TAMPA BAY WATER

University of Florida
Water Institute Symposium

Dealing with Climate Uncertainty in Operating a Reliable Water Supply System

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Tampa Bay Water

Sustainable Water Resources
Florida Challenges, Global Solutions

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Overview

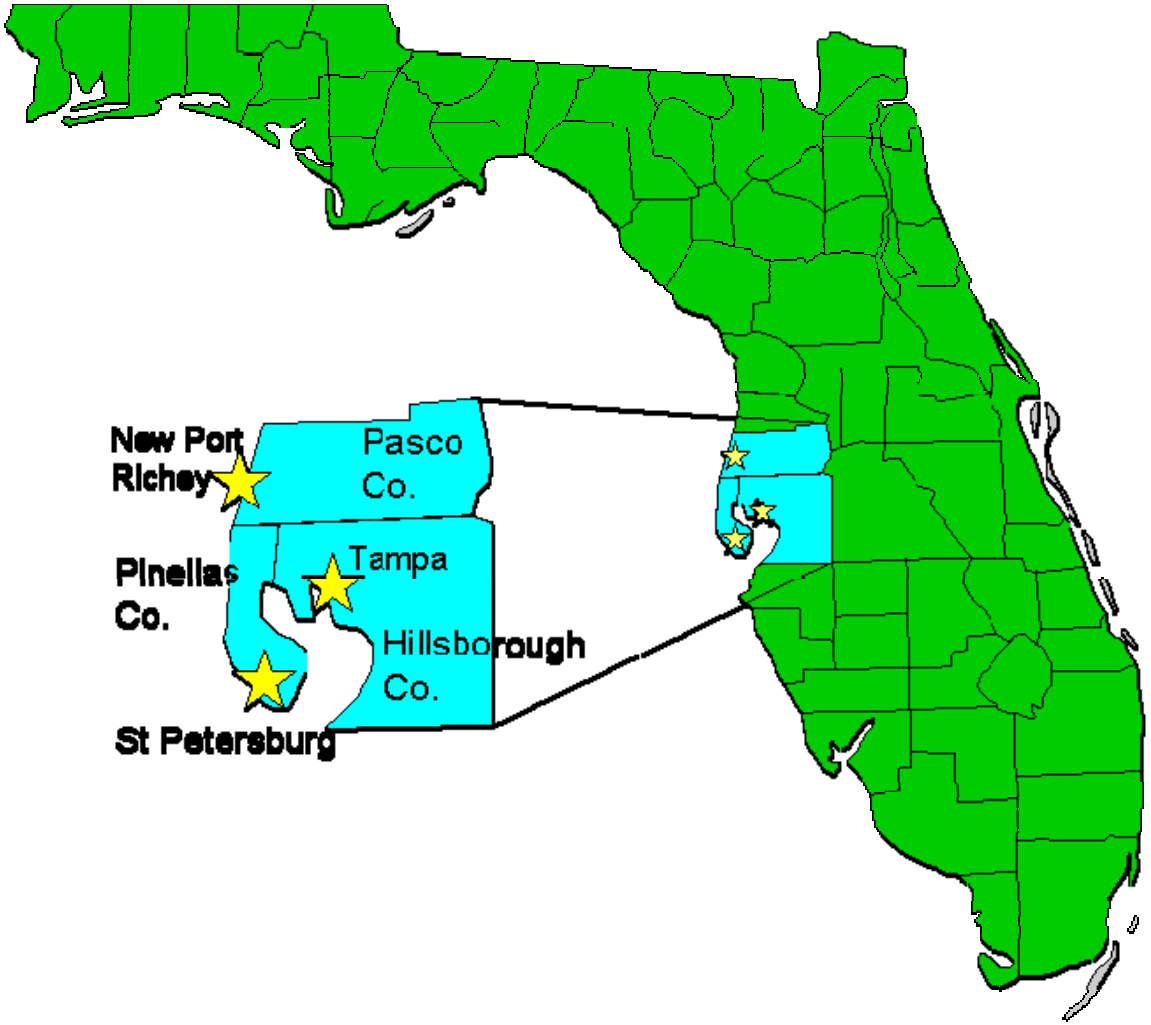
- **Tampa Bay Water - Who we are and what we do**
- **Flexible and integrated water supply system**
- **Climate variability and uncertainty – why it is important**
- **Dealing with climate variability and change**
  - **Current operations**
  - **Future planning**

Tampa Bay Water- Where we are

2.5 Million Residents Served

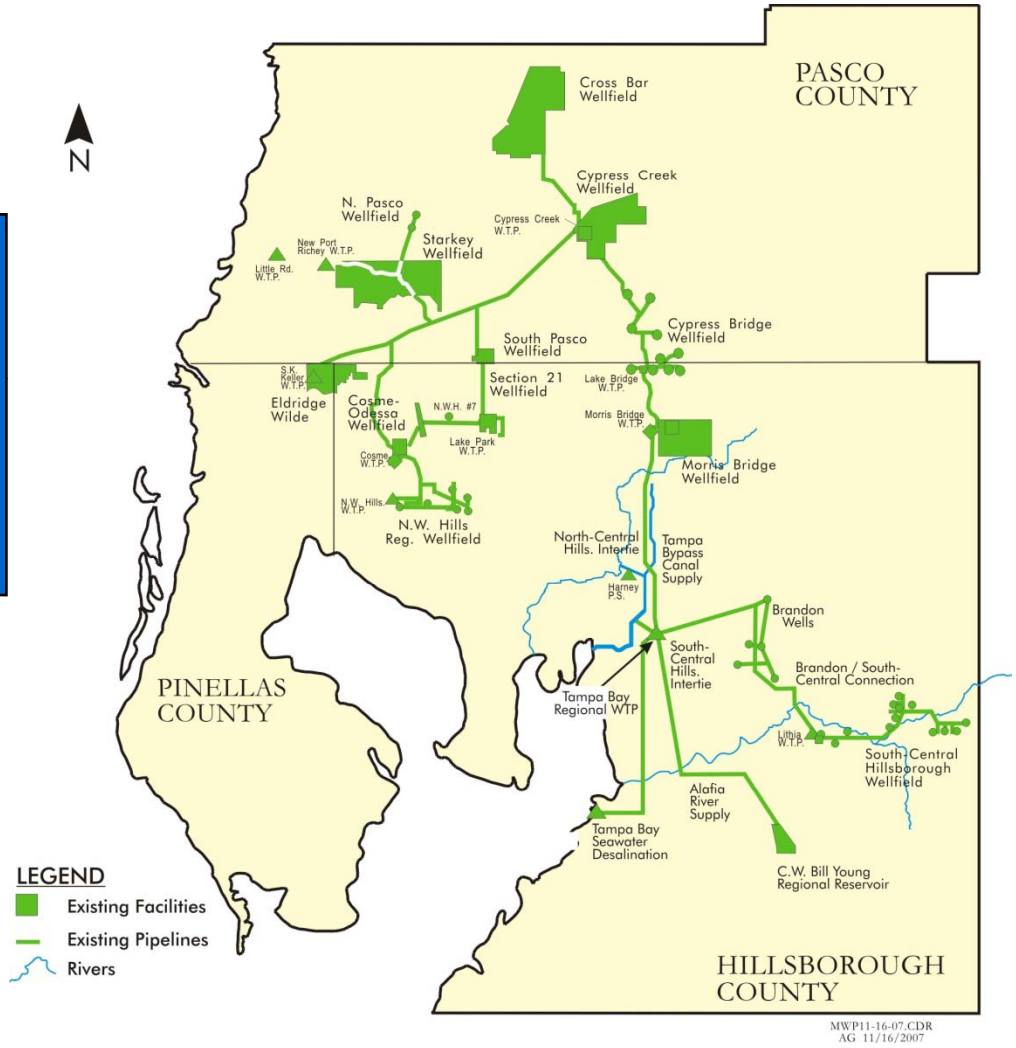
260 mgd total public supply average daily flow

