Florida Department of Environmental Protection

Basin Management Action Plan
Jackson Blue Basin

June 23, 2015

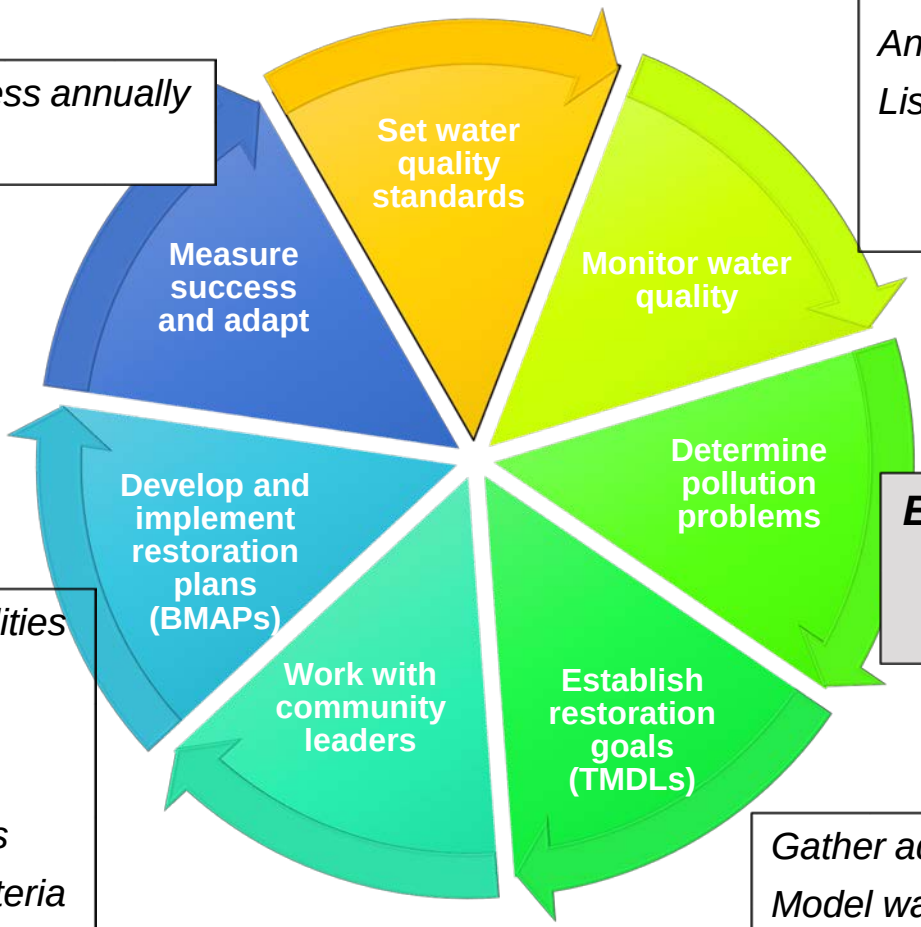




Welcome

- Introductions
- Basin Management Action Plan (BMAP) Process
- Action Item Review
- Nutrient Source Inventory (NSI) Overview
- Water Quality Monitoring
- Potential Actions for Homeowners
- Review and Wrap Up

Water Quality Framework



Collect data
Analyze and verify
List "impaired" waters

REPEAT

Excessive nutrients
Bacteria
Mercury

Gather additional data
Model water quality
Adopt pollutant reduction targets

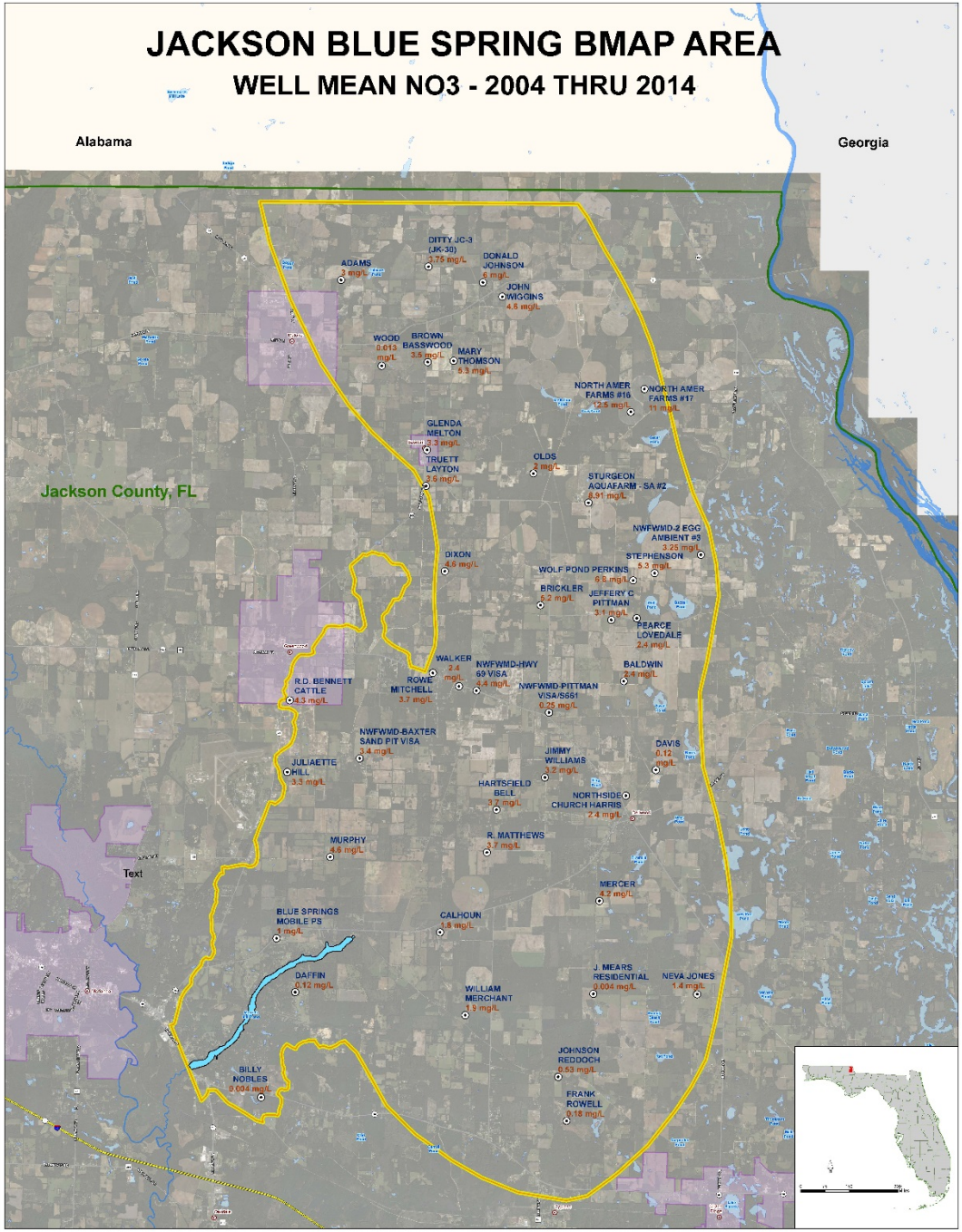
Allocate responsibilities
Identify projects
- *Infrastructure*
- *BMPs*

Establish schedules
Identify success criteria

Monitor and report progress annually
Adapt and change

JACKSON BLUE SPRING BMAP AREA

WELL MEAN NO3 - 2004 THRU 2014



Basin Management Action Plan

- Florida Department of Environmental Protection's (DEP's) method for restoring water quality to an impaired water body.
- BMAPs are adopted by DEP through a Secretarial Order.
- BMAPs are enforceable.
- BMAPs are reviewed annually and updated every 5 years.

Regulatory Framework

- The process for preparing BMAPs is found in:
  - Section 403.067, Florida Statutes (F.S.), known as the Florida Watershed Restoration Act (FWRA).
  - Spells out issues that are addressed within a BMAP.

Jackson Blue Total Maximum Daily Load (TMDL)

- TMDL report dated January 2013.
- Spring and Mill Pond impaired for excessive algae.
- TMDL is 0.35 mg/L nitrate as monthly average.
- BMAP goal is an unimpaired waterbody.

Agriculture and BMAPs

- Agricultural producers obligation:
  - Enroll in Florida Department of Agriculture and Consumer Services (FDACS) Best Management Practices (BMPs);

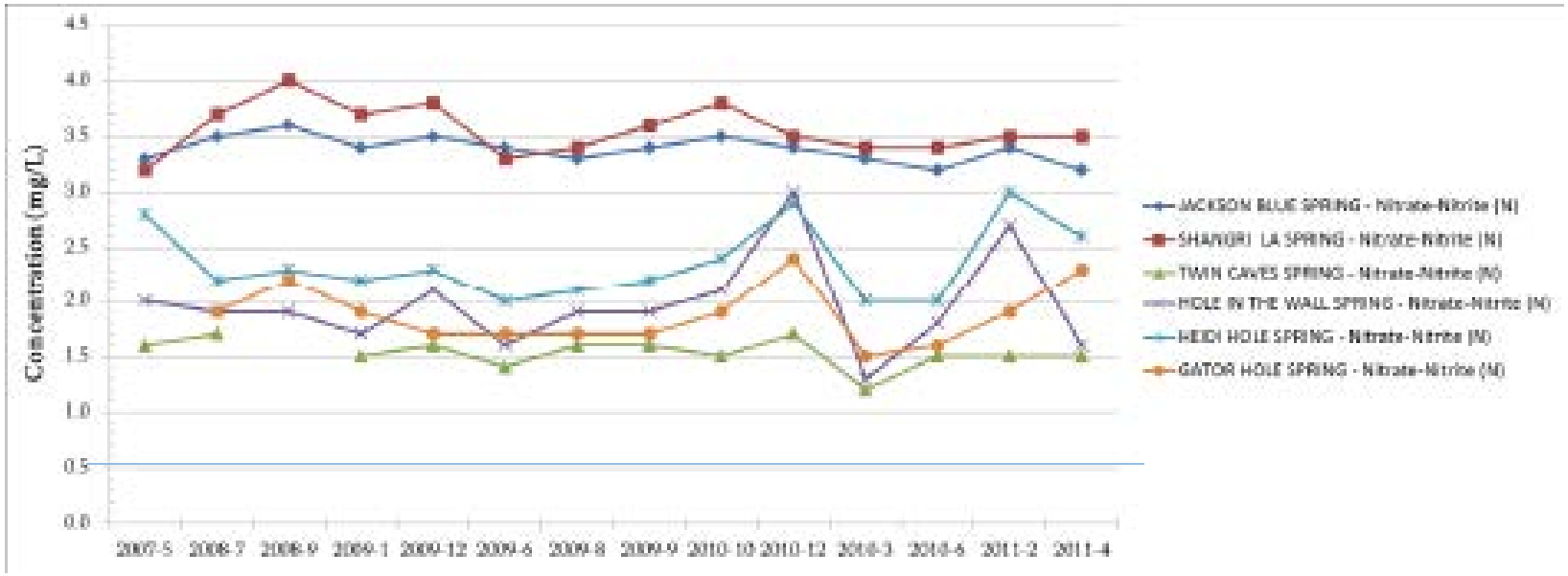
  or

  - Monitor.
- Benefits:
  - Provides a Presumption of Compliance; and
  - Eligibility for cost-share funding.

