



*Florida Department of
Environmental Protection*

Defining the Silver Springs Basin Management Action Plan Area

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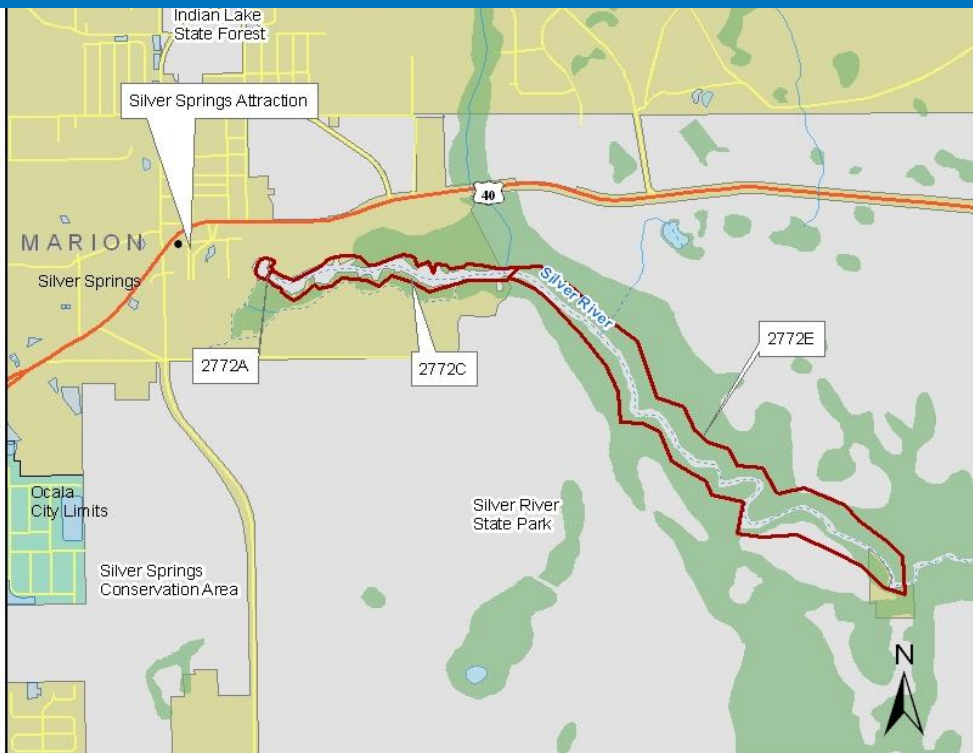
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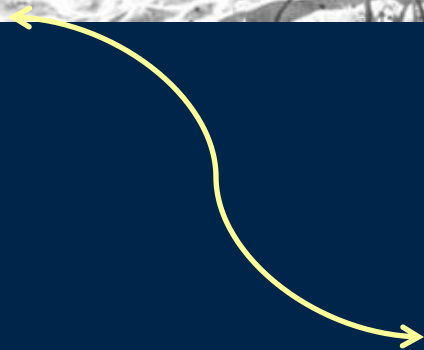
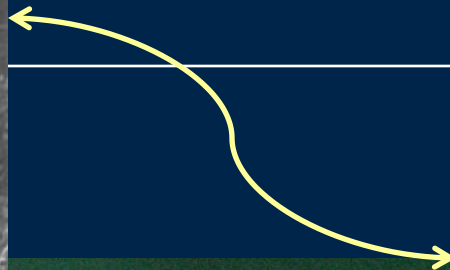


Why There is a Silver Springs BMAP

Silver Springs Main 2772A
Silver Springs Group 2772C
Upper Silver River 2772E



- Listed as impaired in 2009.
- TMDL adopted in 2012.
- Listed because of algal mats.
- Algal growth linked to excess nitrate.
- Nitrate target is 0.35 mg/L.





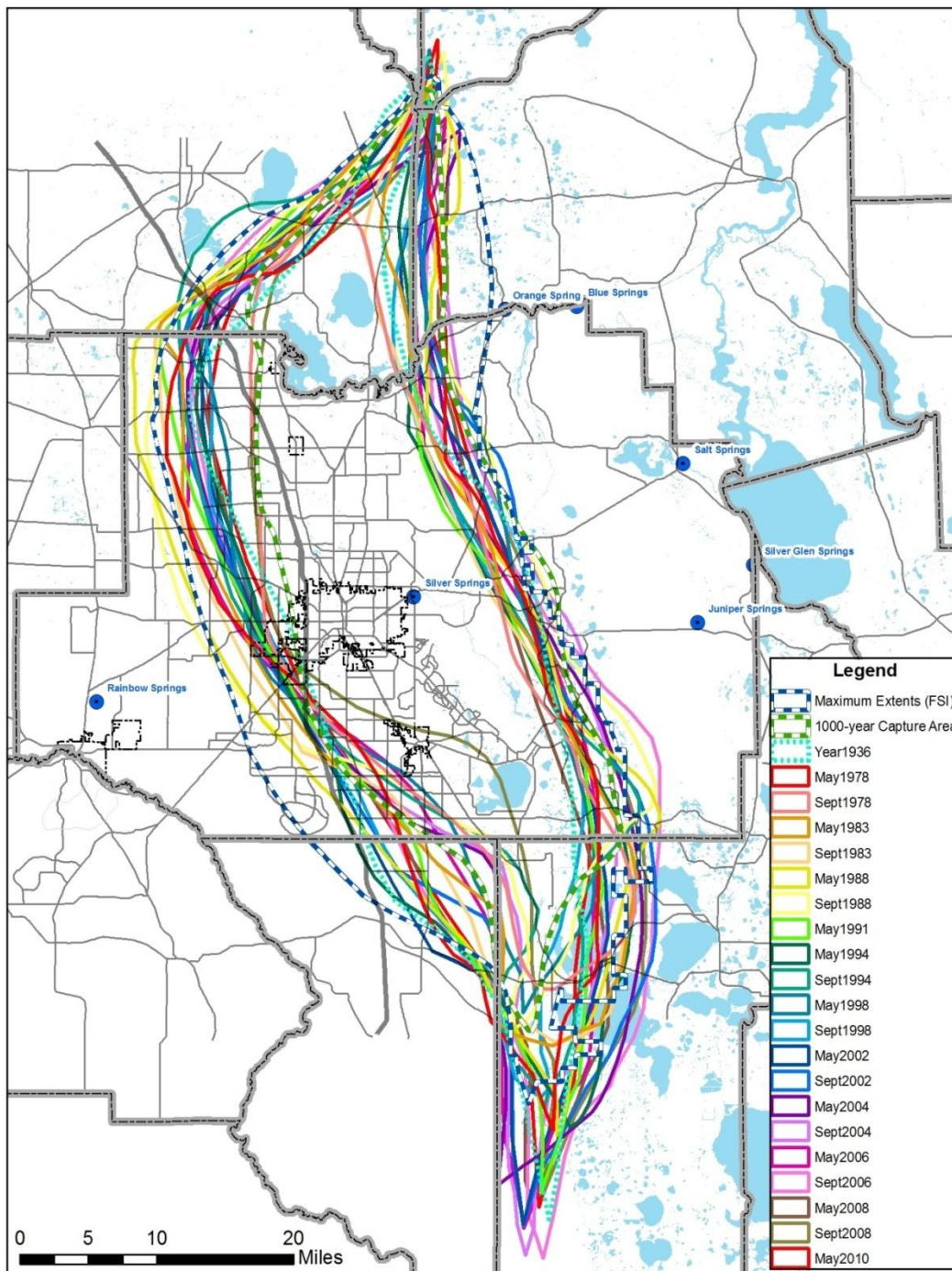
Monthly Average Nitrate Levels 2000-2011

