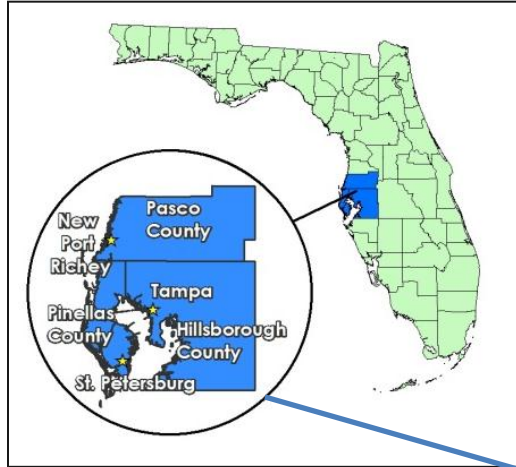




Utility Operational Planning

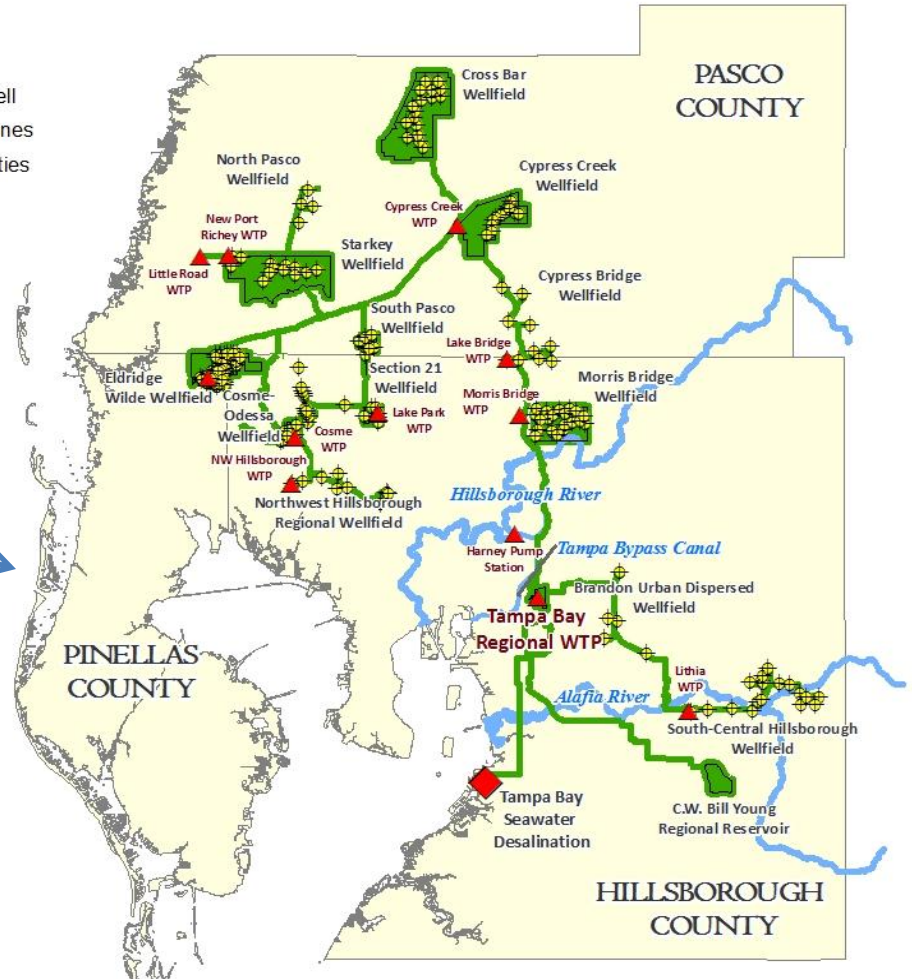
Alison Adams, Ph.D., P.E.
CIWG Workshop 6
May 10, 2012

