

# Data Analysis and Modeling Tools

Central Florida Coordination Area  
Tools Development Team Workshop  
July 29, 2010

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St. John River Water Management District*

# Tools Overview - CFCA Assessment

- The Tools
  - Use of the Tools
  - GW Model Simulations
  - Water Resource Constraints
  - Integrating the Tools
  - Hydrologic Data Evaluation Status

# Listing of Tools

- East Central Florida Transient GW Model
- District-wide Regulation GW Model
- Statistical Evaluation of Hydrologic Data
- USGS Data Mining

## Intended Use of the Tools:

- *Direct Use:* GW models used to evaluate impacts to lakes and springs. Time-series data from model simulations incorporated into water resource constraint evaluations. GW models used to evaluate available groundwater resources.
- *Indirect:* GW models used to evaluate potential for saltwater intrusion and environmental impacts. Statistical models to corroborate the GW model simulations results relative to changes in groundwater levels, lake stage and springflows.

## Groundwater Modeling Objectives

- Assess the effects of current, permitted and projected groundwater withdrawals on the hydrologic and environmental related conditions within the CFCA.
- “Perform simulations of existing and proposed water resource projects and to evaluate those effects on the hydrologic and natural systems.”
- “Examine potential alternative water supply scenarios and identify measures that could minimize potential adverse impacts to the region’s water resources.”

# **Statistical analysis of long-term records of groundwater levels, lake levels, and spring discharge measurements, Intera, Inc.**

## **Objectives:**

- Identify significant trends present in times series of groundwater levels, lake levels, or spring discharge measurements
- Identify the predominant temporal distribution of any trends. That is, are there particular time periods in the period of record during which trends existed or were prevalent?

# **Statistical analysis of long-term records of groundwater levels, lake levels, and spring discharge measurements, Intera, Inc. (Contd.)**

## **Objectives:**

- Identify spatial distribution of trends through cluster analysis
- Determine the relationship between spatial distributions of groundwater level trends to spatial distributions of lake level trends?

# Identification of Natural and Anthropogenic Effects in Ground Water and Lake-Level Data, East-Central Florida, USGS Cooperative Study Investigation.