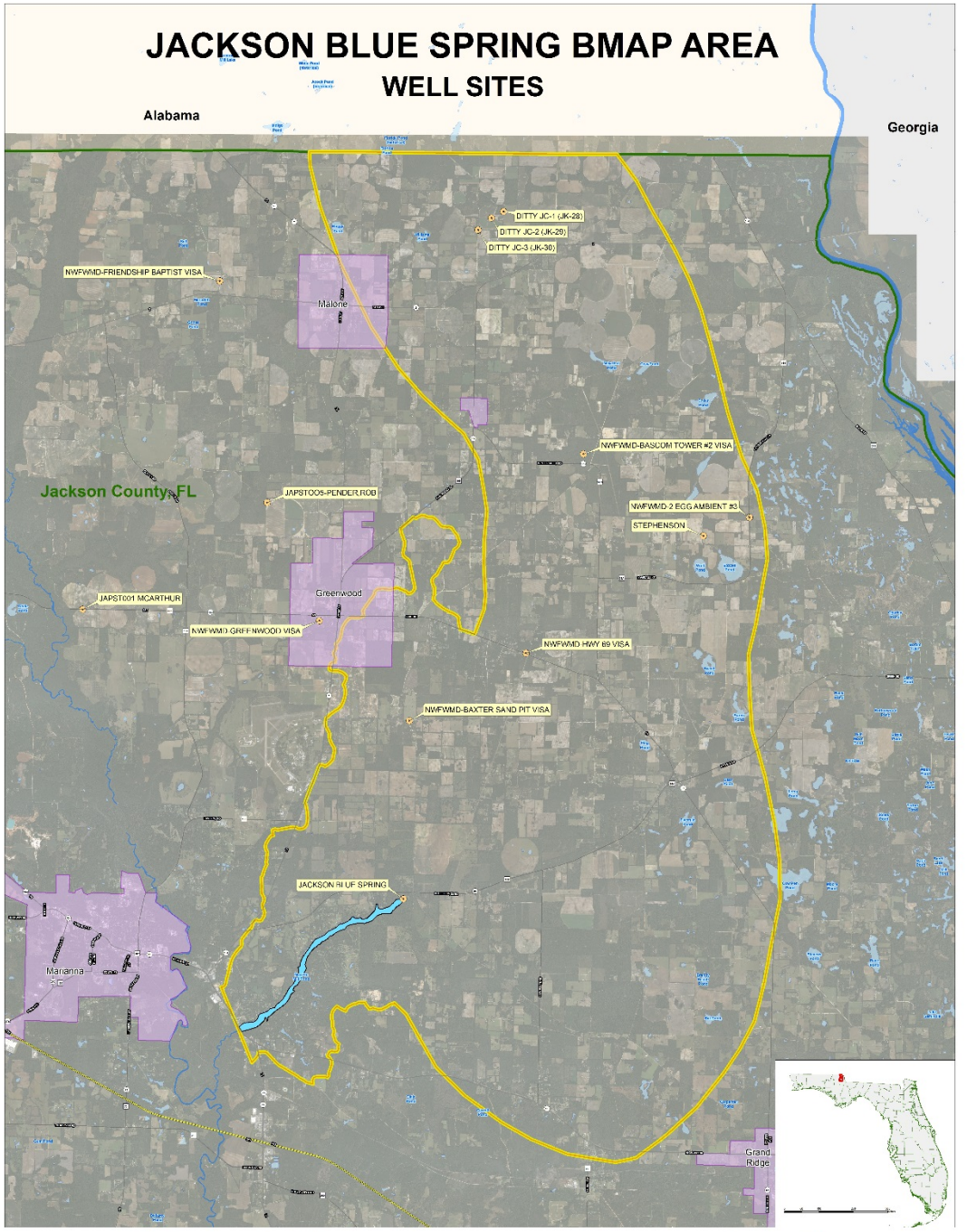
Action Item Review

- Flow and nitrate relationship.
- Landfill monitoring.
- DEP arsenic study.

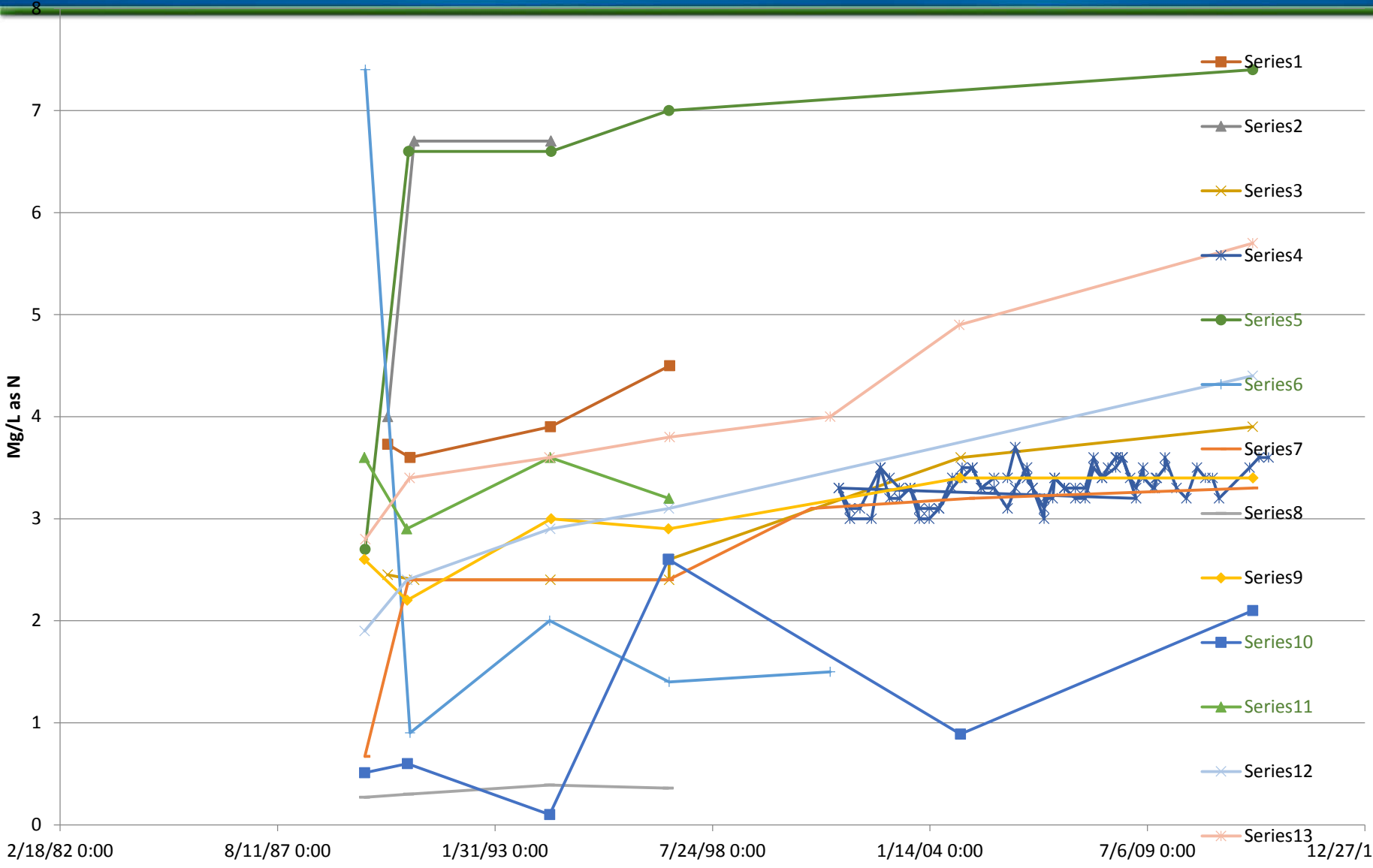
Historic Ground Water Concentrations in Springs