Tampa Bay Water Regional Water Supply System



Legend

- Production Well
- Existing Pipelines
- Existing Facilities
- Rivers

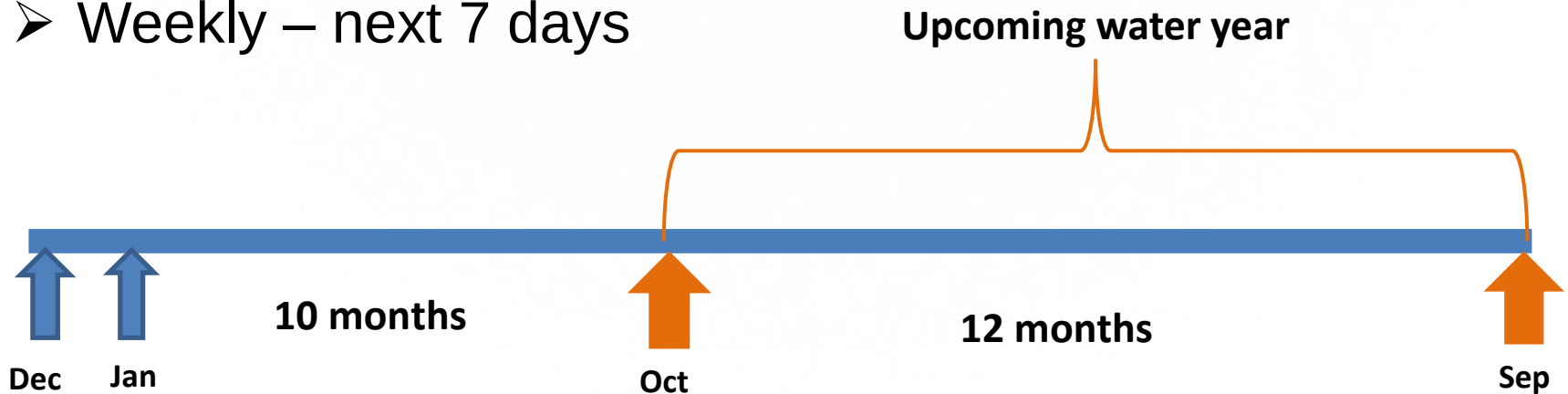


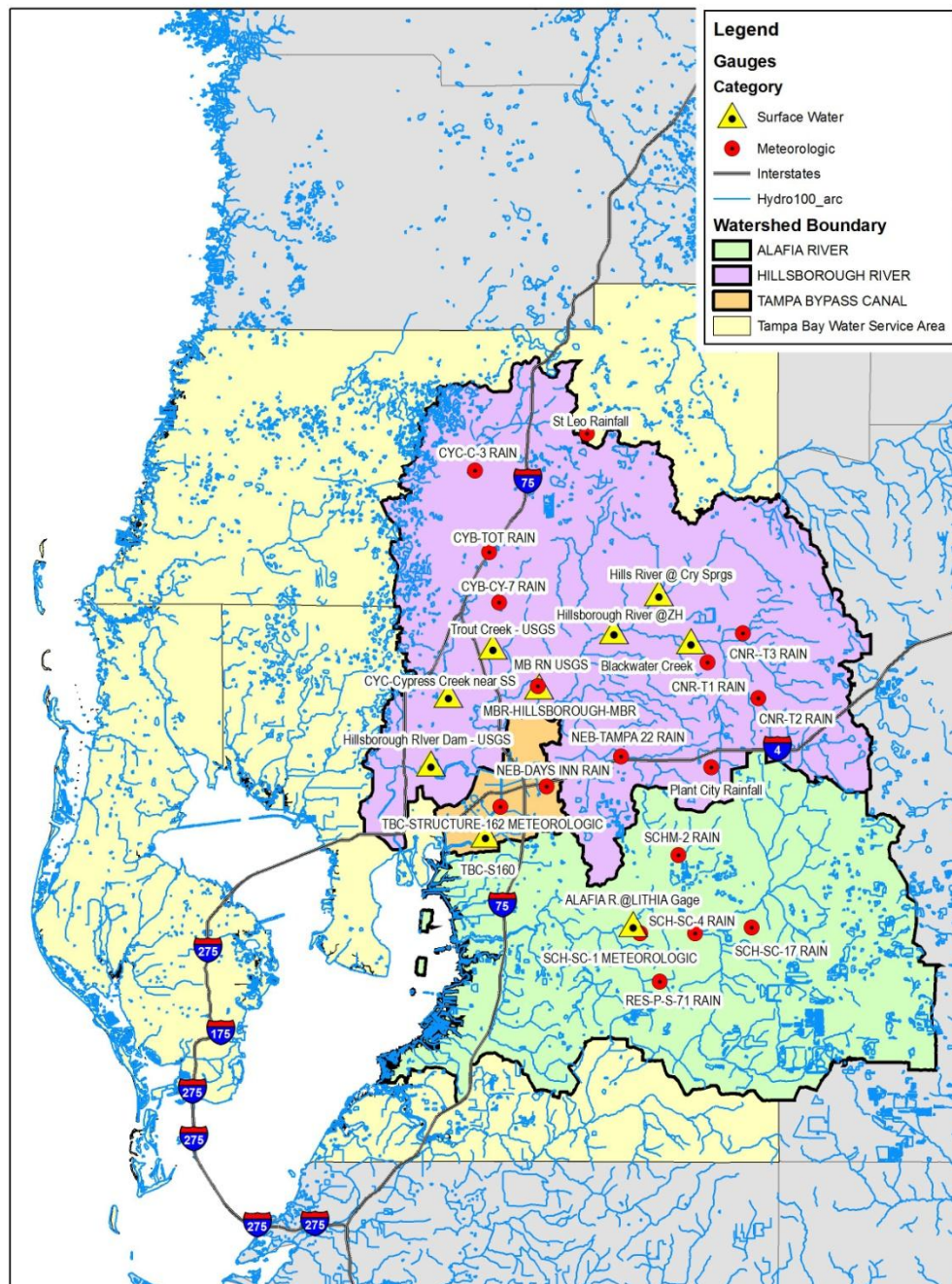
2.4 Million Residents

**220-250 mgd annual
average**

Operational Planning Timeframes

- Budgeting – 22 months look ahead for demands and hydrology
- Annual – 12 months – Update demands and hydrology
- Seasonal – 3 to 4 months
- Monthly – next 30 days
- Weekly – next 7 days



