

Hydrogeology in the Wekiva Springshed

June 17, 2009

Brian McGurk, P.G.

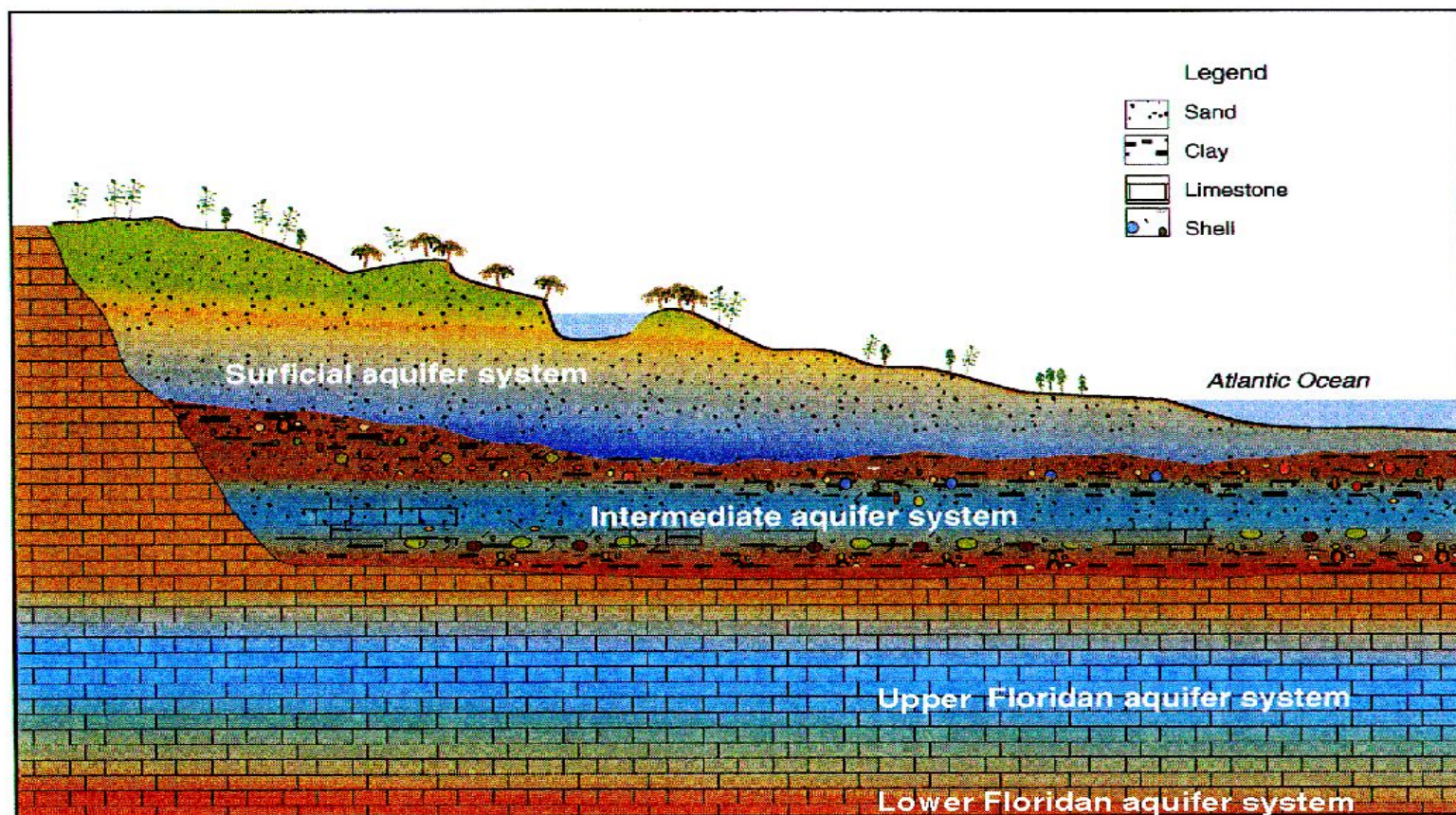
SJRWMD Groundwater Programs Division



OUTLINE:

- HYDROGEOLOGIC
“CONCEPTUAL MODEL”
- SPRINGSHED
DELINEATION
- GROUNDWATER “AGES”





/no me/sp.b/projects/requests/vergara/ecf model 0 2/27/01

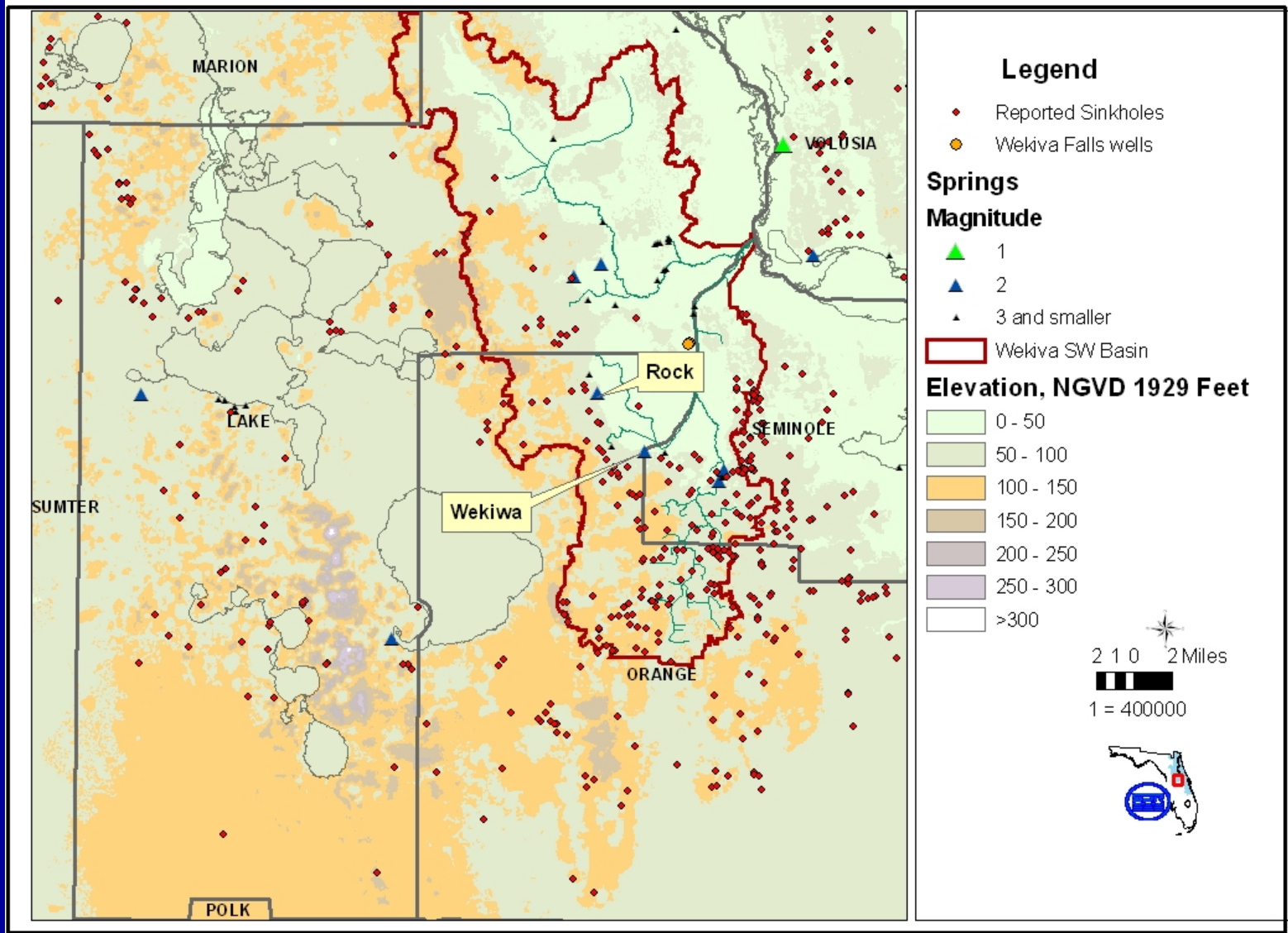
Generalized east-west hydrogeologic cross section of the St. Johns River Water Management District

