

Rotational Supply Management Provides a Bonus - Low Cost, Safe Yield Increase



Session 9
Water Resource Planning and
Management

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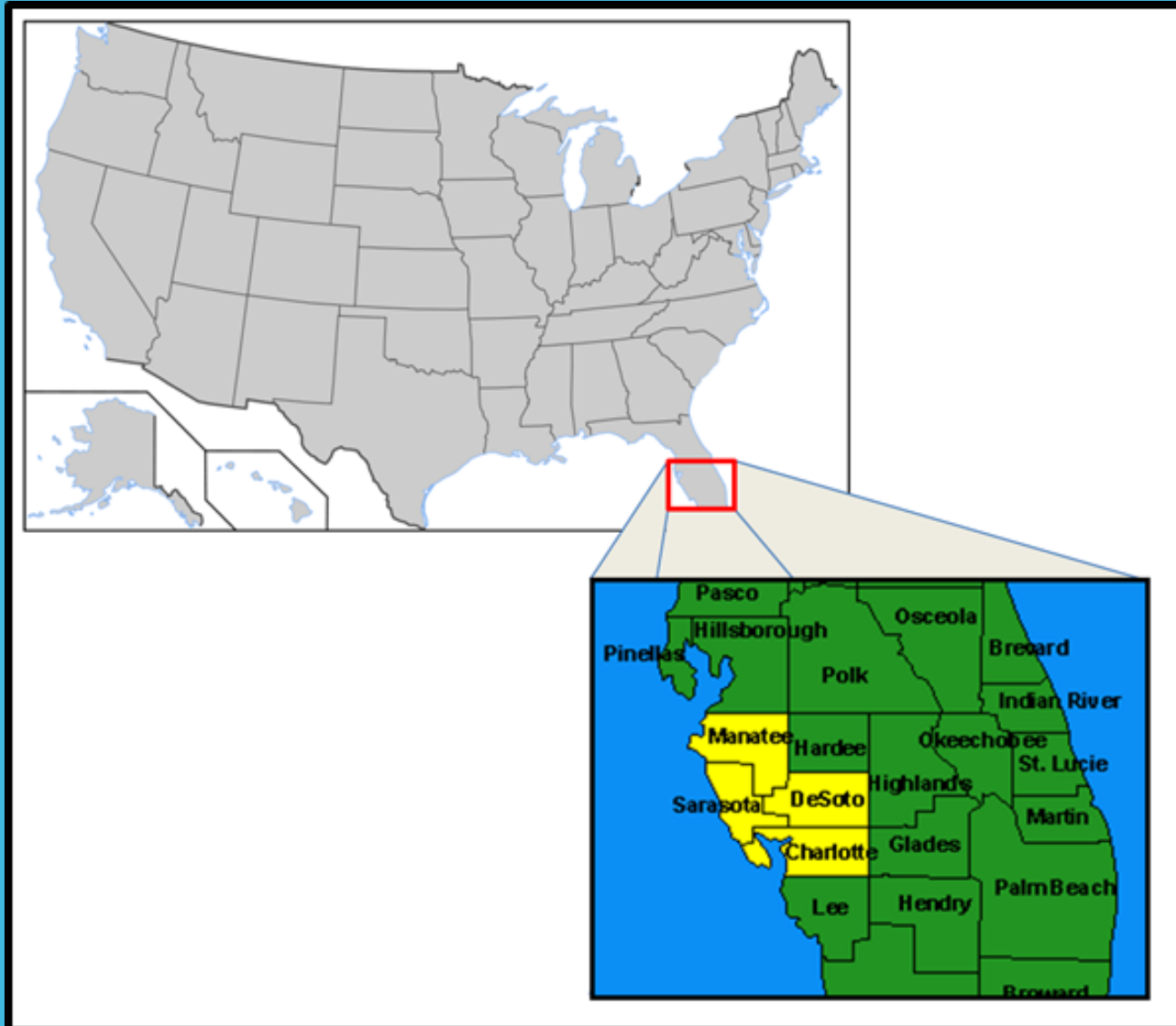
Terri Holcomb
&
Kevin Morris

Who Are We?