Month	Silver Springs (WBID 2772A) Average (mg/L)	Silver Springs Group (WBID 2772C) Average (mg/L)	Upper Silver River (WBID 2772E) Average ¹ (mg/L)	30-Year Rainfall (1981– 2010) (inches)
January	1.18	1.69	0.98 (n=1)	3.550
February	1.16	1.60	ND	3.110
March	1.05	1.41	ND	4.020
April	1.1	1.41	1.01 (n=2)	2.780
May	0.91	1.43	ND	3.550
June	0.98	1.30	ND	7.200
July	1.09	1.45	ND	6.200
August	1.09	1.58	ND	5.840
September	1.07	1.39	1.30 (n=1)	5.600
October	1.14	1.46	ND	2.710
November	1.13	1.54	0.99 (n=1)	2.470
December	0.98	1.30	1.00 (n=1)	2.650
Maximum Monthly Average	1.18	1.69	Not calculated	-



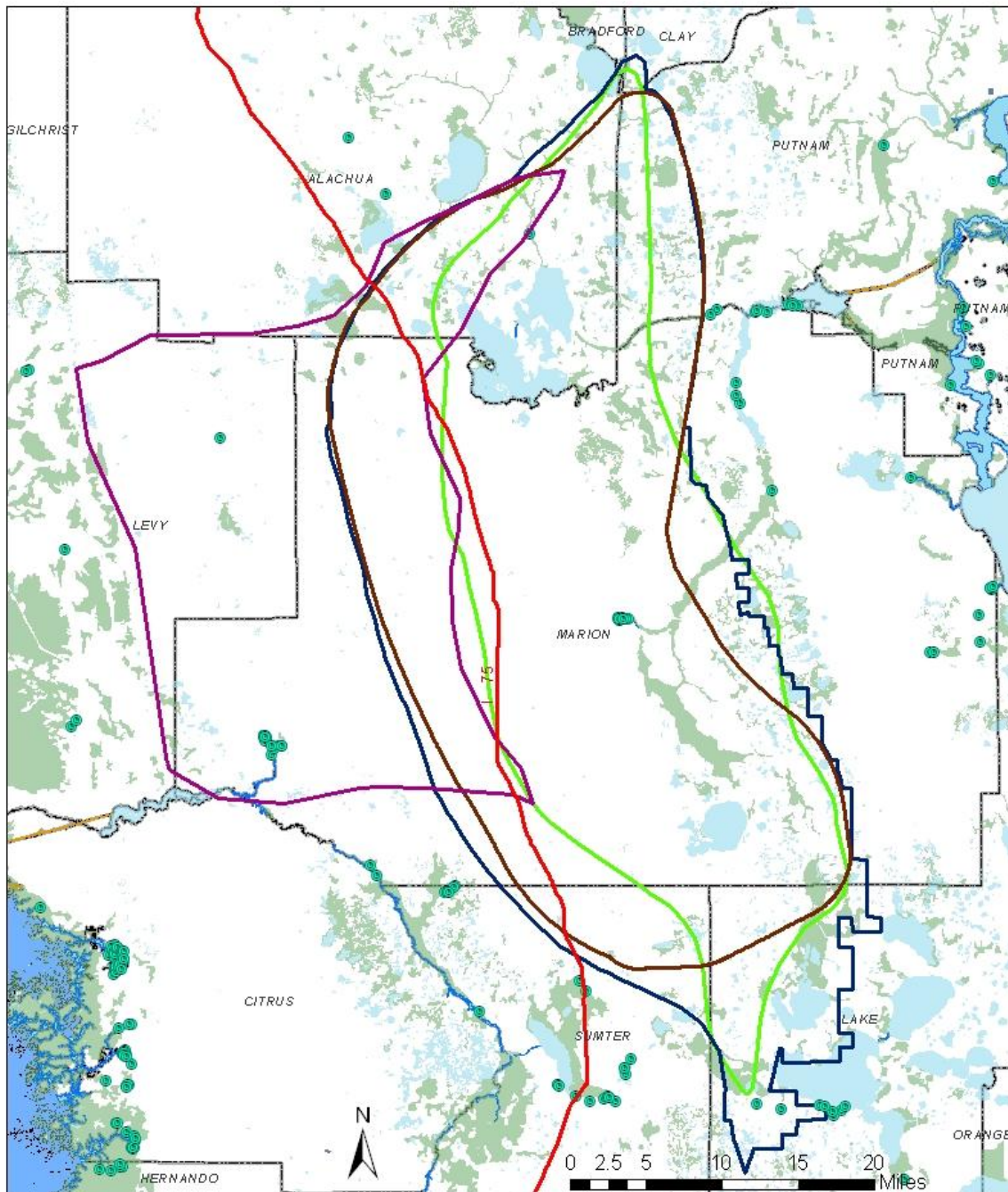
Potentiometric Surfaces

- 21 different surfaces drawn.
- Great variability in location.
- Great variability in total area.
- Dependent on rainfall, season, and analyst.
- Dependent on how many data sets are merged.





Silver Springs Ground Water Delineations



Legend

- Rainbow Springshed 2005
- I-75
- Springs (2011)
- Florida Springs Institute
- 1000 Year Capture Zone
- Phelps Report (USGS)