Generalized Hydrogeologic Cross Section of the SJRWMD region



(William A. Wisner, 1972)

Photo courtesy of Sinkhole.org



Most springs lie at the base of karstic uplands

GROUNDWATER FLOWS “DOWNHILL”



GROUNDWATER FLOW IS PROPORTIONAL TO:

WATER LEVEL GRADIENT
PERMEABILITY



RECHARGE
AREA

water table well

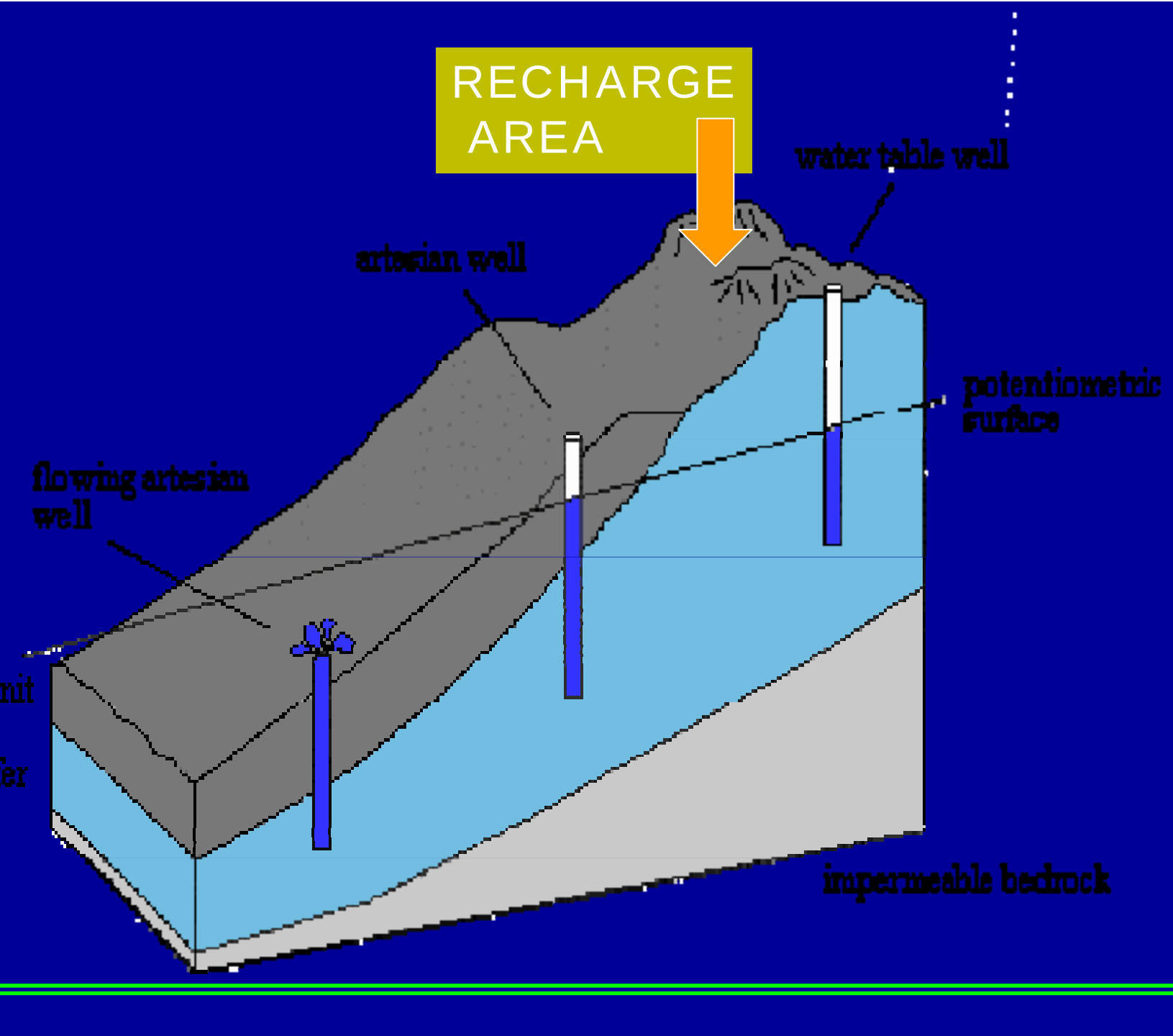
artesian well

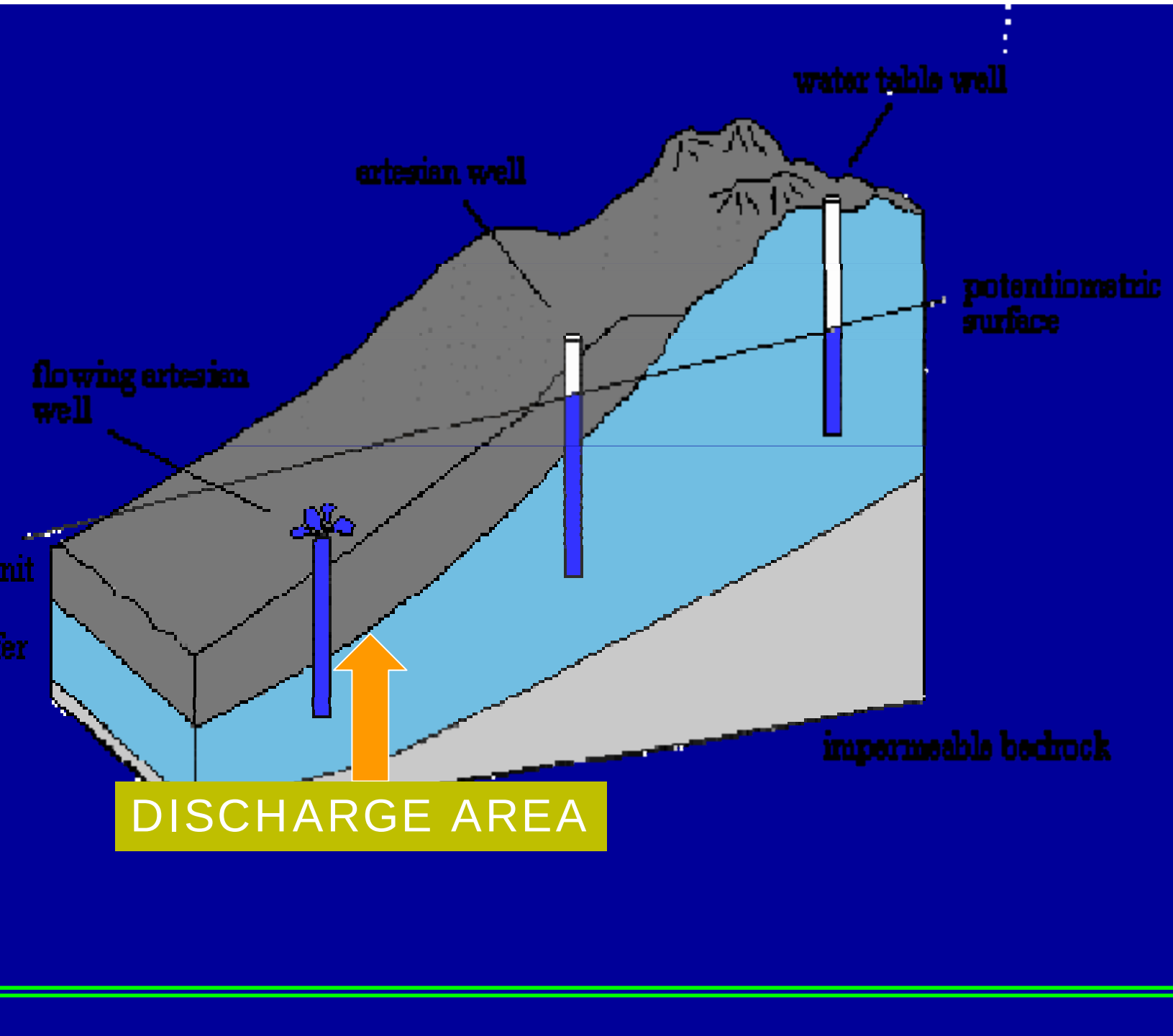
potentiometric
surface

flowing artesian
well

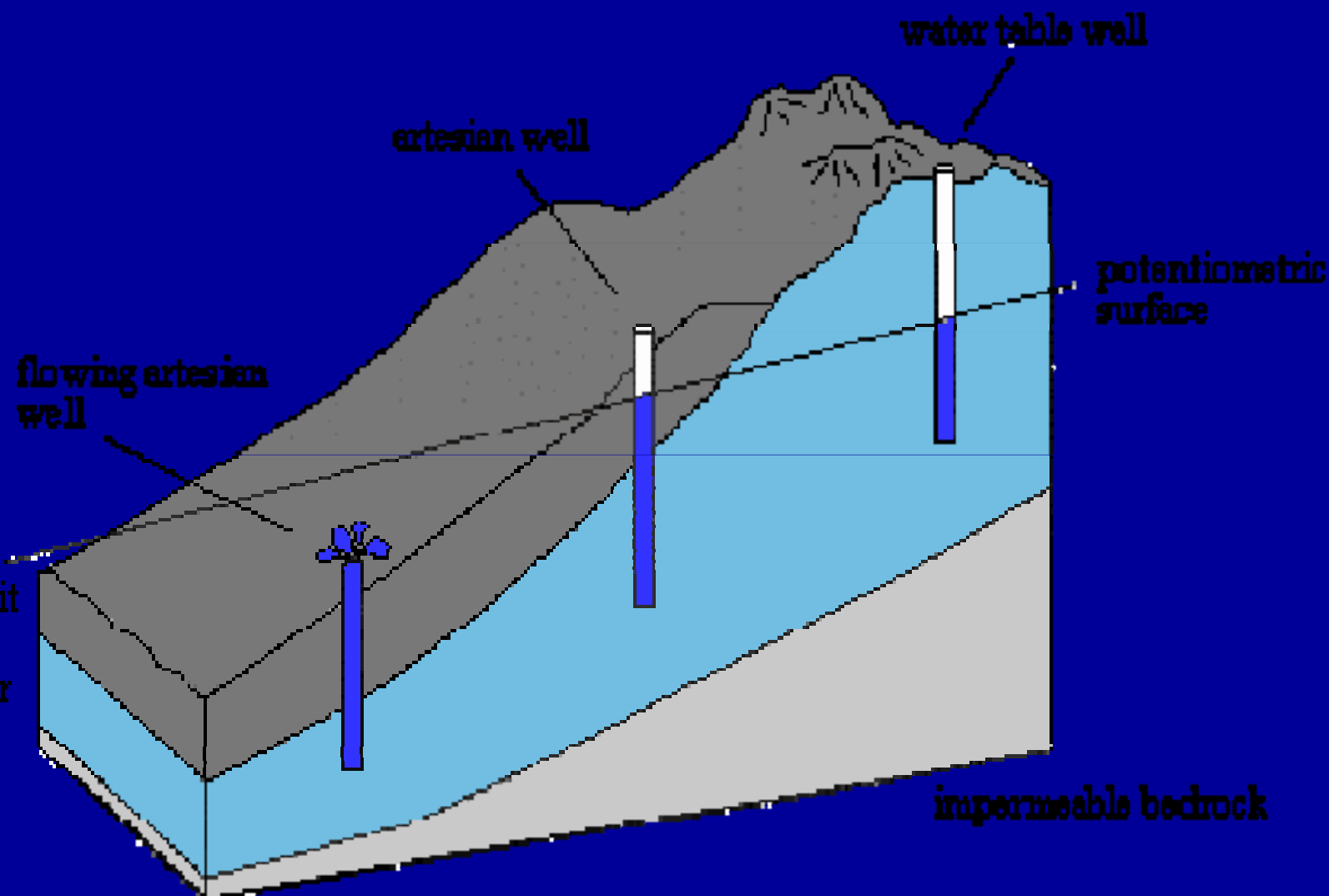
ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
confined aquifer
confining unit

