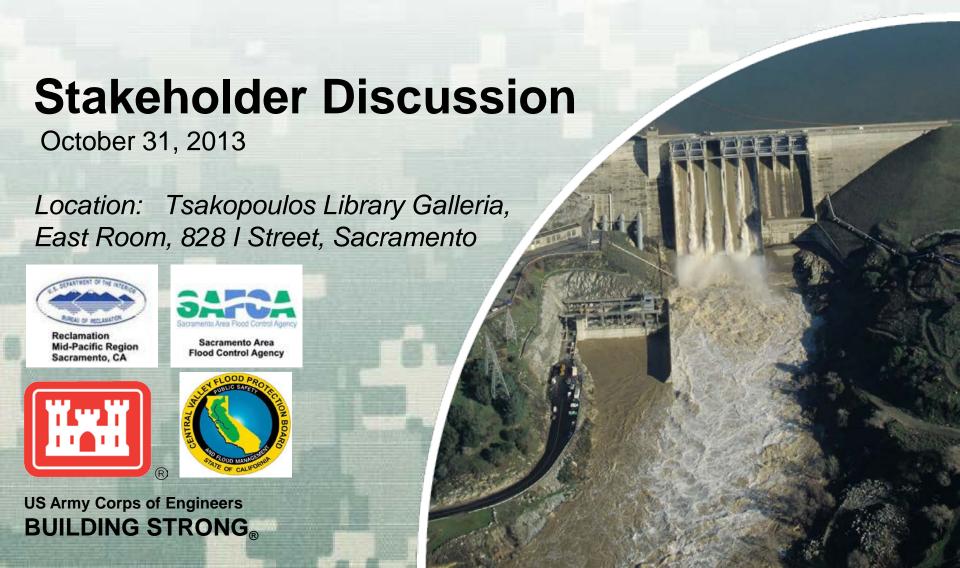
### Folsom Dam Water Control Manual Update



# WELCOME & INTRODUCTIONS



#### **PURPOSE OF MANUAL UPDATE**

- Revise operation rules for Folsom Dam to reduce flood risk based on the capabilities of the Folsom Joint Federal Project (JFP).
- Reflect operational capabilities created by improved weather forecasts.
- Potentially reduce the volume of flood control reservation in Folsom Reservoir at any particular time by comparison to the operations that have been in effect since 1995.



#### **OBJECTIVES OF MANUAL UPDATE**

- Pass the Probable Maximum Flood while maintaining 3 feet of freeboard below the top of dam to stay within the dam safety constraints of the U.S. Department of Interior, Bureau of Reclamation.
- Control a 1/100 annual chance flow ("100-year flood") to a maximum release of 115,000 cubic feet per second as criteria set by the Sacramento Area Flood Control Agency to support Federal Emergency Management Agency levee accreditation along the American River.
- Control a 1/200 annual chance flow ("200-year flood") as defined by criteria set by the State of California (State) Department of Water Resources to a maximum release of 160,000 cubic feet per second, when taking into account all the authorized modifications within the American River Watershed.



#### **PURPOSE OF TODAY'S AGENDA**

- Involving Public, Other Government Agencies,
   & Non-Governmental Organizations
- Project Schedule
- Presentation on Environmental Effects Approach
- Presentation on Technical / Modeling Work
- Group Discussion & Summary Comments



#### INVOLVING THE PUBLIC,

# OTHER GOVERNMENT AGENCIES & NON-GOVERNMENTAL ORGANIZATIONS



#### **INTERESTS**

- Regional Flood Management
- Folsom Lake, Lake Natoma and Lower American River Recreation
- In-Basin Water Supply & Irrigation
- Other Water Supply & Irrigation
- Generation of Hydropower



# REVIEW ISSUES & CONCERNS



#### **PUBLIC INVOLVEMENT**

- Quarterly Public/ Stakeholder Session
- In-Depth Sessions Government Entities:
  - Quarterly Technical / Modeling
  - Quarterly Environmental Effects
- In-Depth Sessions Non-Governmental & Public
  - Quarterly Meetings convened by SAFCA.
- Other Conversations USACE



## INFORMATION AVAILABLE ON LINE Folsom Dam Water Control Manual Update

- July 2012 Briefing Paper
- Summary of 2012 Scoping Meetings
- Stakeholder Assessment
- Other Documents

http://www.spk.usace.army.mil/Missions/CivilWorks/FolsomDamAuxiliarySpillway.aspx



## PROJECT MILESTONE SCHEDULE



#### **SCHEDULE**

#### **Engineering Documentation**

Existing Condition & Future Without Project Models (DEC 2013)

Existing and

future without Project

Assumptions |

(JAN 2014)

W/ Project Conditions Models DRAFT (DEC 2014) W/ Project Conditions Models FINAL (MAY 2015) Engineering Reports / Review Process (FEB 2016)

Folsom Dam Water Control Manual (MAR 2017)



WOP

Existing / FWOP
Analysis
(JUN 2014)

W/ I
Analysis
rison

W/ Project Analyses/Compa rison DRAFT (DEC 2014) W/ Project Analyses/Compa rison FINAL (MAY 2015)