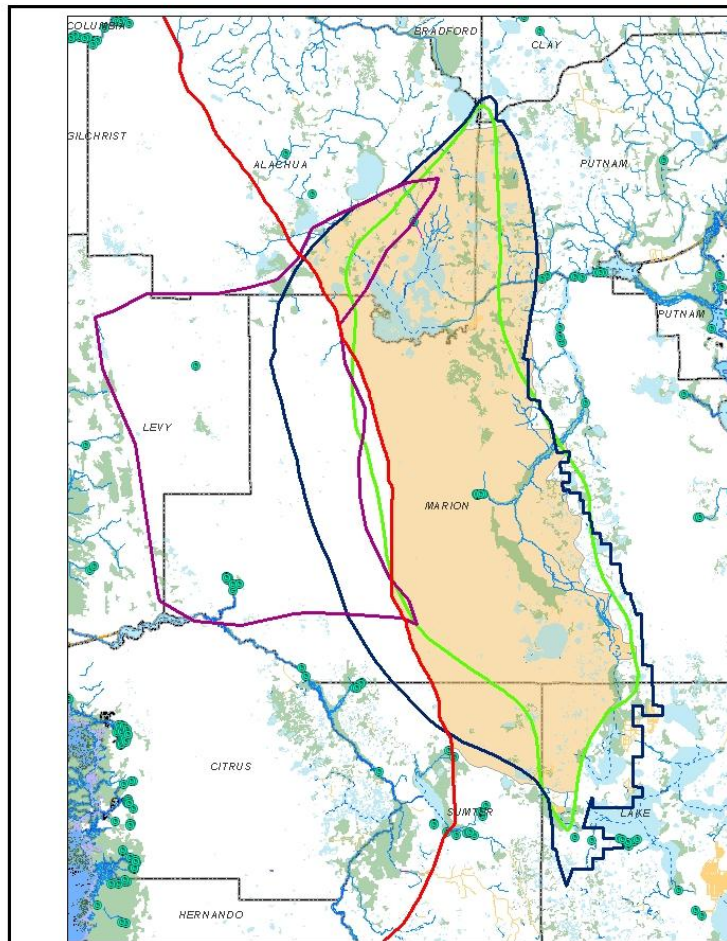
How to Define Silver Springs Basin

- Ground water basins are dynamic, particularly for Silver and Rainbow.
- Complicates the issue. Delineation for any given year may not be correct the following year.
- One solution is to tie the boundary to landmarks that are less likely to change.

This is now a BMAP management area and
NOT A SPRINGSHED DELINEATION!



Proposed BMAP Management Area



N
0 3 6 12 18 24 Miles
Silver Springs Boundary Delineations

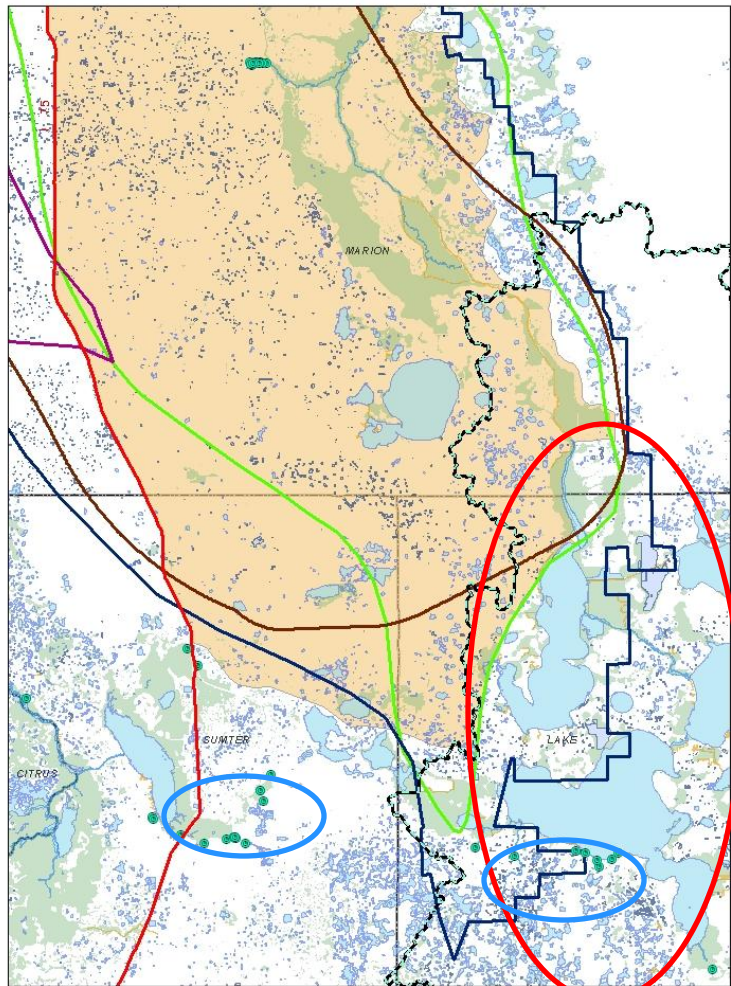
- North Boundary – SR 26
- West Boundary – I-75
- South Boundary – SR 44
- East Boundary – several local roads and Ocklawaha River.

Legend

- Rainbow Springshed 2005
- Springs (2011)
- Florida Springs Institute
- 1000 Year Capture Zone
- BMAP Management Area



Southern Boundary



- Not sure what stair step edge represents?
- Spring cluster located by Lake Harris.
- Other spring clusters close to boundary.