- Largest wholesale water supplier in Florida
- Largest wholesale water supplier in Southeast United States
- A unique system in North America



Integrated, Flexible and Diverse Water Supply System

An integrated, *flexible and diverse* system that produces a su*stainable and reliable* water supply



Tampa Bay Seawater Desalination

Enhanced Surface Water System

Tampa Bypass Canal

Regional Surface Water Treatment Plant

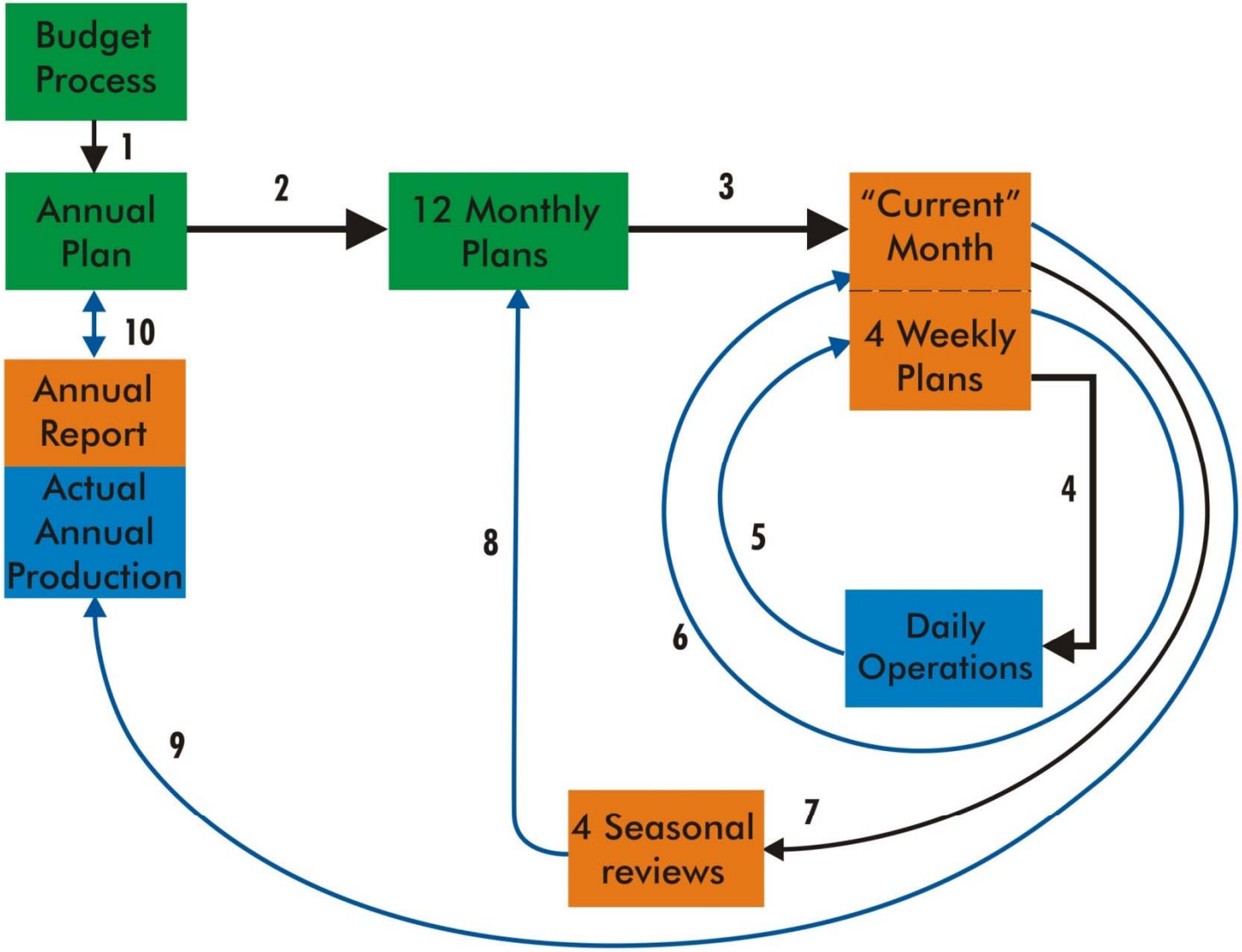
Alafia River Intake

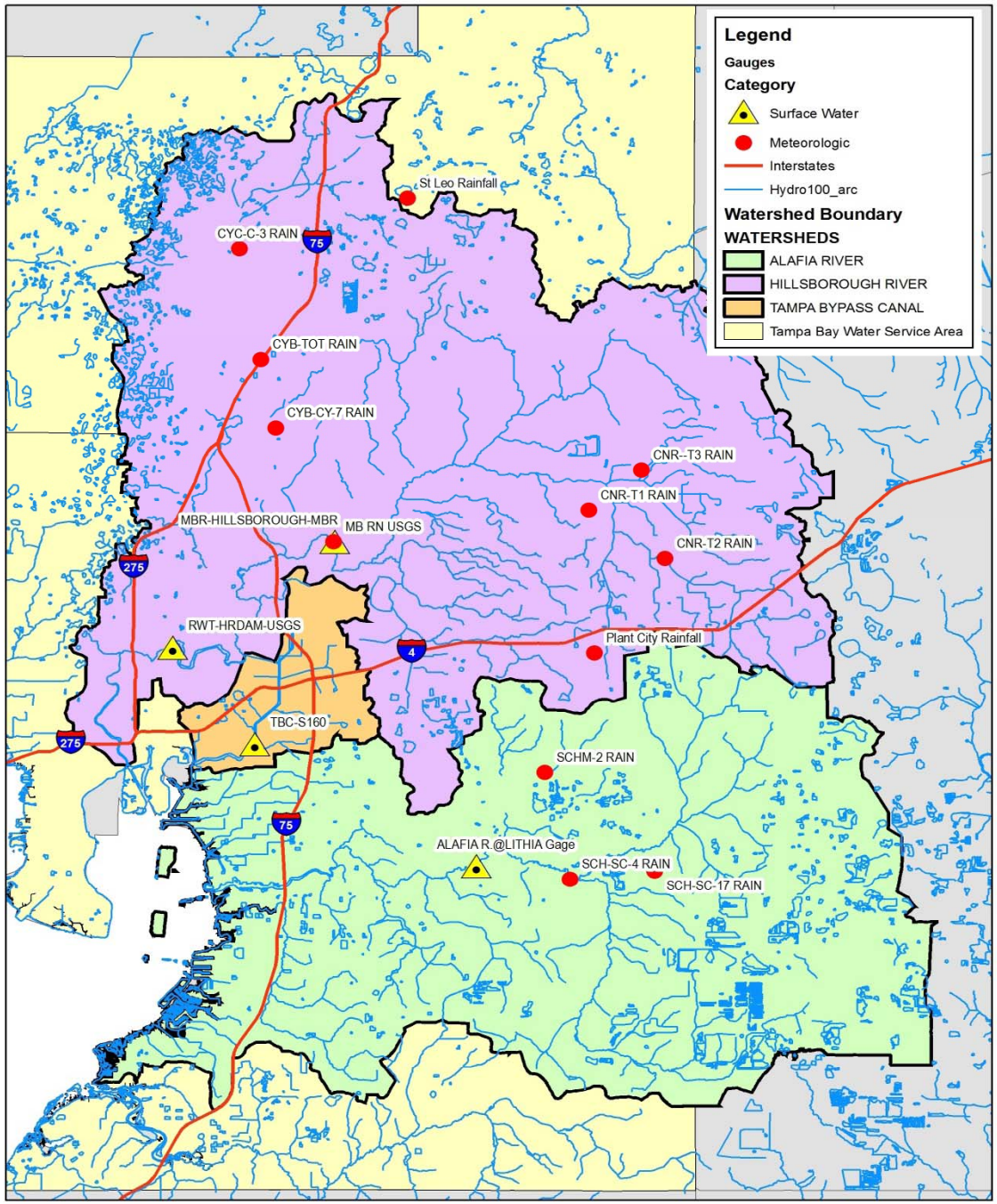
C. W. Bill Young Regional Reservoir

Oct 2005 15.5 billion gallons of storage

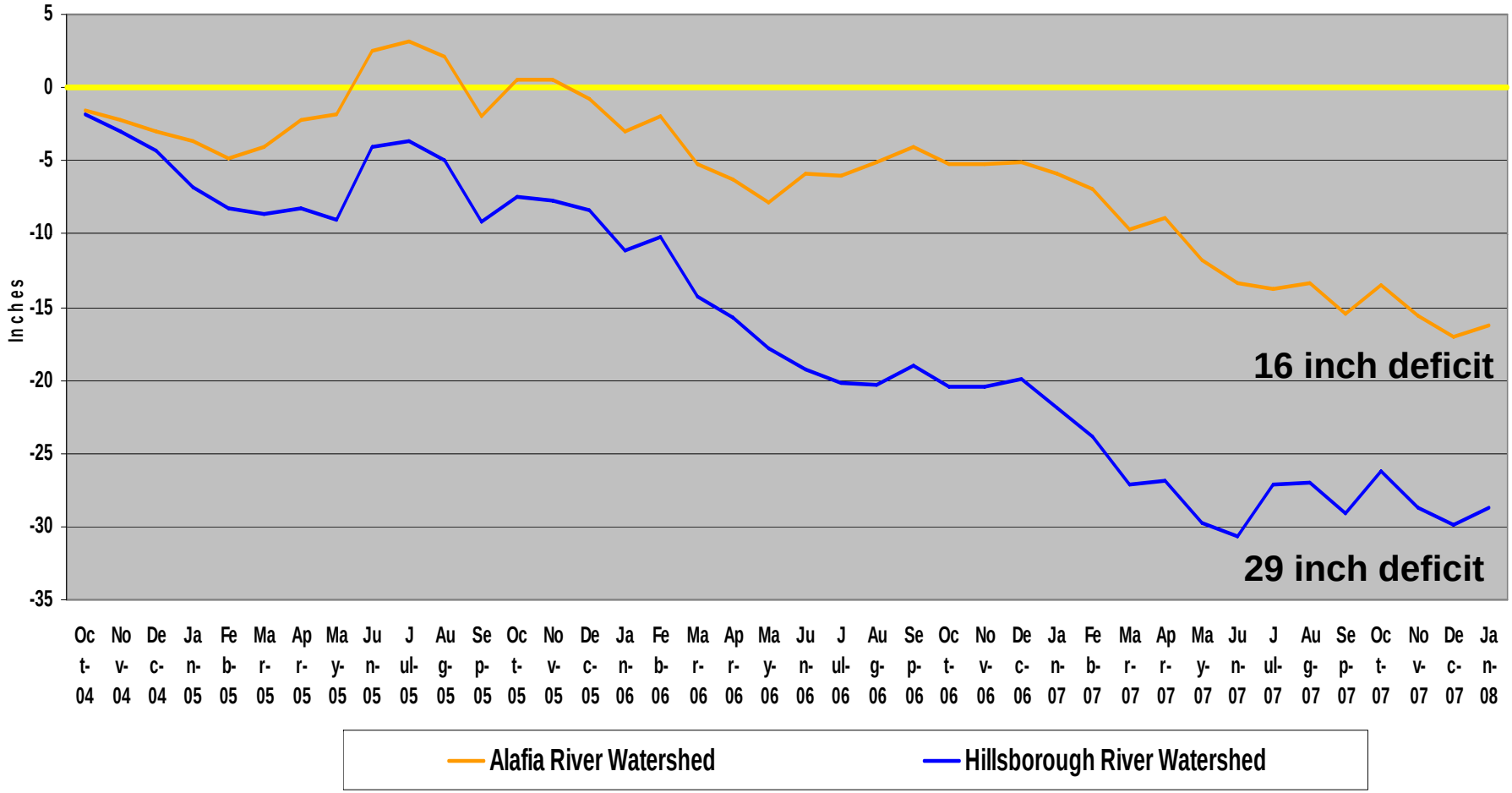
July 2007 Only 2 billion gallons of storage remaining