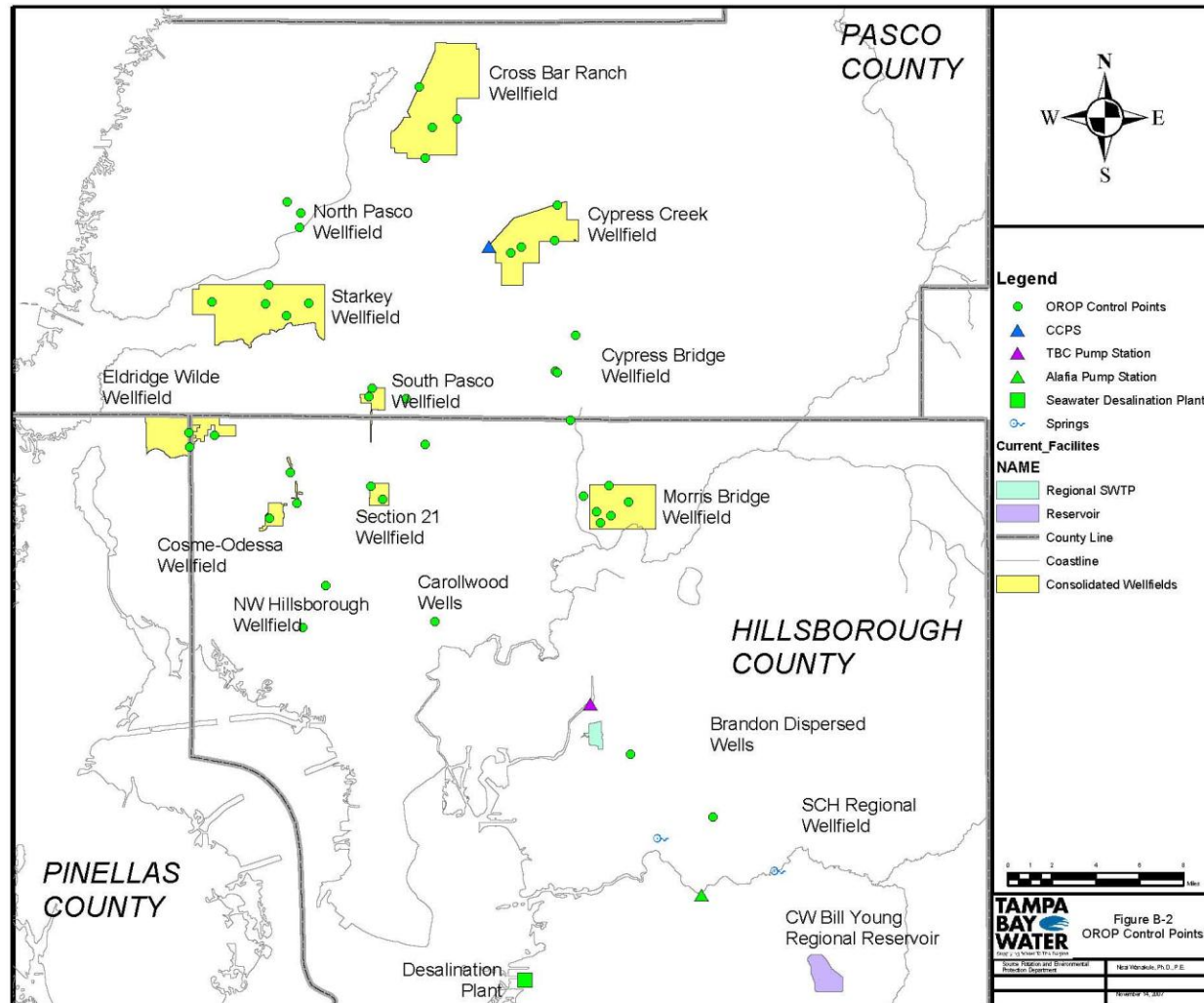


Surface Water Sources

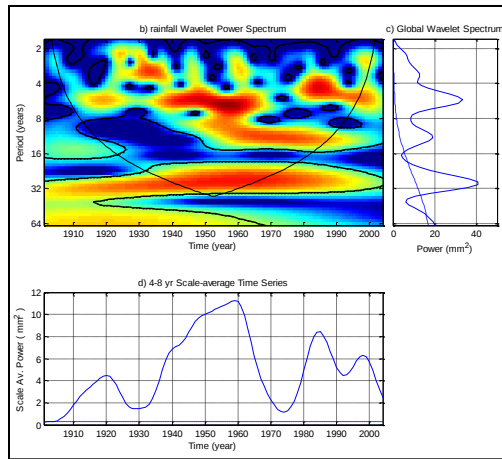
Real time data collection sites

- Rainfall
- Streamflow

Groundwater monitor wells for operational planning



Central Florida Rainfall: A Multi-Scale Climatic Signal



ENSO

JFM

	La Nina	Neutral	El Nino	MarProb
Wet	0	45	55	21
Normal	17	48	35	45
Dry	61	36	3	34
MarProb	28	43	28	100

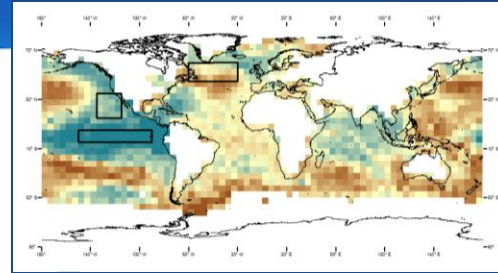
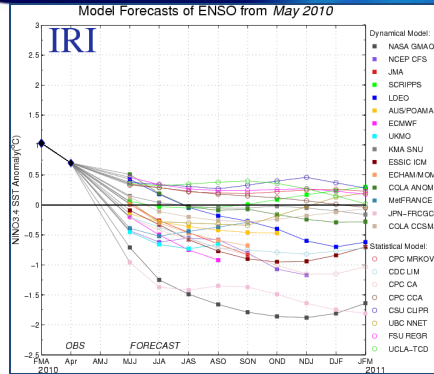


AMO Filter

	La Nina	Neutral	El Nino	MarProb
Wet	0	22	78	8
Normal	23	41	36	21
Dry	82	9	9	10
MarProb	15	11	13	39