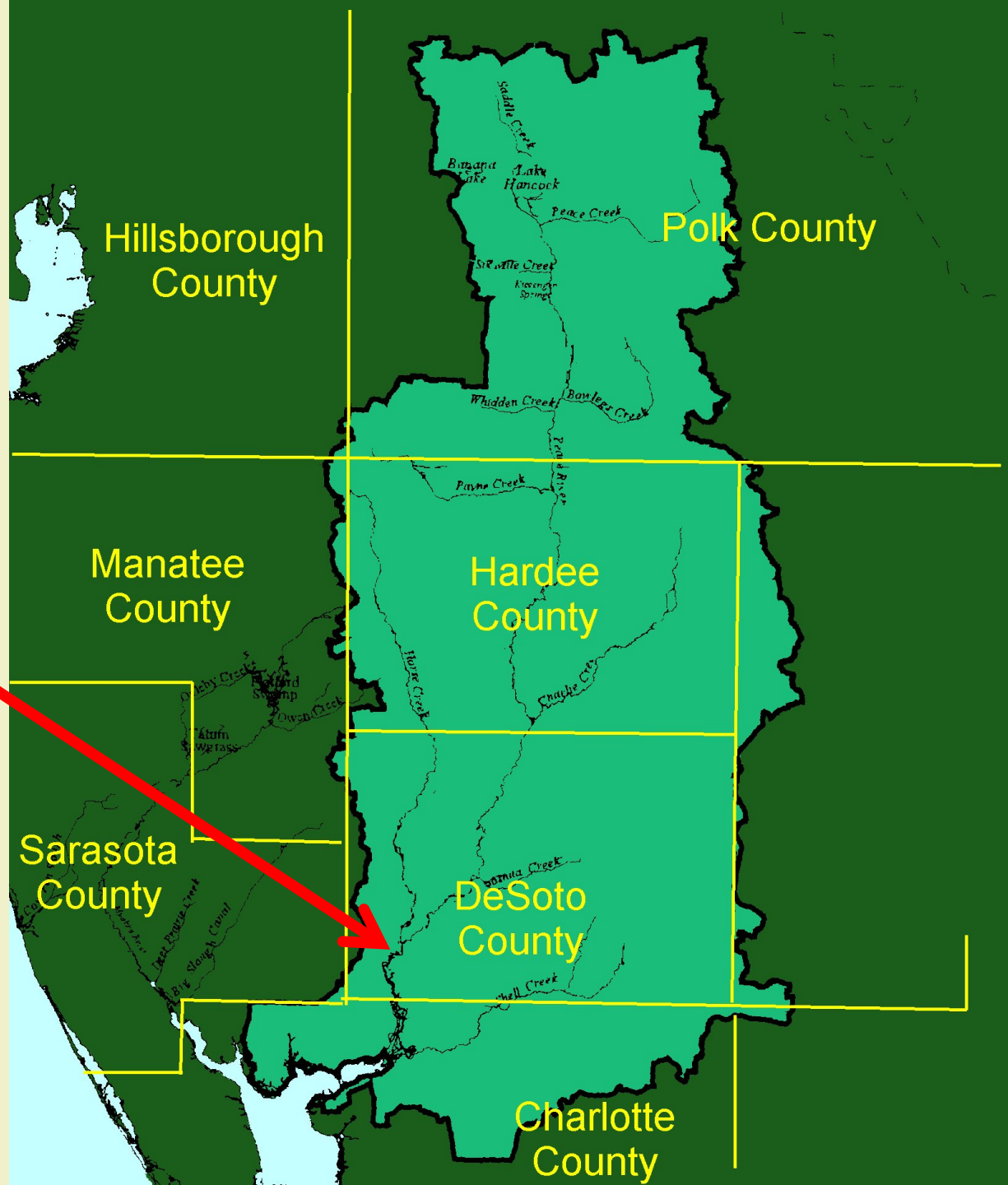
**Peace River
Manasota**

Regional Water Supply Authority



Drainage Basin & the Peace River Facility

- Location of Peace River Facility





**37 miles to
reach Gulf of
Mexico**

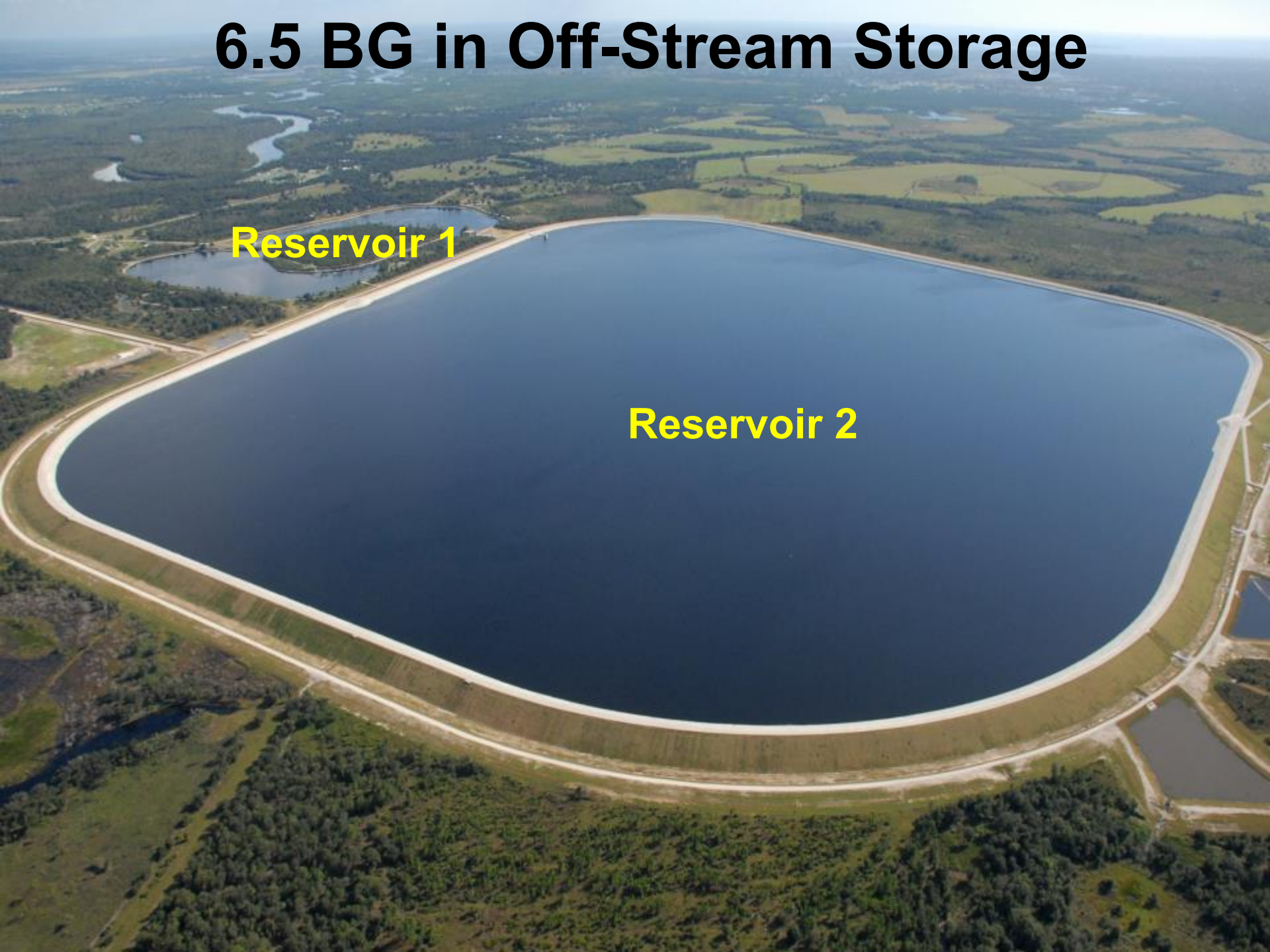
120 MGD River Intake Pump Station