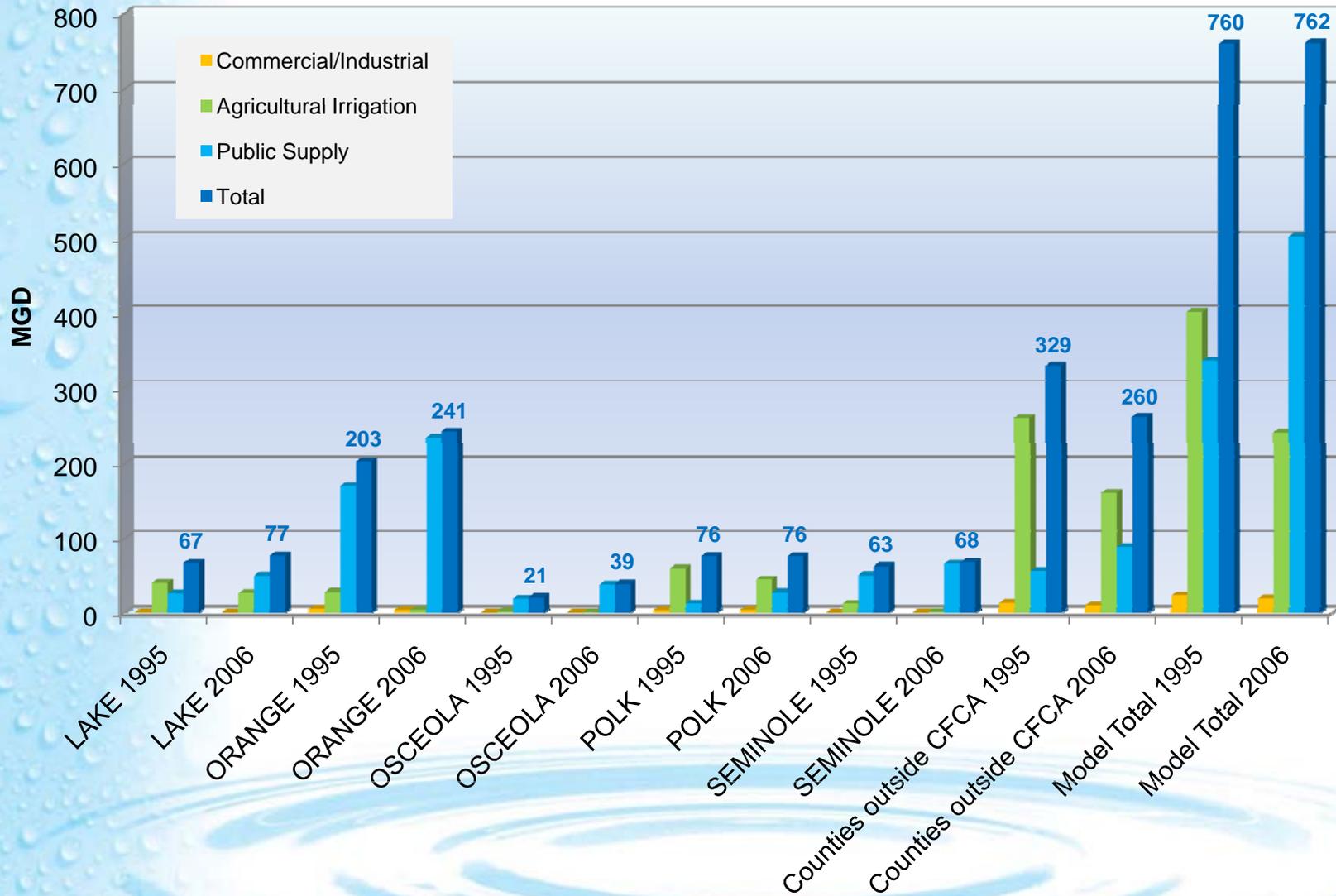
## Objectives

- Compare site-specific ANN results (key lakes, wells, and springs) to same sites simulated by numerical model.
- Using ANN and numerical models synergistically provides an opportunity to improve the accuracy of each model's results.

## **ECFT/DWRM Simulation Approach:**

- 1995-2006 Calibration
- No / Reduced pumping
- 1995 pumping inserted into the 1995-2006 climate data set
- 2006 pumping inserted into the 1995-2006 climate data set
- 2013 est. pumping into the 1995-2006 climate data set
- 2013 permitted allocations into the 1995-2006 data set
- Other simulations to test management strategies