	La Nina	Neutral	El Nino	MarProb
Wet	0	58	42	11
Normal	12	56	32	24
Dry	52	48	0	24
MarProb	12	31	15	58/59

Tampa Bay Water Models: Short Term



Tampa Bay Climate Outlook: July 8, 2010

Neutral to La Nina Watch Both Dynamical and Statistical Models

Climate Outlook

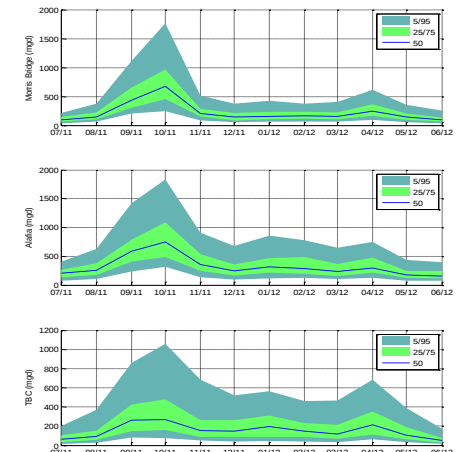
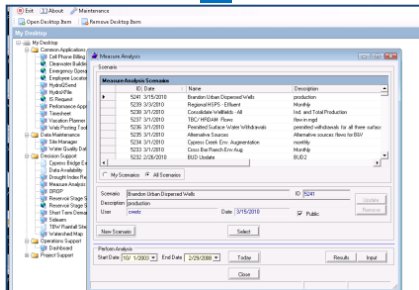
Most of the Statistical and Dynamical Models show the continued current ENSO (through August). But dynamical models show transitioning to La Nina as summer approaches. Figure 1a. Figure 1b shows forecast as seen a year ago. Most show also for outlook through the remainder of 2010

Contingency Table

Markov Rainfall Model

Rainfall/Runoff Model

Climate Outlook
&
Observation



Modeling tools used in operational planning

- Long-term demand forecast models – monthly time step, incorporates socioeconomic factors with weather
- Short-term demand forecasting models – rainfall and temperature driven
- Long-term river flow simulation models (100 yrs of rainfall)
- Short-term river flow forecasting models (weekly to 4 weeks)
- Groundwater level forecast models (weekly to 4 weeks)
- Optimized Regional Operations Plan – weekly groundwater optimization model