6.5 BG in Off-Stream Storage

Reservoir 1

Reservoir 2



51 MGD Treatment Capacity

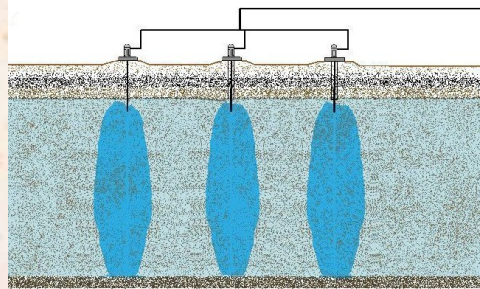


7 BG in Underground Storage

21 Finished Water ASR Wells



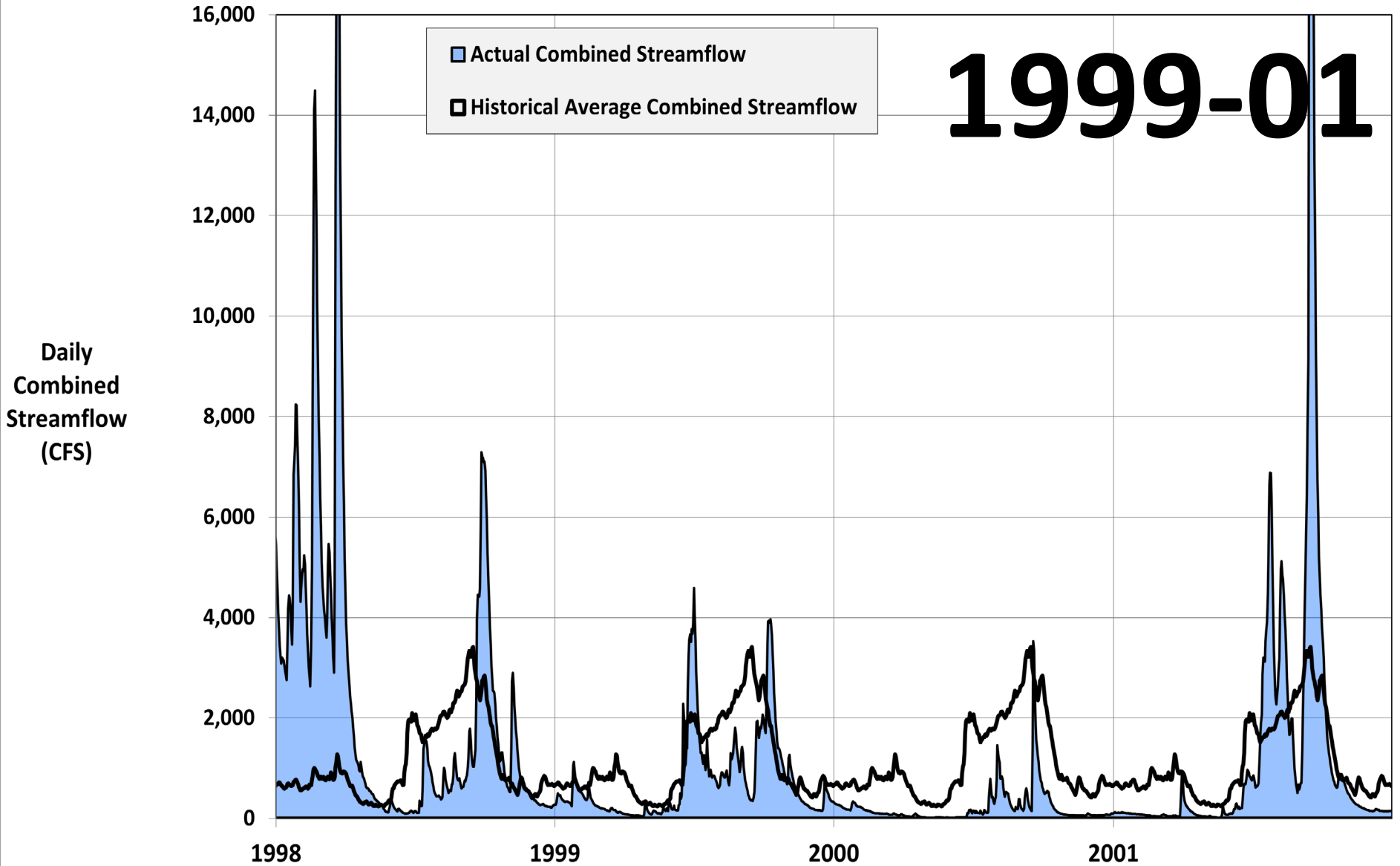
ASR Well System