NEPA Process Continues (JAN 2017)

**Environmental Documentation** 



#### **SCHEDULE**

	H	Technical	Focus of Meetings	Technical Work Group (TWG)	Environmental Working Group (EWG)	Meetings	All Stakeholder/ Public Workshops	Stakeholder Input Due
Meeting								
Sequence		Engineering	Environmental					
1	Λυσ 12	*Final engineering baseline runs	*Approach to effects evaluation	Λυσ 12				
	Aug-13 Sep-13	*Tier 1 evaluations	*Baseline assumptions	Aug-13	Sep-13			
	Oct-13	Ther I evaluations	Buseline assumptions		3ep-13	Oct-13	Oct-13	
2	OCC-13	*Draft with-project	*Draft baseline runs			OCC-13	OCI-13	*Engineering baseline runs - 11/29/13
	Nov-13	runs	Draft baseline rans	Nov-13				Engineering baseline rans 11/25/15
	Dec-13	*Tier 1 evaluations	*Tier 2 evaluations		13-Dec			
	Jan-14					Jan-14	Jan-13	
3	Feb-14	*Draft with-project runs	*Final baseline runs	Feb-14				*Draft engineering with-project and draft environmental baseline runs - 2/28/14
	Mar-14	*Tier 1 evaluations	*Tier 2 evaluations		Mar-14			
	Apr-14					Apr-14	Apr-14	
4	May-14	*Draft with-project runs	*Draft with-project runs vs. final baseline	May-14		·	·	*Engineering draft with-project and final environmental baseline runs - 5/31/14
	Jun-14	*Tier 1 evaluations	*Tier 2 and 3 evaluations		Jun-14			
	Jul-14					Jul-14	Jul-14	
5		*Final with-project runs	*Draft with-project vs final baseline runs					*Draft engineering with-project and draft environmental with-project runs - 8/31/14
	Aug-14			Aug-14				
	Sep-14	*Tier 1 evaluations	*Tier 2 and 3 evaluations		Sep-14			
	Oct-14					Oct-14	Oct-14	
6	Nov-14		*Final with-project runs vs final baseline runs	Nov-14				TBD
	Dec-14		*Tier 2 and 3 evaluations		Dec-14			
	Jan-15					Jan-15	Jan, 15	

TBD



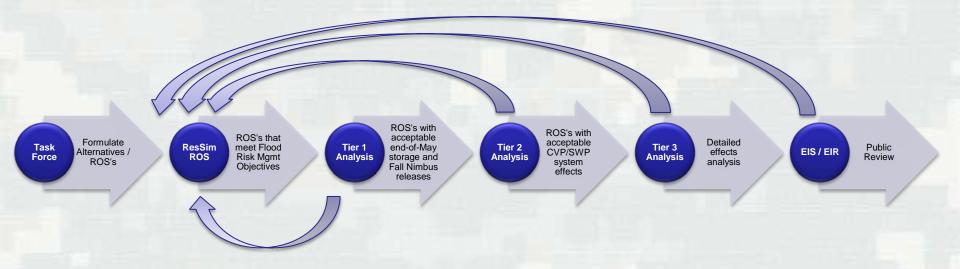
#### **Discussion / Questions**



## ENVIRONMENTAL EFFECTS APPROACH



### CURRENT MODELING PLAN OVERVIEW



Task Force = Corps, Reclamation, CVFPB/DWR, SAFCA representatives

ROS = Reservoir Operations Set

ResSim ROS = ResSim model developed for each ROS and evaluated for flood risk management performance



#### Tier 1 Analysis

- 'High level' evaluation of effects to project beneficial uses
- Developed from period of record (POR) HEC-ResSim and CalSim II runs using the same flood storage reserve requirements
- Compares HEC-ResSim and CalSim II end-of-month storages and lower American River (LAR) fall flows
- General consistency between the two models is viewed as consistency with meeting project beneficial uses



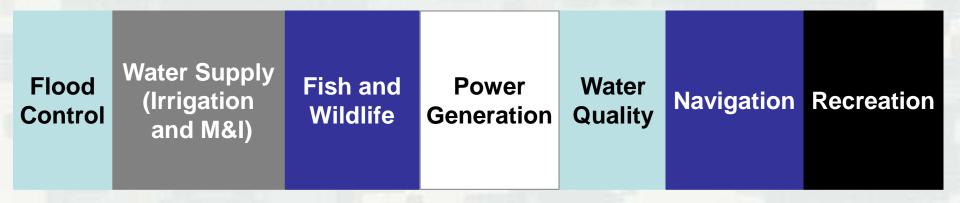
#### CalSim II Model Build

- Current CalSim II model build subject to concurrence between USACE, Reclamation and DWR
- Any modifications to base model assumptions will be further discussed by the partner agencies



#### **Environmental Effects Analysis**

Environmental effects analyses will be centered around effects flood management operations alternatives would have on the other Folsom Dam Project purposes:





#### **Tier 2 Analysis**

- Comparison of 'with ROS' CalSim II run with baseline CalSim II run
- Monthly flood storage reserve requirement in Folsom is feature of ROS that is incorporated into CalSim II
- Screening level comparison of SWP/CVP beneficial uses of project water using key system indicators



