Hydrogeology of the Floridan Aquifer System

III. *Floridan aquifer system* — thick carbonate sequence which includes all or part of the Paleocene to early Miocene Series and functions regionally as a water-yielding hydraulic unit. Where overlain by either the intermediate aquifer system or the intermediate confining unit, the Floridan contains water under confined conditions. Where overlain directly by the surficial aquifer system, the Floridan may or may not contain water under confined conditions depending on the extent of low permeability material in the surficial aquifer system. Where the carbonate rocks crop out, the Floridan generally contains water under unconfined conditions near the top of the aquifer system, but because of vertical variations in permeability, deeper zones may contain water under confined conditions. The Floridan aquifer system is present throughout the State and is the deepest part of the active ground-water flow system on mainland Florida.

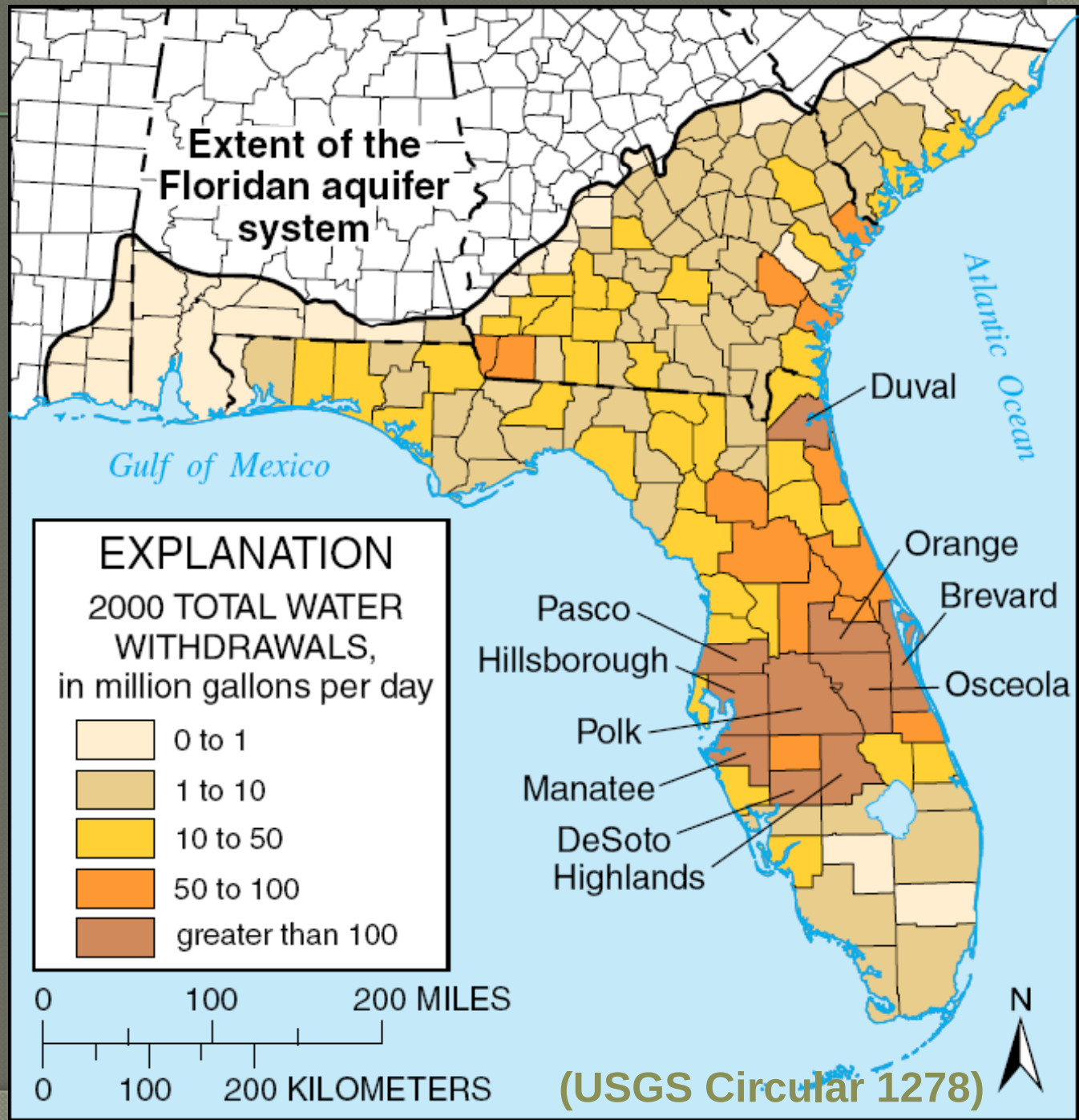
From: *Hydrogeological Units of Florida*, Special Pub. 28 of the Florida Geological Survey. 1986

Floridan Aquifer Demands (2000)

Floridan Use (MGD)

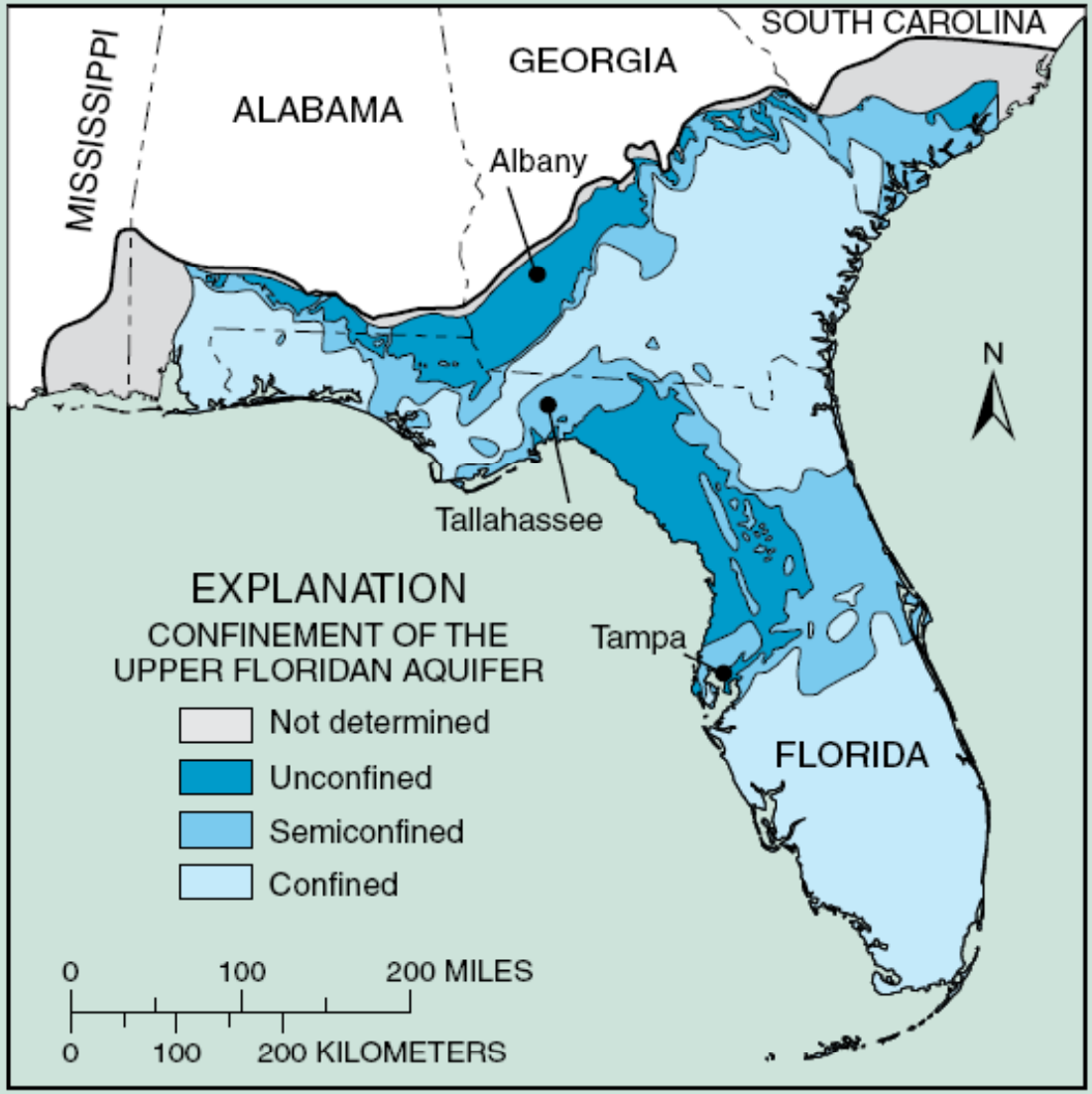
	2000	2005	2010
LWC	31.67	66.50	?

the Floridan Aquifer System supports almost 10 million people as their primary source of water … (Marella and Berndt, 2005