Well Locations



Historic Area Well Values



Flow vs. Concentration

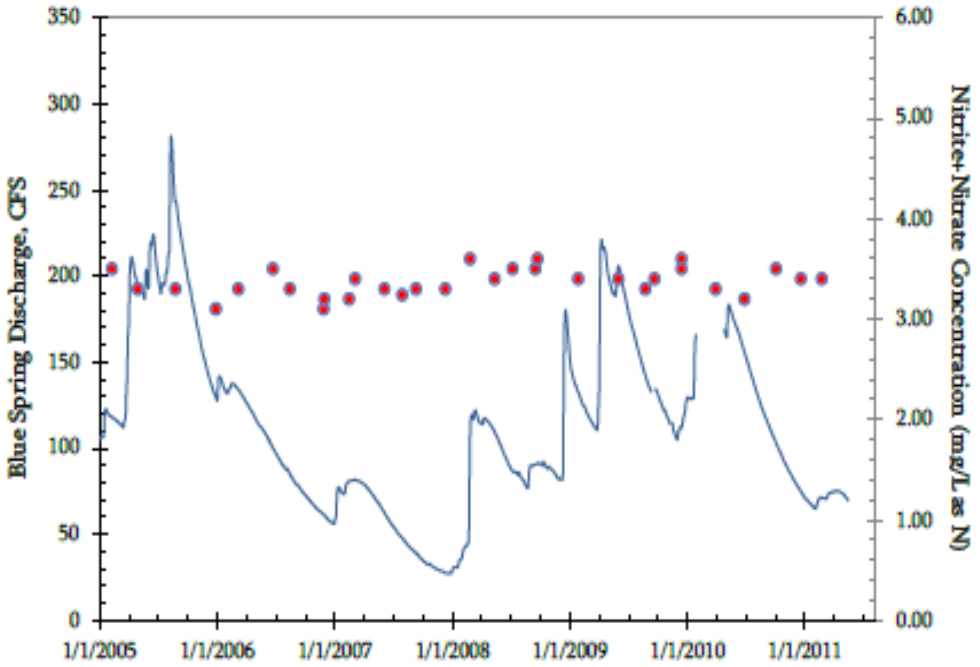
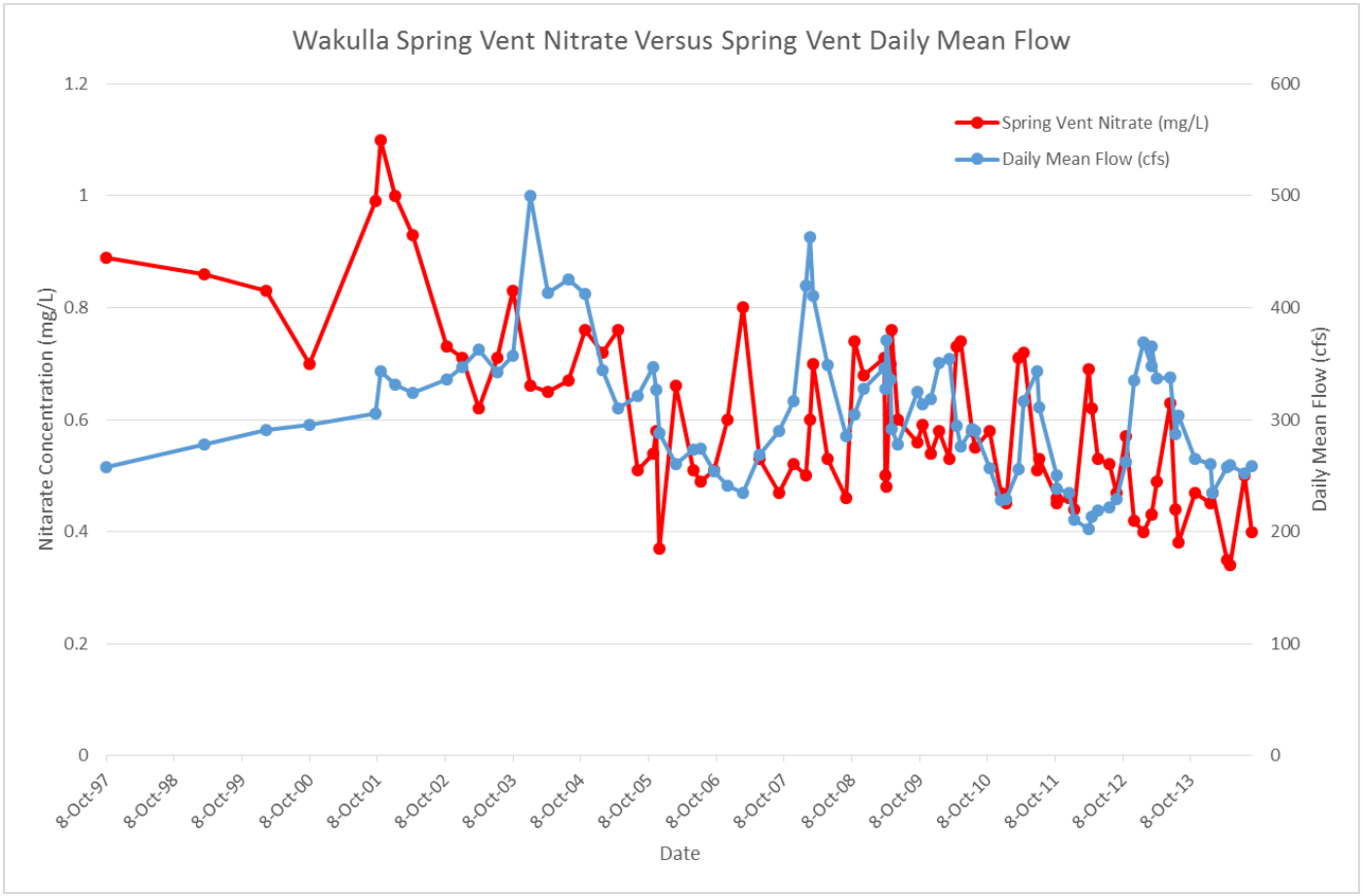
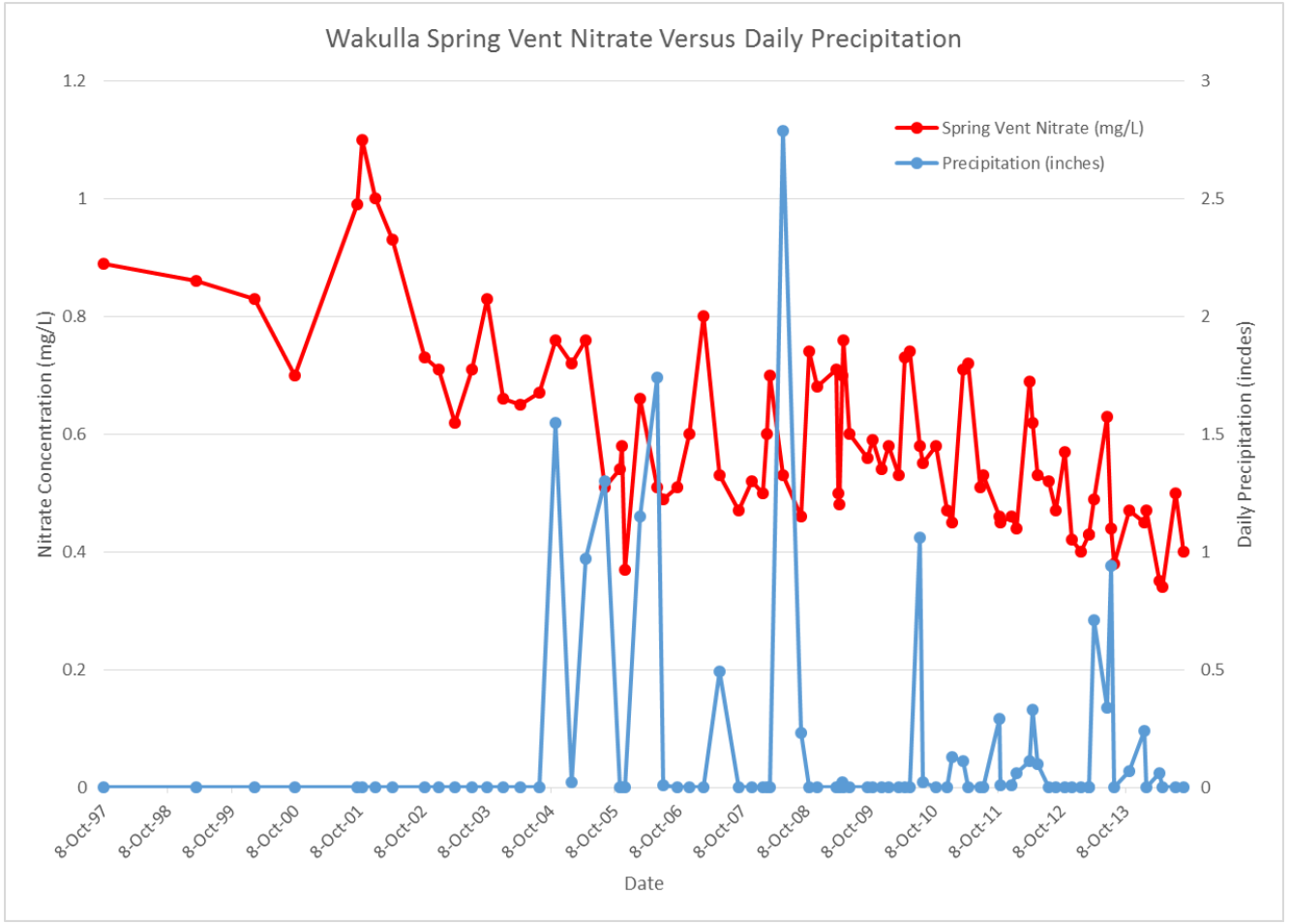