#### **Tier 2 System Indicators**

- Water delivery to CVP municipal and industrial contractors north and south of the Delta;
- Water delivery to settlement and exchange contractors;
- Water deliveries to Feather River SWP contractors;
- Water delivery to CVP agricultural contractors north and south of the Delta;
- Minimum release requirements (MRR) CVP and SWP conveyances;
- SWP Delta exports;



#### Tier 2 System Indicators (cont.)

- Old and Middle River (OMR) flows;
- The position of the X2 (the near-bottom 2 parts per thousand isohaline boundary);
- The Delta export to inflow (E/I) ratio;
- Delta Outflow;
- Water delivery to refuges north and south of the Delta;
- May end-of-month storage in Shasta, Oroville and Folsom Reservoirs, and
- September end-of-month storage in Shasta, Oroville and Folsom Reservoirs.

#### **Tier 3 Analysis**

- Evaluate other system effects that CalSim II cannot simulate
- Comparison of alternatives to baseline conditions
  - ► Long-term average values (period of record) and sorted by water year type
- Closer evaluation of effects in Lower American River
- Screening level evaluation for more distant parts of CVP/SWP system followed by detailed evaluation, as needed



## Baseline Conditions Folsom Reservoir Flood Operation and Configuration

- Existing Conditions/Current Operations
- Future Without Project/No Action
- Cumulative Effects



## Existing Conditions/ Current Operations (E504)

- Flood Storage: 400,000/670,000 Acre-Feet (AF)
- Outlet Configuration: Existing (No Auxiliary Spillway)
- Temperature Control Devices (TCD): 3-2-4 shutter configuration
- Operations: Current (2004 Operation Rules)



#### Future Without Project/ No Action (J604)

- Flood Storage: 400,000/670,000 AF
- Outlet Configuration: Existing plus Auxiliary Spillway (JFP)
- TCDs: 3-2-4 shutter configuration
- Operations: Current + use of auxiliary spillway for emergency releases only



#### **Cumulative Effects**

- Past 400,000 AF (Fixed) flood space; no JFP;
   1-1-7 shutter configuration;1987 WCD (E503 ResSim Model)
- Present 400,000/670,000 AF flood space; no JFP; 3-2-4 shutter configuration; 2004 WCD (E504 ResSim Model)
- Future 400,000/600,000 AF flood space;
   Authorized 3.5-ft Dam Raise; JFP; 7(1)-2 shutter configuration; 2017 WCD updated for Dam Raise (R702 ResSim Model)

#### Dam Raise - Future Project

 Not a with-project alternative for this WCM Update; however, considered in cumulative effects analysis

#### Features

- ► Automation of TCD 7(1)-2 configuration
- ► Raise auxiliary dikes by 3.5 feet
- ► Retrofit emergency spillway gates
- ► Ecosystem restoration at 2 sites on LAR



#### Dam Raise - Future Project





## Other Baseline Assumptions Under Discussion

- Bay Delta Conservation Plan (BDCP)
- Lower American River (LAR) Purveyor Demands
- Level of Development
- Biological Opinions
- Climate Change
- Other Future Projects



## EVALUATIONS BY RESOURCE



#### Ag, M&I Water Supply

#### CalSim II Outputs

- Model Parameters
  - Deliveries from Folsom Lake and to the City of Sacramento
  - CVP/SWP deliveries South of Delta
  - ▶ Non-CVP/SWP water rights deliveries
  - ► End-of-May Storage: Trinity, Shasta, Oroville, Folsom Reservoirs
  - ► End-of-September Storage: Trinity, Shasta, Oroville, Folsom Reservoirs



#### **Power**

 CalSim II reservoir storages and releases applied to LTGen and SWPGen models

#### Evaluation of:

- ► Total capacity, quantity and timing of energy production
- Any changes in Project use
- Net capacity and energy at load center
- ► Effects to timing of peaking operations at Folsom Dam



#### **Fisheries Resources**

- Effects analysis based on river flows, lake levels and water temperature modeling.
- Special-status fish species (i.e., steelhead, Chinook salmon, delta smelt, green sturgeon, etc.).
- Recreationally important species (e.g., striped bass and American shad).



#### **Water Quality**

- Parameters evaluated as part of the Fisheries analysis:
  - Water temperature in the Lower American River
  - Salinity dynamics in the Delta
- Salinity dynamics in the Delta
  - addressed at a screening level (changes in X2, total Delta inflow/outflow, and the E/I ratio).
  - Substantial changes may warrant more detailed evaluation using DSM2
- Salinity quality at key in-Delta points for local Ag and M&I supplies

#### **Terrestrial Resources**

- Shoreline understory and wooded areas.
- Reservoir parameters:
  - ▶ water surface elevations

- Riverine parameters:
  - ► Flow



### Recreation

- Primary focus is Folsom Lake and Lower American River
- Folsom Lake
  - ▶ Water surface elevation as it relates to access, inundation, aesthetics, and time of year
- Lower American River
  - Flows and timing



### **Erosion**

 Changes in erosion rates at key index points along LAR

 Focus is period between completion of JFP/auxiliary spillway and completion of Common Features project