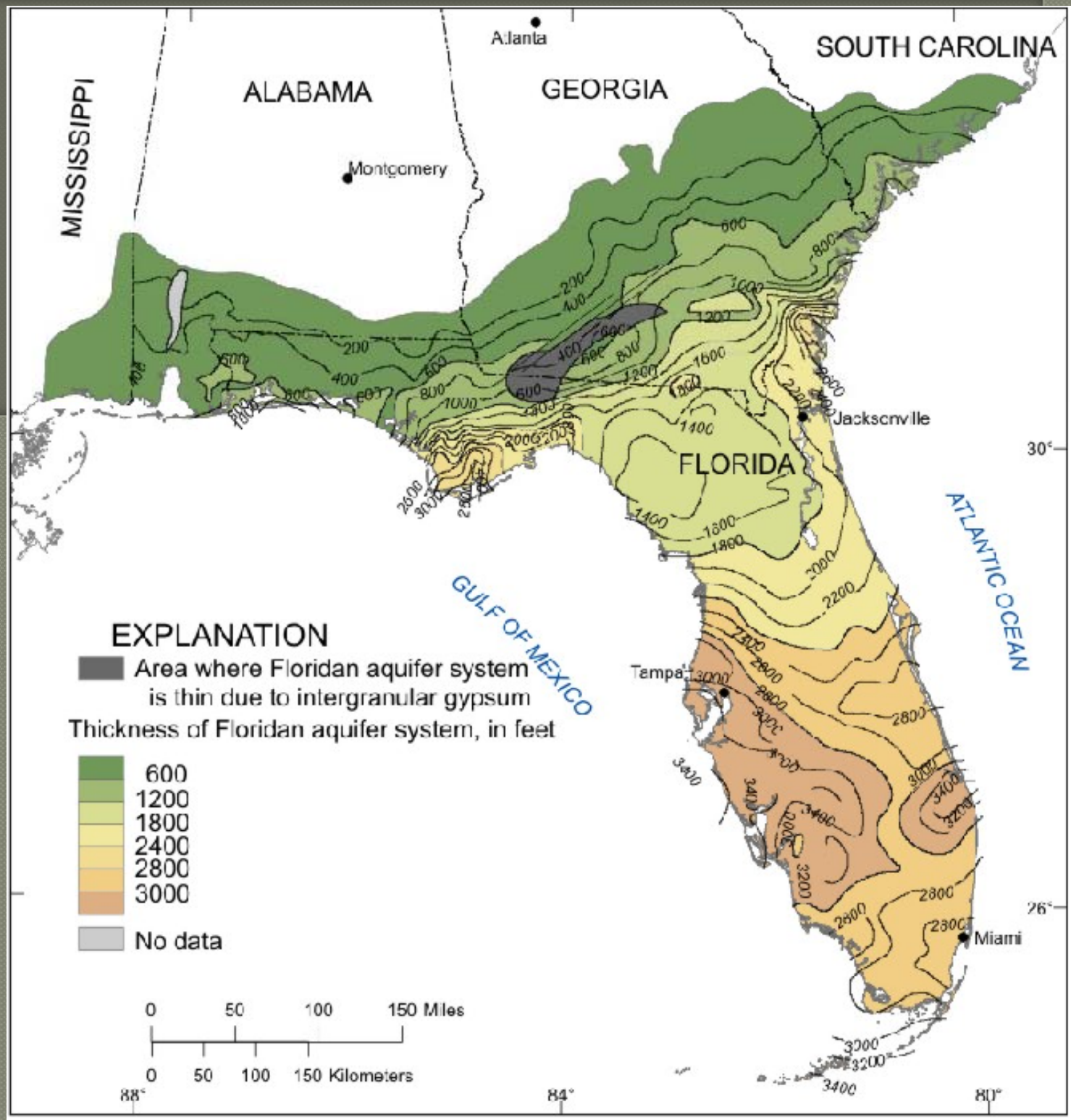


Geographic Differences of Floridan Aquifer System

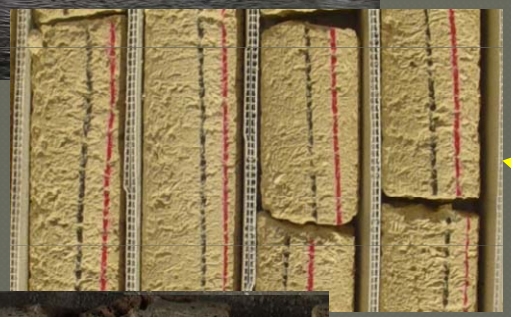
- Recharge Area in Central Florida
- Confined Aquifer in South Florida
  - (-) less water released from storage, greater drawdowns
  - (+) less problem with impacts to wetlands or surface-water bodies



Thickness of the Floridan Aquifer System (FAS)?