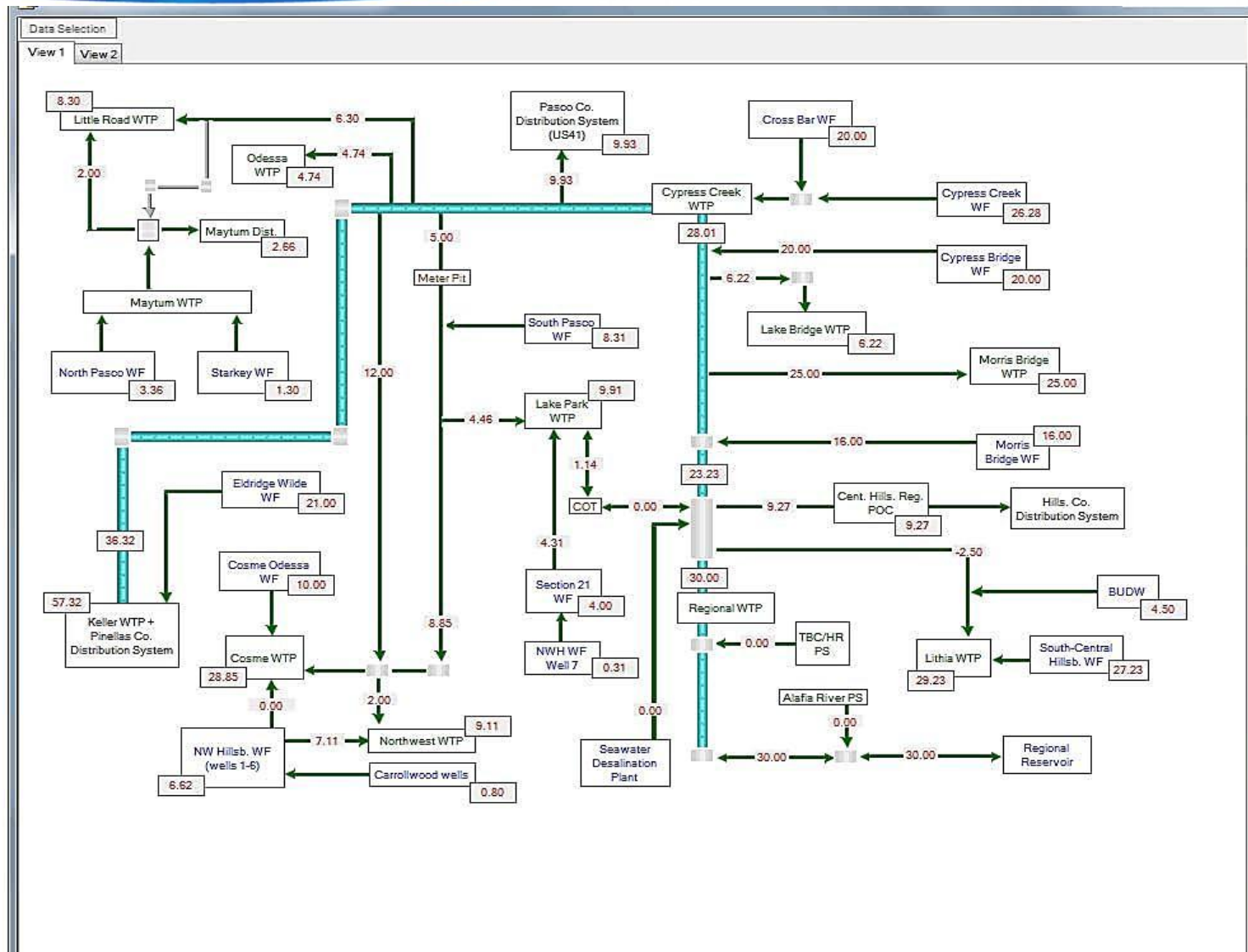


Monthly Supply Allocation Plan

Supply Allocation Table WY 2011 (July 4, 2011)

WY 2011	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	AVG	FY 2011 Budget
Revised Ann. Delivery	171.7	163.9	171.4	155.7	148.5	157.0	163.4	178.6	178.6	160.0	152.0	152.0	162.7	163
Env. Augmentation	1.12	1.74	1.27	1.2	1.18	1.03	0.76	1.26	1.53					
SWTP	75.12	59.94	51.03	55.31	46.19	48.25	49.18	50.02	50	45	50	50	52.5	45
Desal	0	0	0	9.87	14.57	12.17	8.79	0	0	0	0	0	3.8	4
THIC	1.14	1.54	1.14	1.14	1.14	1.14	1.14	1.14	1.13	1	1	1	1.1	1
301	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
SW Total	76.26	61.48	52.17	66.32	61.9	61.56	59.11	51.16	51.13	46	51	51	57.42	50.00
CWUP	74.21	80.15	99.83	71.20	67.04	72.58	74.79	94.46	100.71	87.00	75.00	75.00	81.00	85
SCH and BUD WF	23.79	24.92	22.79	19.91	20.90	24.57	30.06	34.88	28.44	26.00	25.00	25.00	25.52	27