Figure 11. Discharge vs. Nitrite+Nitrate Concentration

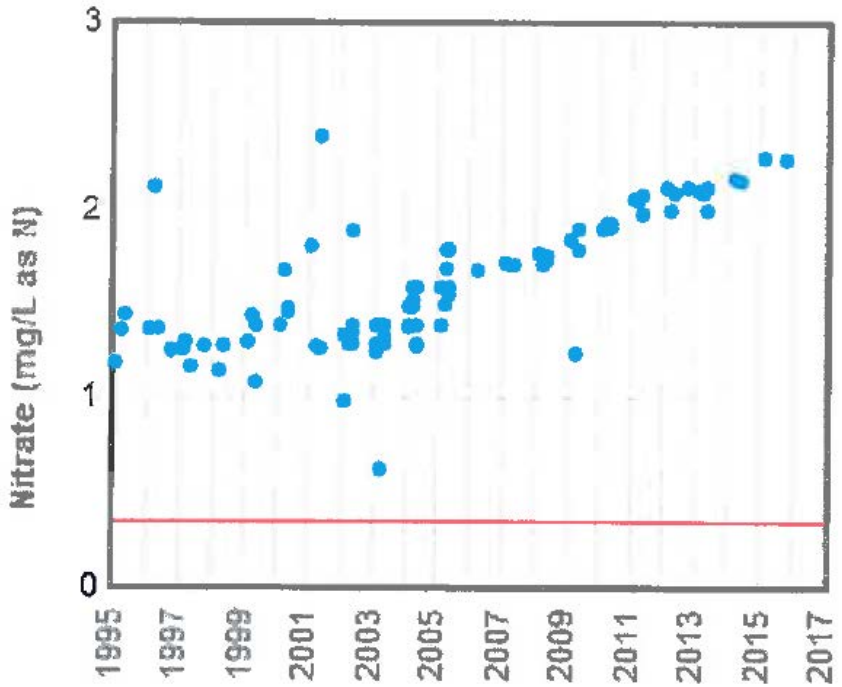
Wakulla Flow vs. Concentration

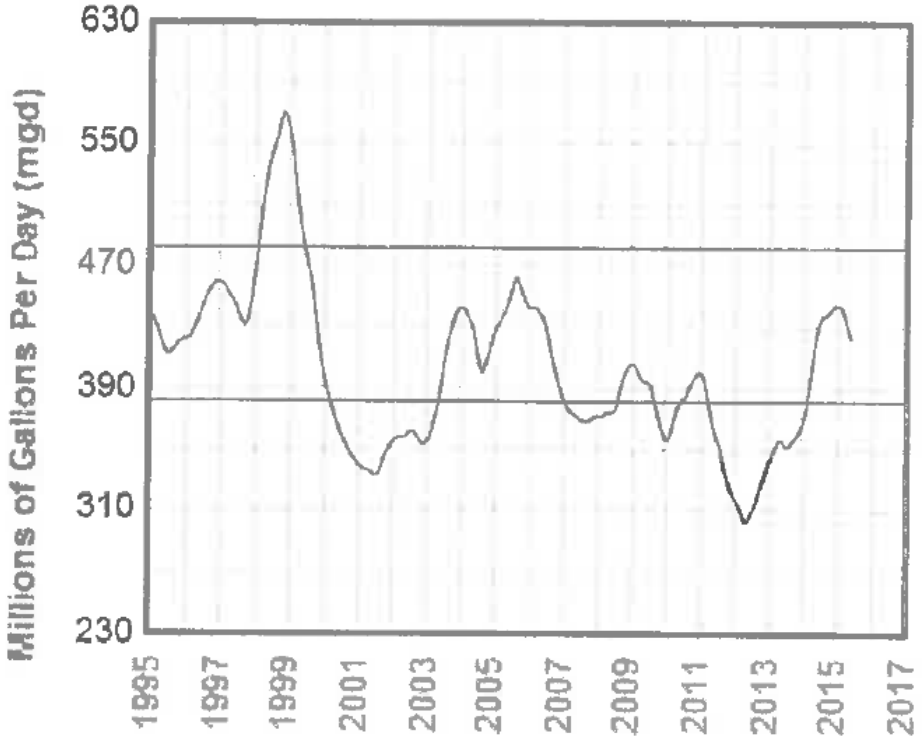


Wakulla Flow vs. Rainfall

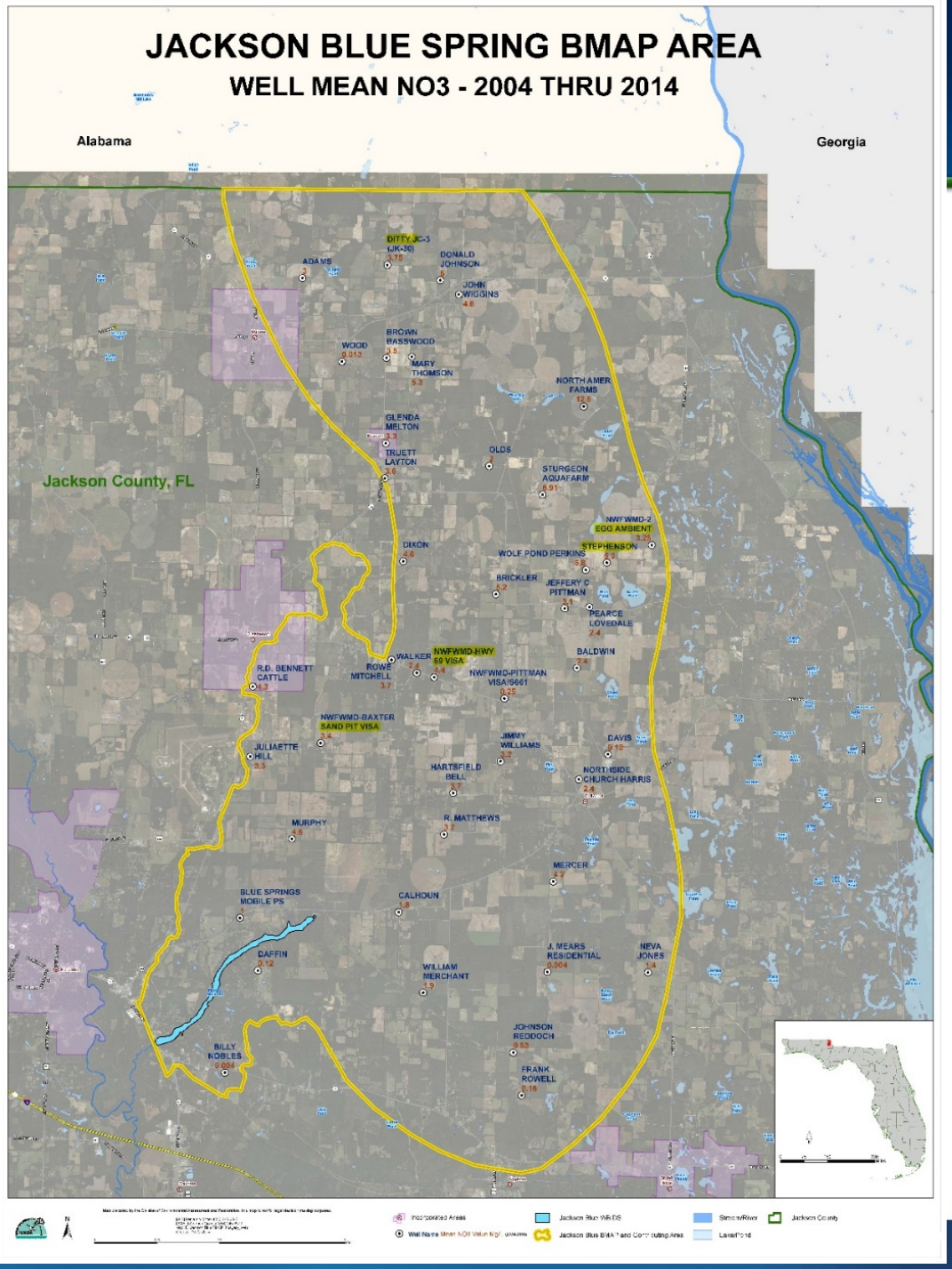


Rainbow Spring Flow vs. Concentration

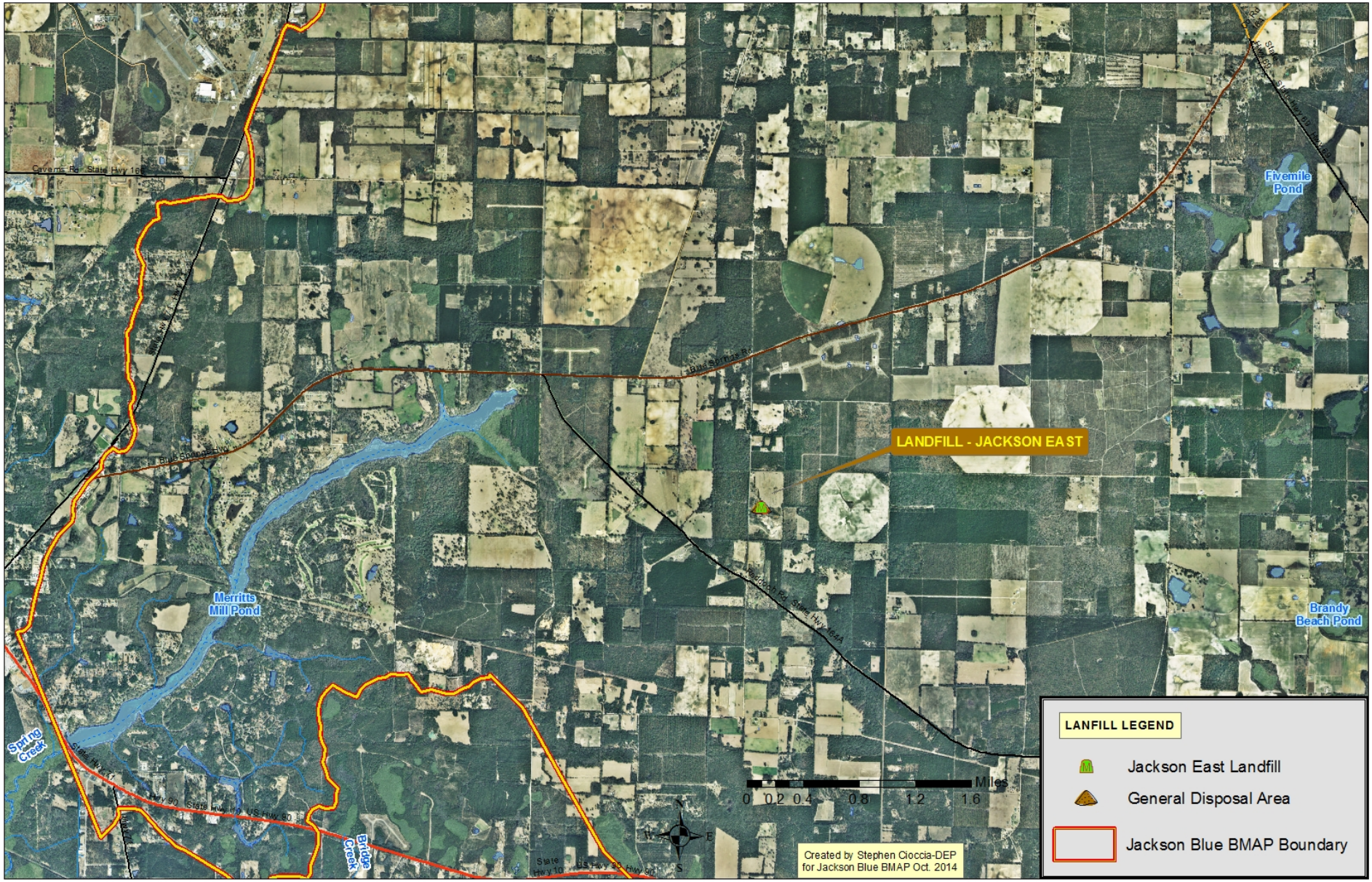




Recent Median Values



East Jackson Landfill



East Jackson Landfill

Test Well Name	Avg. NO3 Conc.	NO3 Units	Test Well Description
MW-1	0.58	Avg NO3-N mg/L	BACKGROUND MONITORING WELL
MW-2	0.13	Avg NO3-N mg/L	COMPLIANCE MONITORING WELL
MW-3	1.10	Avg NO3-N mg/L	COMPLIANCE MONITORING WELL
MW-4	0.57	Avg NO3-N mg/L	COMPLIANCE MONITORING WELL
MW-5	0.21	Avg NO3-N mg/L	COMPLIANCE MONITORING WELL
MW-6	0.04	Avg NO3-N mg/L	COMPLIANCE MONITORING WELL
Avg 1-5	0.41	mg/L NO3-N	COMPLIANCE MONITORING WELL

0.41 Avg. COMPLIANCE MONITORING WELL NO3-N mg/L

0.58 Avg. BACKGROUND MONITORING WELL NO3-N mg/L

East Jackson Landfill

PARAMETERS AT OR ABOVE THE LABORATORY DETECTION LIMIT
JACKSON CO E. CLASS III LANDFILL
FIRST SEMIANNUAL 2014

PARAMETER		CONDUC-TIVITY (FIELD)	DISSOLVED OXYGEN (FIELD)	GROUND-WATER ELEVATION	pH (FIELD)	REDOX POTENTIAL	TEMPER-ATURE (FIELD)	TURBIDITY (FIELD)	AMMONIA NITROGEN	CHLORIDE	NITRATE NITROGEN	TOTAL DISSOLVED SOLIDS	ANTIMONY	ARSENIC	BARIUM
STANDARD UNITS		(1) uS/cm	(1) ppm	(1) ft, NGVD	6.5-8.5 S.U.** S.U.	(1) mV	(1) deg C	(1) NTU	2.8 mg/L*** mg/L	250 mg/L** mg/L	10 mg/L* mg/L	500 mg/L** mg/L	6 µg/L* µg/L	10 µg/L* µg/L	2000 µg/L* µg/L
Background															
MW-1R	05/21/2014	519	0.36	-	6.78	69.3	21.4	0.42	< 0.020	2.9 I	0.21	294	< 0.50	< 5.0	19.4
Compliance															
MW-2	05/22/2014	298	0.34	83.45	7.39	-89.2	22.1	0.42	< 0.020	3.3 I	< 0.043	154	< 0.50	< 5.0	43.9
MW-2R	05/22/2014	724	0.17	-	6.61	-82.6	23.4	11.8	0.57	8.3	< 0.043	429	< 0.50	42.1	169
MW-3	05/22/2014	265	4.27	83.30	7.47	60.2	21.6	1.47	< 0.020	4.0 I	1.4	147	< 0.50	< 5.0	18.7
MW-3R	05/22/2014	536	0.31	-	6.78	-47.9	25.4	1.53	0.43	7.5	0.075	277	0.82 I	31.6	71.4