# ECFT Water Use for 1995 and 2006



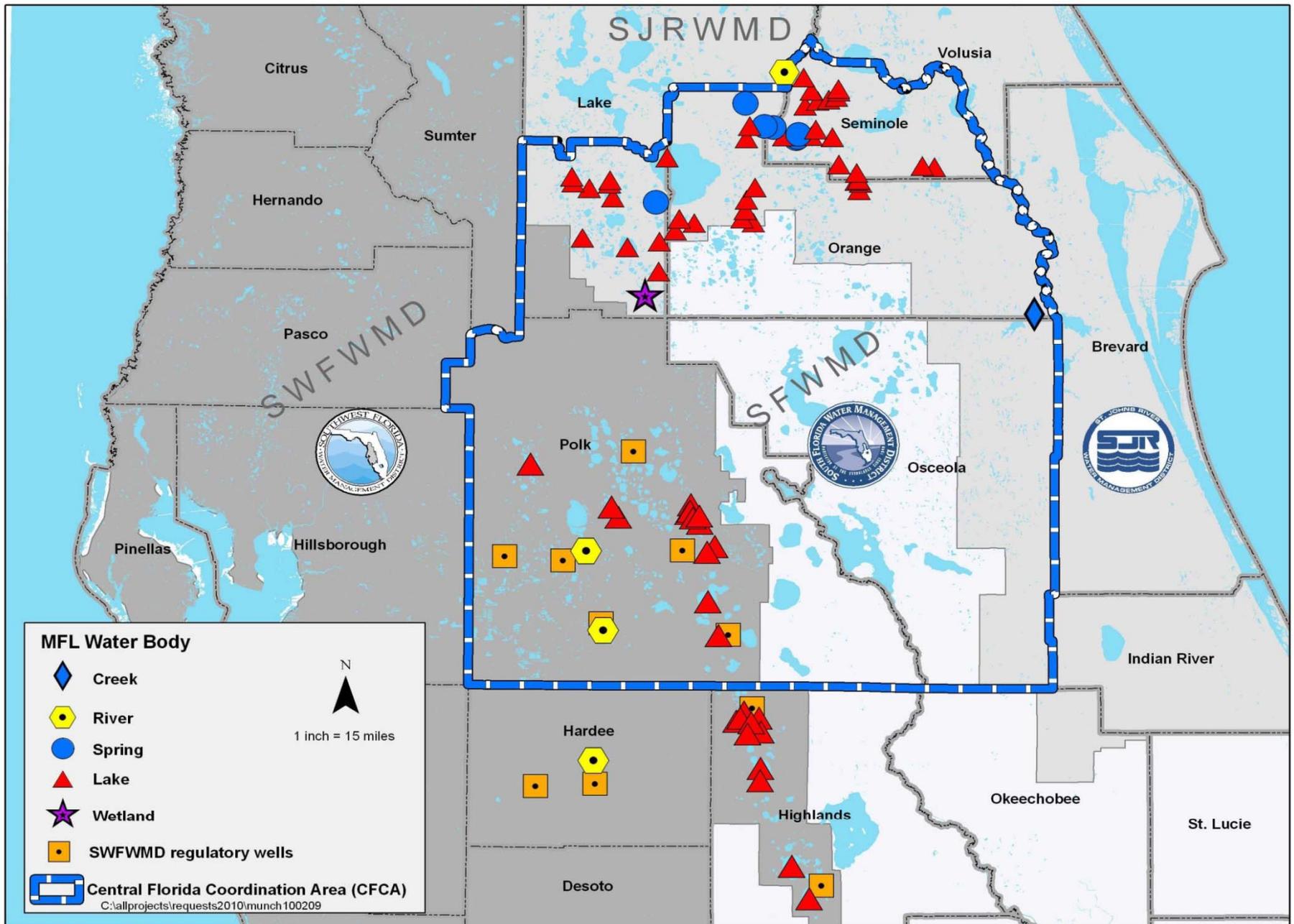
# ECFT Public Supply Water Use by Year



# Water Resource Constraints

- Adopted Minimum Flow and Level Lakes
- Lakes without an MFL but are considered stressed
- Springs with an adopted MFL
- Groundwater levels with Regulatory Implications
- Groundwater quality - saltwater intrusion potential
- Current and potentially impacted wetland areas

# CENTRAL FLORIDA COORDINATION AREA



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WATER BODY	TYPE	COUNTY
LAKE JACKSON	LAKE	HIGHLANDS
LAKE VERONA	LAKE	HIGHLANDS
LAKE ANGELO	LAKE	HIGHLANDS
LAKE JUNE IN WINTER	LAKE	HIGHLANDS
LAKE LETTA	LAKE	HIGHLANDS
LAKE PLACID	LAKE	HIGHLANDS