Southern Boundary



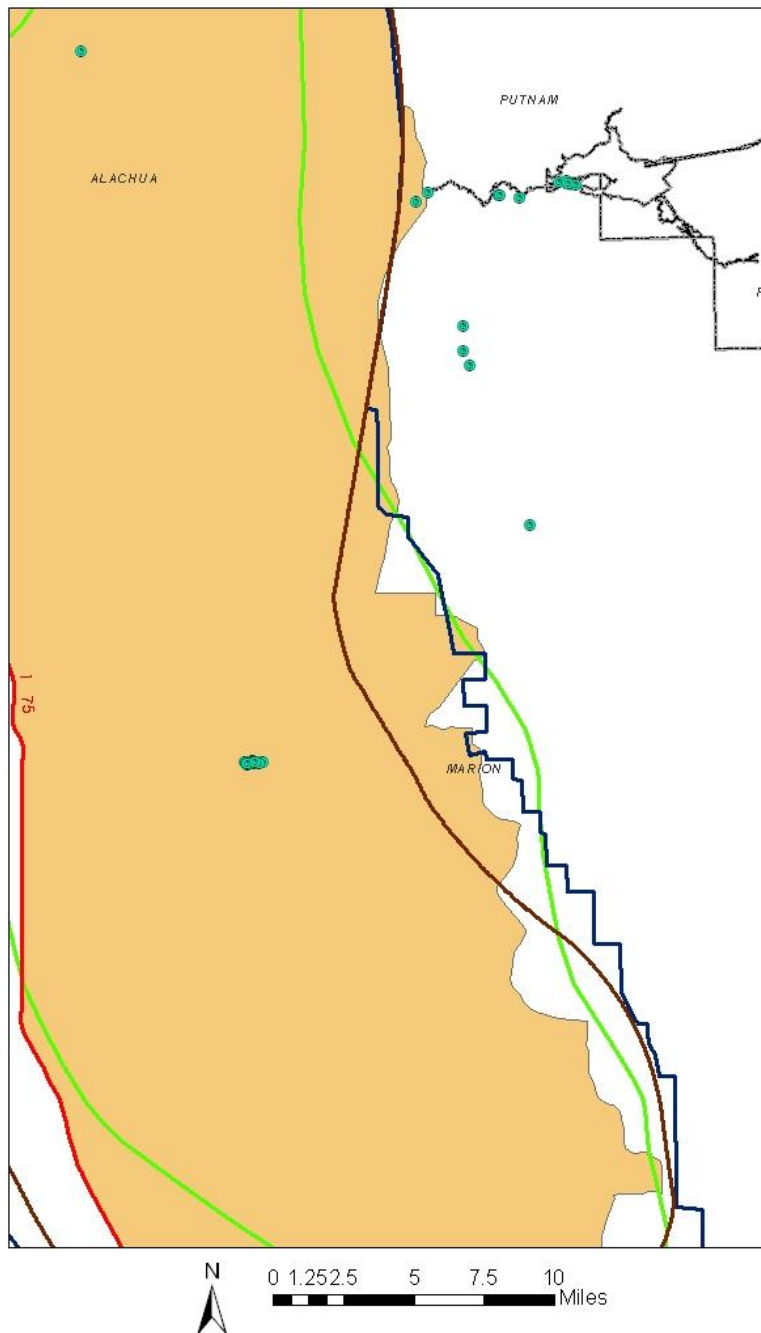
Legend

- Rainbow Springshed 2005
- I-75
- Upper Ocklawaha Basin
- Springs (2011)
- Florida Springs Institute
- 1000 Year Capture Zone
- BMAP Management Area
- Phelps Report



Eastern Boundary

- Follow local roads. Not always able to find a good road to delineate the border.

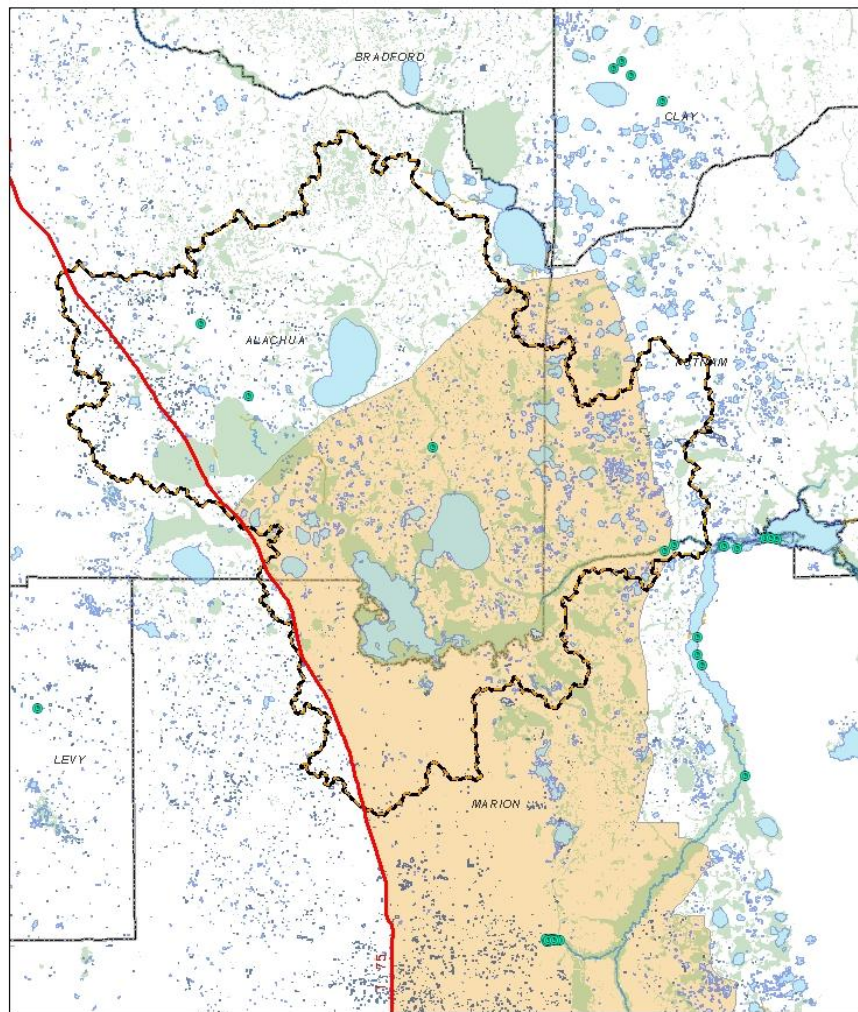


Legend

- I-75
- Springs (2011)
- Florida Springs Institute
- 1000 Year Capture Zone
- BMAP Management Area
- Phelps Report (USGS)



Northern Boundary



Northern Boundary

- SR 26 is north boundary.
- Lake Santa Fe is left intact.
- Still close to potentiometric high point of Floridan aquifer.
- Need to find local roads to better delineate border.

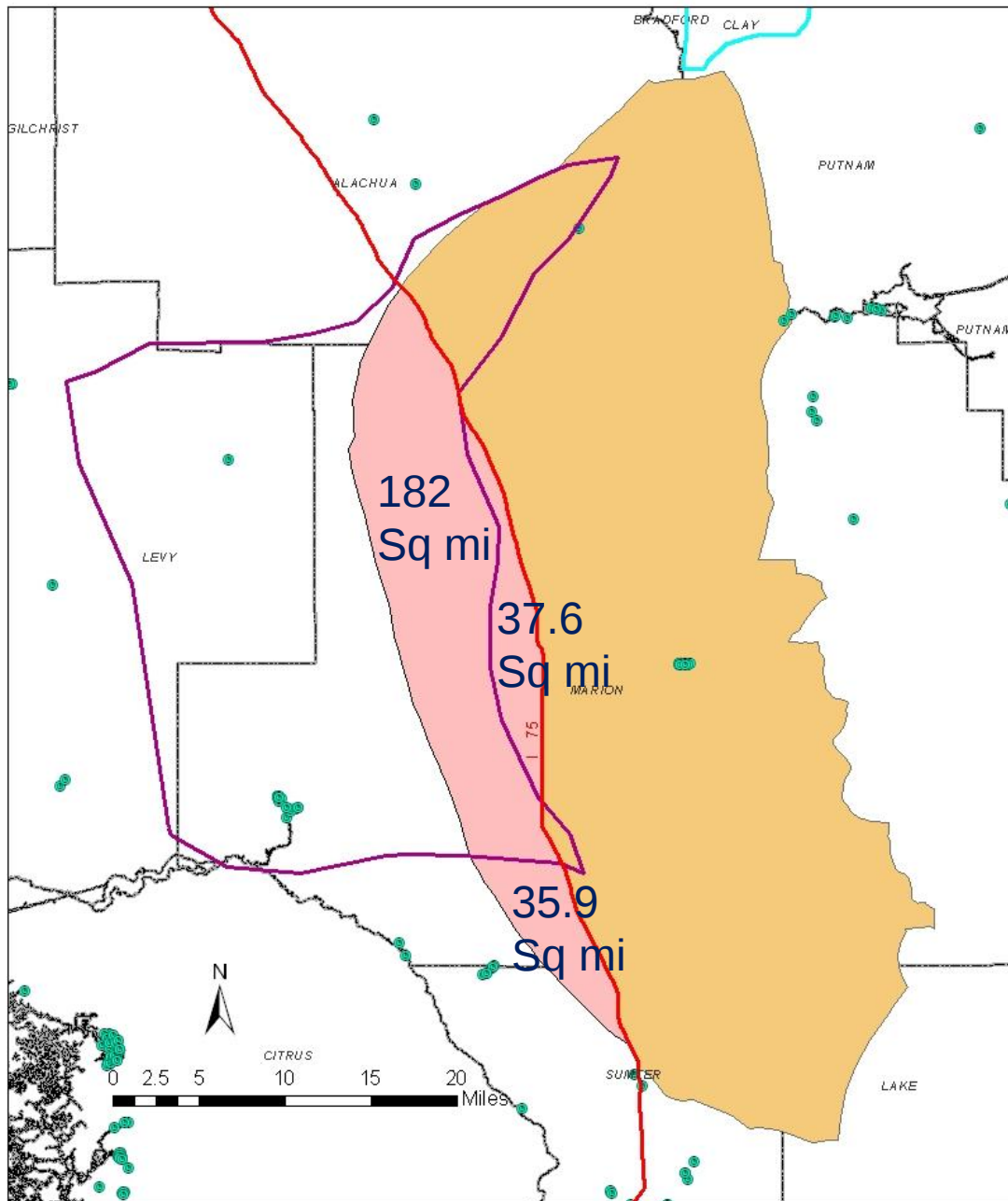
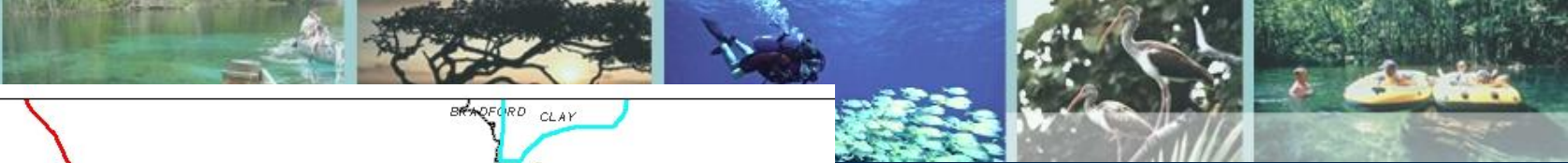
Legend