MW-4R	05/21/2014	353	0.20	-	7.37	-93.2	25.6	0.73	< 0.020	2.6 I	< 0.029	195	< 0.50	13.0	83.4
MW-5R	05/21/2014	755	0.68	83.55	6.55	-56.5	22.3	0.62	0.66	7.4	0.85	426	< 0.50	29.8	106
MW-6R	05/21/2014	801	0.19	83.64	6.50	-106.2	22.7	0.43	2.3	17.8	< 0.029	436	< 0.50	83.8	133
QAQC															
EQUBLK	05/21/2014	-	-	-	-	-	-	-	< 0.020	< 2.5	< 0.029	< 5.0	< 0.50	< 5.0	< 5.0

LEGEND

*	=Primary Drinking Water Standard	I	= Value is between the Method Detection Level (MDL) and the Reporting Detection Level (RDL)
**	=Secondary Drinking Water Standard	J	= Estimated value
***	=Chapter 62-777 - Groundwater Cleanup Target Level (GCTL)	V	= Analyte found in associated method blank
(1)	=No Standard	Q	= Estimated value; analyte analyzed after acceptable holding time
-	=Not Analyzed		

DEP Arsenic Study

- Report Issued June 2005 by DEP Site Investigation Section (SIS Report # 2005-03)
  - *"Merritts Mill Pond Arsenic Study Marianna, Jackson County, Florida Preliminary Contamination Assessment Report."*
  - Study commenced April 25, 2003.
  - Florida Department of Health (FDOH)-Jackson County sampled over 100 private wells with more than 20 having arsenic >10 ug/l, several >100 ug/l.

DEP Arsenic Study

- Soil samples collected and analyzed. (2.1 mg/kg)
- Ground water wells installed, sampled and analyzed. (0.010 mg/L)
- Investigation Results:
  - The arsenic source area within the Mill Pond area remains undiscovered.
  - Potential source areas:
    - Ravines to transport spilled or dumped arsenic to the aquifer.
    - Use of arsenic herbicides to clear an area.

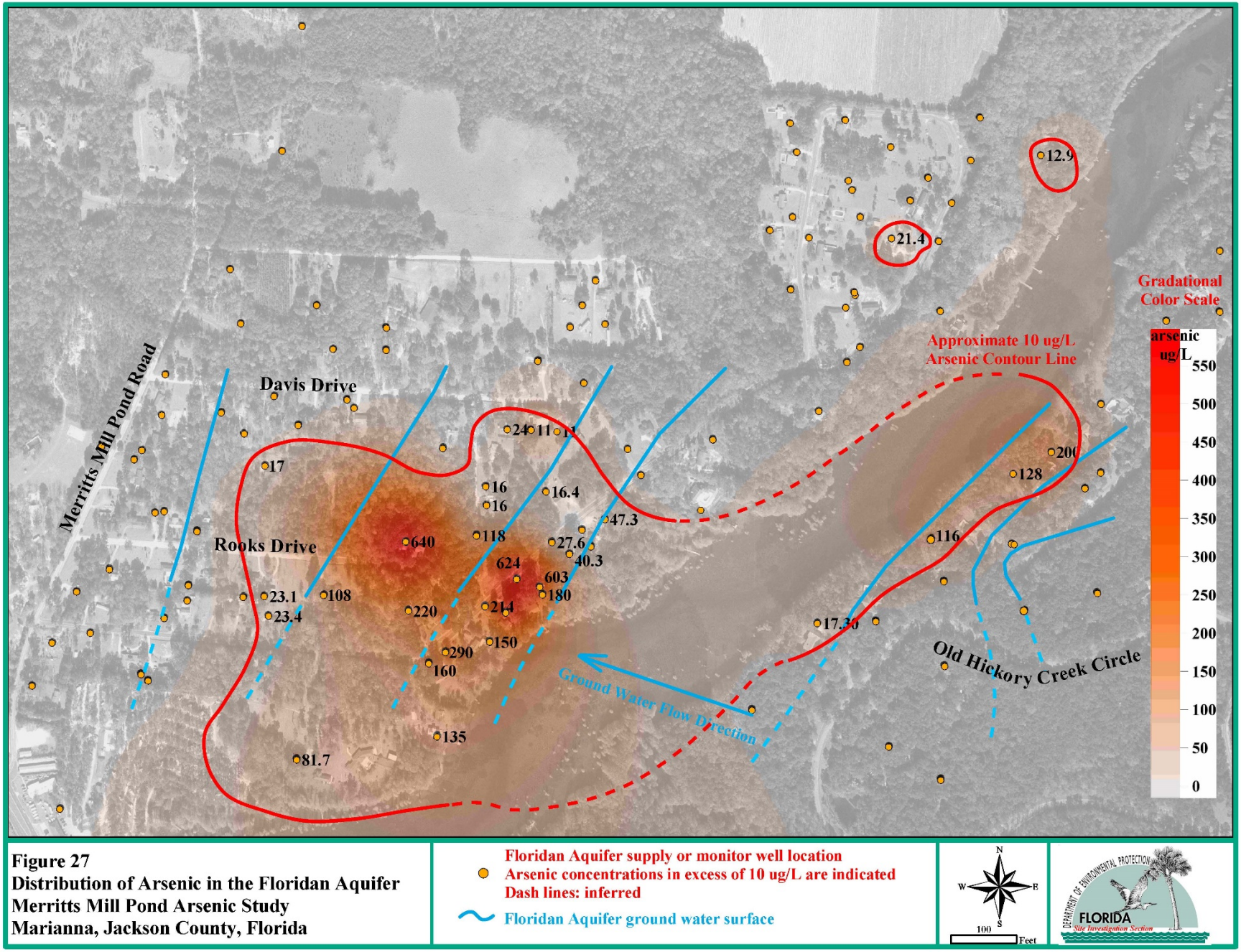


Figure 27
Distribution of Arsenic in the Floridan Aquifer
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

DEP Arsenic Study

Potential source areas:

- Ravines to transport spilled or dumped arsenic to the aquifer.
- Use of arsenic herbicides to clear an area.
- Old peach orchard.
- Cattle dip vat.
- Naturally occurring arsenic associated with glauconite.