Carrollwood/Eagles	0.56	0.86	0.81	0.81	0.90	0.81	0.83	0.77	0.83	1.00	1.00	1.00	0.85	1
GW Total	98.56	105.93	123.43	91.92	88.84	97.96	105.68	130.11	129.98	114.00	101.00	101.00	107.37	113.00
System Total	174.8	167.4	175.6	158.2	150.7	159.5	164.8	181.3	181.1	160.0	152.0	152.0	164.8	163.00
BUD WF to Lithia	0.7	2.4	3.3	2.7	2.8	3.0	2.2	2.8	4.0	2.0	2.0	2.0	2.49	
Reg HSPS to Lithia	8.2	2.0	1.8	3.1	5.9	5.5	3.0	2.8	6.5	3.0	3.0	3.0	3.98	
BUD WF to Reg HSPS	0.0	0.0	0.0	0.2	0.0	0.3	2.6	2.1	0.0	3.0	3.0	3.0	1.18	
SCH (Lithia) to Reg HSPS	0	0	0	0	0	0	0	0	0	0	0	0	0.00	
Reservoir Storage (BG)	15.0	13.2	11.5	8.8	8.8	8.4	7.5	9.9	8.3	6.9	7.8	9.3	10.5	
Reservoir (net eff MG)	1519.82	1680.97	1573.76	1085.25	344.14	1058.9	-2649.4	1447.83	1499	-930	-1550	-1200		
Reservoir (eff rate MGD)	49.03	56	51.03	41.44	12.3	34.15	Fill	50	50	-30	-50	-40		
Reservoir Stage (ft)	135.1	129	123.4	114.0	114	112.6	109.4	117.9	112.2	107.2	110.5	115.9	120	