Surface Water System and Challenge Events

Comparison of Normal Combined Streamflow to Actual Combined Streamflow

This Periods Reflects the 1999-01 Drought Event



The Effect of Drought on the Upper Peace River



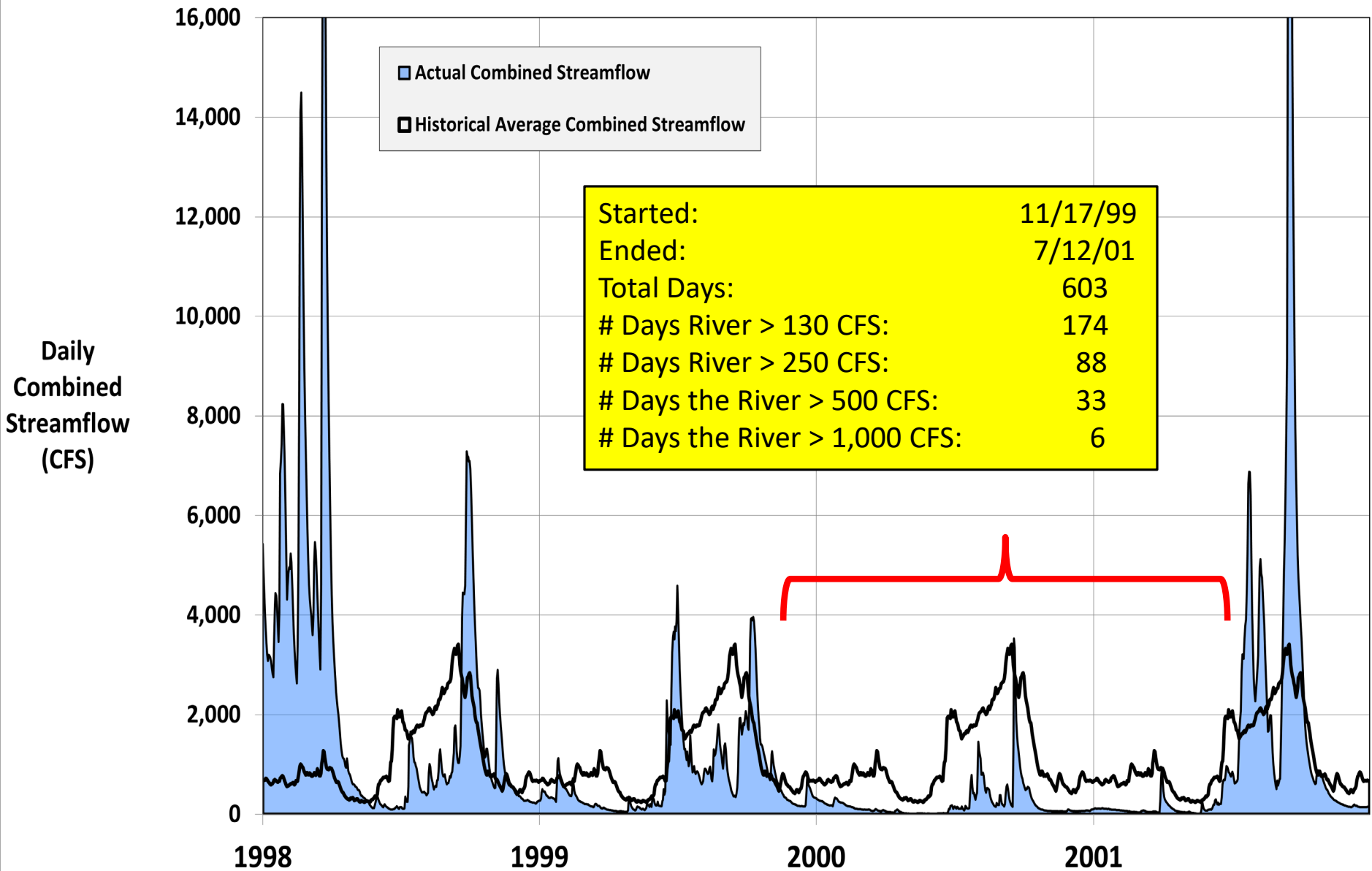
Picture from FDEP's "Florida's Water" webpage