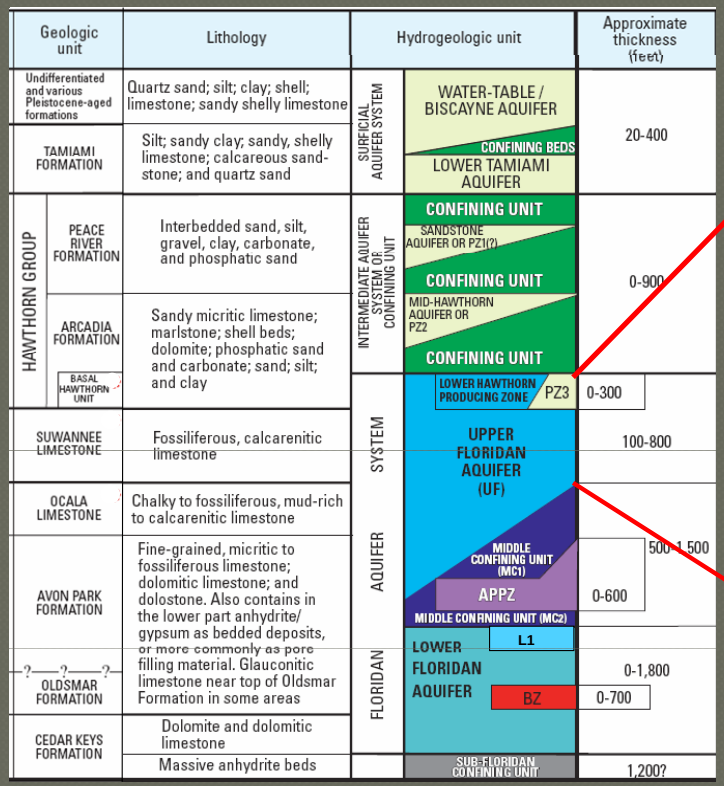


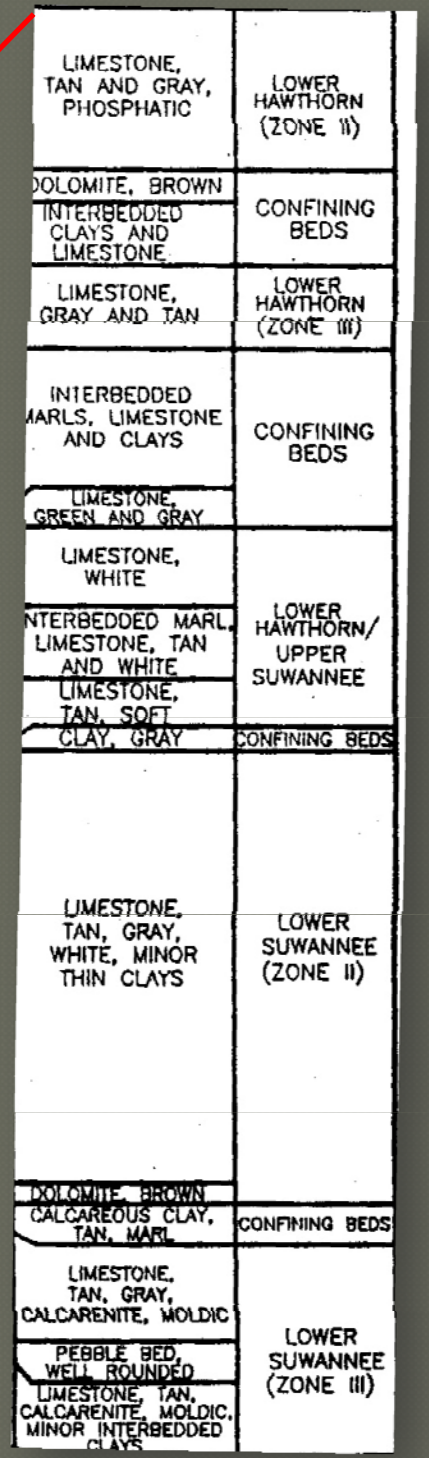
Simplified Hydrostratigraphic Chart



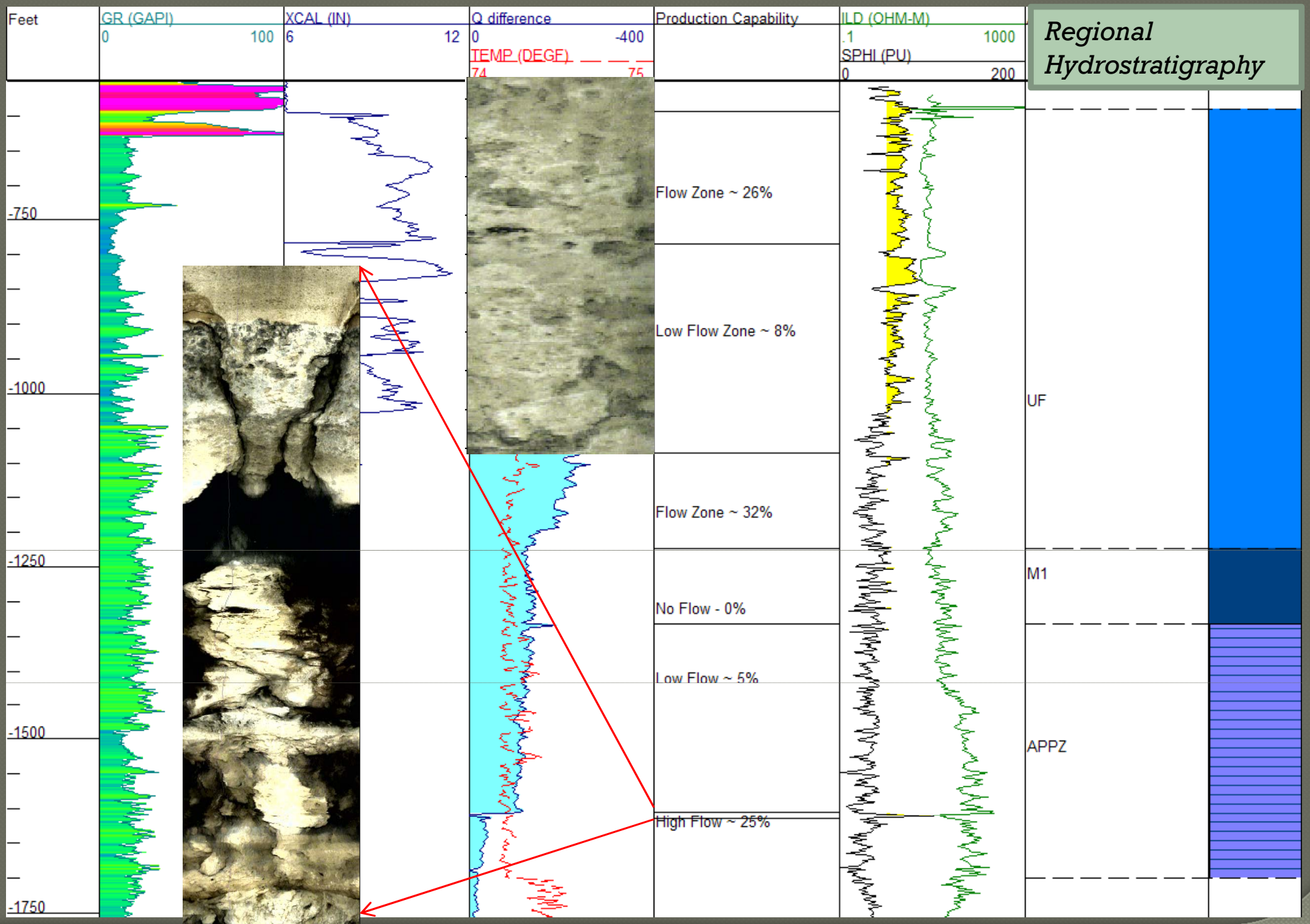
Geologic unit		Lithology	Hydrogeologic unit		Approximate thickness (feet)
Undifferentiated and various Pleistocene-aged formations		Quartz sand; silt; clay; shell; limestone; sandy shelly limestone	SURFICIAL AQUIFER SYSTEM	WATER-TABLE / BISCAYNE AQUIFER	20-400
TAMIAMI FORMATION		Silt; sandy clay; sandy, shelly limestone; calcareous sandstone; and quartz sand		CONFINING BEDS / LOWER TAMIAMI AQUIFER	
HAWTHORN GROUP	PEACE RIVER FORMATION	Interbedded sand, silt, gravel, clay, carbonate, and phosphatic sand	INTERMEDIATE AQUIFER SYSTEM OR CONFINING UNIT	CONFINING UNIT / SANDSTONE AQUIFER OR PZ1(?) / CONFINING UNIT / MID-HAWTHORN AQUIFER OR PZ2 / CONFINING UNIT	0-900
	ARCADIA FORMATION	Sandy micritic limestone; marlstone; shell beds; dolomite; phosphatic sand and carbonate; sand; silt; and clay			
	BASAL HAWTHORN UNIT				
SUWANNEE LIMESTONE		Fossiliferous, calcarenitic limestone	FLORIDAN AQUIFER SYSTEM	LOWER HAWTHORN PRODUCING ZONE / PZ3	0-300
OCALA LIMESTONE		Chalky to fossiliferous, mud-rich to calcarenitic limestone		UPPER FLORIDAN AQUIFER (UF)	100-800
AVON PARK FORMATION		Fine-grained, micritic to fossiliferous limestone; dolomitic limestone; and dolostone. Also contains in the lower part anhydrite/gypsum as bedded deposits, or more commonly as pore filling material. Glauconitic limestone near top of Oldsmar Formation in some areas		MIDDLE CONFINING UNIT (MC1) / APPZ / MIDDLE CONFINING UNIT (MC2)	500-1,500 / 0-600
?—?—? OLDSMAR FORMATION				LOWER FLORIDAN AQUIFER / L1 / BZ	0-1,800 / 0-700
CEDAR KEYS FORMATION		Dolomite and dolomitic limestone			
		Massive anhydrite beds		SUB-FLORIDAN CONFINING UNIT	1,200?