### **NEPA** and **CEQA**

Corps of Engineers

**NEPA Lead Agency** 

Central Valley Flood Protection Board

**CEQA Lead Agency** 

Bureau of Reclamation

**NEPA Cooperating Agency** 

Department of Water Resources

**CEQA Responsible Agency** 

Sacramento Area Flood Control Agency

**CEQA Responsible Agency** 



# BASIS OF ALTERNATIVE DEVELOPMENT



### Parameters Common to Each Alternative

- Flood Storage: As directed by Congress, 400,000/600,000 AF at Folsom with upstream storage credit considerations
- Outlet Configuration: Existing outlets and auxiliary spillway
- Temperature Control Diagram Configuration:
   3-2-4 shutter configuration



### Variable Alternative Parameter

- Operating Rules: Rule curves that derive flood storage reserve requirements from some combination of the following:
  - ▶ Basin Wetness
  - ► Forecast Information



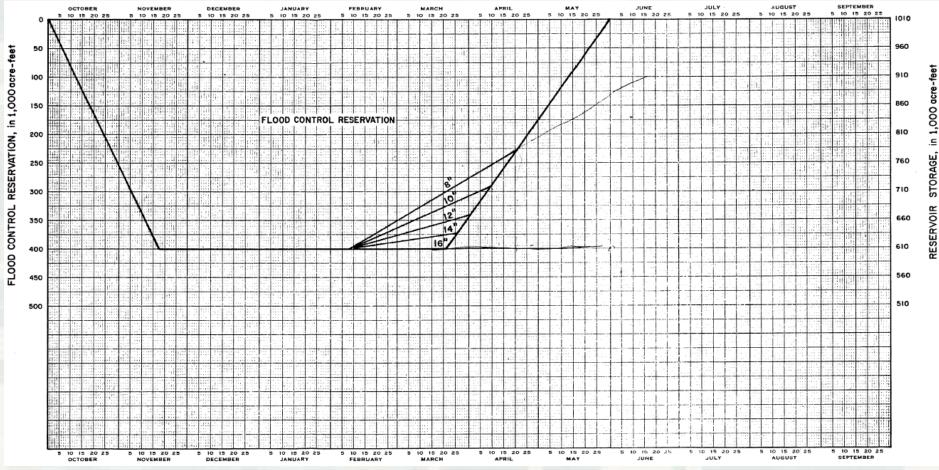
### **Discussion / Questions**



# PRESENTATION ON TECHNICAL / MODELING WORK

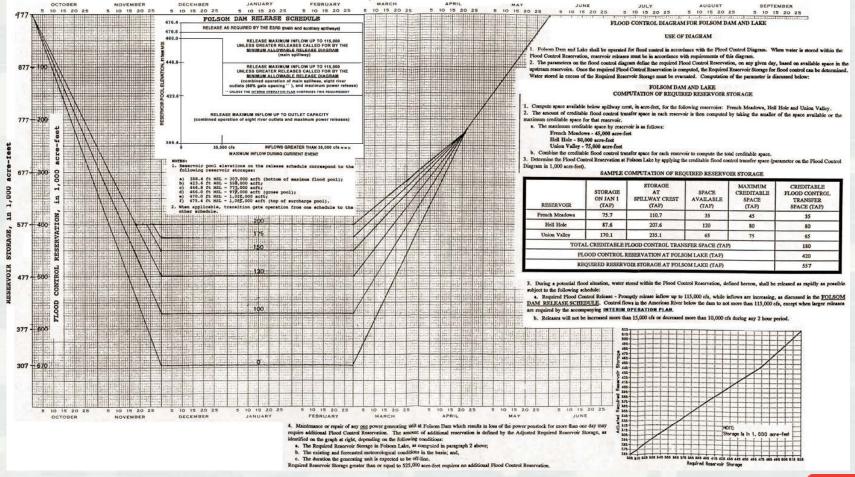


### Baseline Comparisons to the With Project Condition -- Cumulative Past -400-Fixed Flood Control Storage



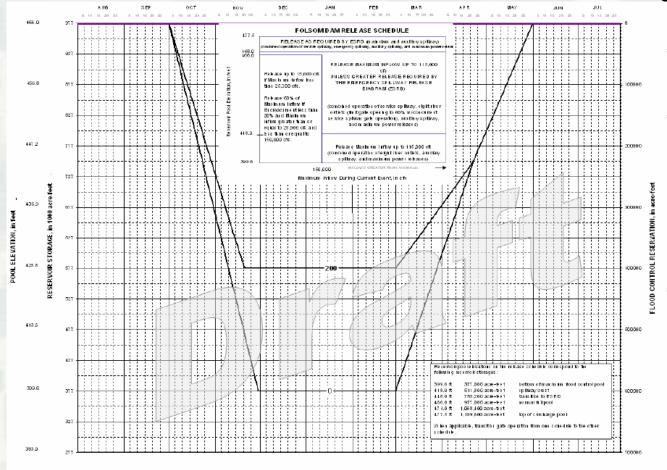


### Baseline Comparisons to the With Project Condition -- Existing -400-670 Flood Control Storage





#### **Baseline Comparisons to the With Project Condition** -- With Project --**400-600 Flood Control Storage**



#### FLOOD CONTROL DIAGRAM

#### USE OF DIAGRAM

- i. Polson Daniand Lake stallbe operated for flood control is accordance with the Picod Control Biagram When water is stored within the Flood Control Reservation, reservoir releases must be in apportunite
- 2. The parameters on the flood control diagram define the legicled Picod Control Reservation, or any given day, based on awaitable space in the spate amire servoirs. Once the required Flood Control Reservation is computed, the Required Resemblistorage to into document can be determined. Water ctored in excess of the Magnifeld Macentoristorage in 1st be exacutated. Computation of the parameter is dispussed below:
- COMPUTATION OF REQUIRED FLOOD RESERVATION STORAGE 1. Compute stack at algebrate twistill was cost in acro-pet. For the to power reservoirs: Project Meadows . Hell Hole and Union Valey
- 2. The amount of creditable food control transfer space in each reservoir is their computed by taking the smaller of the apace available or the maximum creditable space for that esemblic
- The marinum creditable space by element is as follows Fierch Meadows AS 000 agreet et 80,000 acre-\$ +1 Billon Malley 15,000 acre-test
- Combine the creditalisk floori control transites space for each reservoir to compute the total
- Determine the Floori Control Reservation at Folions Lake by applying the ore rifable flood control transfer space charameter on the Flood Control Diagram 1 (1996 nore-leet)

#### SANFLE COMPUTATION OF REQUIRED RESERVOIR STORAGE

RESERVOIR	STORAGE CN.J.R 1 (TAT)	R MILL WAY CHERT (TAV)	RPUCE AVAILABLE (FAF)	BUSCULTU CREDITABLE RPACE (TWF)	CREDITABLE FLOOD CONTROL TRUMPER SPACE (TW)
FRENCH DEUCOUVE	167	1107	- 25	299	. Ali
HELL HOLE	67.0	207.0	10.0	00	80
LINGN VALLEY	190.1	20.6.1	76	79	%
TOTAL CREDITABLE FLOOD CONTROL TRANSFER SPACE (TAP)					200
LOGG CONTROL RESERVATION AT FOLIOW LAKE (PLF)					677
ACT WAS DESCRIPTED TO BE AND ADDRESS OF THE PARTY OF THE					60.0

#### RELEASE SCHEDULE

- s. Diffig a pote tel flood situation, water to be divitibilitie. Thou Control Reservation, defined liere his shall be released as rapidly as possible subject to tie following selects hi:
- Required fixed Courts i Felicase Promptly is base infow up to 115,000 etc while inflows are nowasing, as decreased in the FOLSO II DAM RELEASE SCHEDULE. Control tows In the American Theories of the American Community of the American Community of the American Theories of the American Community of the American Comm
- Peleases will not be increased more than 30,000 cts or decreased more than 10,000 cts