— I-75

Orange Creek Basin

• Springs (2011)

• BMAP Management Area



Western Boundary

- Bounded by I-75.
- Additional areas proposed for Rainbow Springs: 182 square miles
- Connecting Rainbow Springs to I-75 adds: 37.6 square miles
- What do we do about Rainbow Springs boundary?

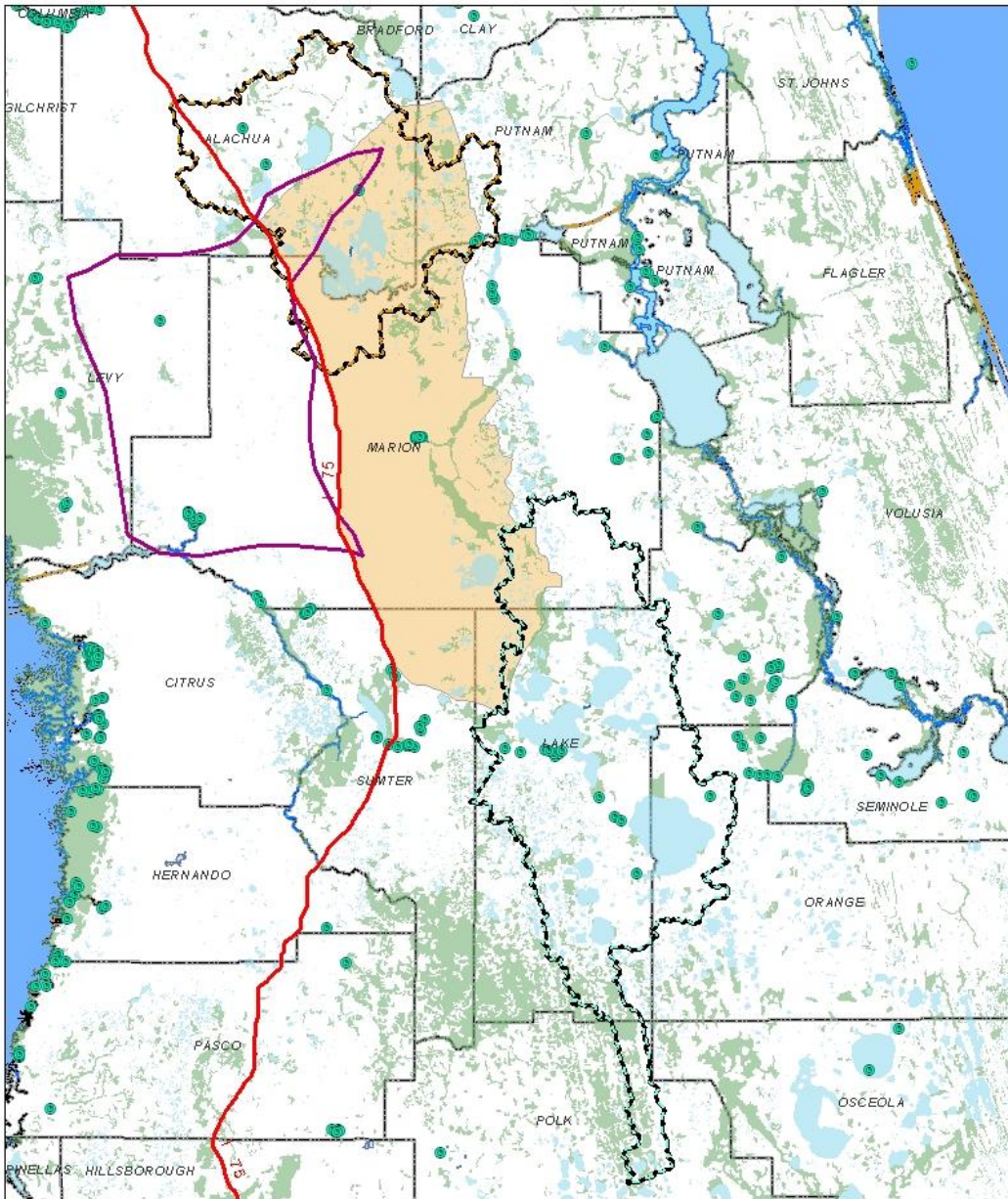


All BMAP Areas

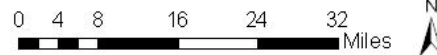
- There will be overlap with Orange Creek Basin because of surface water connections to aquifer.
- Orange Lake TMDL is for TP.
- Lochloosa Lake listed as impaired, but DEP did not adopt TMDL.