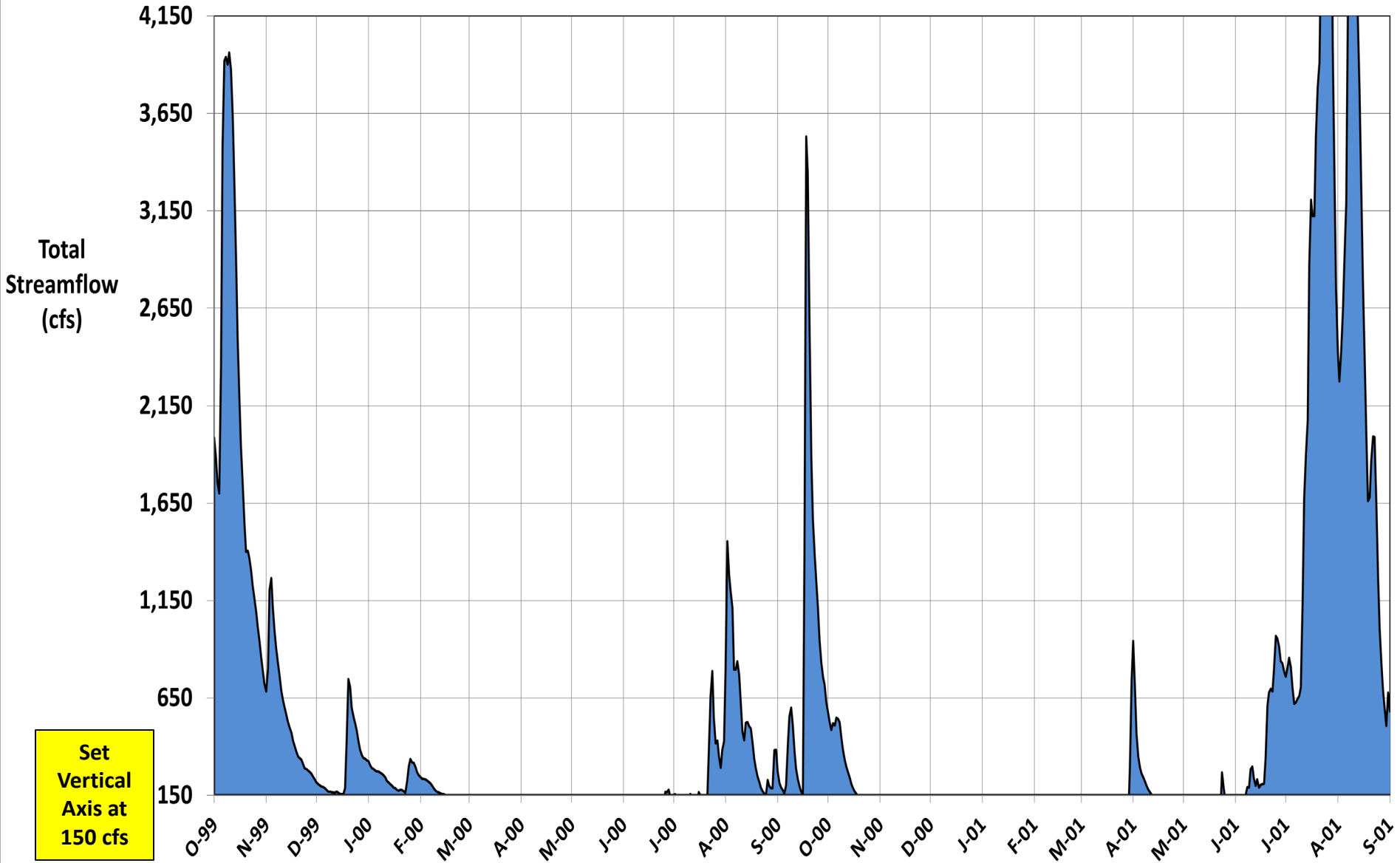
Picture by Sam Stone during 2000-1 drought