impermeable bedrock

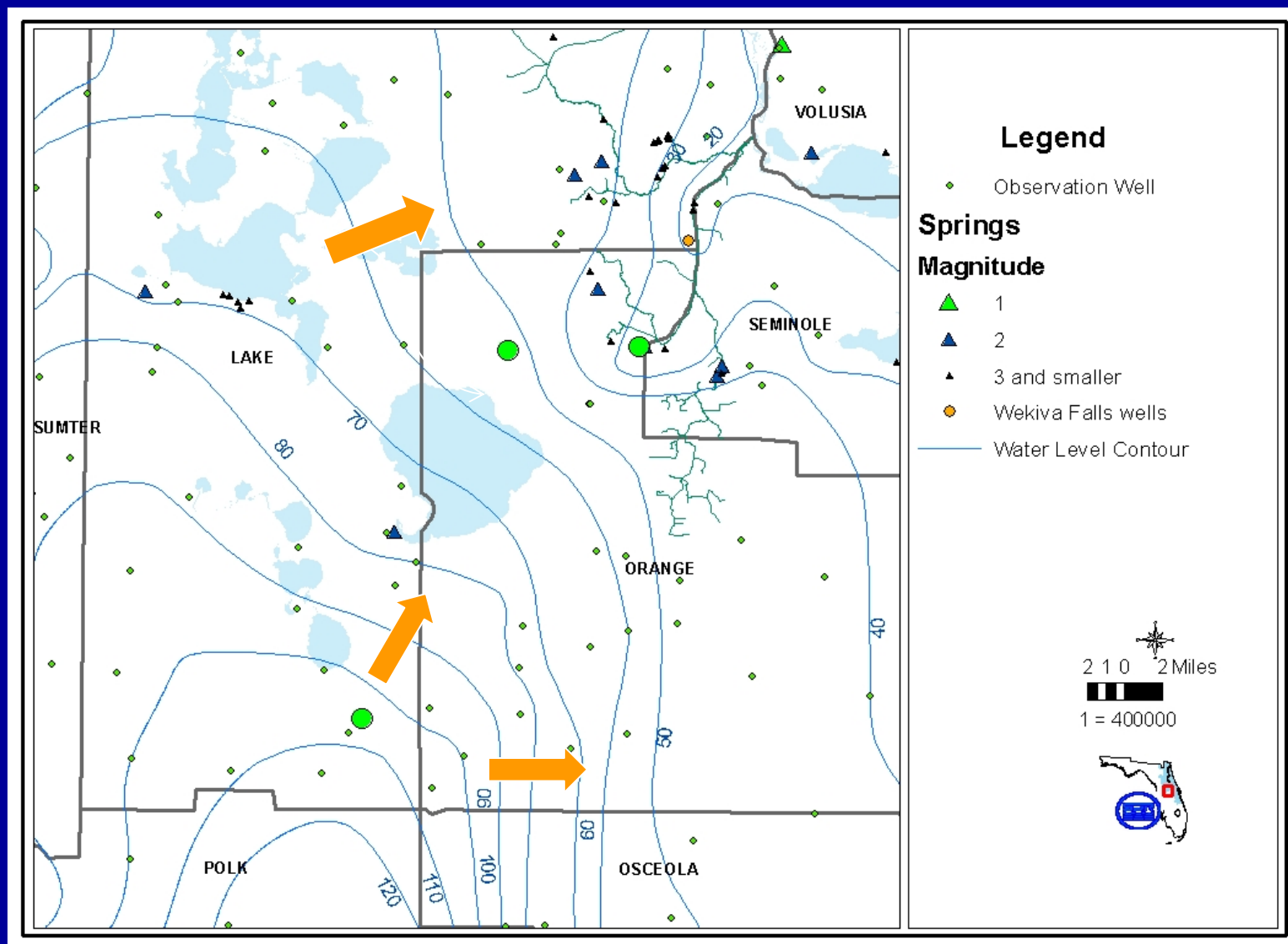






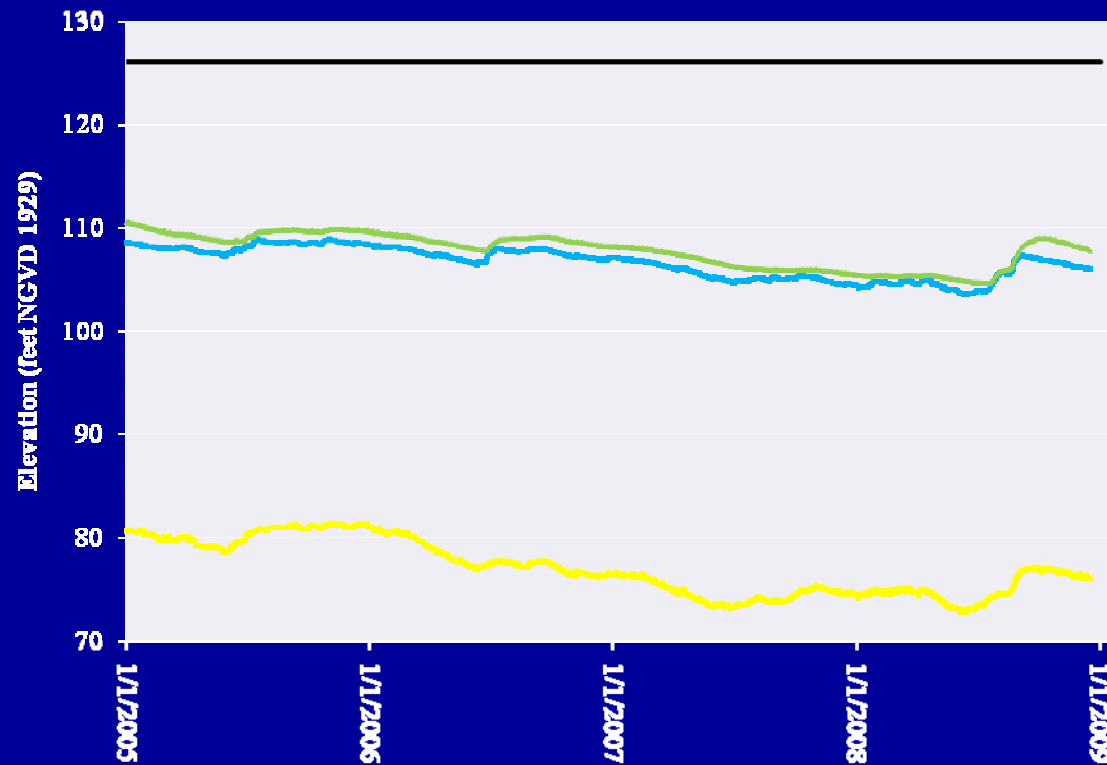


The "Potentiometric Surface" concept is used to estimate GW flow direction.



Upper Floridan Aquifer Potentiometric Surface

LAKE LOUISA STATE PARK, LAKE COUNTY



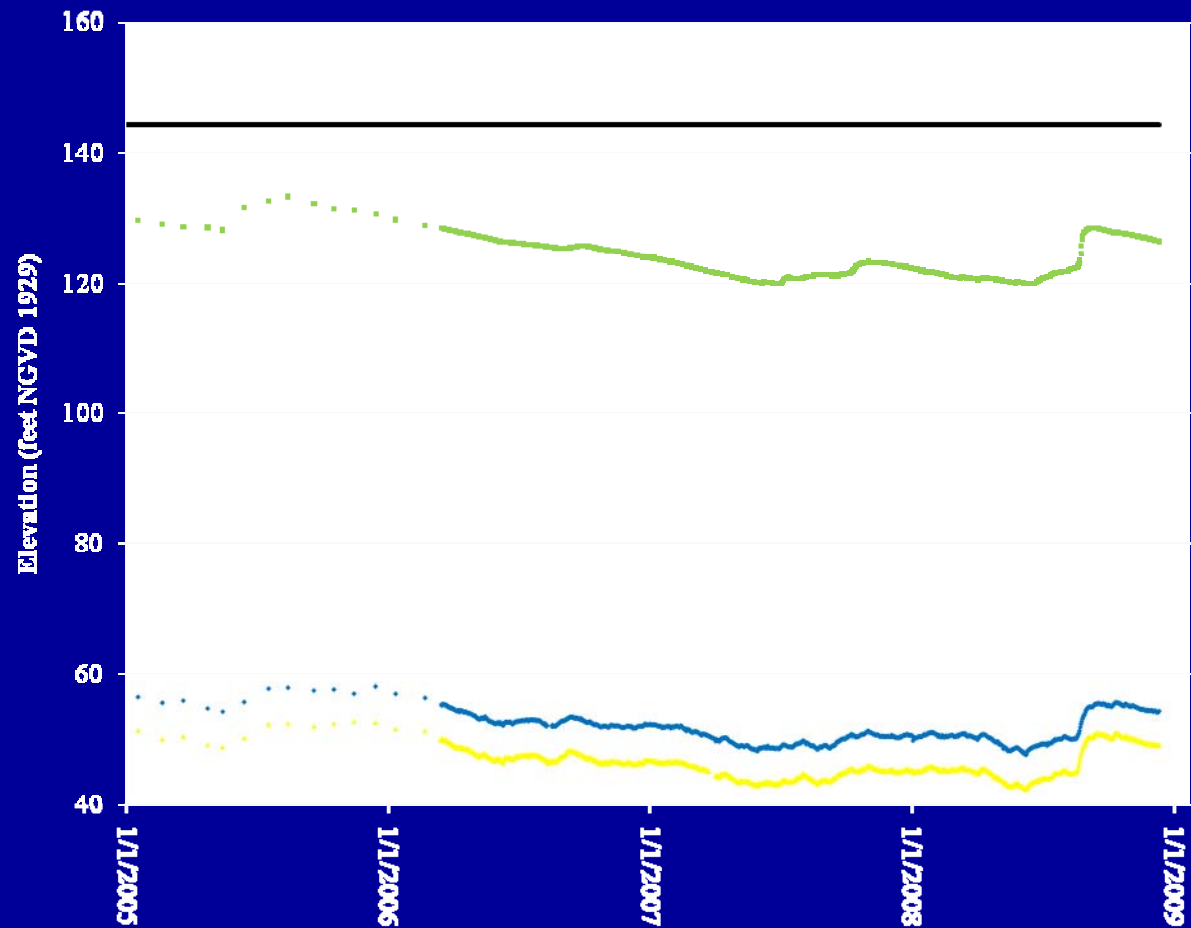
Green: Surficial Aquifer System
 Blue: Upper Floridan Aquifer
 Yellow: Lower Floridan Aquifer

Well Site Name and Monitored Interval

- L-0709, 81 to 101 ft bls
- L-0710, 32 to 42 ft bls
- L-0729, 1300 to 1410 ft bls