Un-Simplified Hydrostratigraphic Chart



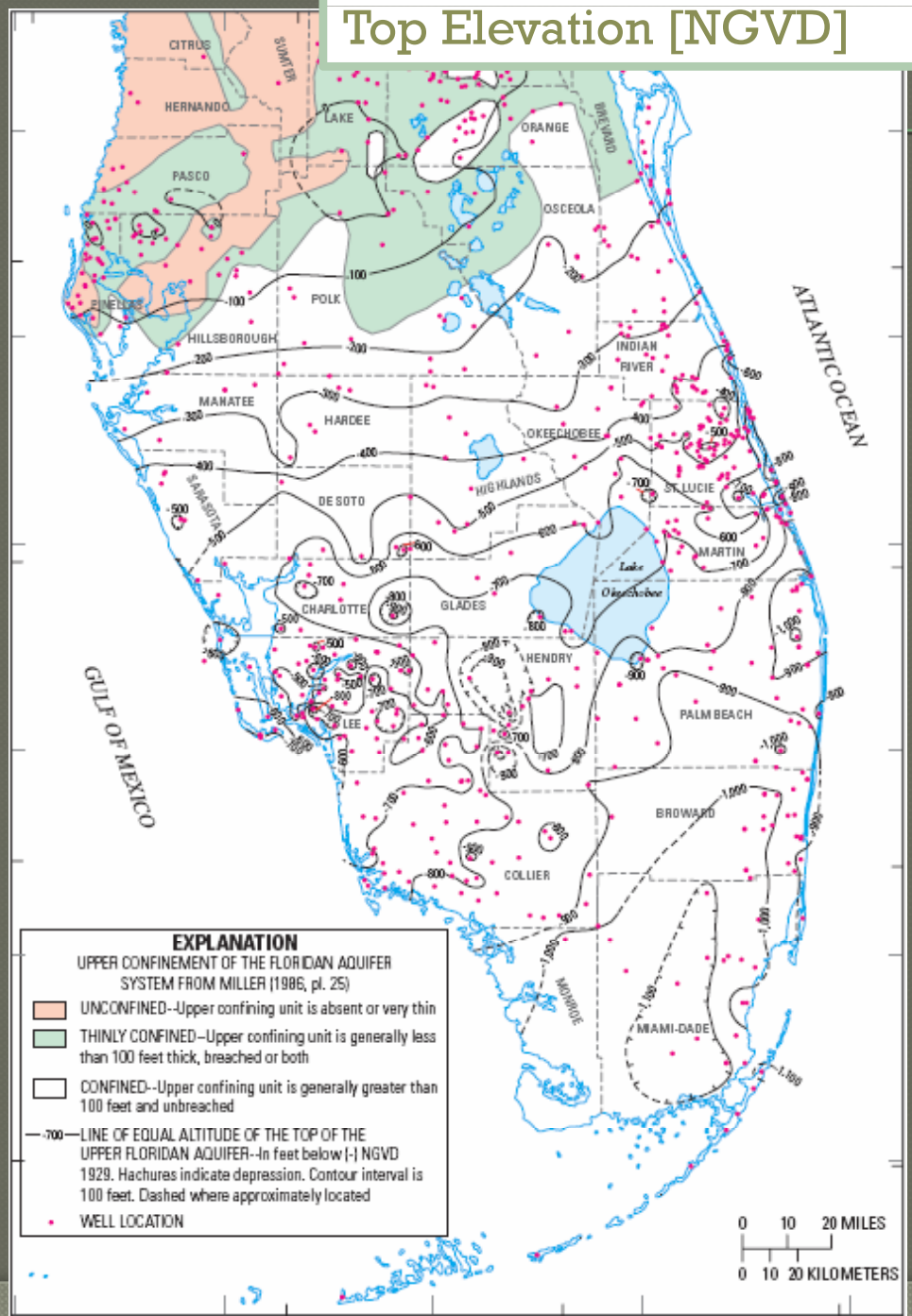


Vertical Differences of Floridan Aquifer System: Example

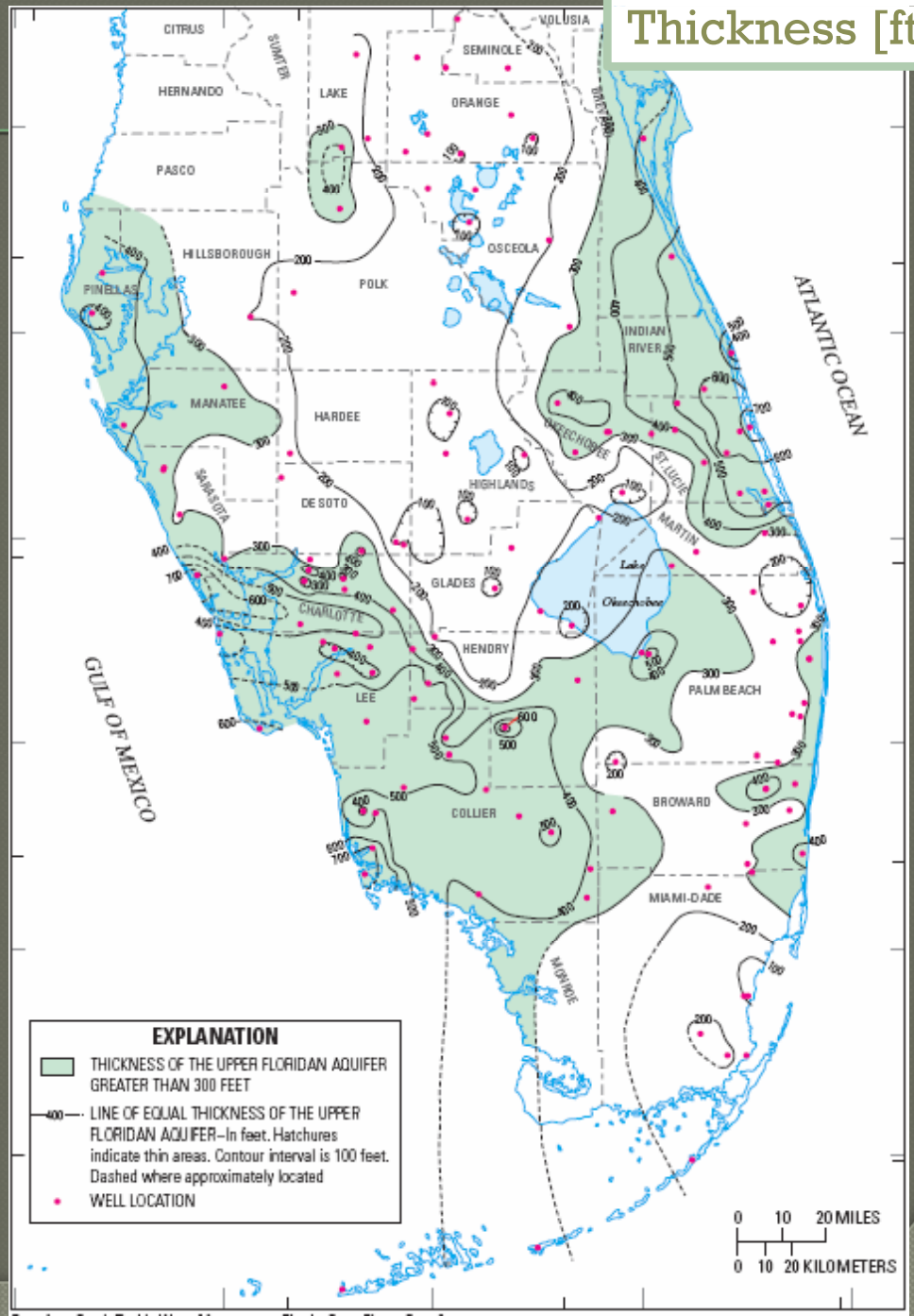


Uppermost Production Zone..

Top Elevation [NGVD]

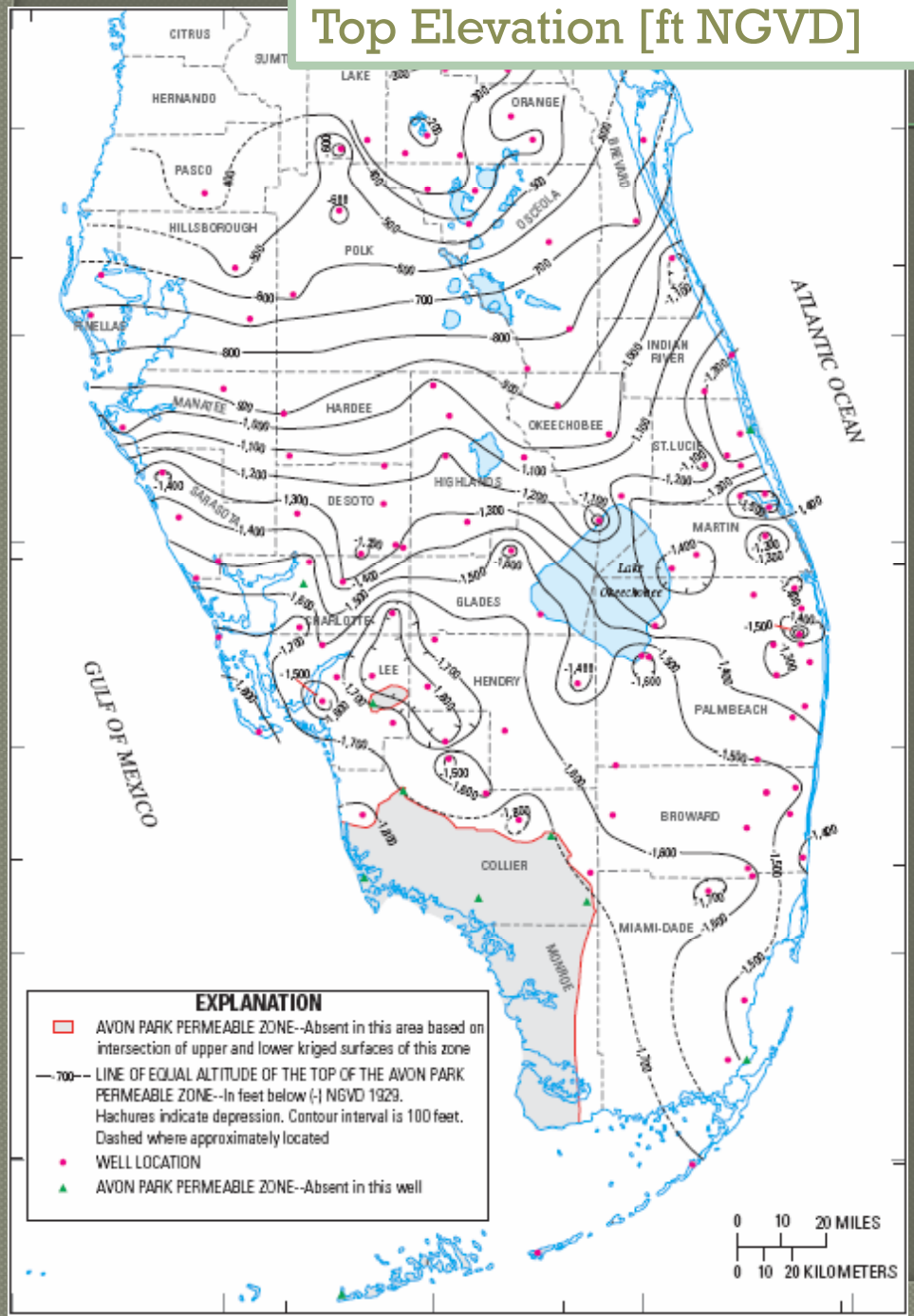


Thickness [ft]

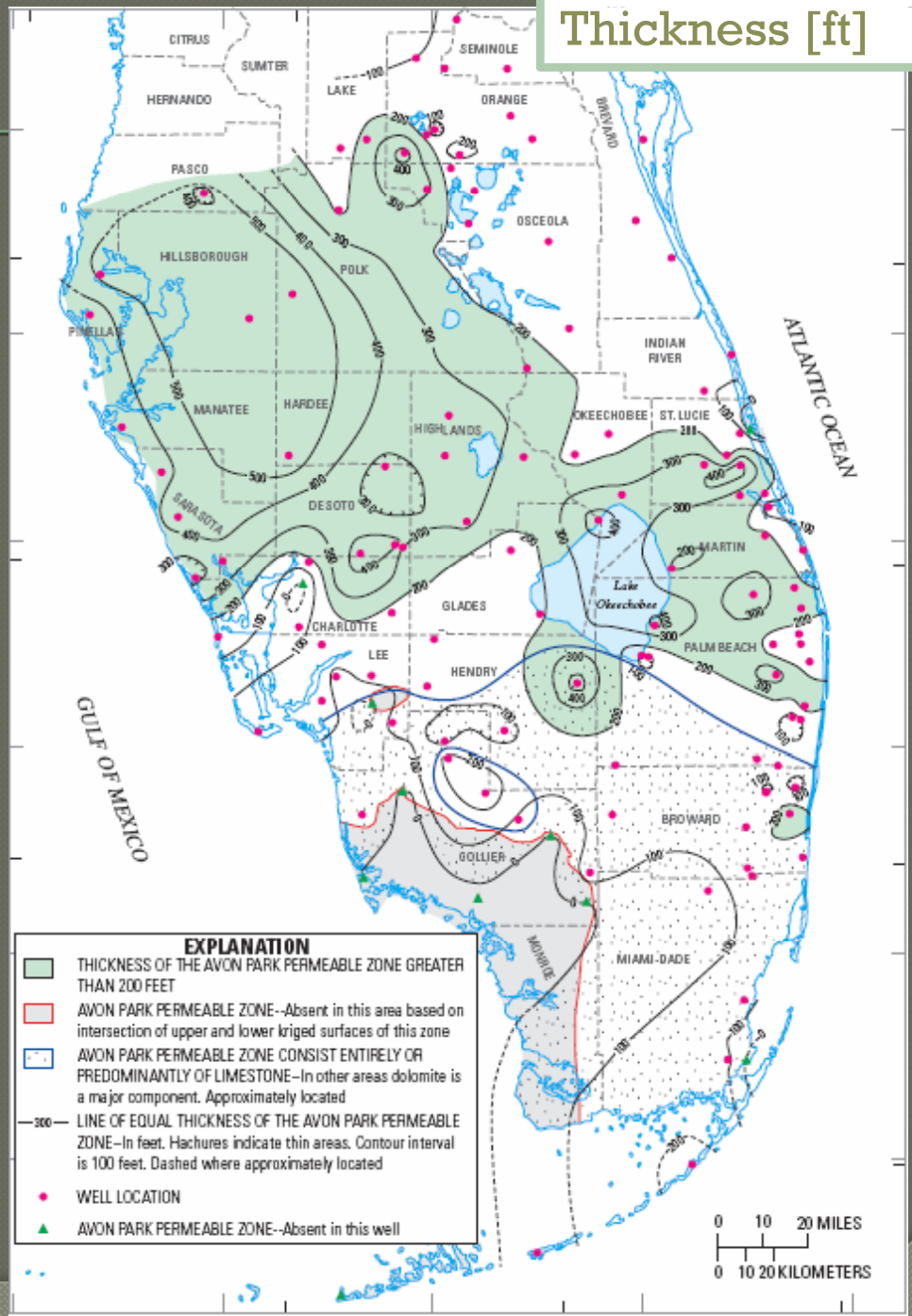


Avon Park Producing Zone

Top Elevation [ft NGVD]