Operating Protocol Implementation Process – Using recent data to make adjustments

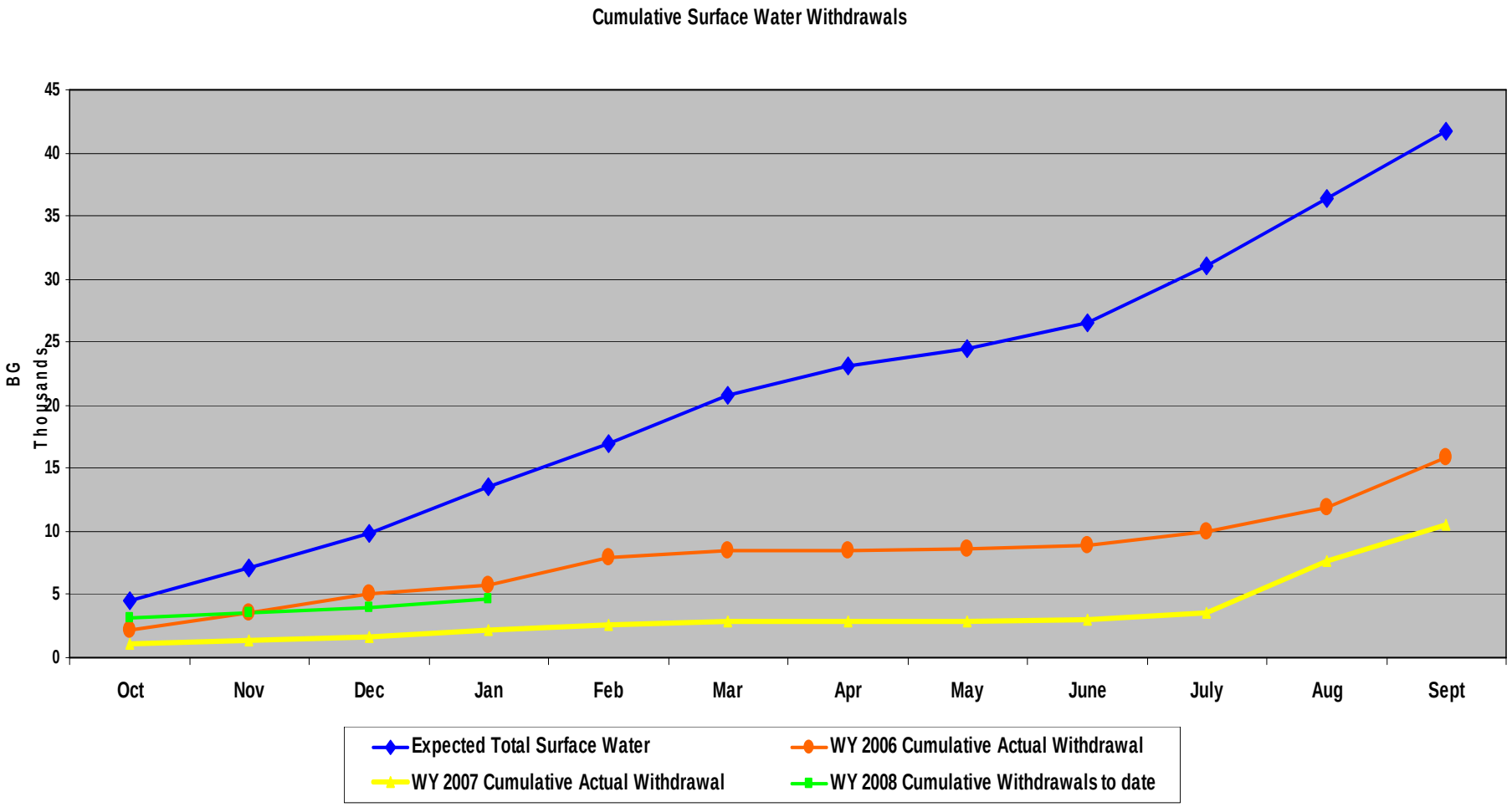



Legend
Gauges
Category
Surface Water
Meteorologic
Interstates
Hydro100_arc
Watershed Boundary
WATERSHEDS
ALAFIA RIVER
HILLSBOROUGH RIVER
TAMPA BYPASS CANAL
Tampa Bay Water Service Area
St Leo Rainfall
CYC-C-3 RAIN
CYB-TOT RAIN
CYB-CY-7 RAIN
CNR--T3 RAIN
CNR-T1 RAIN
CNR-T2 RAIN
MBR-HILLSBOROUGH-MBR
MB RN USGS
RWT-HRDAM-USGS
Plant City Rainfall
TBC-S160
SCHM-2 RAIN
ALAFIA R.@LITHIA Gage
SCH-SC-4 RAIN
SCH-SC-17 RAIN
75
275
4