— Average Land Surface Datum

Plymouth Firetower

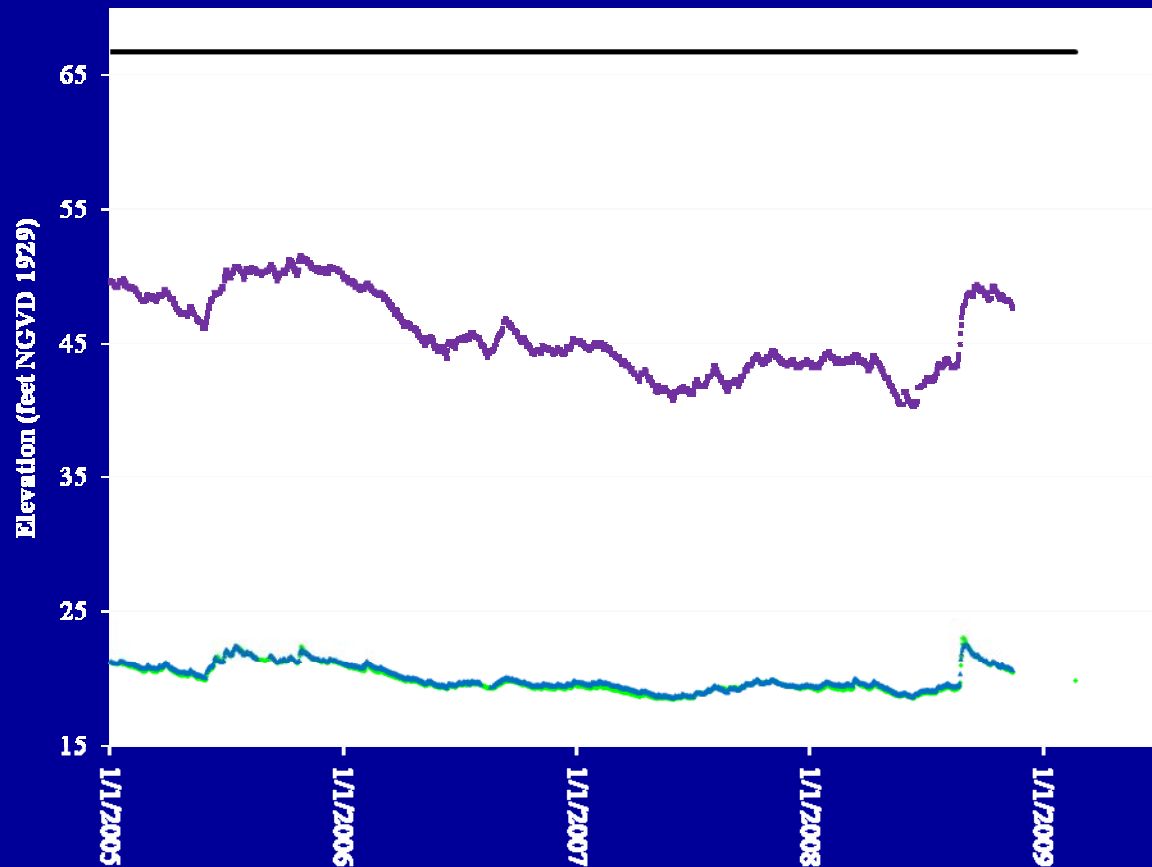


Green: Surficial Aquifer System
 Blue: Upper Floridan Aquifer
 Yellow: Lower Floridan Aquifer

Well Site Name and Monitored Interval

- **OR0106, 100 to 395 ft bls**
- **OR0107, 20 to 40 ft bls**
- **OR0794, 1050 to 1140 ft bls**
- **Average Land Surface Datum**

Wekiwa Springs State Park



Green: Surfacial Aquifer System
 Blue: Upper Floridan Aquifer
 Purple: Middle Semi-confining Unit

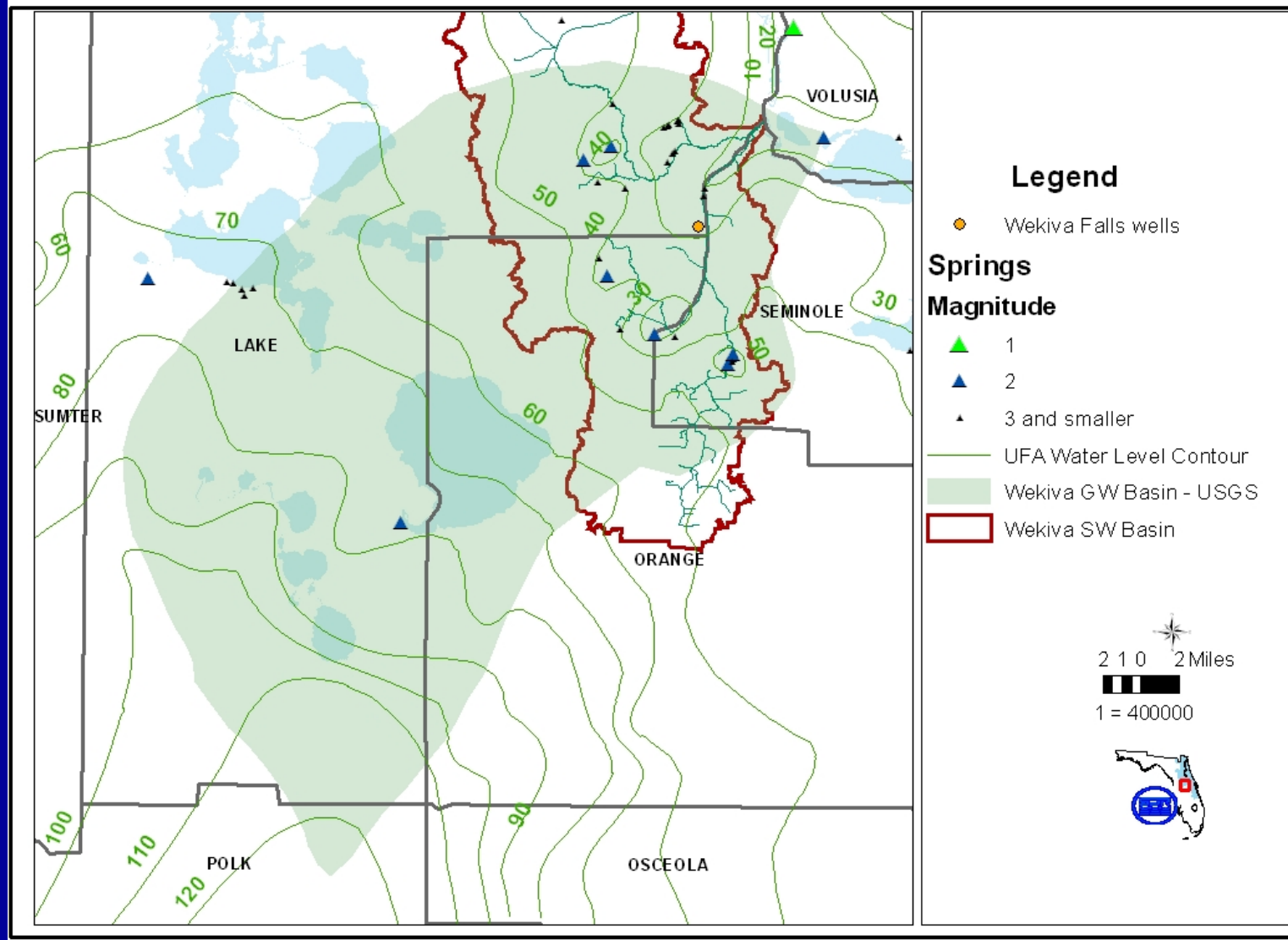
Well Site Name and Monitored Interval

- OR0546, 50 to 60 ft bls
- OR0547, 440 to 645 ft bls
- OR0548, 100 to 155 ft bls
- Average Land Surface Datum