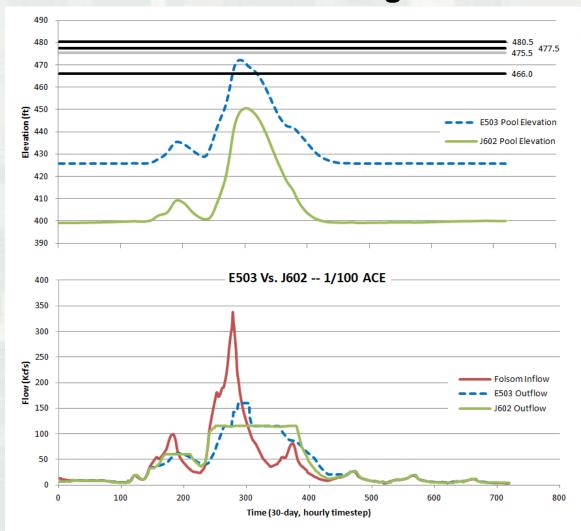
AMERICA VIRIVER WATERS HED DROJECT C ENERAL DESIGN DOCUMENATION REPORT

DRAFT WATER CONTROL PLAN

FIGURE 5-5

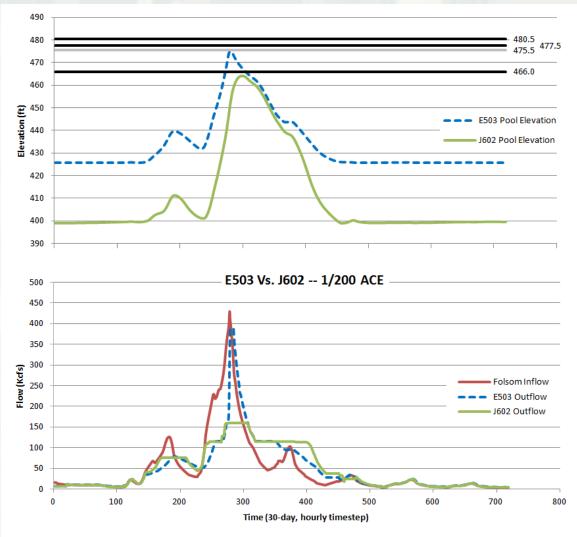


# Cumulative Past Vs. With Project Condition 400-Fixed Vs. 400-600 Flood Control 1/100 Routing



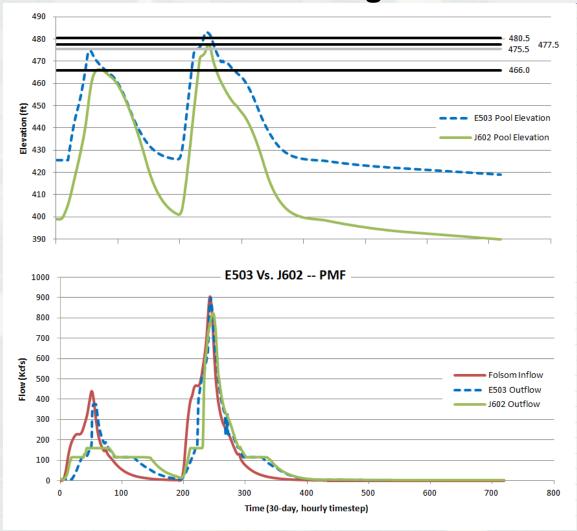


# Cumulative Past Vs. With Project Condition 400-Fixed Vs. 400-600 Flood Control 1/200 Routing



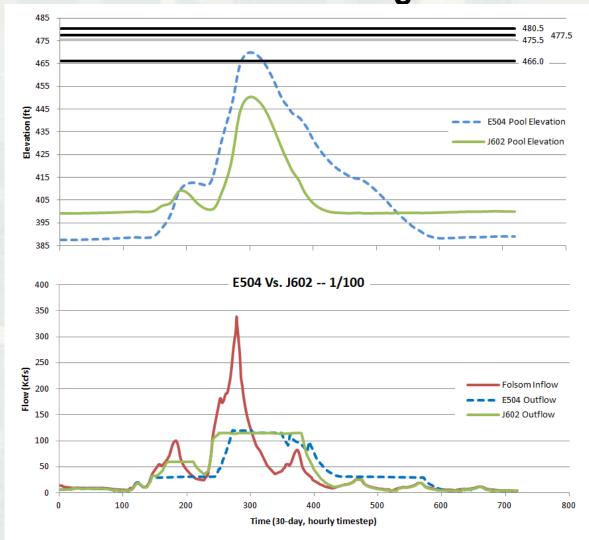


### Cumulative Past Vs. With Project Condition 400-Fixed Vs. 400-600 Flood Control PMF Routing



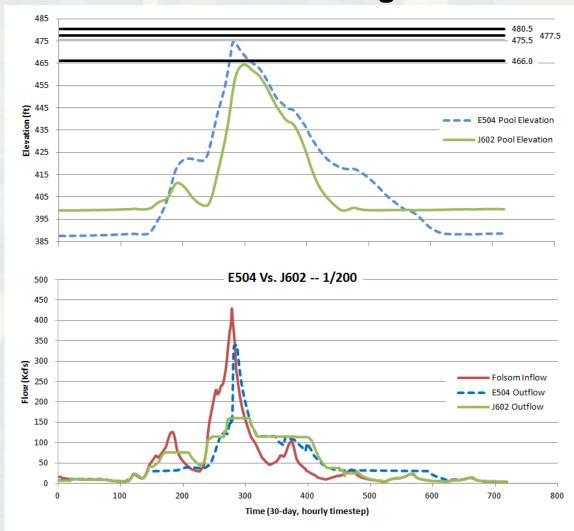