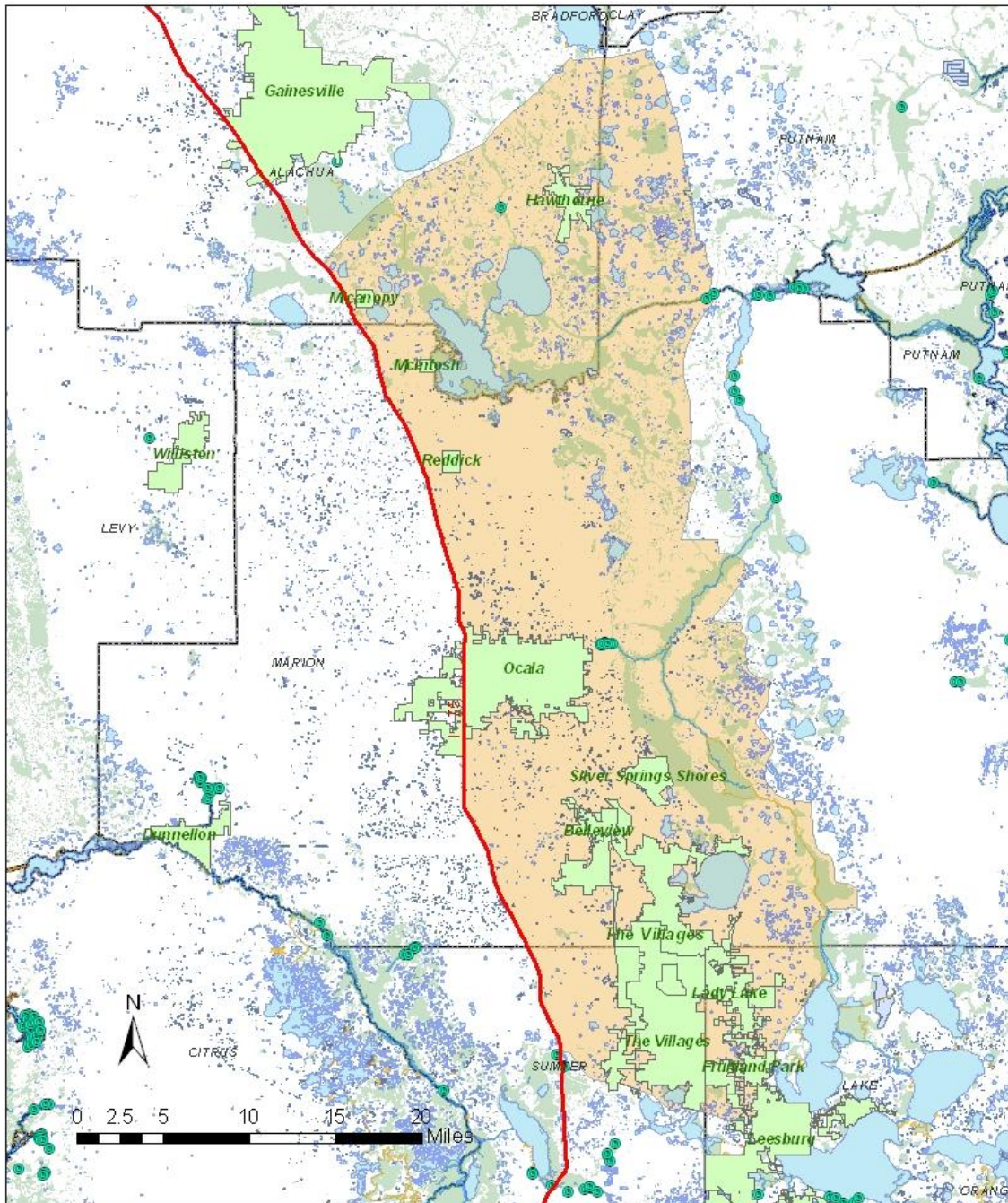
Legend

- Rainbow Springshed 2005
- I-75
- Springs (2011)
- Orange Creek Basin
- Upper Ocklawaha Basin
- BMAP Management Area



All BMAP Area Boundaries





Local Government Stakeholders

Marion County
Alachua County
Lake County
Ocala
Belleview
The Villages
Lady Lake
Fruitland Park
Reddick
McIntosh
Hawthorne
Micanopy
Silver Springs Shores
FDOT Districts 5 and 2
Marion County DOH



Lake Griffin

- Suspected leakage from lake, (Rolly Fulton, SJRWMD).
- Hydrologic model that simulates the interaction of lake with Upper Floridan aquifer.
- Model is still in calibration stage.
- Substantial improvement in Lake Griffin. TN concentration for 1996-2001 was 4.5 mg/L and has declined to 2.6 mg/L for 2008-2012.
- Nitrate levels in the lake have been low, close to detection levels.





Eastern Orange Creek Basin Lakes

- South Bull Pond
- Lake Melrose
- Lake Rowan
- Lake Loyal
- Lake Whitcomb
- Redwater Lake
- Bream Lake
- Moss Lee Lake
- Lake Jeffords
- Lake Winnott
- Lake Suggs
- Long Lake
- Lake Goodson
- Lake Barco
- Little Orange Lake
- McKeenin Lake
- Fanny Lake





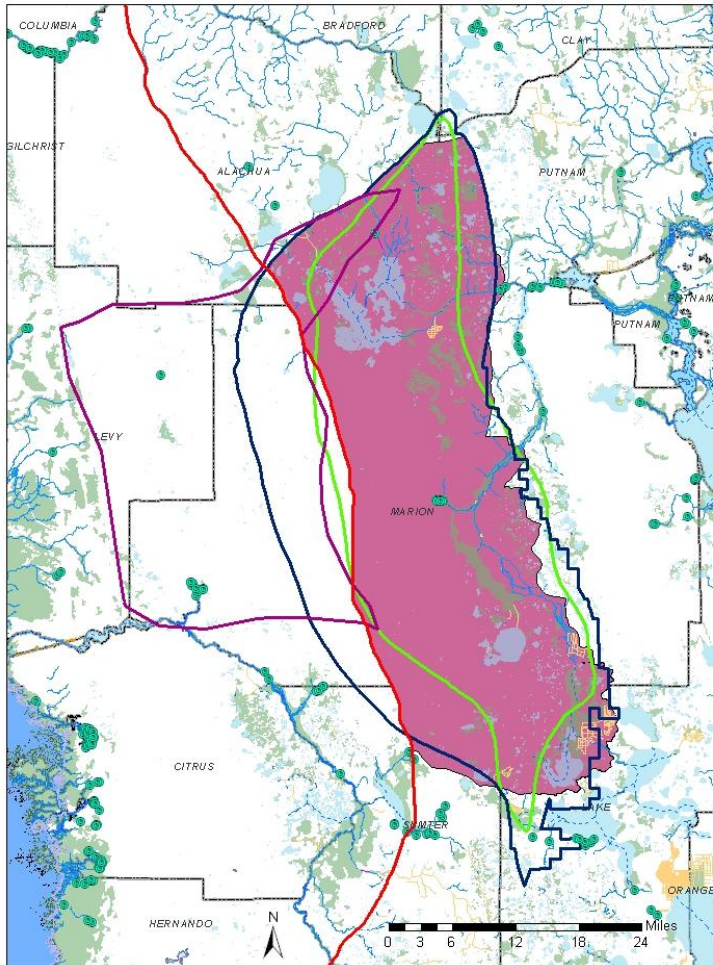
Water Quality Check

- Looked at seasonal averages for alkalinity, specific conductance, calcium.
- Data density is limited.
- Alkalinity range 1 – 7 mg/L.
- Specific conductance range 41-116 $\mu\text{mhos/cm}$.
- Calcium range 1 – 4 mg/L.
- By comparison Lochloosa Lake is higher for all 3 analytes.
- Needs further evaluation.