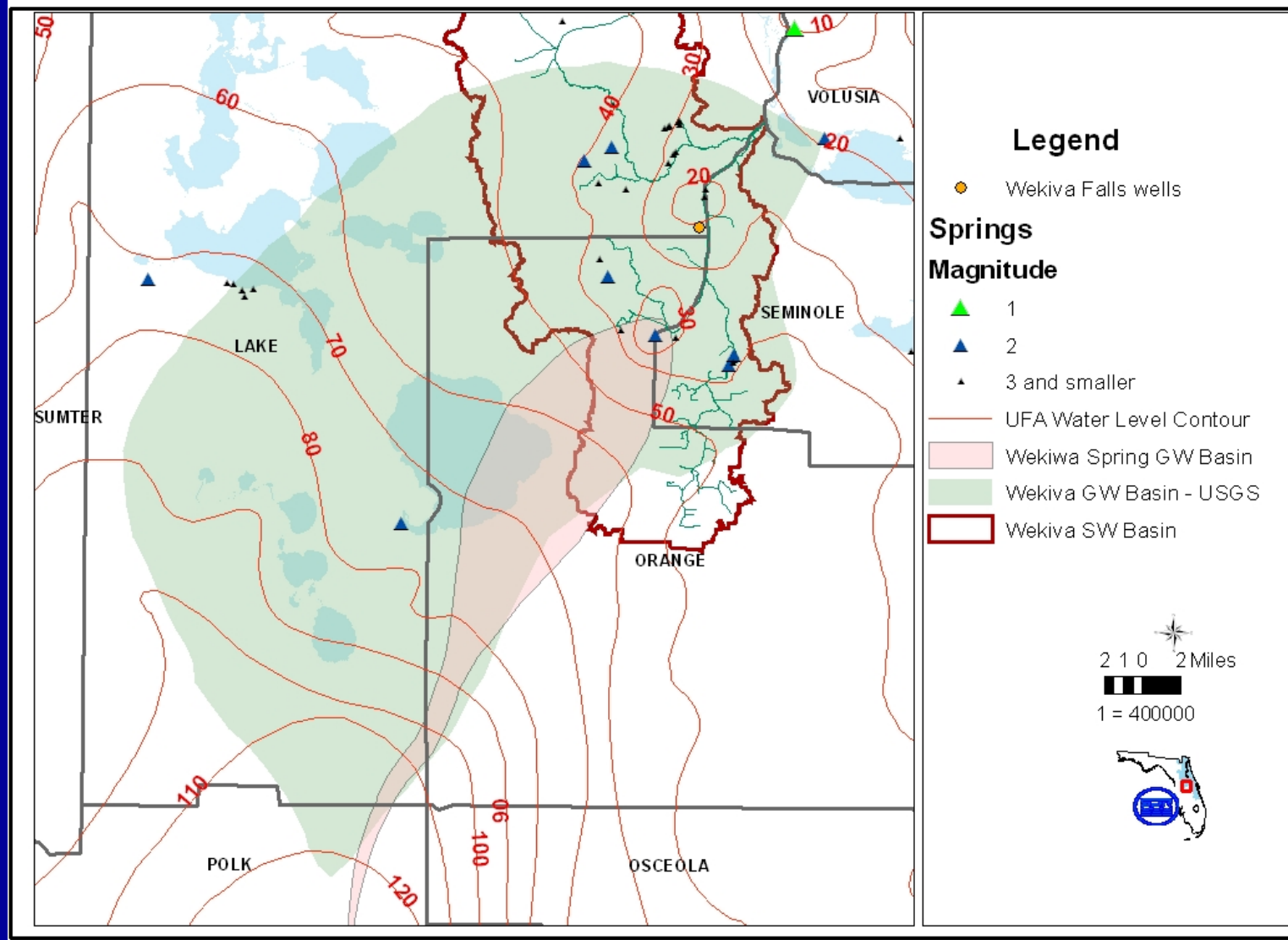
Springshed / Spring Recharge Basin

- Boundaries are approximate
- Boundaries vary with time
- Methods vary

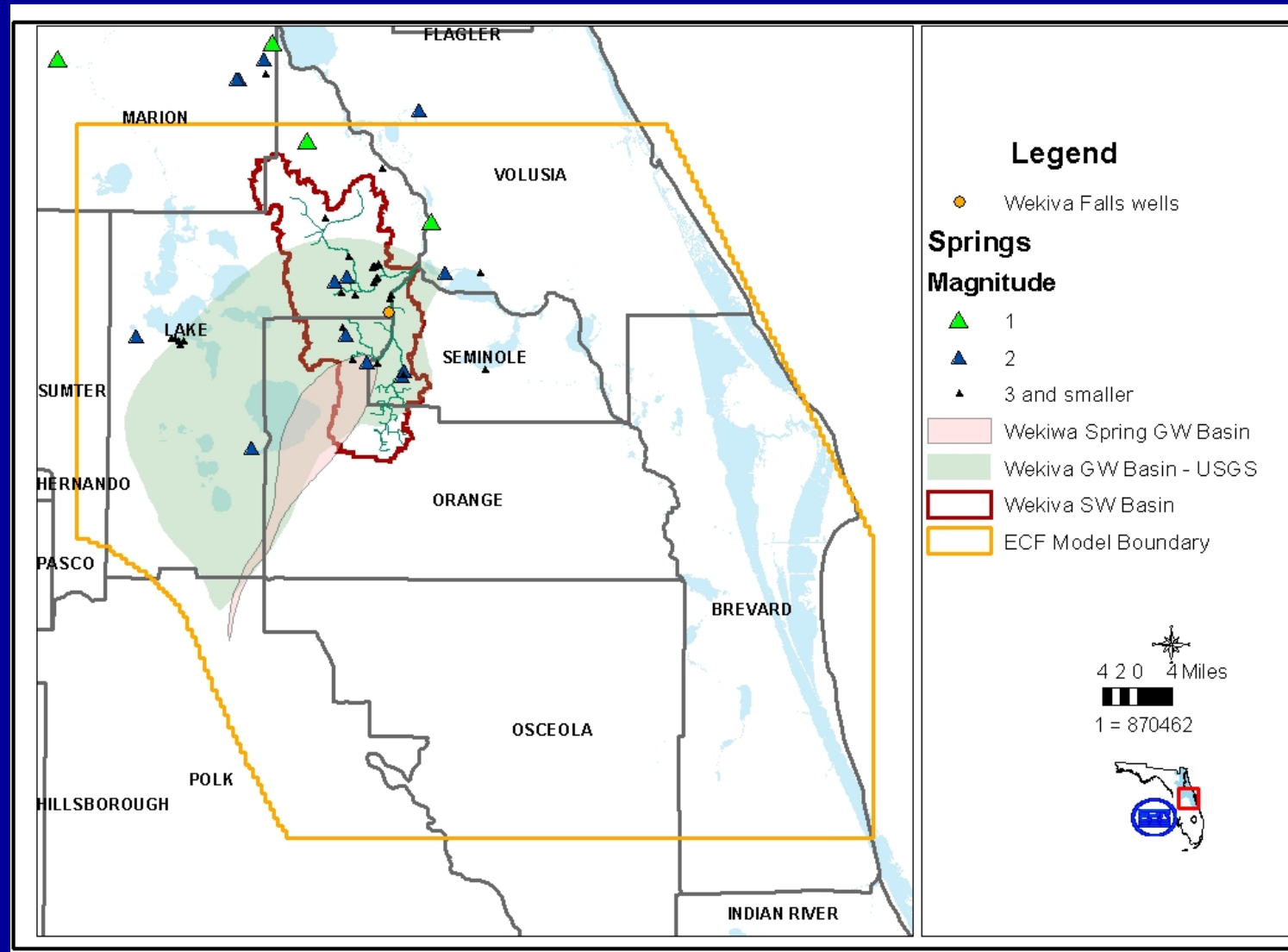




The Wekiva groundwater basin was drawn using a water-level contour map from May, 1980