Possible scenarios for no “smoking gun”:

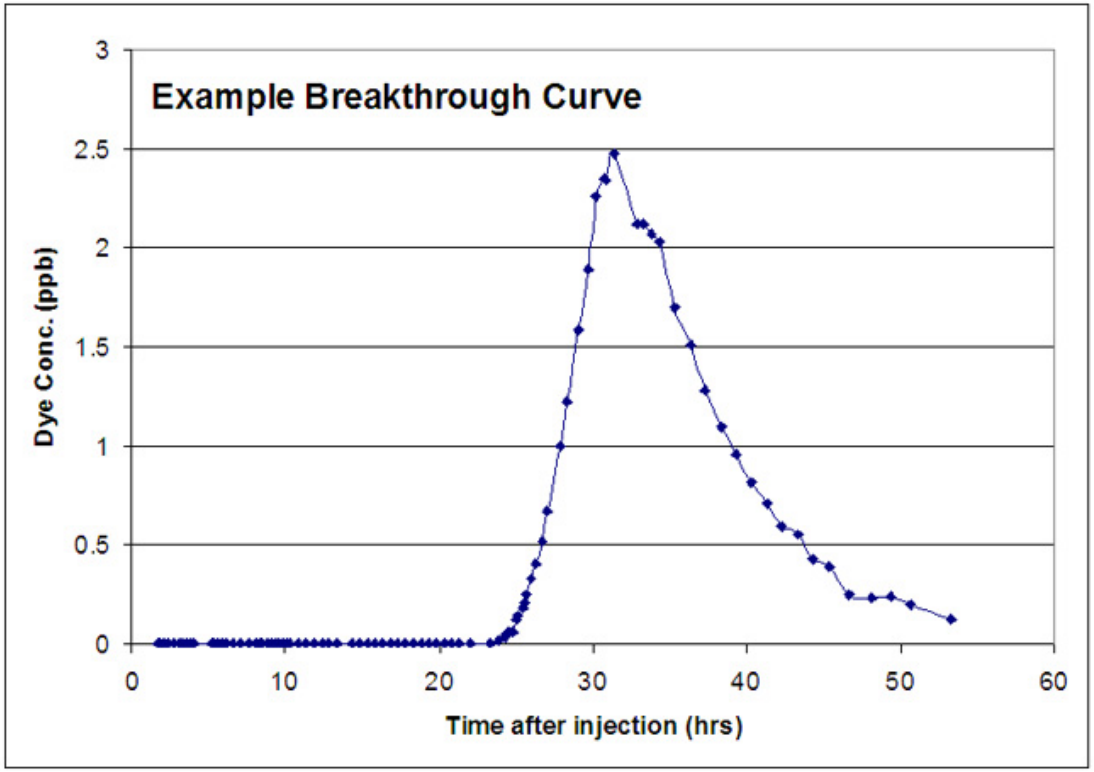
- Source previously excavated.
- Source currently underwater.
- Source eroded by moving water.

Proposed Monitoring Actions

- Dye Trace.
- Cave Vent Sampling.
- Mill Pond Sampling.
- Real-Time Water Quality Monitors.

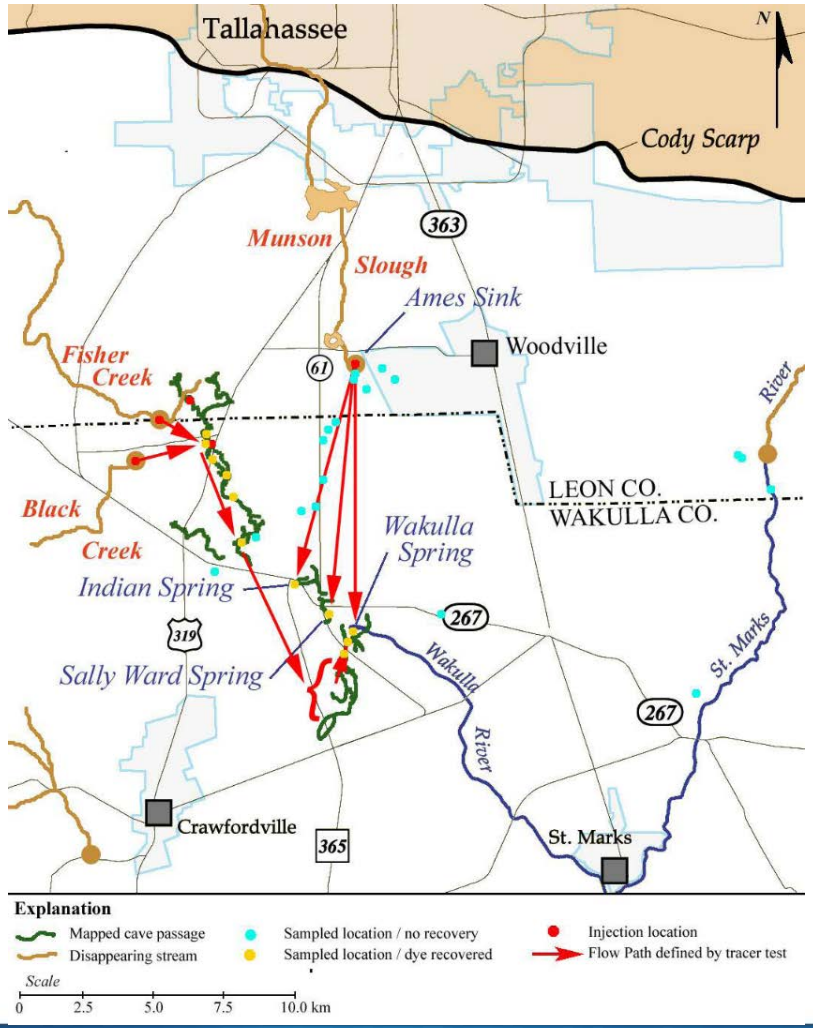
Dye Trace

Dye is injected into aquifer via a well. Detection occurs at spring vent(s).



Dye Trace

Wakulla Springs Example



2004: Ames Sink – Indian Spring
- 4.95 miles in 16 days

2004: Ames Sink – Sally Ward
- 5.35 miles in 17.5 days

2004: Ames Sink – Wakulla
- 5.8 miles in 22 days

Cave Vent Sampling

- Dye Trace Packet Placement and Retrieval.

- Vent Water Quality Sampling.

Mill Pond Sampling

- DEP will be sampling for fauna (stream condition index), flora (rapid periphyton survey/linear vegetation survey) data on a quarterly basis; including nutrient water quality parameters and field parameters.

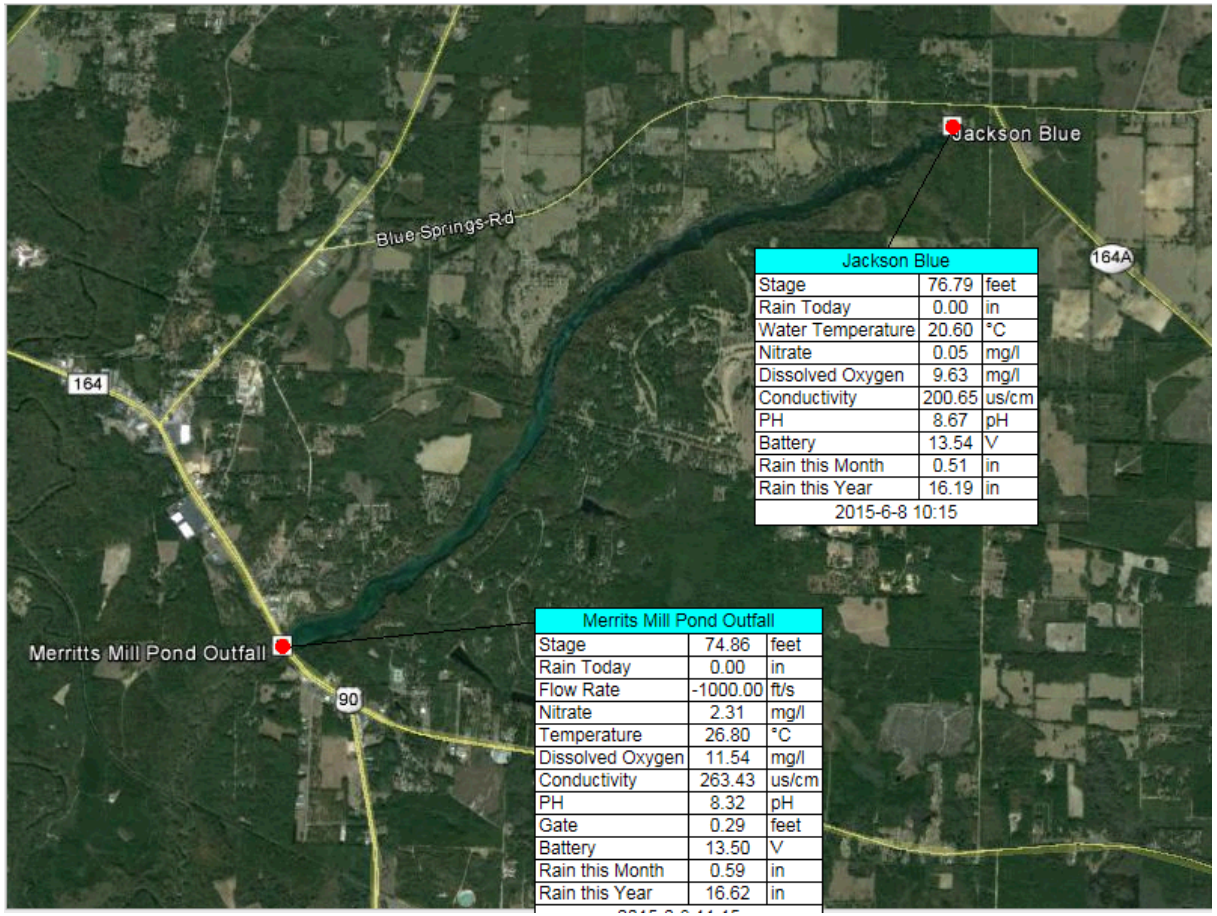
- Sampling schedule has not been finalized yet, but will begin this sometime this summer.