LAKE ANOKA	LAKE	HIGHLANDS
LAKE TULANE	LAKE	HIGHLANDS
LITTLE LAKE JACKSON	LAKE	HIGHLANDS
LAKE LOTELA	LAKE	HIGHLANDS
LAKE DENTON	LAKE	HIGHLANDS
BOGGY MARSH	WETLAND	LAKE
SAWGRASS	LAKE	LAKE
LOUISA	LAKE	LAKE
FLAT	LAKE	LAKE
PINE ISLAND	LAKE	LAKE
APOPKA SPRING	LAKE	LAKE
MINNEOLA	LAKE	LAKE
CHERRY	LAKE	LAKE
APSHAWA SOUTH	LAKE	LAKE
LUCY	LAKE	LAKE
APSHAWA NORTH	LAKE	LAKE
EMMA	LAKE	LAKE
APOPKA	LAKE	LAKE
WEKIVA RIVER @ SR 46	RIVER	LAKE
TAYLOR CREEK	CREEK	ORANGE
AVALON	LAKE	ORANGE
BLACK	LAKE	ORANGE
HIAWASSEE	LAKE	ORANGE
JOHNS	LAKE	ORANGE
ROSE	LAKE	ORANGE
SHERWOOD NORTH	LAKE	ORANGE
LUCY	LAKE	ORANGE
IRMA	LAKE	ORANGE
CROOKED	LAKE	ORANGE
PEARL	LAKE	ORANGE
MARTHA	LAKE	ORANGE
BURKETT	LAKE	ORANGE
McCOY	LAKE	ORANGE