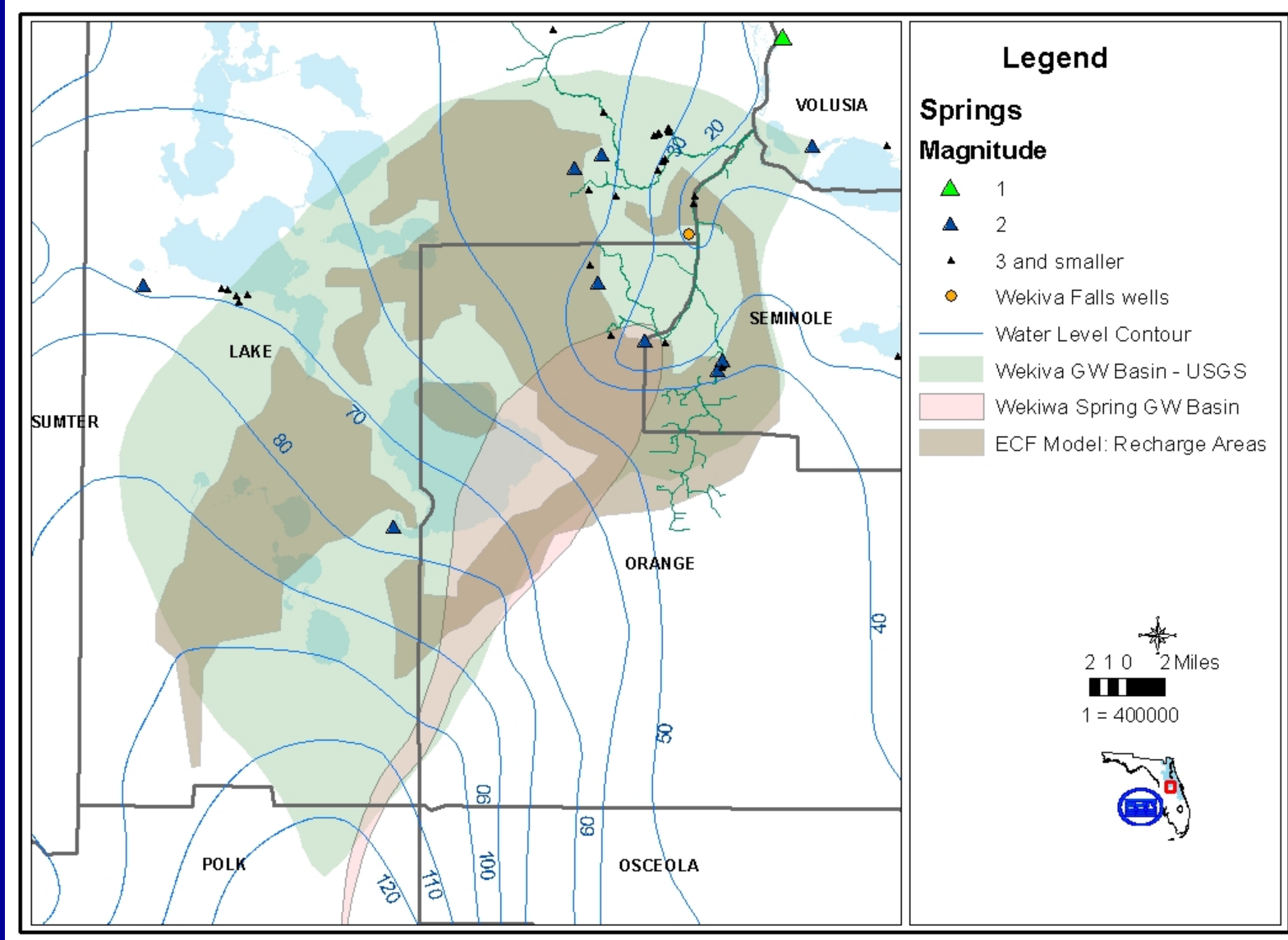
The Wekiwa Springs groundwater basin was drawn using a water-level contour map from 1995.



The East-Central groundwater model focuses upon Orange County, primarily Orlando



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The ECF model was used to map recharge areas to 2nd and 3rd magnitude springs in the Wekiva Basin

Groundwater Age Dating

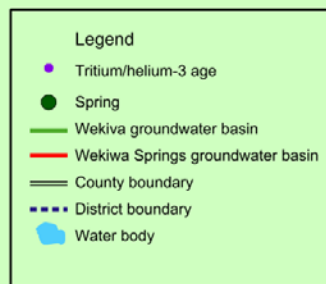
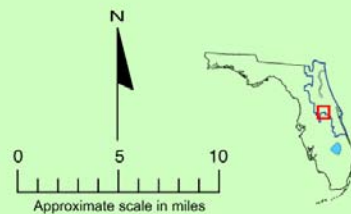
- Provides approximate dates
- Age-dating methods commonly assume no mixing of water from different sources
- Carbon-14: several hundred to thousands of years
- Tritium: since about 1953
- Particle-tracking: estimated porosity