### Existing Vs. With Project Condition 400-670 Vs. 400-600 Flood Control 1/100 Routing



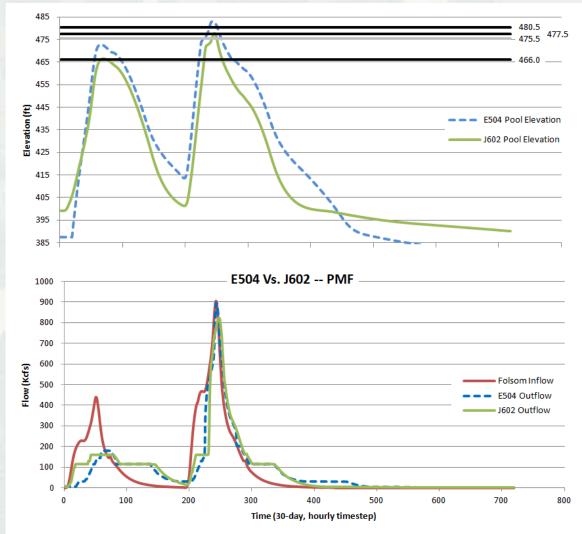


# Existing Vs. With Project Condition 400-670 Vs. 400-600 Flood Control 1/200 Routing





# Existing Vs. With Project Condition 400-670 Vs. 400-600 Flood Control PMF Routing



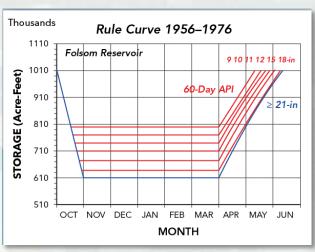


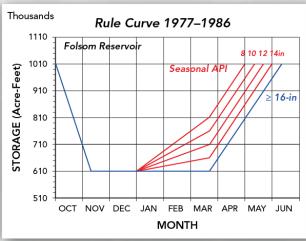
### **Basin Wetness**

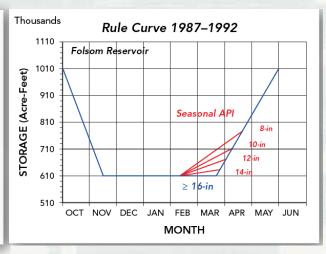


- Index could be based on basin precipitation, inflow, or projected snowmelt runoff.
- An index has been utilized in the past:

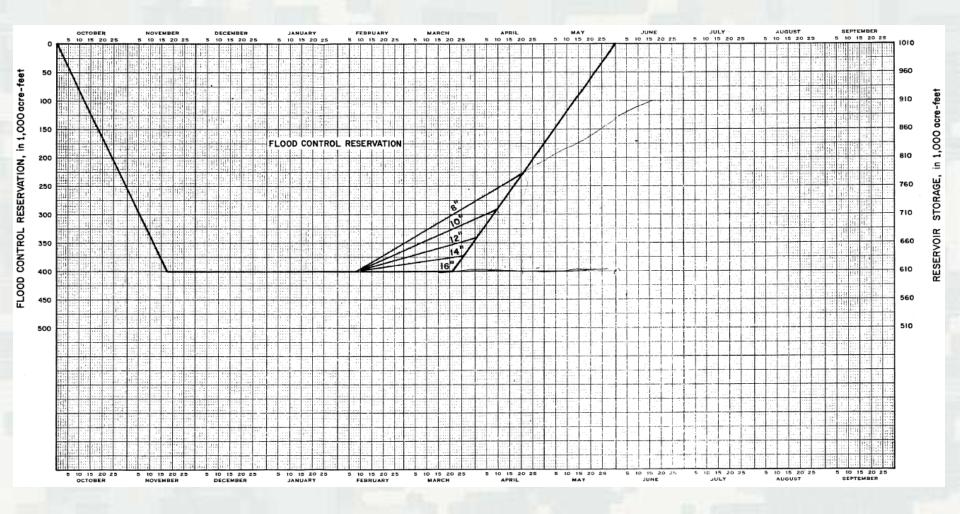
PAR = P(today) + [(% Persistence) \* PAR(yesterday)]