- Sampling is intended to monitor changes in the watershed, TMDL/BMAP effectiveness (i.e. meeting BMAP goals).

Real Time Water Quality Monitoring

http://virtual.locherenv.com/vdv/index.html

fdep / fdep



Nutrient Source Inventory Loading Tool

- Process to assist with determining potential sources of nutrients to the ground water,
- Following example is for the Kings Bay / Crystal River BMAP in Citrus County.

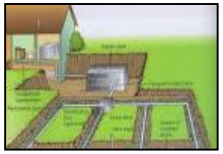
Crystal River / Kings Bay Nutrient Source Inventory Loading Tool (NSILT)

Estimating Nitrogen Loads to Ground Water

Process:

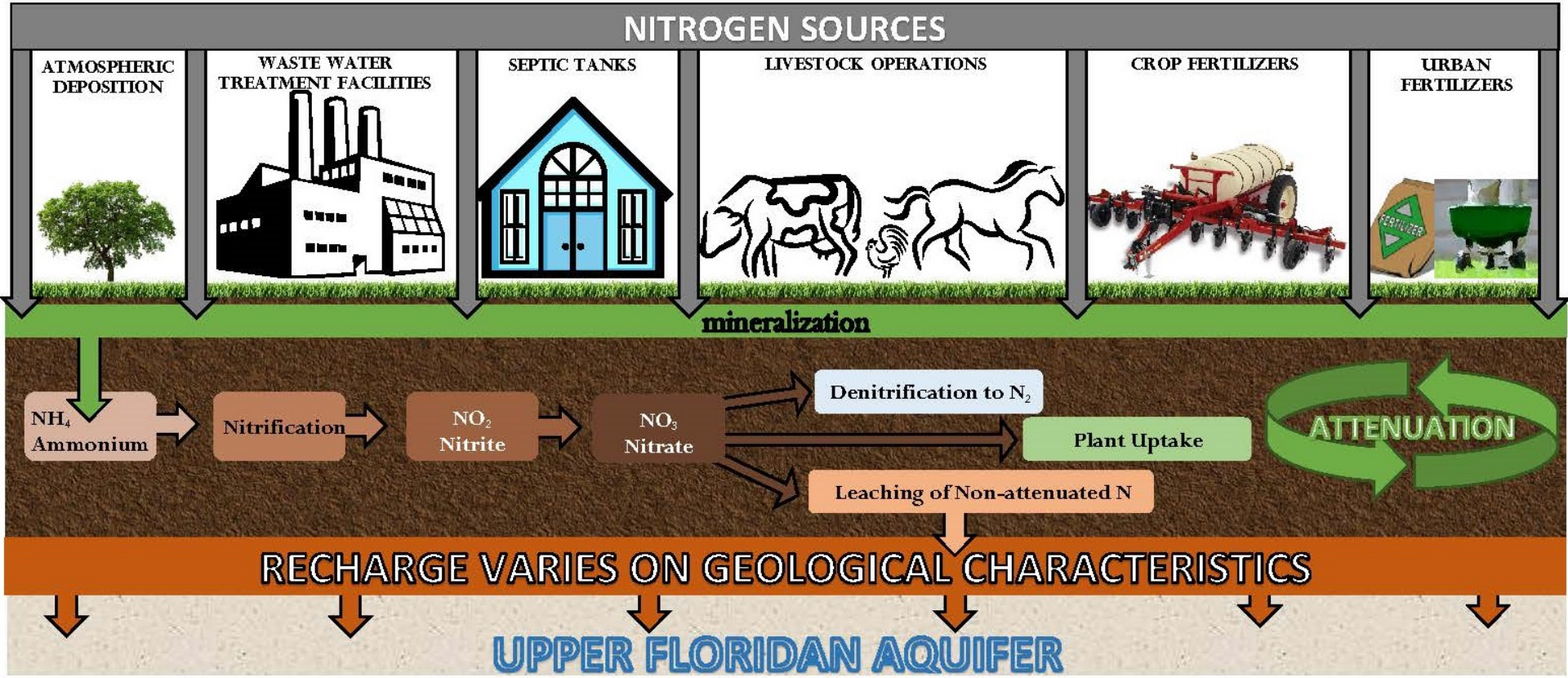
1. Estimate the inputs of nitrogen to the land surface from the source inventory information (best available).
2. Apply attenuation factors based on the various environmental processes that could transform the various forms of nitrogen in the subsurface (such as denitrification, nitrification of ammonia, uptake by vegetation, mineralization of organic nitrogen).
3. Apply an areal weighting factor that is based on the rate of recharge to ground water to estimate nitrogen loads to ground water.
4. Fine-tune estimates after getting feedback from stakeholders.







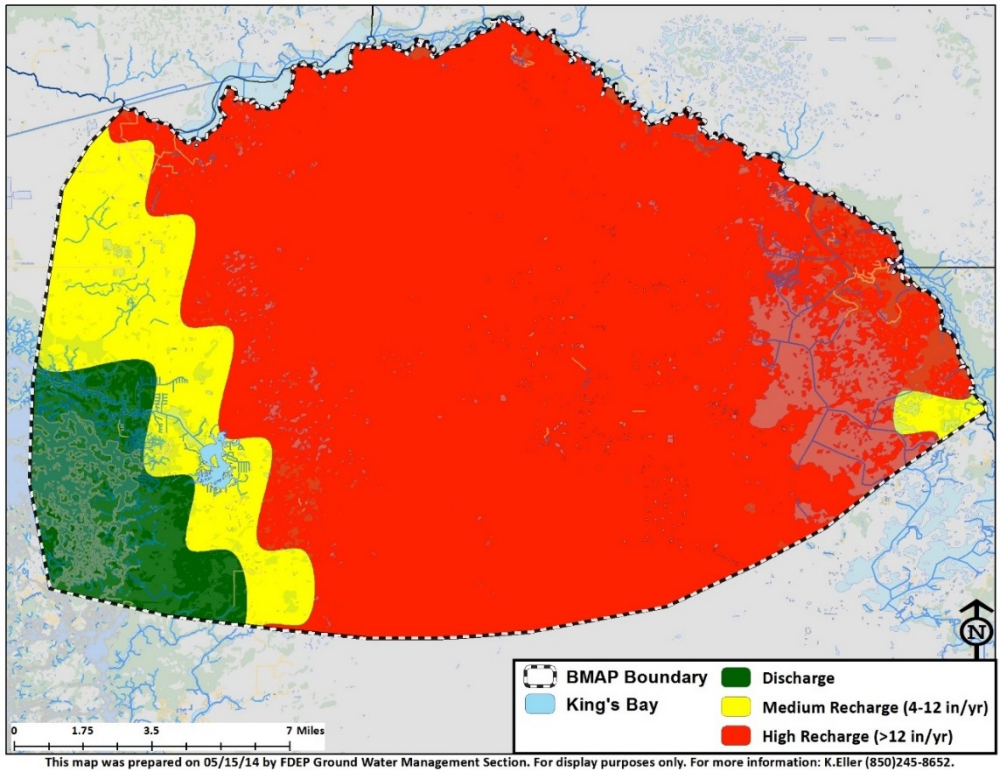

Nitrogen Cycle and Nitrogen Attenuation



Processes that control the transformation of N in soils and the subsurface.

The wide ranges reflect variable soil conditions, fertilizer material, livestock, crop types, etc.,
ALL AFFECT LEACHING OF N TO GROUND WATER.

Recharge to Ground Water



- Quantify the amount of water that replenishes an aquifer during a specified time.
  - High Recharge: >12 in/yr.
  - Medium Recharge: 4-12 in/yr.
- Rates are weighted to estimate nitrogen loading potential to ground water for each source category.

Methods Summary

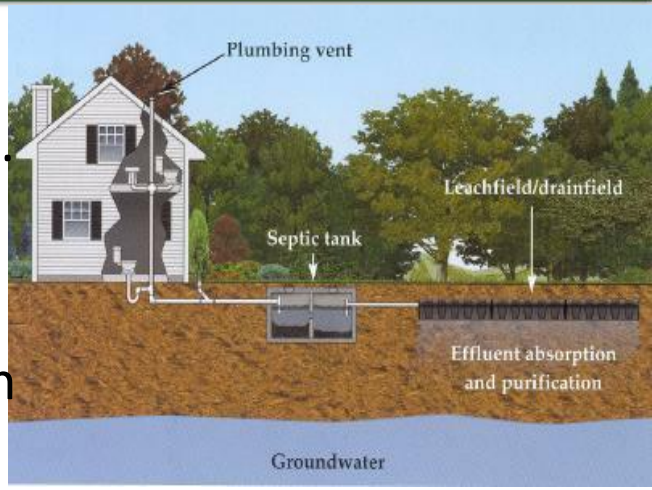
- Atmospheric Deposition:
  - Estimate total deposition from nationwide model.
  - Based on monitoring stations and modeled atmospheric concentrations.
  - Model year is an average from 2011 to 2013.

Meadowcrest WWTF

- Wastewater Treatment Facilities:
  - Determine contributing facilities.
  - Estimate total input to land surface from effluent concentrations and annual flow.
  - Rapid infiltration basins, spray fields, and reclaimed water sites are assessed independently.

Methods Summary

- Septic Tanks
  - Estimate number of people using septic tanks.
    - # of septic tanks.
    - Residents per household by county (census).
  - Calculate input by factoring in annual nitrogen contribution per person.