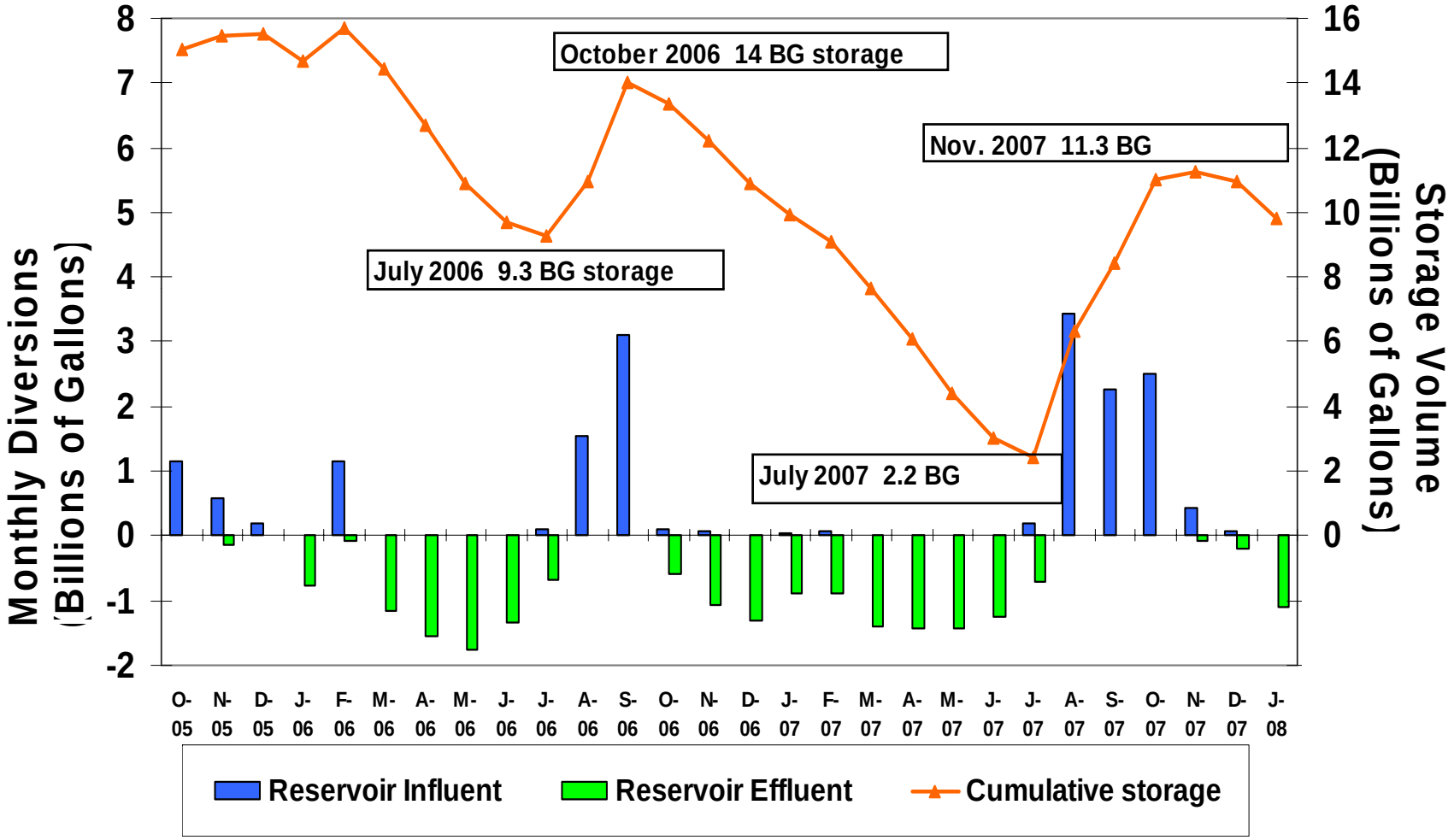
40-month Cumulative Rainfall Deficits



Cumulative Surface Water Availability



C. W. Bill Young Regional Reservoir Summary



Source Reliability / Supply Certainty

- River supplies depend on rainfall
- Dry season supply depends on reservoir water levels
- System reliability in times of drought depends on groundwater supplies

Water Shortage Mitigation Plan – Trigger Objectives

- **Hydrologic triggers are used to enter or exit the various water shortage levels**
- **Two types of triggers desired**
  1. **Hydrologic indicators used to provide early warning of a potential drought**
  2. **Water shortage triggers used to describe the severity of surface water supply shortage**

Indicators Selected for Triggers

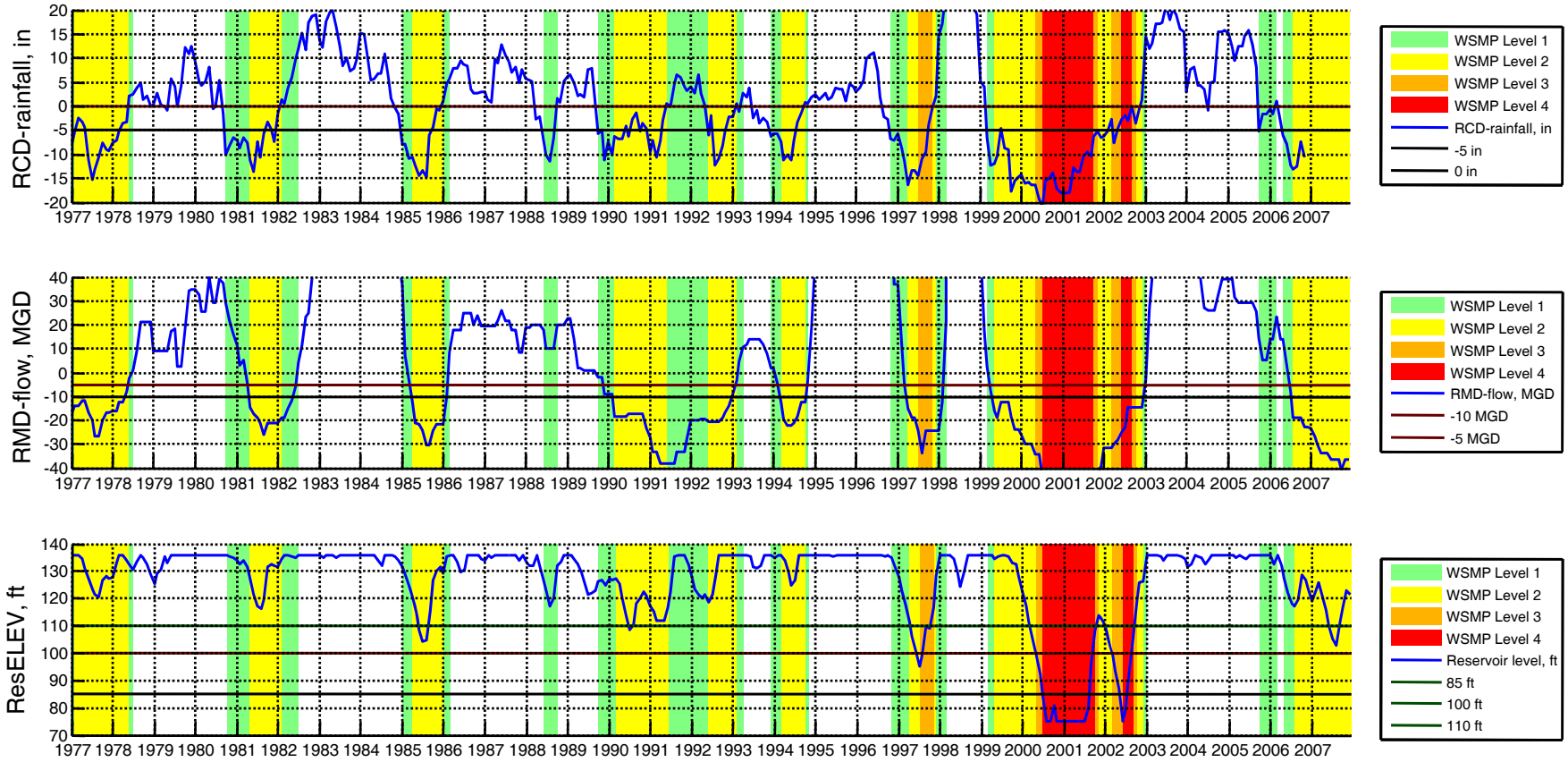
- **Rainfall (RCD Rainfall)**
  - **12-month Rolling Cumulative Deficit rainfall**
- **Streamflow (RMD Flow)**
  - **12-month Rolling Median Deficit in Hillsborough River flow at Morris Bridge**
- **Surface water storage (ResELEV)**
  - **Regional Reservoir Elevation/volume**