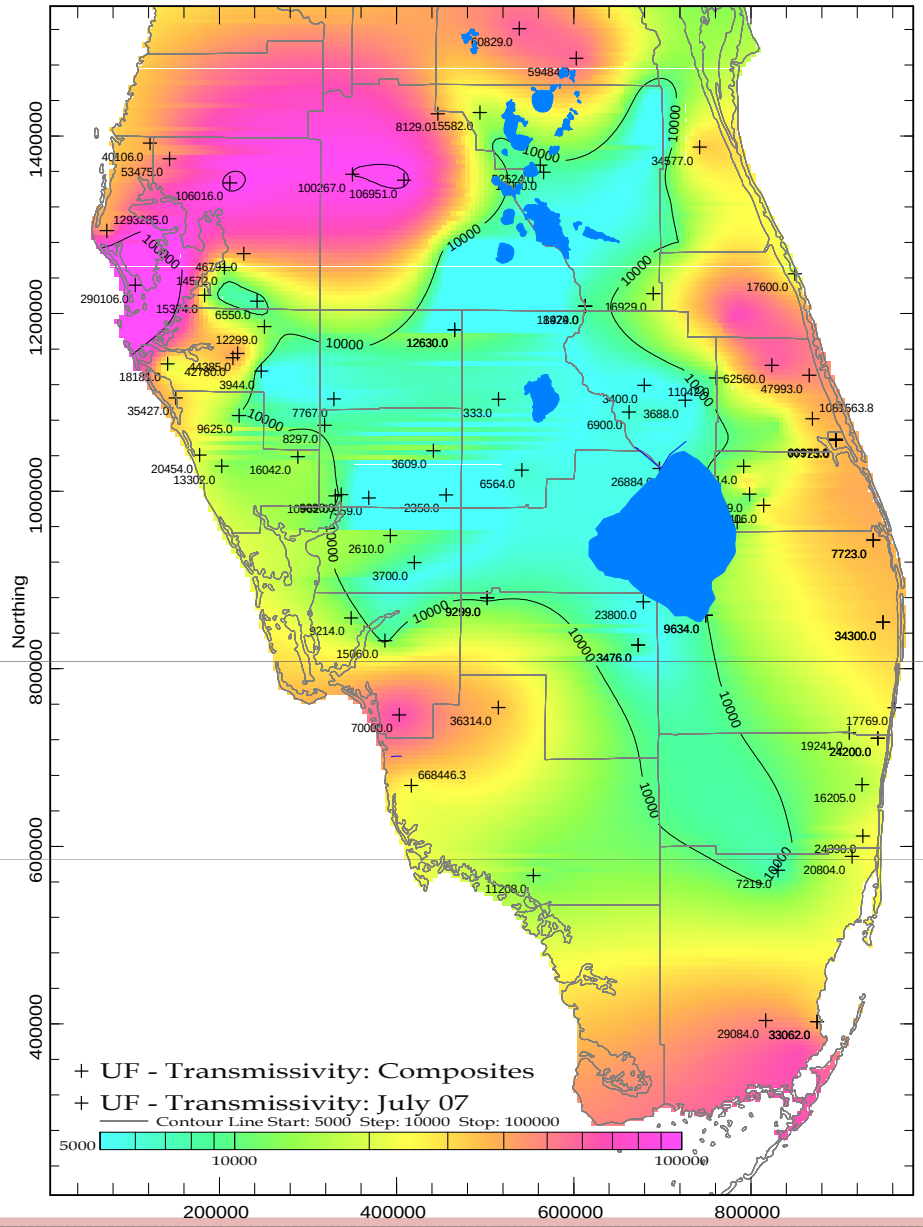


Thickness [ft]