Weekly scheduled demand and supply



Water Shortage Mitigation Plan

- 4 Water Shortage Levels
- Triggers activate transition between water shortage levels
- Hydrologic
 - Early drought warning
- Surface water supply
 - Increasing severity



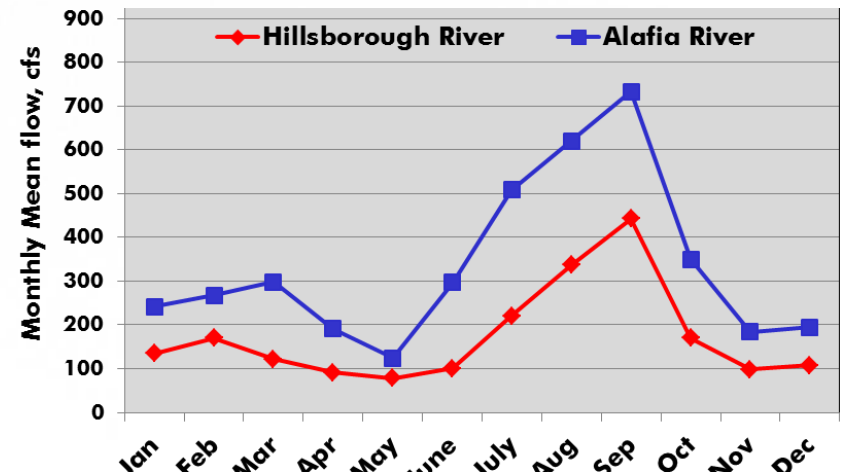
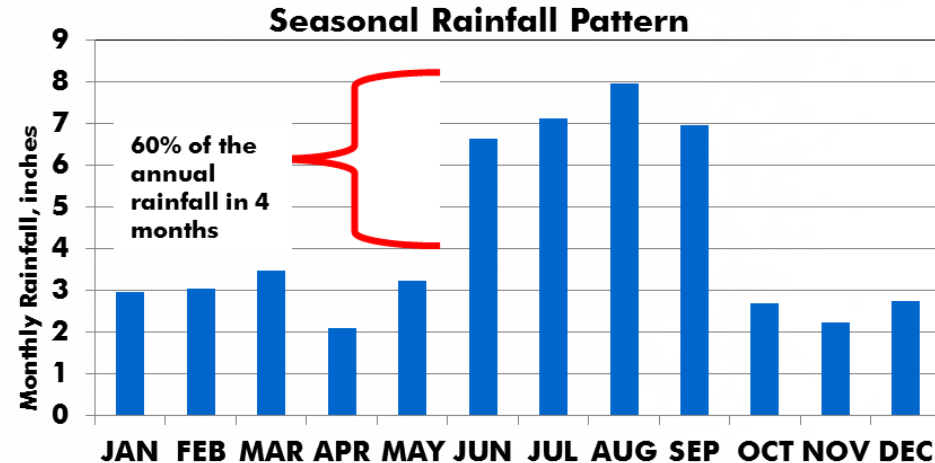
Water Shortage Mitigation Plan

Final Report

February, 2009

Operational Planning Challenges

- Reliability of ENSO Forecast
- Summer rainfall predictive skill
- Useable seasonal rainfall predictions at finer resolutions
- Improved demand forecasting at monthly to seasonal scale



Thank you

QUESTIONS?