WSMP Triggers and Levels

Water Shortage Levels	Triggers	
	ON	**OFF**
I. Drought Alert (Moderate)	RCD Rainfall ≤ -5” **OR** RMD Flow ≤ - 10 mgd	No RCD Rainfall **AND** RMD Flow ≥ - 5 mgd
II. Drought Warning (Severe)	RCD Rainfall ≤ -5” **AND** RMD Flow ≤ - 10 mgd	No RCD Rainfall **OR** RMD Flow ≥ - 5 mgd
III. Regional Supply Shortage (Extreme)	RMD Flow ≤ -10 mgd **AND** Reservoir Level drops below 100’ elevation (~60 days SW supply)	RMD Flow ≥ - 5 mgd **OR** Reservoir Level moves above 110’ Elevation
IV. Water Supply Crisis (Critical)	RMD Flow ≤ - 10 mgd **AND** Reservoir Level drops below 85’ elevation (~20 days SW supply)	RMD Flow ≥ - 5 mgd **OR** Reservoir Level moves above 100’ Elevation

Historical WSMP Simulations

RCD-rainfall, RMD-flow, and ResELEV with simulated water-shortage-level declarations vs time (1977 -2007)

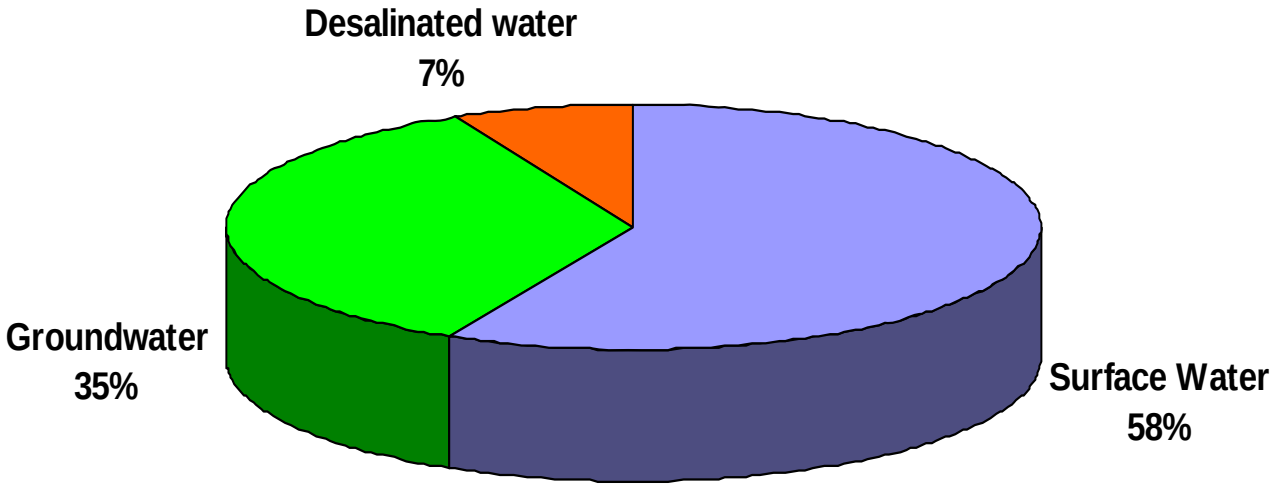


Reservoir Levels Critical Indicator of Water Supply Conditions

- **In Tampa Bay Water's interconnected, unique system, water supply shortage levels are linked to reservoir storage**
- **Our interconnected system allows us to manage between surface water storage and ground water storage**

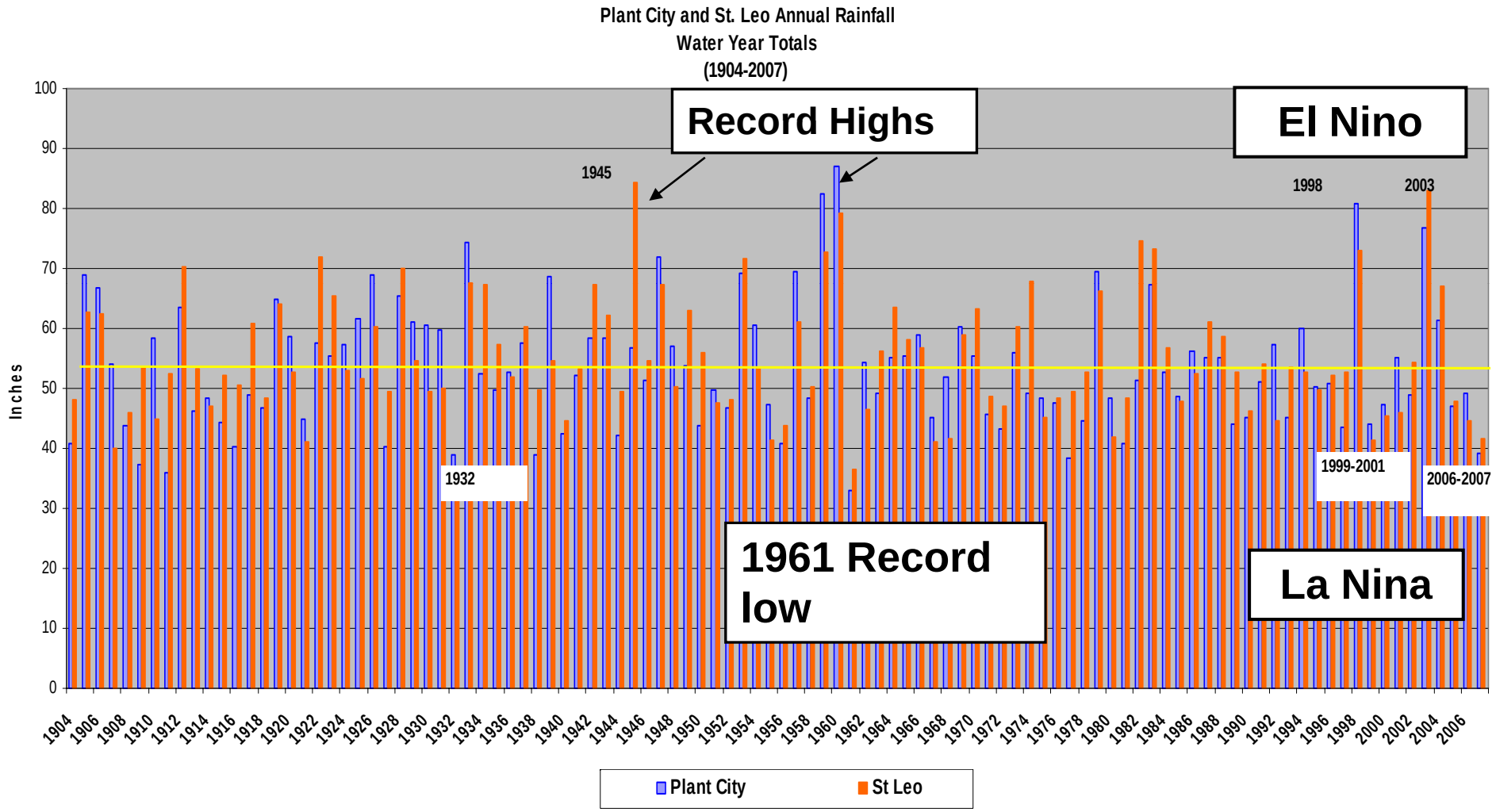
Why is climate variability and its uncertainty important to Tampa Bay Water?