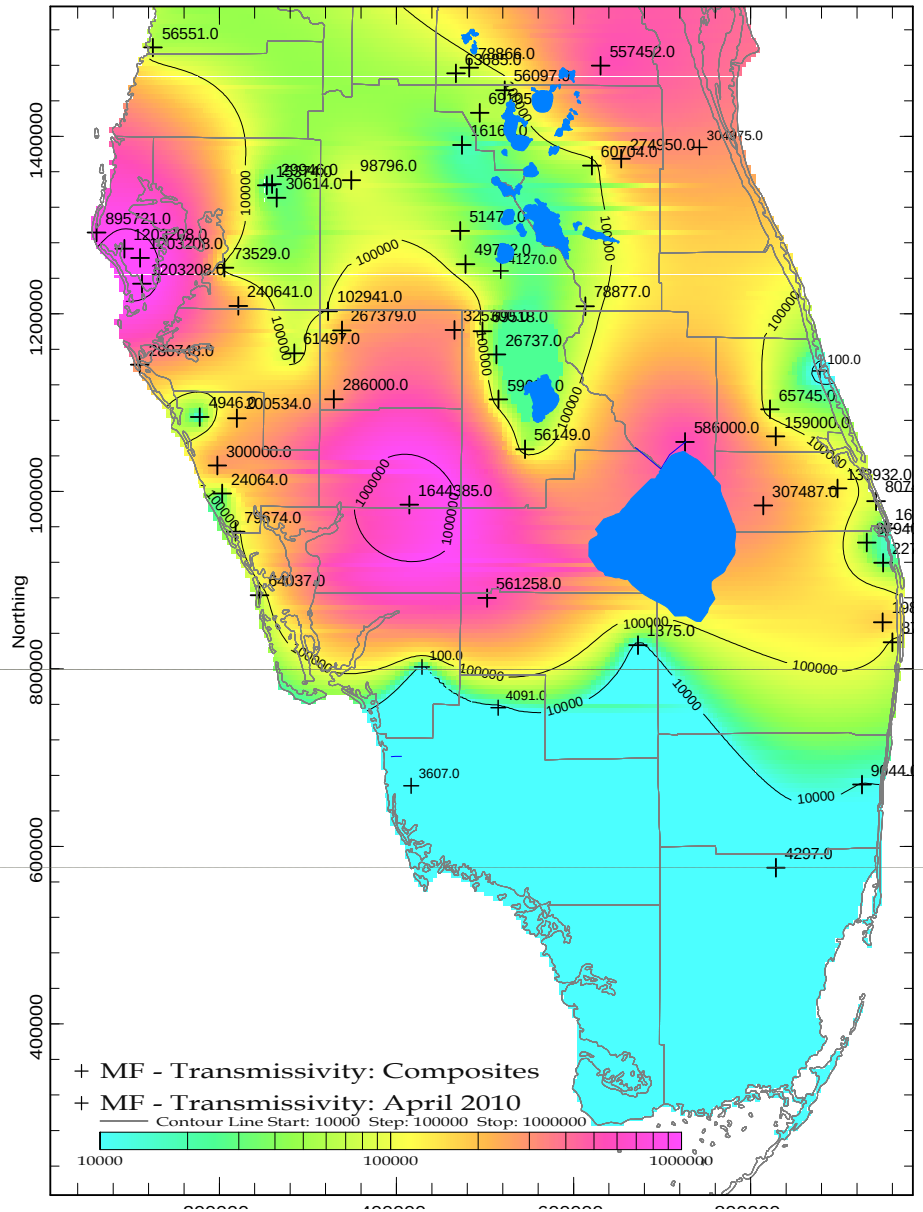


Geographic Differences in Transmissivity within the FAS

Uppermost Producing Zone

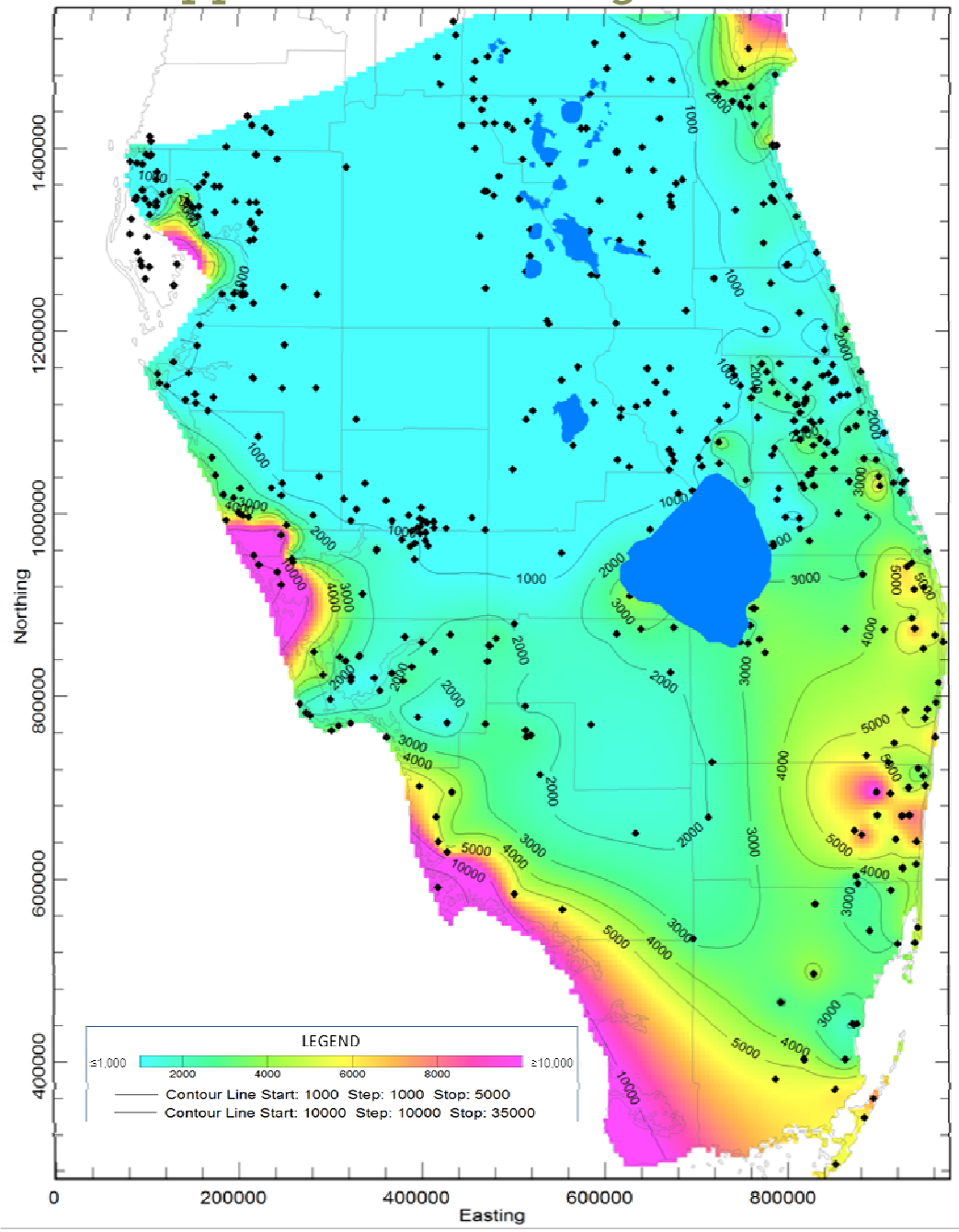


Avon Park Producing Zone

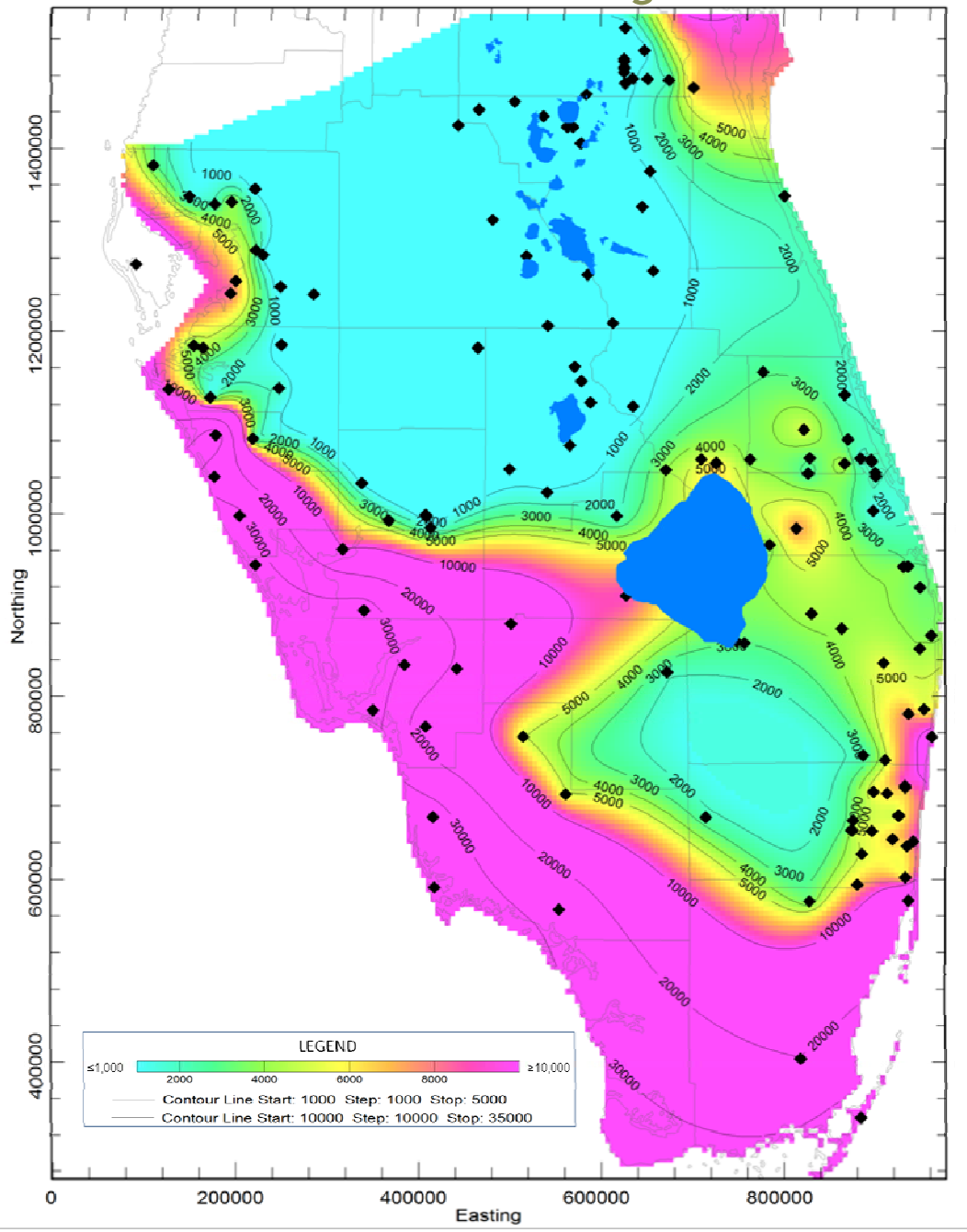