Comparison of Normal Combined Streamflow to Actual Combined Streamflow

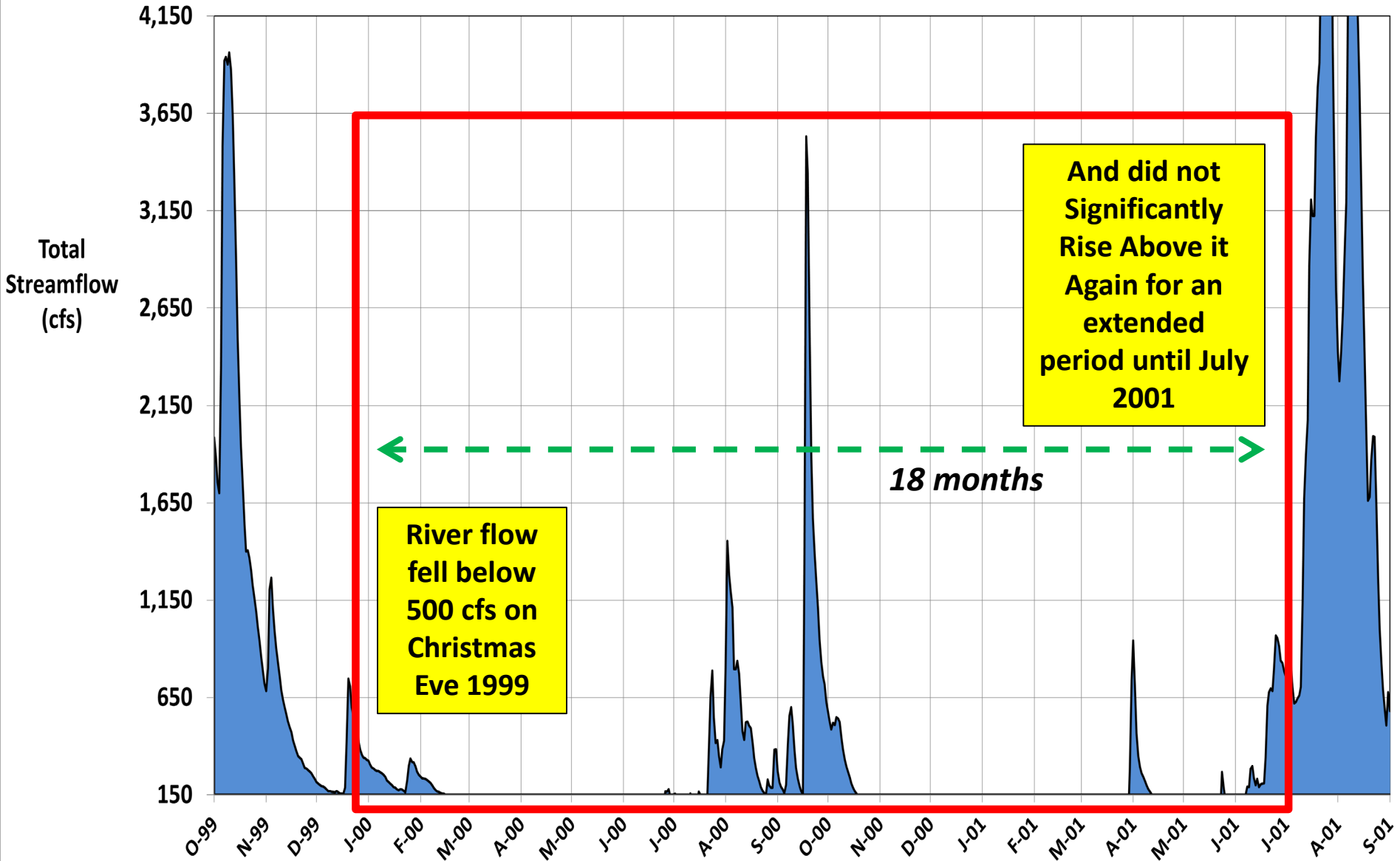
This Periods Reflects the 1999-01 Drought Event



Combined Streamflow for the 1999-01 Drought Event

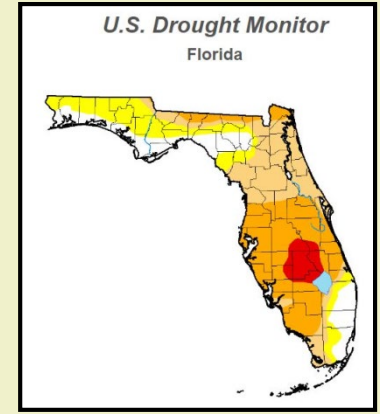


Combined Streamflow for the 1999-01 Drought Event



Florida Droughts

- Florida Droughts are Unique!
- Florida saw 4 significant droughts between 1975-2015
- Florida droughts have lasted 18 – 24 months
- Roughly 7 drought years in the past 40 years
- Droughts do not announce themselves in advance
- You may not realize you are in an extended drought until you have already been in it 6 – 8 months



**System Models are
Powerful Decision Support Tools**

Peace
River



Reservoir 2

Reservoir 1

Animation Showing Cyclical Water Resource Dynamics for the Peace River Facility

ASR Wellfield 1

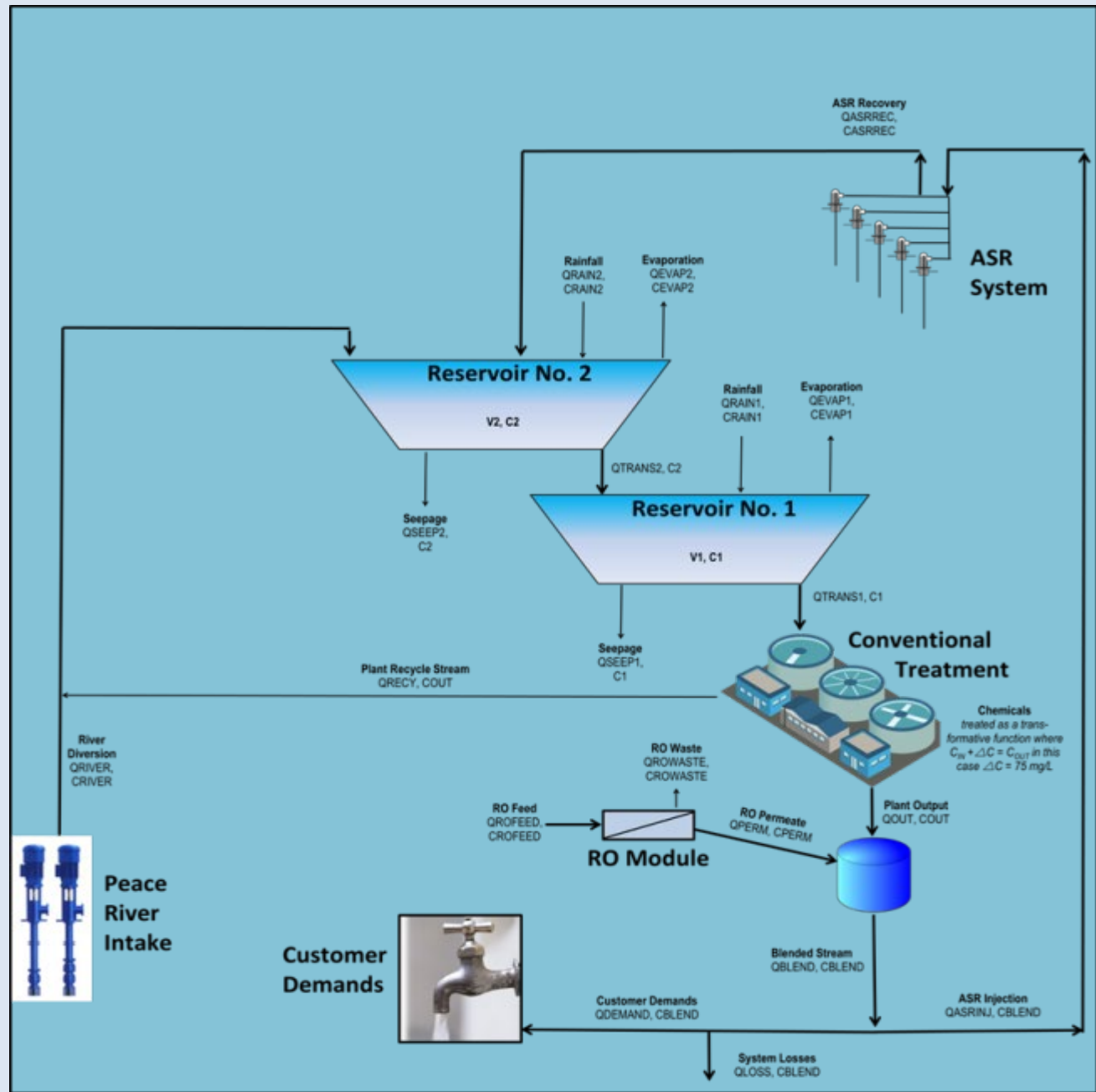
ASR Wellfield 2

Water
Treatment
Plant



Public Supply

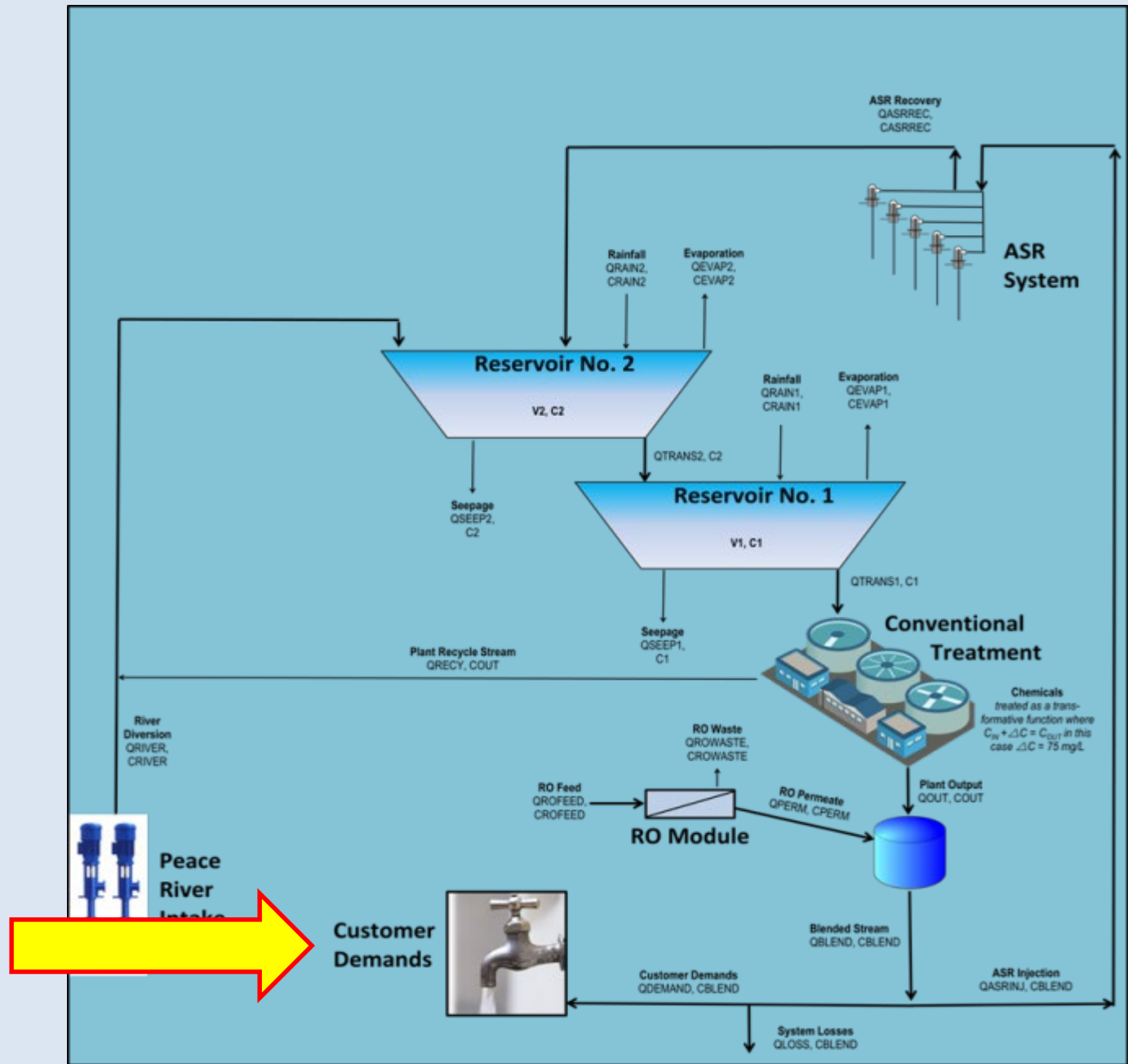
System Reliability Modeling Starts by Defining Fundamental Solvent & Solute Mass Balance Relationships
(Solute in this case is TDS)



Types of Sources

- Diversified Portfolio of Supply
 - **Surface Water Supplies** & storage mechanisms
 - In-stream storage
 - Off-stream storage
 - ASR storage
 - **Groundwater Supplies**
 - *Desalination Supplies*
- Benefits of a Diversified Portfolio
 - Enhances System Resiliency & Sustainability
 - Enables Possibility for Rotational Source Management

We can Model Offsets from Other Sources by Adjusting Demand to Reflect Other Sources are Feeding into the Regional System



Offsetting Water Supply Scenarios Considered Here (*infinite possibilities*)

- Baseline
- Schedules 1, 2 & 3 – **dual level, triggered by raw water reserves**
- Schedule 4 – **single level, drier months NDJFMAM**
- Schedule 5 – **single level, driest months MAM**
- Schedule 6 – **dual level, drier months NDJFMAM**
- Schedule 7 – **dual level, based on river flow**

**Ancillary Benefit of Rotational
Management - Offsetting Water can
Boost System Safe Yield**

Quantity Reliability Matrix

Demand (MGD)	No Offset Quantity Reliability	Schedule 1 Offset Quantity Reliability	Schedule 2 Offset Quantity Reliability	Schedule 3 Offset Quantity Reliability	Schedule 4 Quantity Reliability	Schedule 5 Quantity Reliability	Schedule 6 Quantity Reliability	Schedule 7 Quantity Reliability
34.7	99.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0
35.7	99.8	100.0	100.0	100.0	99.9	99.9	100.0	100.0
36.7	99.2	100.0	100.0	100.0	99.6	99.8	100.0	100.0
37.7	99.0	100.0	100.0	100.0	99.1	99.3	100.0	100.0
38.7	98.7	100.0	100.0	100.0	98.9	99.0	99.9	100.0
39.7	98.4	99.8	99.9	100.0	98.6	98.6	99.8	100.0
40.7	98.1	99.5	99.7	99.8	98.3	98.2	99.2	100.0
41.7	97.8	99.2	99.2	99.5	98.0	97.9	98.9	99.9
42.7	97.5	98.9	99.0	99.1	97.8	97.7	98.4	99.5
43.7	97.0	98.7	98.8	98.9	97.3	97.4	98.1	99.2
44.7	96.5	98.3	98.5	98.7	96.9	97.1	97.9	99.0

Note: Conditional Formatting Rules

99.5
99.0
98.0



Quality Reliability Matrix

Demand (MGD)	No Offset Quality Reliability	Schedule 1 Offset Quality Reliability	Schedule 2 Offset Quality Reliability	Schedule 3 Offset Quality Reliability	Schedule 4 Quality Reliability	Schedule 5 Quality Reliability	Schedule 6 Quality Reliability	Schedule 7 Quality Reliability
34.7	95.0	97.2	97.4	97.5	97.2	95.9	96.9	98.3
35.7	94.2	97.1	97.3	97.4	97.0	95.6	96.9	97.5
36.7	93.6	96.8	97.1	97.3	96.9	95.0	96.3	97.3
37.7	93.0	96.4	96.9	97.2	96.7	94.4	96.0	97.2
38.7	92.6	96.1	96.6	97.0	96.6	93.8	95.8	97.1
39.7	92.1	95.2	96.3	96.7	95.9	93.5	95.3	96.8
40.7	91.7	94.7	95.9	96.3	95.2	93.1	94.8	96.4
41.7	91.5	94.3	95.1	96.0	94.4	92.5	94.1	95.3
42.7	91.2	94.0	94.7	95.5	94.1	92.0	93.6	95.0
43.7	90.8	93.8	94.4	95.2	93.6	91.7	93.3	94.4
44.7	90.3	93.1	94.1	94.6	93.3	91.3	92.7	93.6

Note: Conditional Formatting Rules

95.0
94.0
93.0



Conclusions

- Benefits of rotating sources of supply:
 - Improved resiliency & sustainability
 - 15% boost in safe yield for low capital cost
- System modeling plays important role in evaluating future configurations and scenarios
- Challenges ahead:
 - Unified operational control
 - Trigger mechanisms for “switching” sources
 - Offsetting compensation
 - Permitting



Acknowledgements

- PRMRWSA Water Resources & Operations Departments
- Florida Water and Climate Alliance