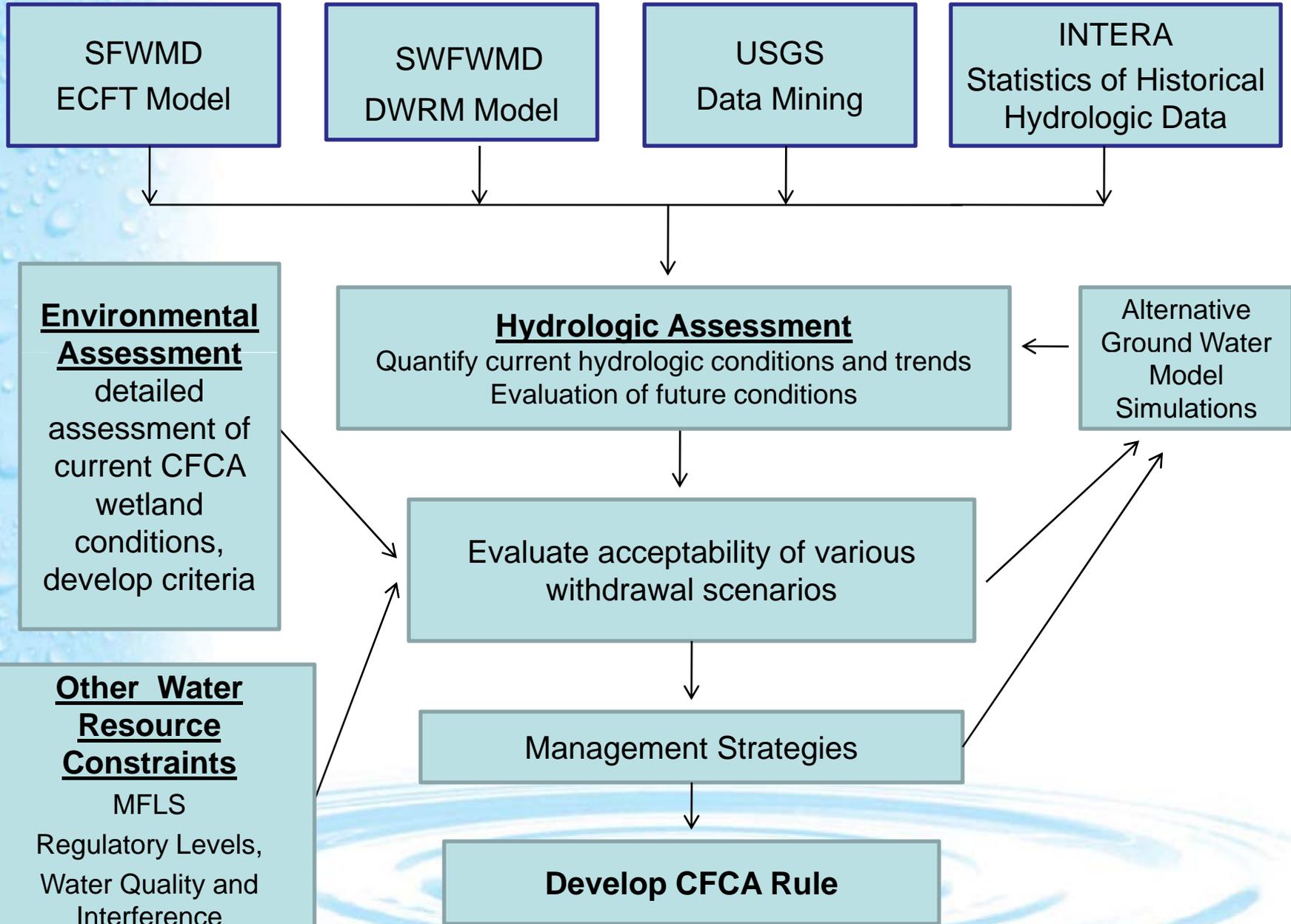
WATER BODY	TYPE	COUNTY
WEKIWA SPRINGS	SPRING	ORANGE
PREVATT	LAKE	ORANGE
ROCK SPRINGS	SPRING	ORANGE
LAKE STARR	LAKE	POLK
LAKE ANNIE	LAKE	POLK
LAKE BONNIE	LAKE	POLK
LAKE VENUS	LAKE	POLK
LAKE MCLEOD	LAKE	POLK
PEACE RIVER AT BARTOW	RIVER	POLK
PEACE RIVER AT FORT MEADE	RIVER	POLK
PEACE RIVER AT ZOLFO SPRINGS	RIVER	POLK
LAKE LEE (POLK, NEAR LAKE WALES)	LAKE	POLK
LAKE CLINCH	LAKE	POLK
DINNER LAKE (POLK, LAKE WALES)	LAKE	POLK
LAKE MABEL	LAKE	POLK
CROOKED LAKE	LAKE	POLK
LAKE PARKER (POLK, LAKELAND)	LAKE	POLK
LAKE WALES	LAKE	POLK
EAGLE LAKE	LAKE	POLK
BEAR GULLY	LAKE	SEMINOLE
MILLS	LAKE	SEMINOLE
HORSESHOE	LAKE	SEMINOLE
HOWELL	LAKE	SEMINOLE
SANLANDO SPRINGS	SPRING	SEMINOLE
PALM SPRINGS	SPRING	SEMINOLE
HODGE	LAKE	SEMINOLE
BRANTLEY	LAKE	SEMINOLE
ISLAND	LAKE	SEMINOLE
STARBUCK SPRING	SPRING	SEMINOLE
SEARCY	LAKE	SEMINOLE
MIAMI SPRINGS	SPRING	SEMINOLE
RICE	LAKE	SEMINOLE
EMMA	LAKE	SEMINOLE
CRYSTAL WEST	LAKE	SEMINOLE
CRYSTAL EAST	LAKE	SEMINOLE
BELAIR	LAKE	SEMINOLE
BANANA	LAKE	SEMINOLE
DEFOREST	LAKE	SEMINOLE
SYLVAN	LAKE	SEMINOLE

WELL SITE_NAME	TYPE	REG NETWRK	COUNTY
ROMP 60 OCAL~AVPK	WELL	UPPER PEACE TARGET LEVEL	POLK
ROMP 31 SWNN~AVPK	WELL	UPPER PEACE TARGET LEVEL	HARDEE
ROMP 30 SWNN~AVPK	WELL	UPPER PEACE TARGET LEVEL	HARDEE
ROMP 45 AVPK	WELL	UPPER PEACE TARGET LEVEL	POLK
ROMP 59 SWNN~AVPK	WELL	UPPER PEACE TARGET LEVEL	POLK
LAKE ALFRED DEEP AT LAKE ALFRED	WELL	RIDGE LAKES AREA TARGET LEVEL	POLK
COLEY DEEP	WELL	RIDGE LAKES AREA TARGET LEVEL	POLK
ROMP 57 SWNN~AVPK	WELL	RIDGE LAKES AREA TARGET LEVEL	POLK
ROMP 28X SWNN~AVPK	WELL	RIDGE LAKES AREA TARGET LEVEL	HIGHLANDS
ROMP 43XX AVPK	WELL	RIDGE LAKES AREA TARGET LEVEL	HIGHLANDS

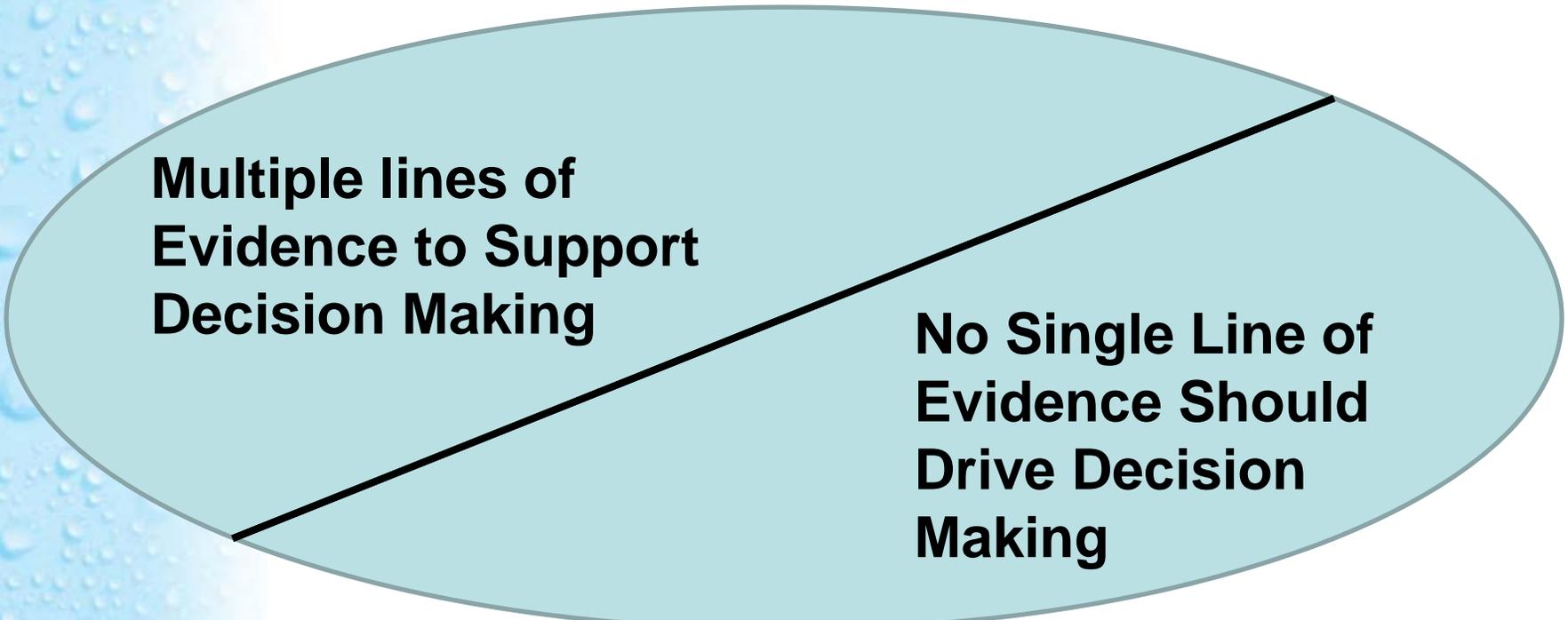
The background of the slide features a vertical column of water droplets on the left side, transitioning into a series of concentric ripples in water at the bottom. The overall color scheme is light blue and white.

# **Integrating the Tools into the overall Assessment**

CENTRAL FLORIDA COORDINATION AREA



# The Weight of Evidence Approach



**Multiple lines of  
Evidence to Support  
Decision Making**

**No Single Line of  
Evidence Should  
Drive Decision  
Making**

- **Some lines of evidence weighted more heavily than others**
- **Increasingly complex evaluations are used when needed**