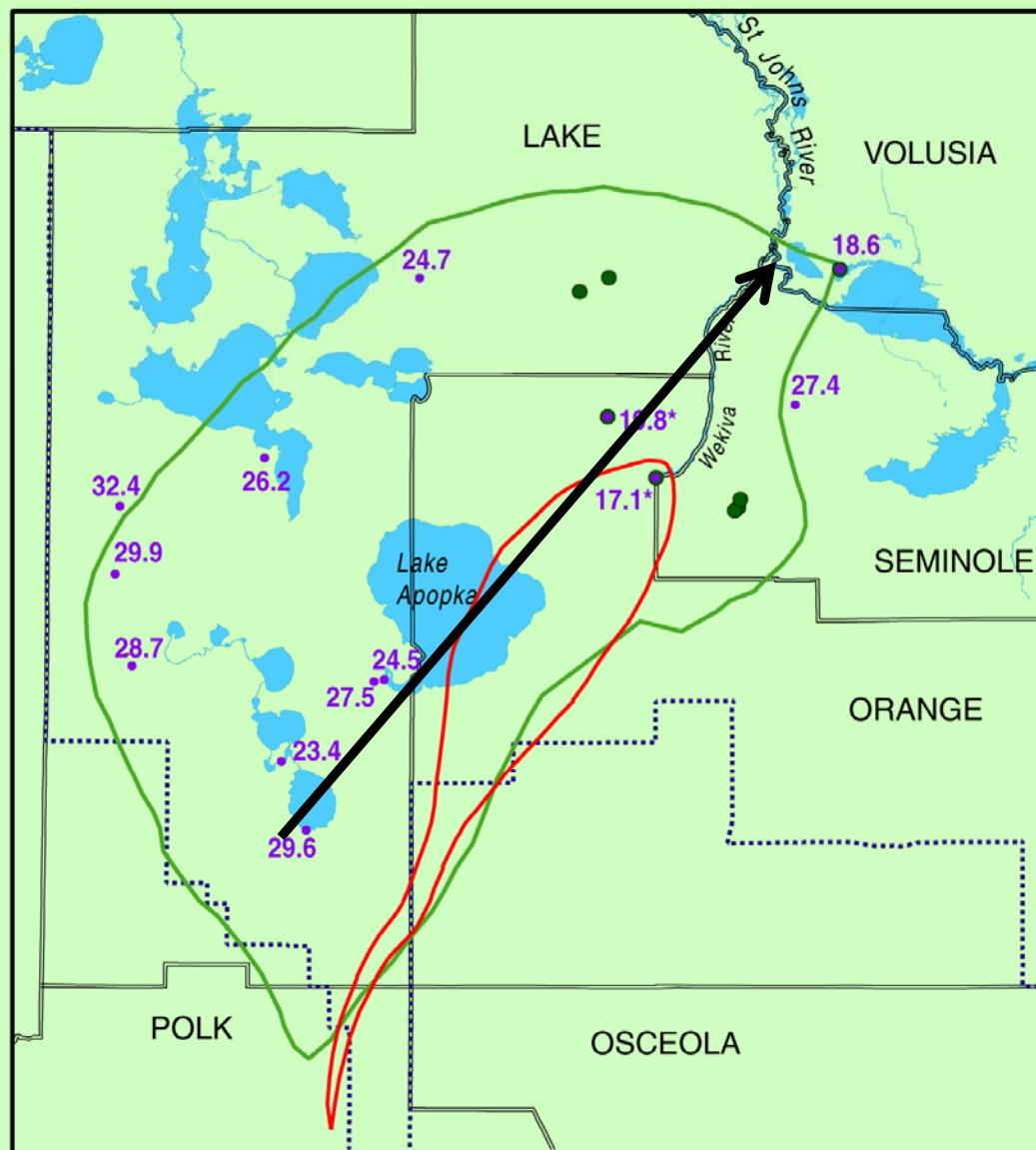
Groundwater Age examples

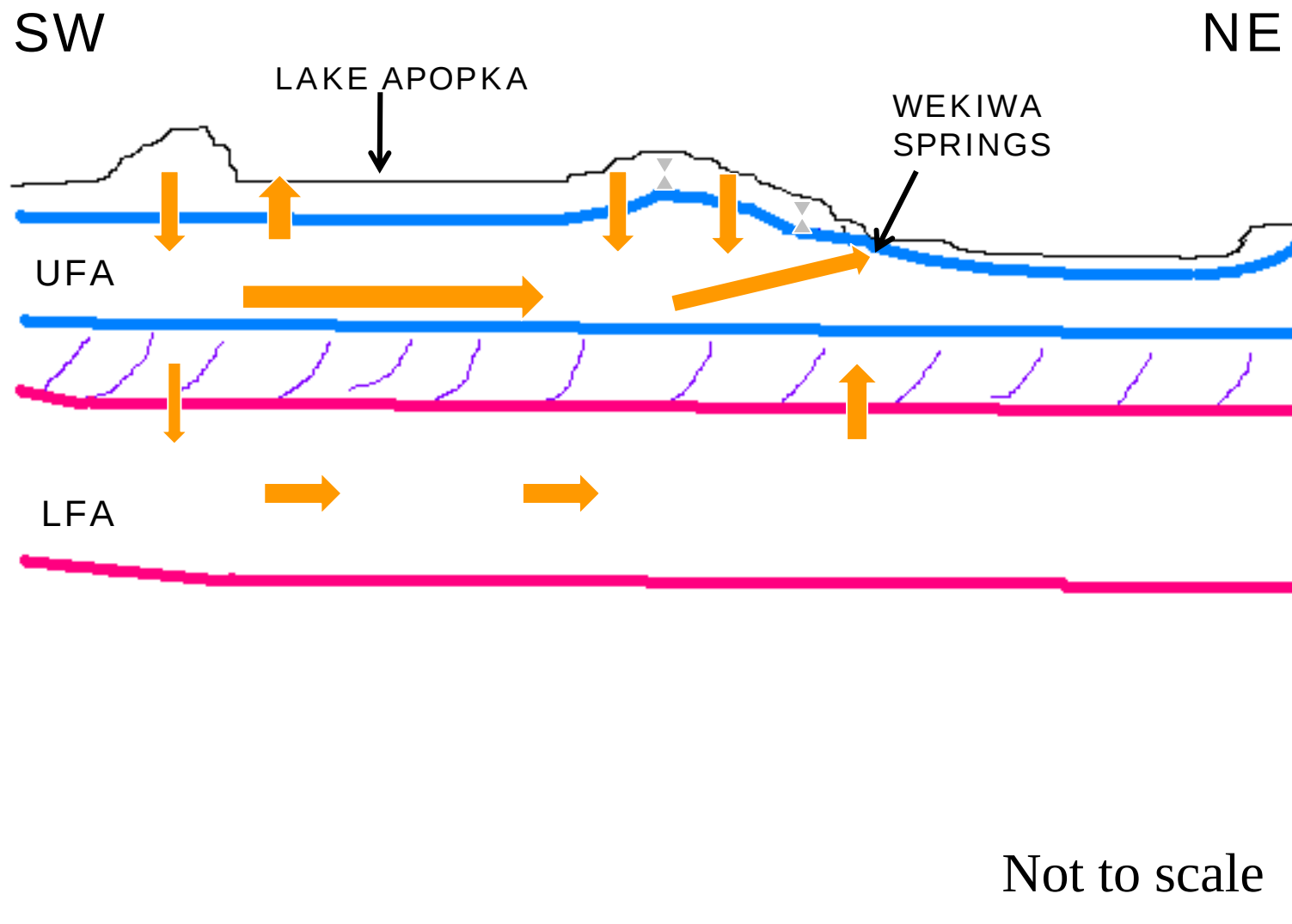
Location	Tritium/Helium Age (years)	C-14 Age (years)
Wekiwa Springs	~15	>50
Wekiva State Park Upper Floridan well	~40	~1150
Wekiva State Park deeper Floridan well	>70	~7225





Tritium/helium-3 age for samples in the Wekiva groundwater basin.
Numbers with asterisk are from Toth 1999.







Thanks for caring about springs!

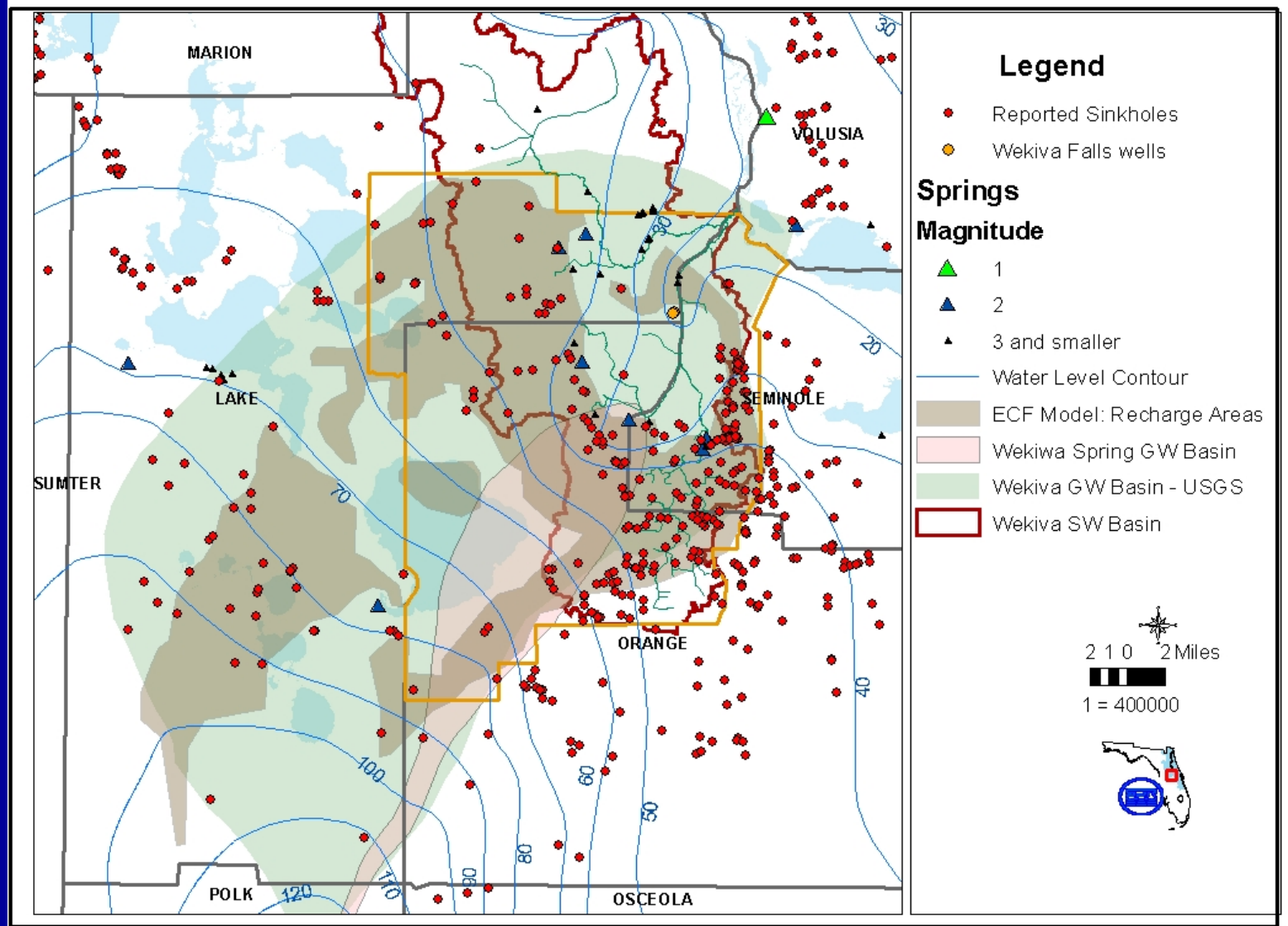


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- may not be suitable for other purposes. This information is
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- obtained by contacting: St. Johns River Water Management
- District, Geographic Information Systems, Program
- Management, P.O. Box 1429, 4049 Reid Street
- Palatka, Florida 32178-1429. Tel: (386) 329-4245.







Sinkholes are abundant in the recharge areas near the springs.



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OBSERVATION WELL SITE NEAR PLYMOUTH



TEST-HOLE DRILLING: PREVATT LAKE, JULY 2007