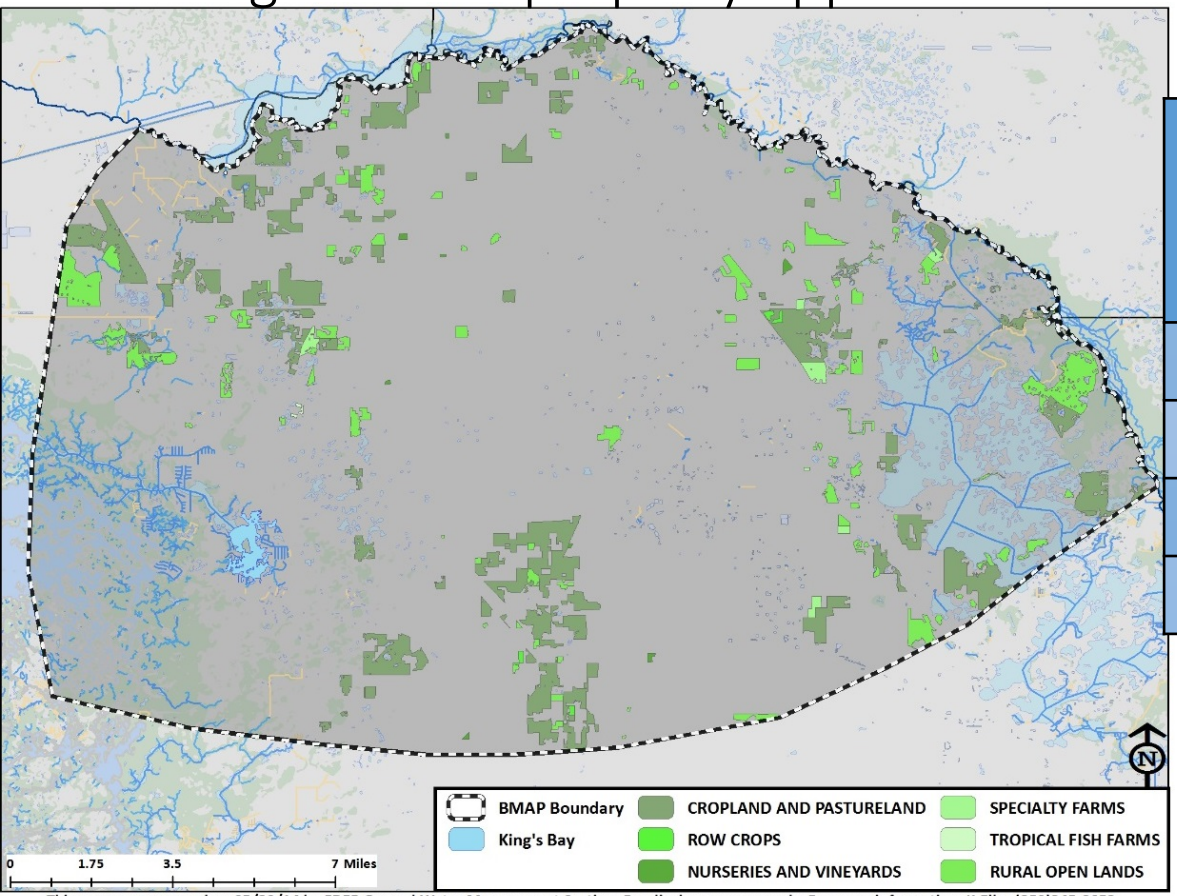
- Urban Fertilizers
  - Property appraiser data identifies urban landscapes.
  - Impervious surfaces estimated based on zoning laws.
  - Application rates based on Southwest Florida Water Management District studies.

Methods Summary (continued)

- Golf Courses:
  - Surveys sent to all area golf courses.
  - Based on application rates used by individual courses.
  - Average annual application = 4.5 lb-N/1,000 sq. ft.

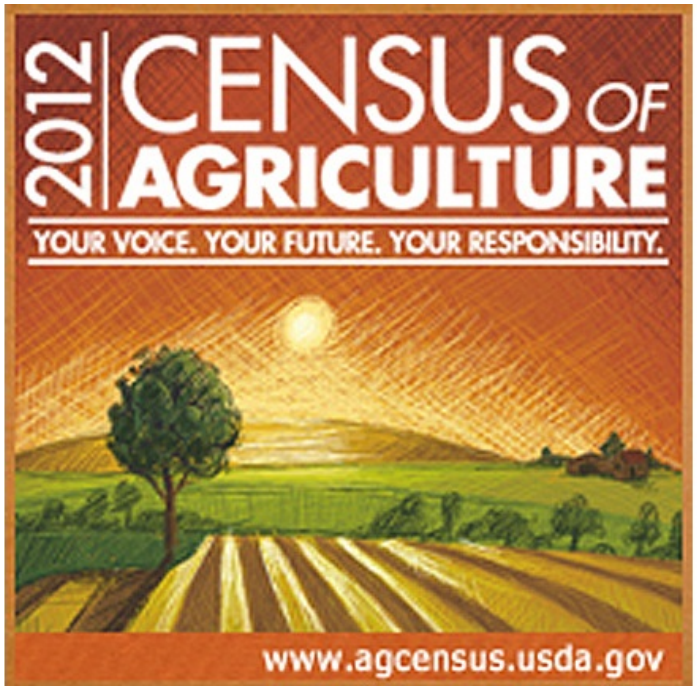
Farm Fertilizers

- Property appraised land use data used for assessment.
- Land areas for specific crops were estimated based on communication with agricultural property appraiser.



Estimated Crop	Acres	Annual Application Rate (lb-N/ac)
Hay	1,389	80
Orchards/Citrus	23	150
Ornamentals	148	80
Pasture	8,134	25

Livestock Populations



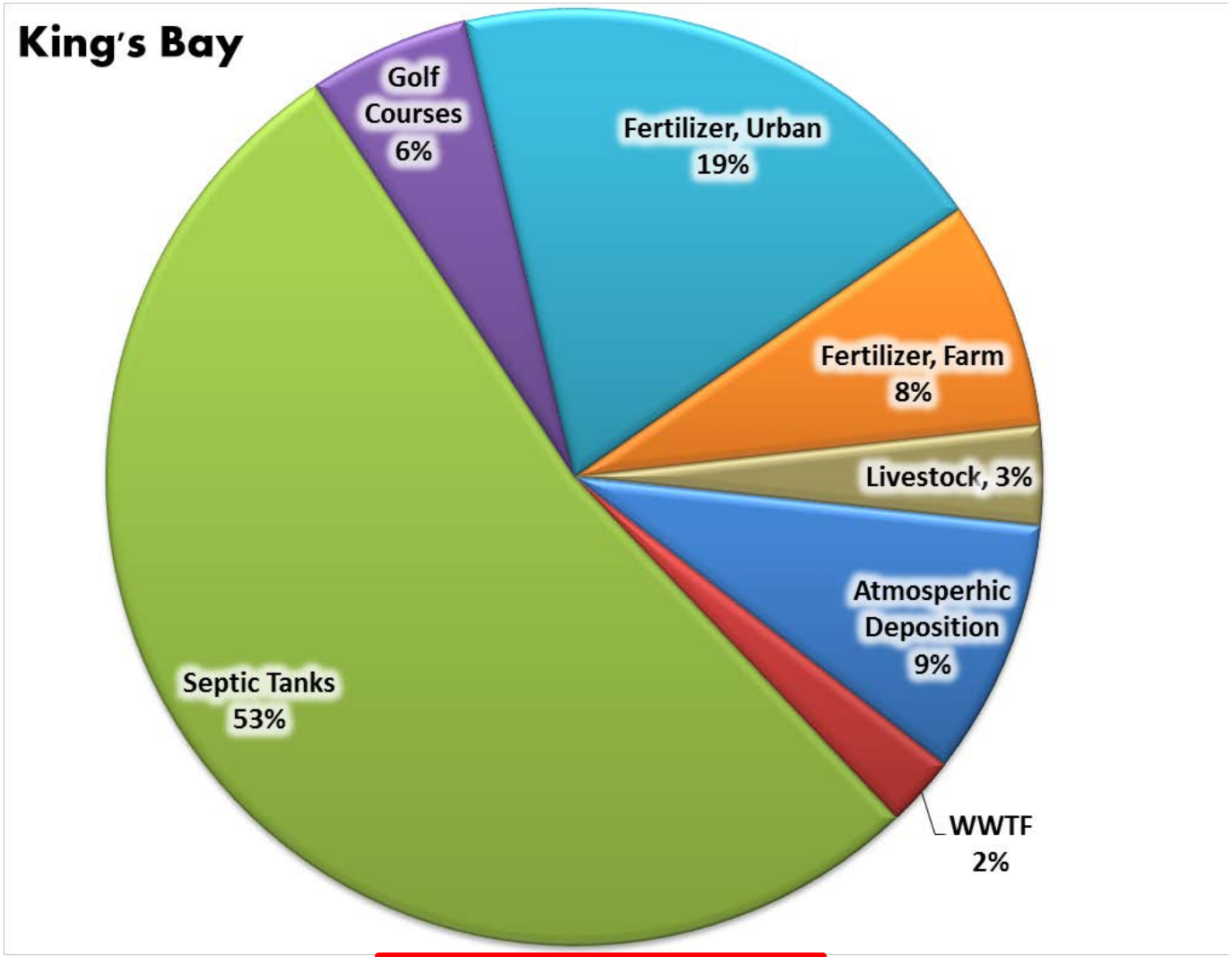
- Census of Agriculture:
  - Dept. of Agriculture.
  - Every 5 years.
  - # of livestock (categorized by animal).
  - Full county data ONLY.

Livestock Waste

- Beef cattle is estimated based on a stocking rate of 1 cow per 8 acres of all pastures in BMAP area.

Animal	Estimated BMAP population	Daily Waste Factor (lb-N/day)
Cattle	2,201	0.337
Horses	433	0.273
Broiler Chickens	130	0.159
Layer Chickens	664	0.003
Goats	338	0.035
Hogs	73	0.190
Sheep	104	0.198
Turkey	10	0.006

Annual Average Loading to Ground Water



900,118 lb-N/yr

Home Owner Actions

- Understand your nutrient footprint:
  - Water Use.
  - Lawn Fertilizer.
  - Healthy Septic System.
  - Runoff to Mill Pond:
    - Water.
    - Yard Waste.

QUESTIONS?

http://publicfiles.dep.state.fl.us/DEAR/BMAP/Apalachicola-Chipola/Jackson Blue Spring BMAP/