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FOLSOM DAM RELEASE SCHEDULE

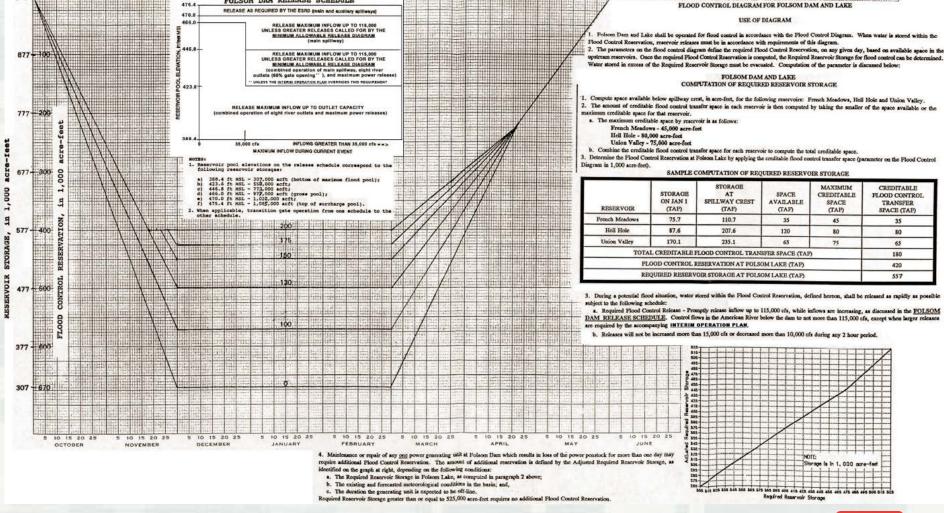
OCTOBER

NOVEMBER

10 15 20 25

DECEMBER

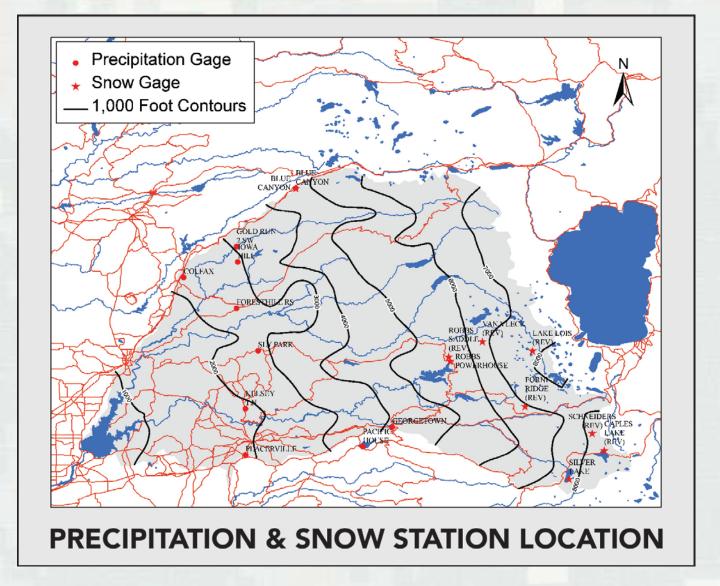
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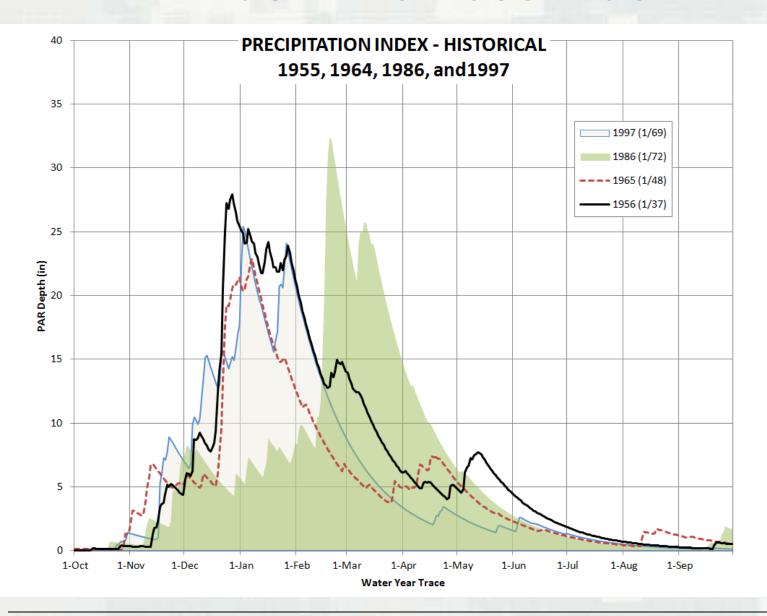


SEPTEMBER

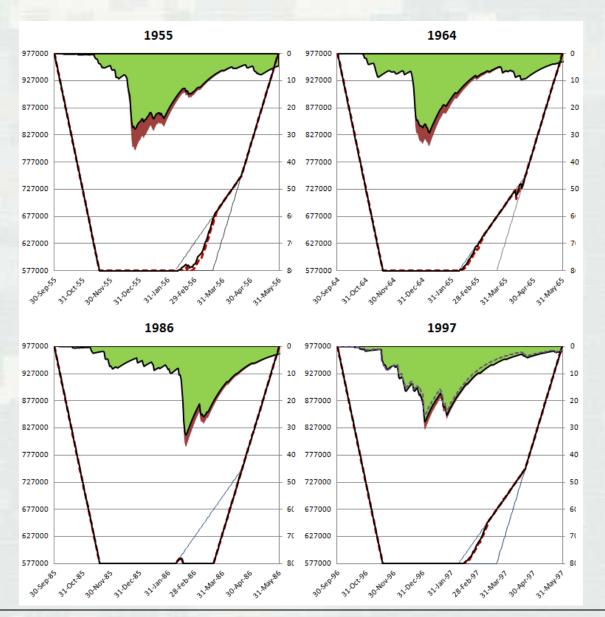
5 10 15 20 25



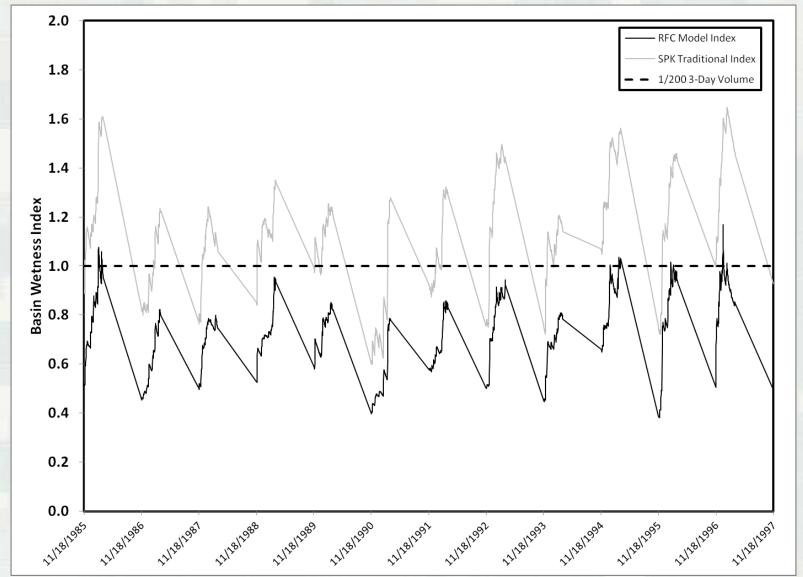














### **Discussion / Questions**





# GROUP DISCUSSION & SUMMARY COMMENTS



- Summary Discussion.
  - ► Existing issues and concerns addressed
  - New issues and concerns from today's meeting



### **Closing Remarks**