Geographic Differences in Salinity within the FAS

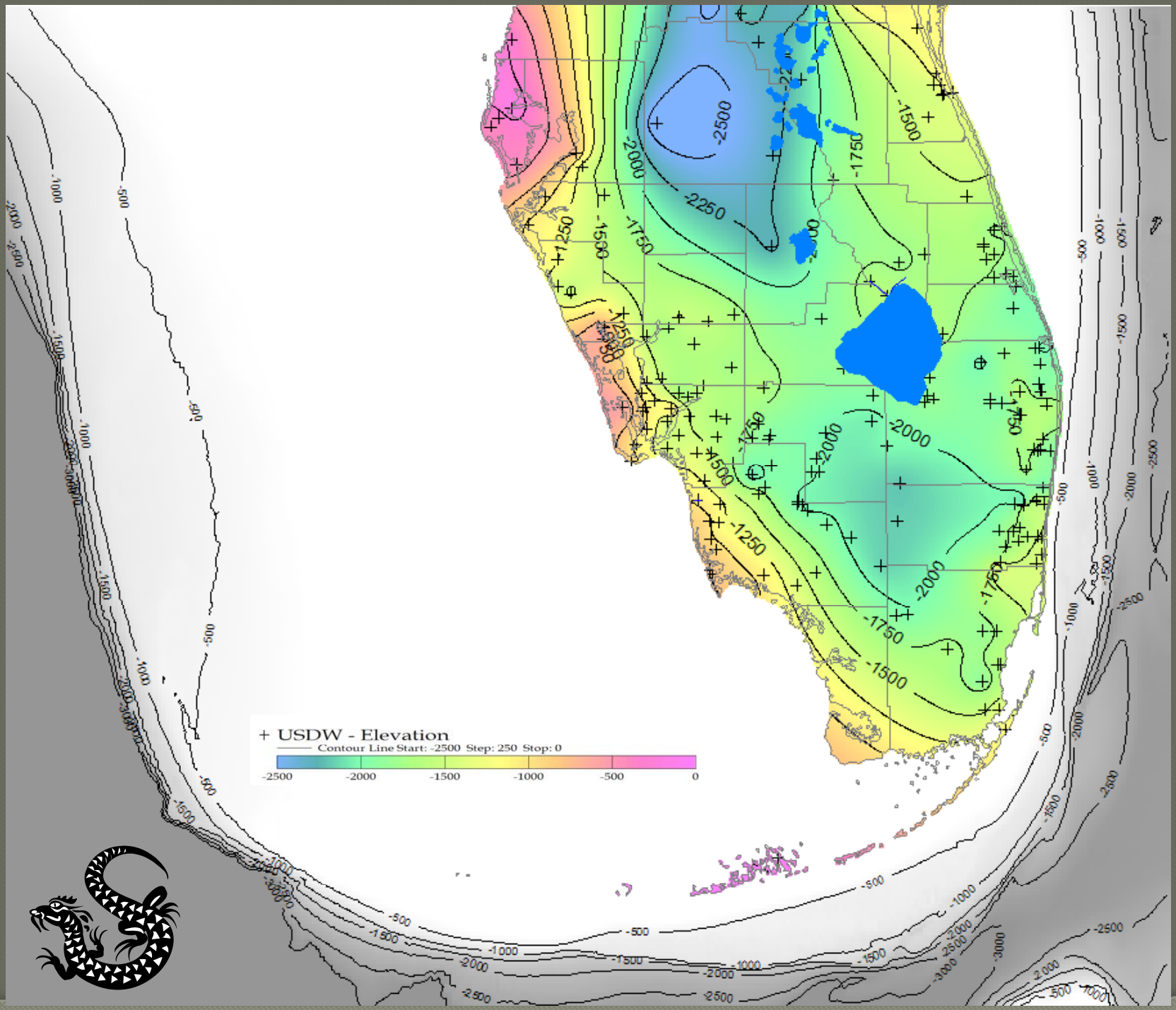
Uppermost Producing Zone



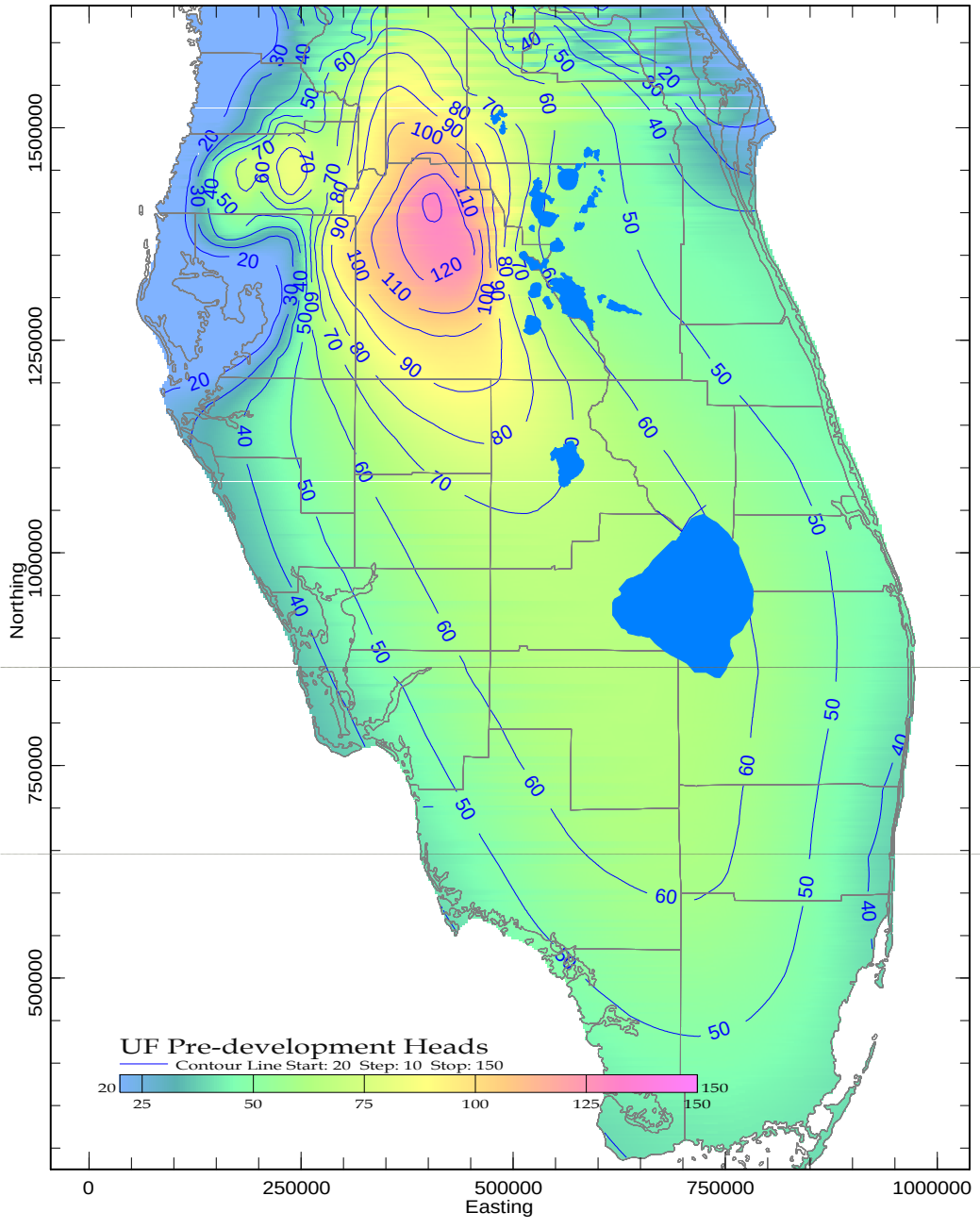
Avon Park Producing Zone

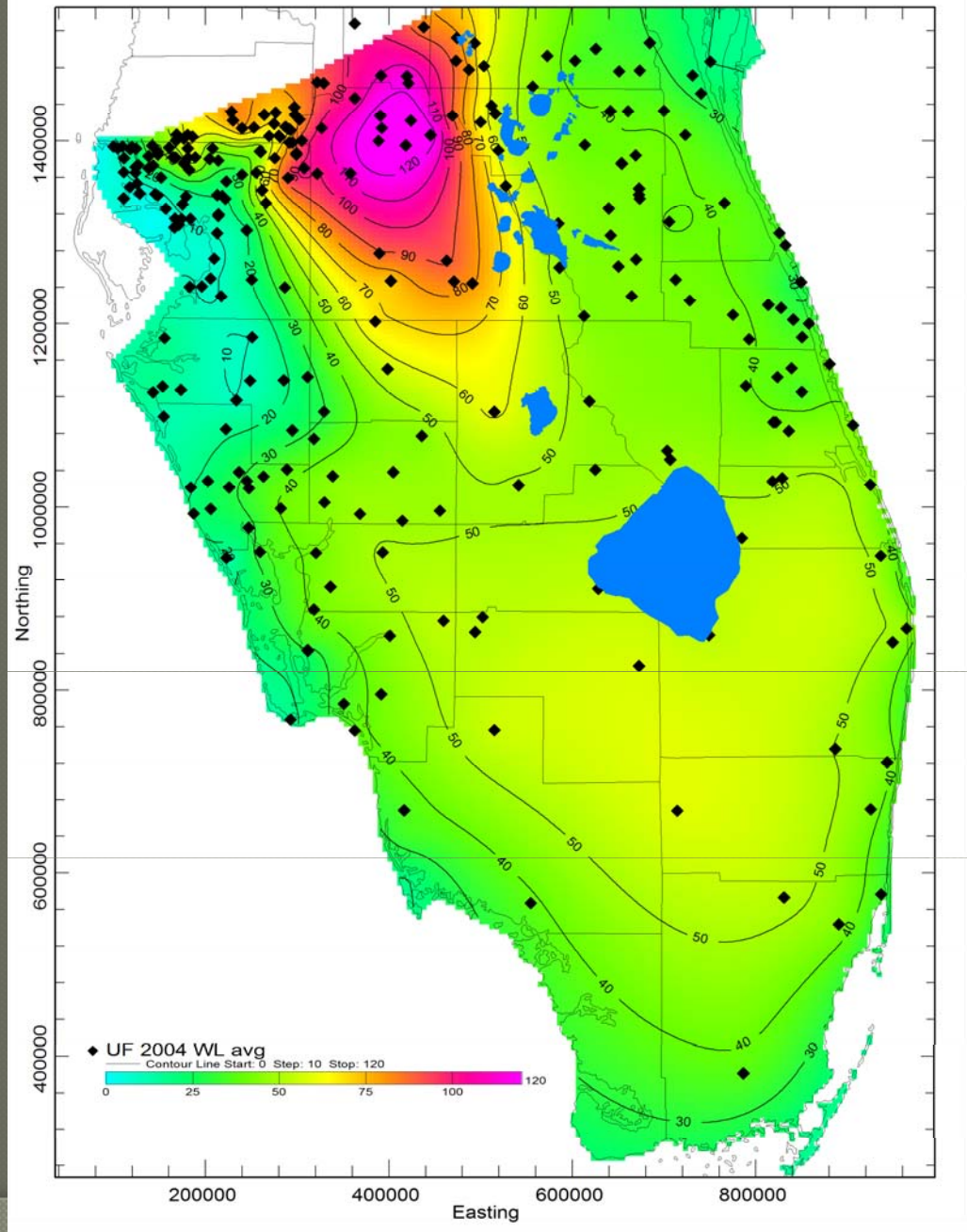


Elevation of the USDW (10,000 mg/l TDS)