Including Lake Griffin

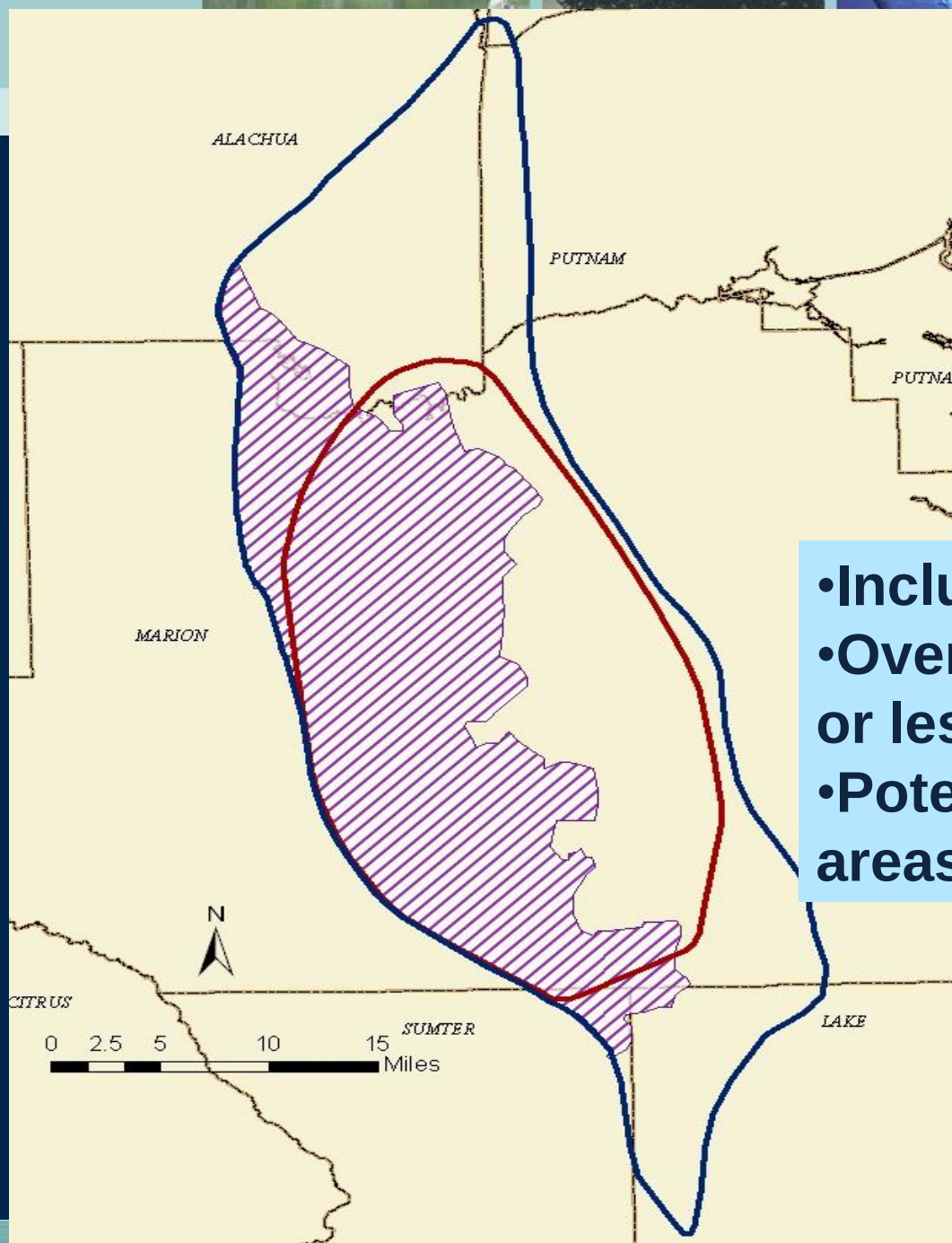


Silver Springs Boundary with Lake Griffin

Legend

- Rainbow Springshed 2005
- Springs (2011)
- Florida Springs Institute
- 1000 Year Capture Zone
- BMAP Management Area Lake Griffin

Should Lake Griffin be included?



REVIEW

Refined Focus Area: Semi to Unconfined Aquifer Conditions

- Includes 100 year capture zone.
- Overburden thickness is 50 feet or less (hatched area) on map).
- Potentially most vulnerable areas.

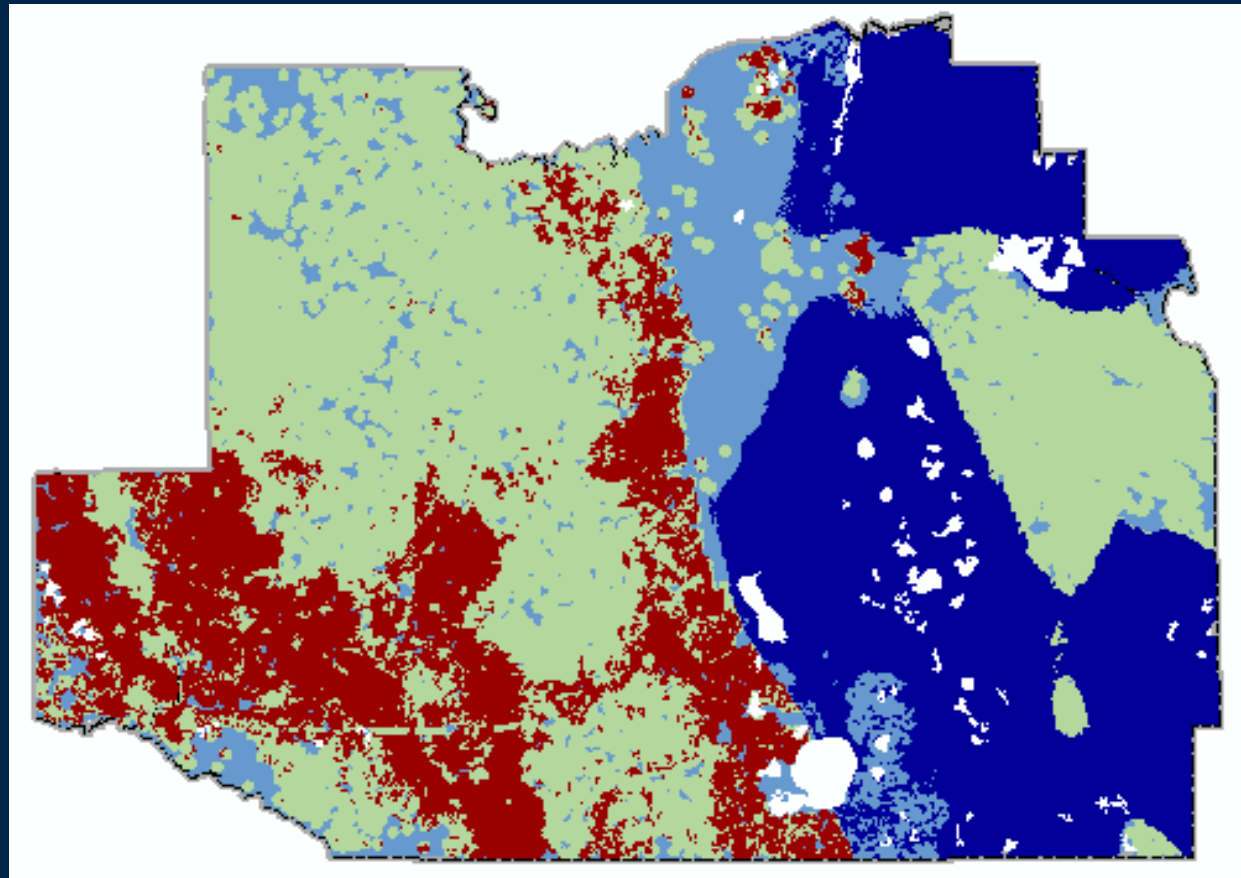
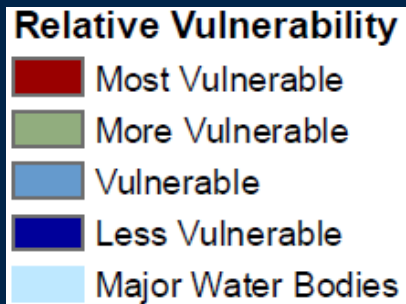
Legend

-  Springshed Boundary
-  100 Year Capture Zone
-  Semi -Unconfined Aquifer



Marion County Aquifer Vulnerability Assessment

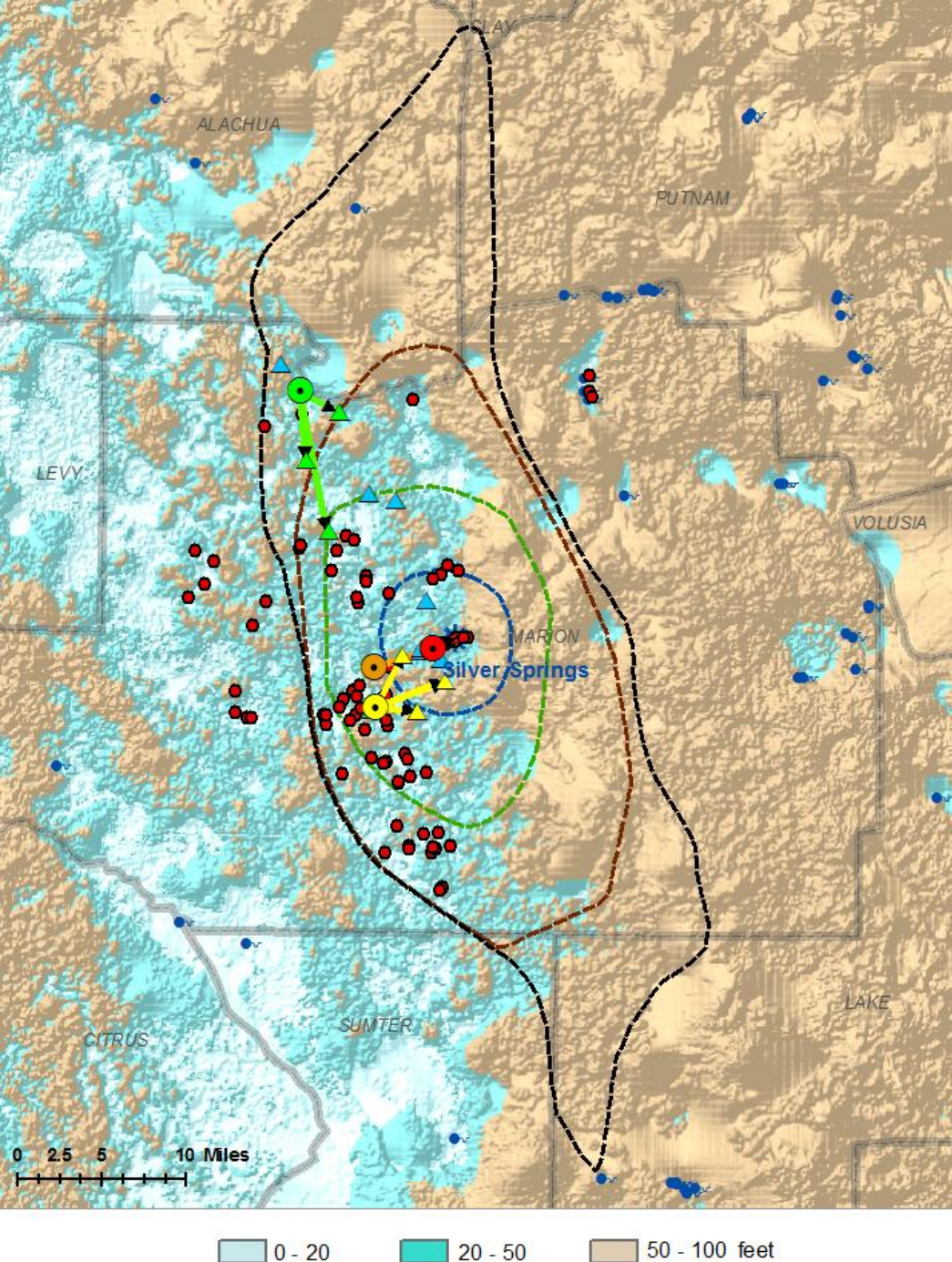
REVIEW





REVIEW

Thickness of Sediments Overlying Upper Floridan Aquifer with Cave Locations and Capture Zones



A photograph of a dense, green forest with a body of water in the foreground. The water is calm and reflects the surrounding trees and foliage. The forest is composed of various types of trees, including tall, thin trunks and dense green canopies. The overall scene is peaceful and natural.

- Questions?



Website and FTP Addresses

- <http://www.dep.state.fl.us/water/watersheds/bmap.htm> - website for meeting announcements.
- http://www.dep.state.fl.us/water/tmdl/final_tmdl.htm - website for TMDL documents, under Ocklawaha Basin.
- http://publicfiles.dep.state.fl.us/DEAR/BMAP/Silver_springs/ - FTP site for meeting notes and presentations.