- **Tampa Bay Water is becoming more reliant on surface water sources**

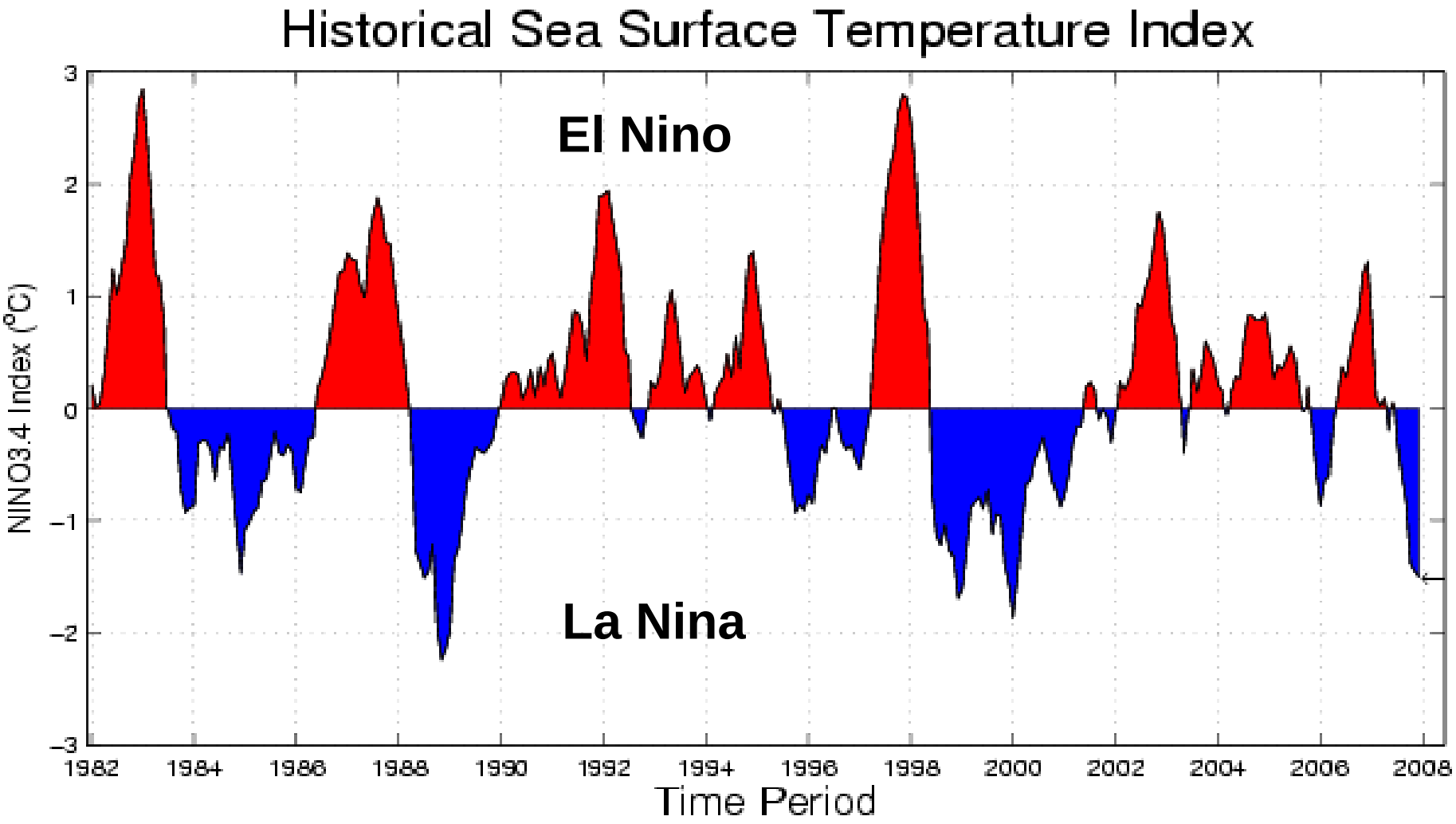


Source of Regional Supplies in 2012

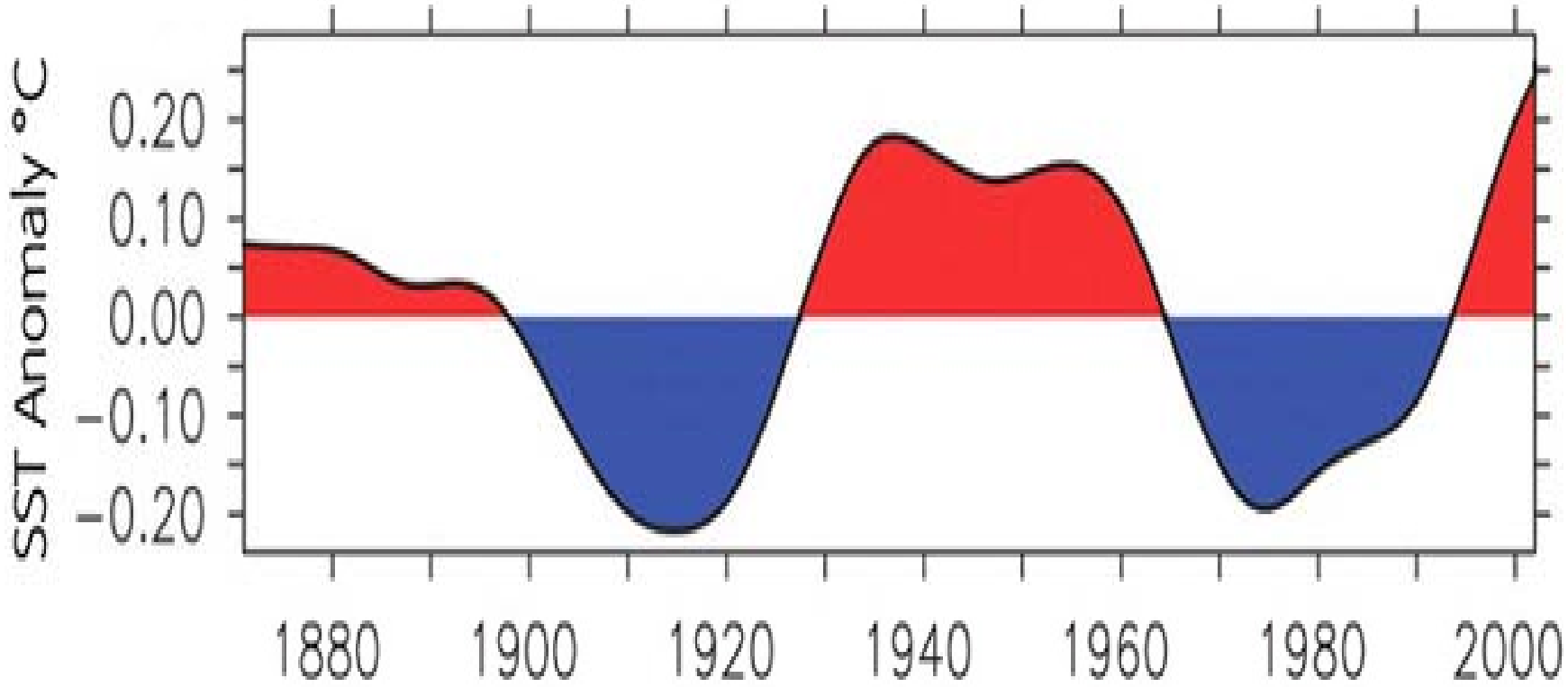
Future changes in climate may affect the water resources upon which the region depends



Observed El Niño and La Niña phases



Atlantic Multi-decadal Oscillations

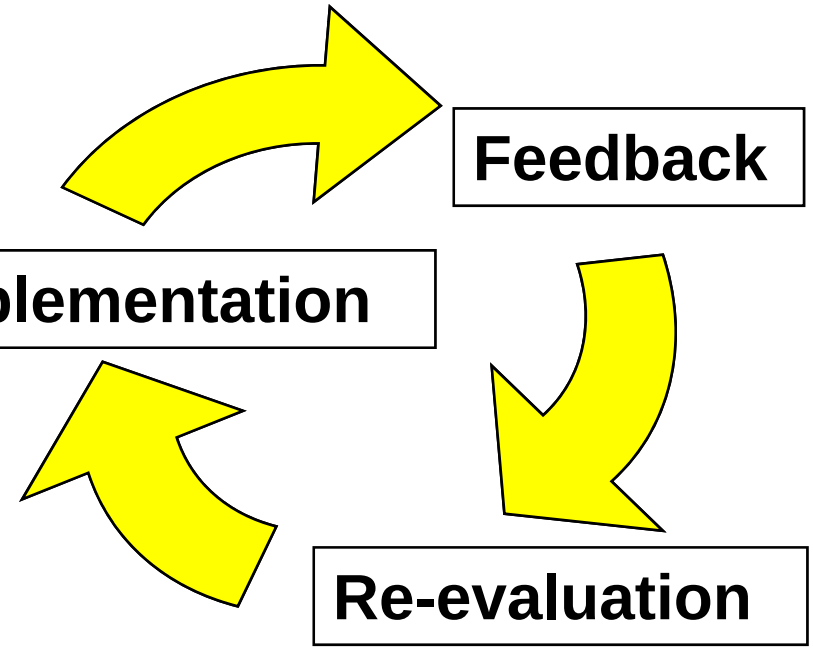


Adaptive Management Strategies for Long Range Planning

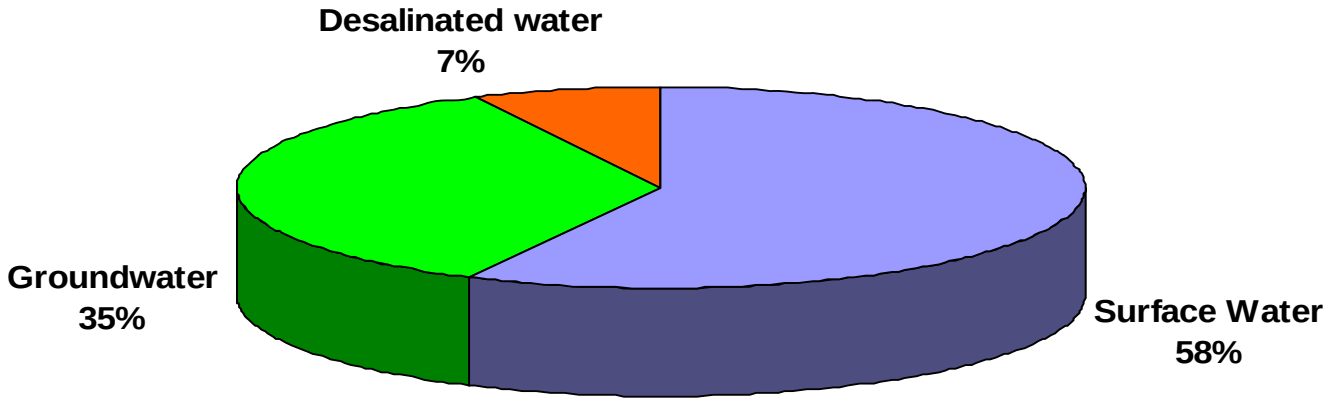
Adaptive Management

- **Support action in the face of uncertainty and limited scientific knowledge**

- **Implementation**
  - **water supply planning, construction programs, and operations**
- **Feedback**
  - **monitoring and review of economic and environmental outcomes of management actions**
- **Re-evaluation**
  - **Conceive new strategies (planning and operational) as information accumulates and understanding improves**
- **Repeat loop until desired result is achieved**



Why is climate variability and its uncertainty important to Tampa Bay Water?



Failure to adapt to climate change and climate variability can be costly and hinder reliability and environmental stewardship goals

Tampa Bay Water's is proactive

- **Collaborative climate research efforts with University of Florida and NOAA**
- **Risk-based modeling to incorporate planning uncertainties**
- **Adaptive management strategies in both operational and planning agency functions**

A Complex System