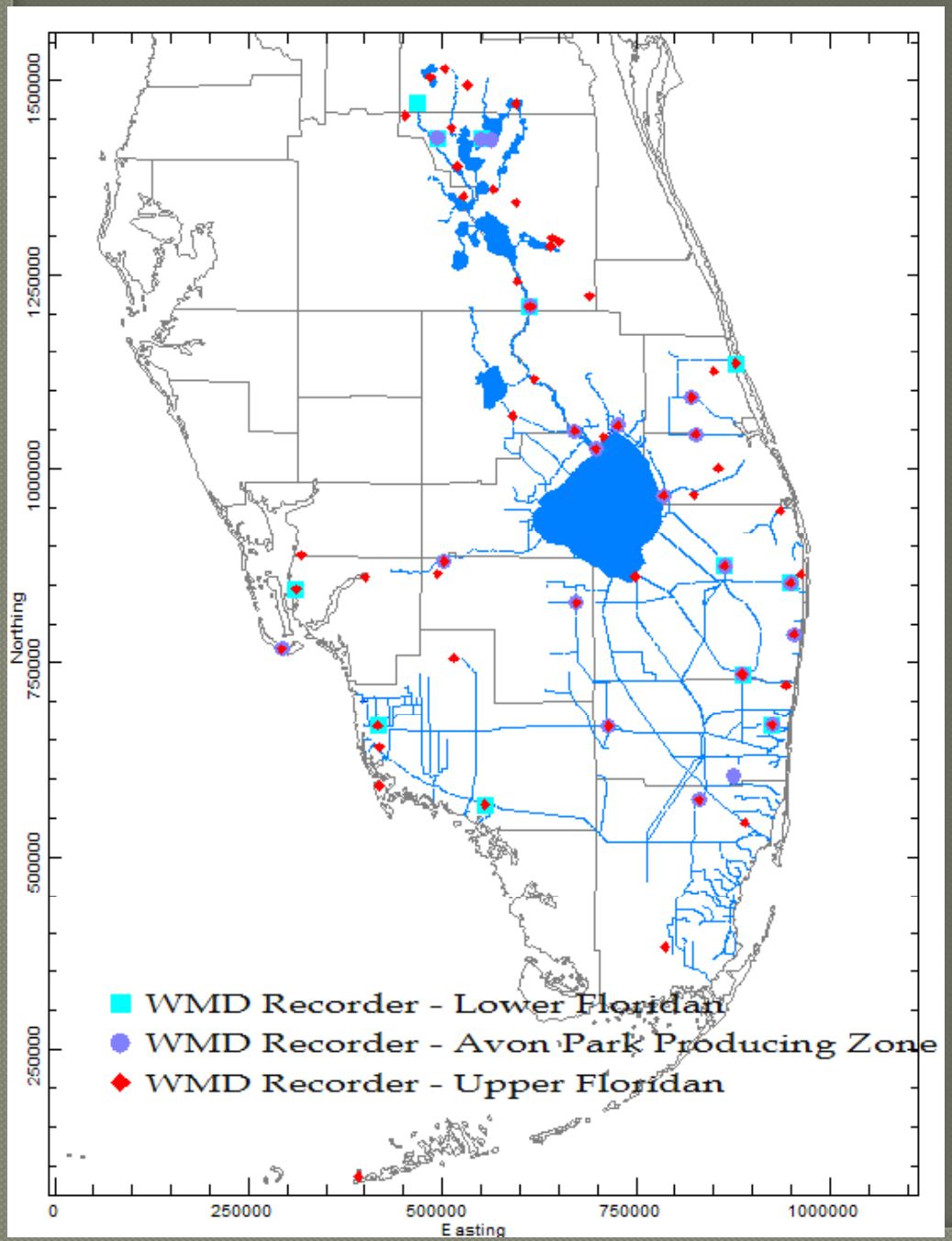


Changing Water-levels due to Long-term Withdrawals

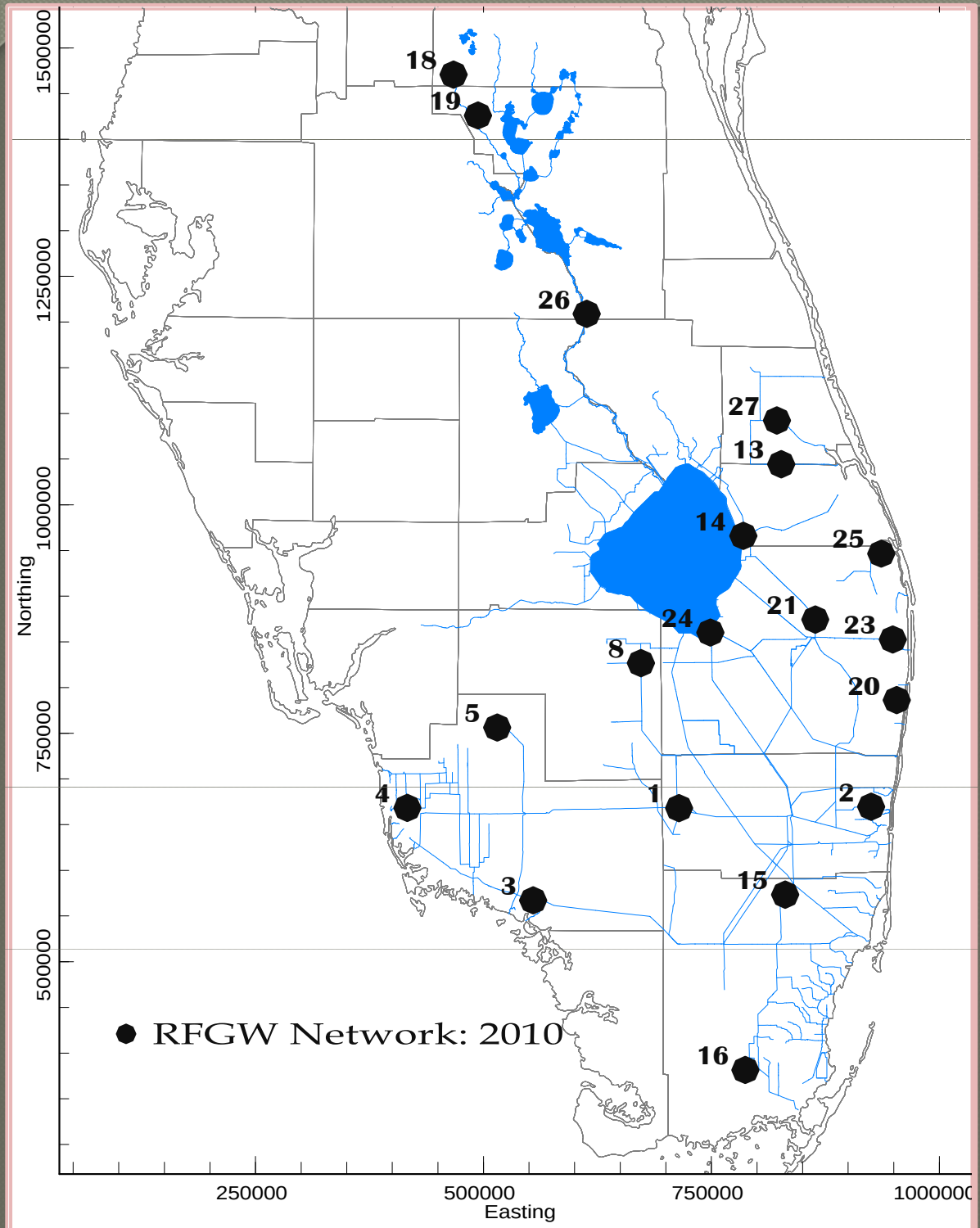




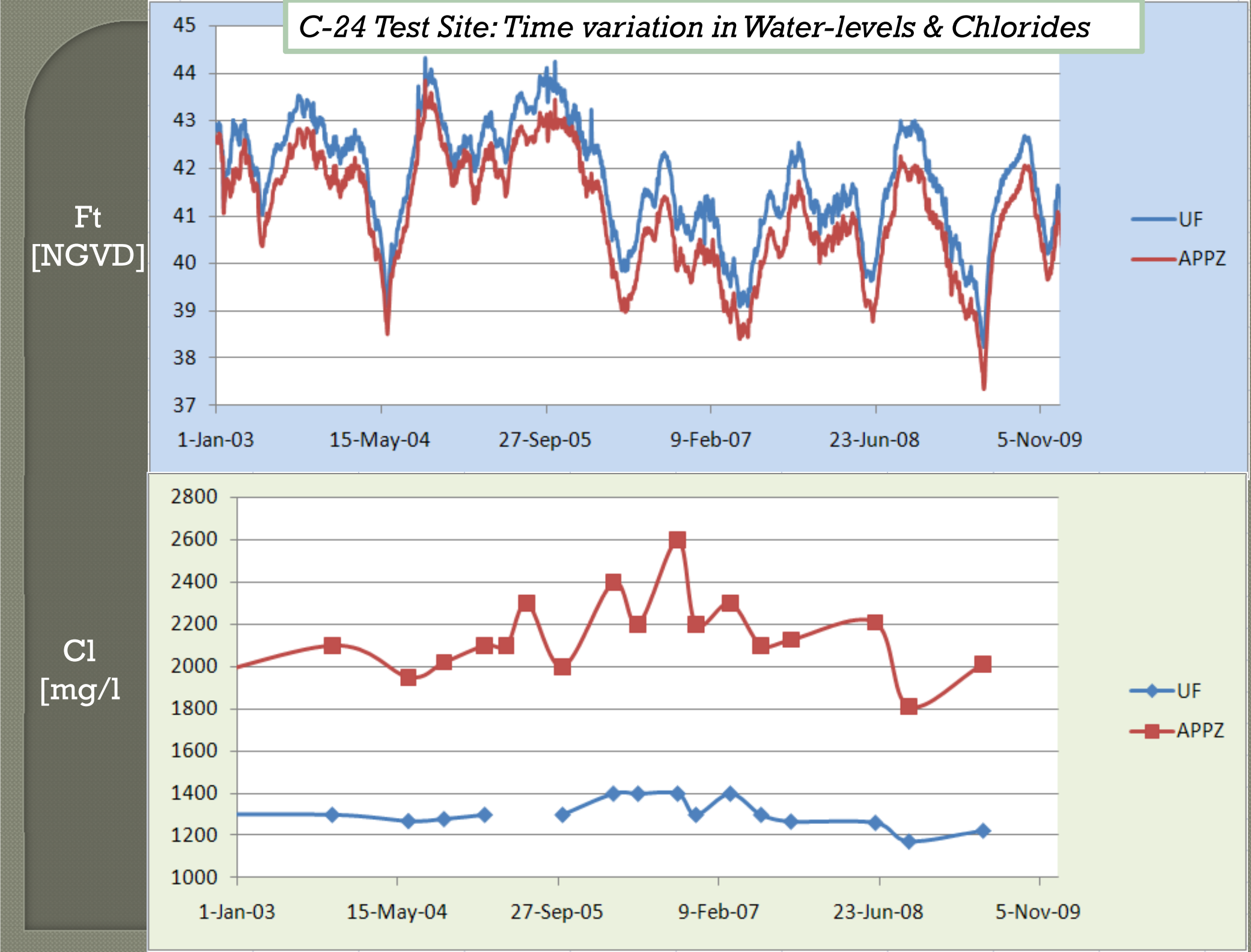
Floridan Water-Level Monitor Network



Floridan Water Quality Monitor Network



- Focus on brackish wells
- Annual sampling for specific conductance & field parameters
- Every 5 years: sample for major cations / anions


C-24 Test Site: Time variation in Water-levels & Chlorides
Ft [NGVD]
45
44
43
42
41
40
39
38
37
1-Jan-03
15-May-04
27-Sep-05
9-Feb-07
23-Jun-08
5-Nov-09
UF
APPZ
Cl [mg/l
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
1-Jan-03
15-May-04
27-Sep-05
9-Feb-07
23-Jun-08
5-Nov-09
UF
APPZ

General Characterization of the Floridan Aquifer System

- Upper permeable zone can be used for both Aquifer Storage and Recovery and RO source water in the LWC
- Brackish quality requires membrane treatment to meet drinking water standards
- Productivity is variable!
- Relatively stable water quality seasonally, but geographically and vertically variable
- Some pumping wells become saltier (up-coning of more saline water from below or laterally along coast)
- Access Data on the Floridan On-line:

http://www.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu