

# FLORIDA FIRE IN THE SWAMP

Sue McLellan, System Project Administrator (GIS)  
Florida Division of Forestry

Authors: Susan E. McLellan, Systems Project Administrator; Karen Cummins, GIS Analyst; Jim Brenner, Fire Administrator; Jeff Vowell, Planning Support Services Chief





# Introduction

**Once Upon a Time-**

**60% of Florida's 35 million acres were wetland**

**Reduced to 14 million acres ~26% percent falling into three general categories (wetland, marsh, swamp).**

**Over the past 25 years many large fires have occurred in wetland ecosystems**

**Today we are going to discuss.....**

# Objectives

- Define Muck
- Problems with Muck Fires
- Explore Florida Fire Occurrence
- Provide Practical Application for Mitigation Using Spatial Technology and Analysis



M-U-C-K



# PEAT vs. MUCK

**Muck** is used to describe highly decomposed soils (lower fibric and higher mineral content).

**Peat** loosely refers to soils with notably high fibric composition (and low mineral content).

Histosols are dark soils that have slightly decomposed organic materials derived from sedges, grasses, leaves, hydrophytic plants and woody materials. These soils dominately are very poorly drained and occur in low-lying areas.

Technical definition: Histosols are organic soils that have organic soil materials in more than half of the upper 80 cm., or that are of any thickness if overlying rock or fragmental materials that have interstices filled with organic soil materials.

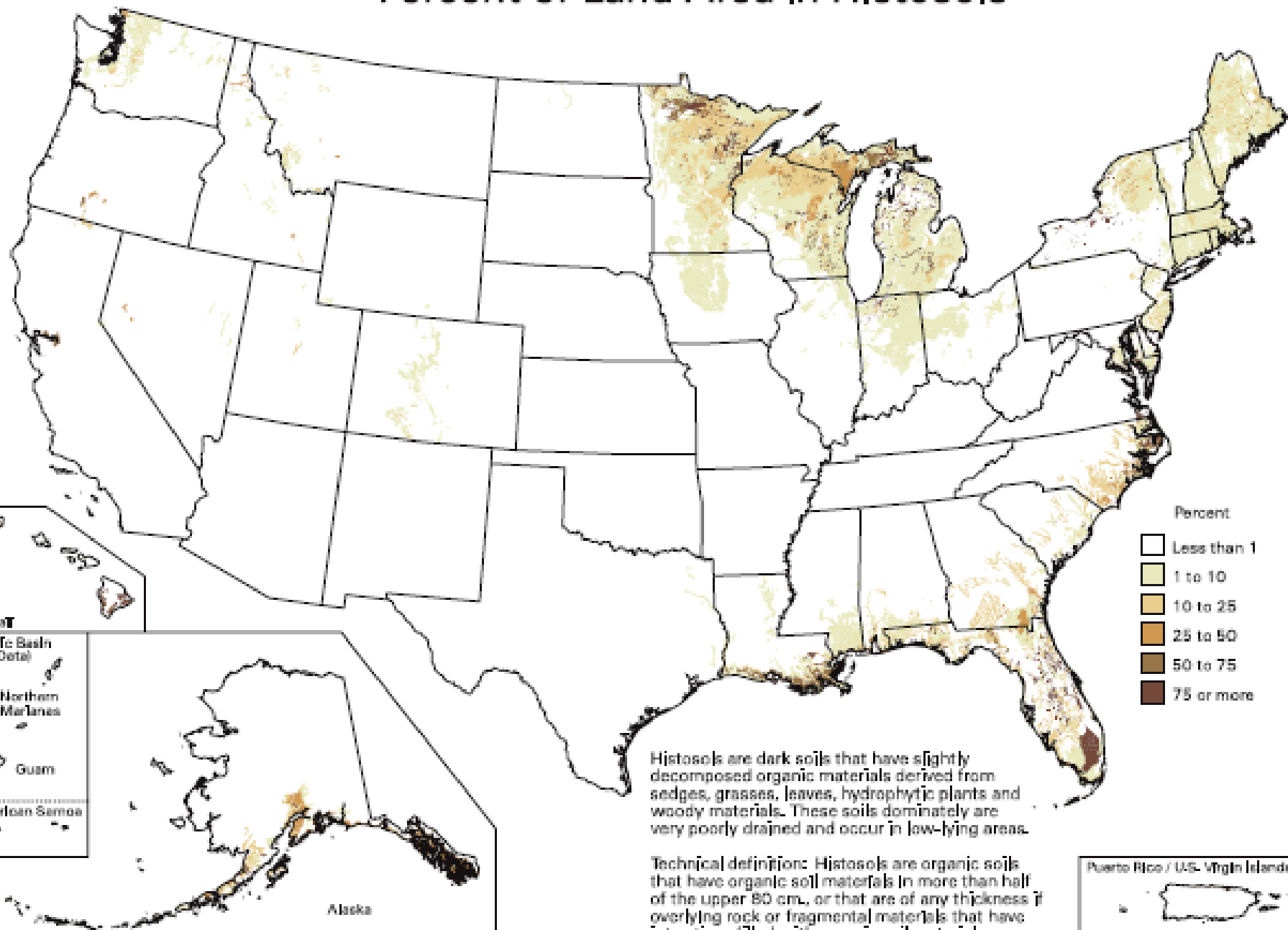


# Muck Fuels



Present Special Suppression Activities and Creates Unique Challenges

# Percent of Land Area in Histosols



Histosols are dark soils that have slightly decomposed organic materials derived from sedges, grasses, leaves, hydrophytic plants and woody materials. These soils dominantly are very poorly drained and occur in low-lying areas.

Technical definition: Histosols are organic soils that have organic soil materials in more than half of the upper 80 cm, or that are of any thickness if overlying rock or fragmental materials that have interstices filled with organic soil materials.

# Muck Fires

- Difficult to Suppress
- Smoldering
- Smoke on the Highways
- Large Fire Events with Long Burning Periods
- Public Health and Traffic Hazards





# MUCK FIRE SUPPRESSION CHALLENGES

- Require specialized equipment
- Re-burn Issues
- Suppression Costs

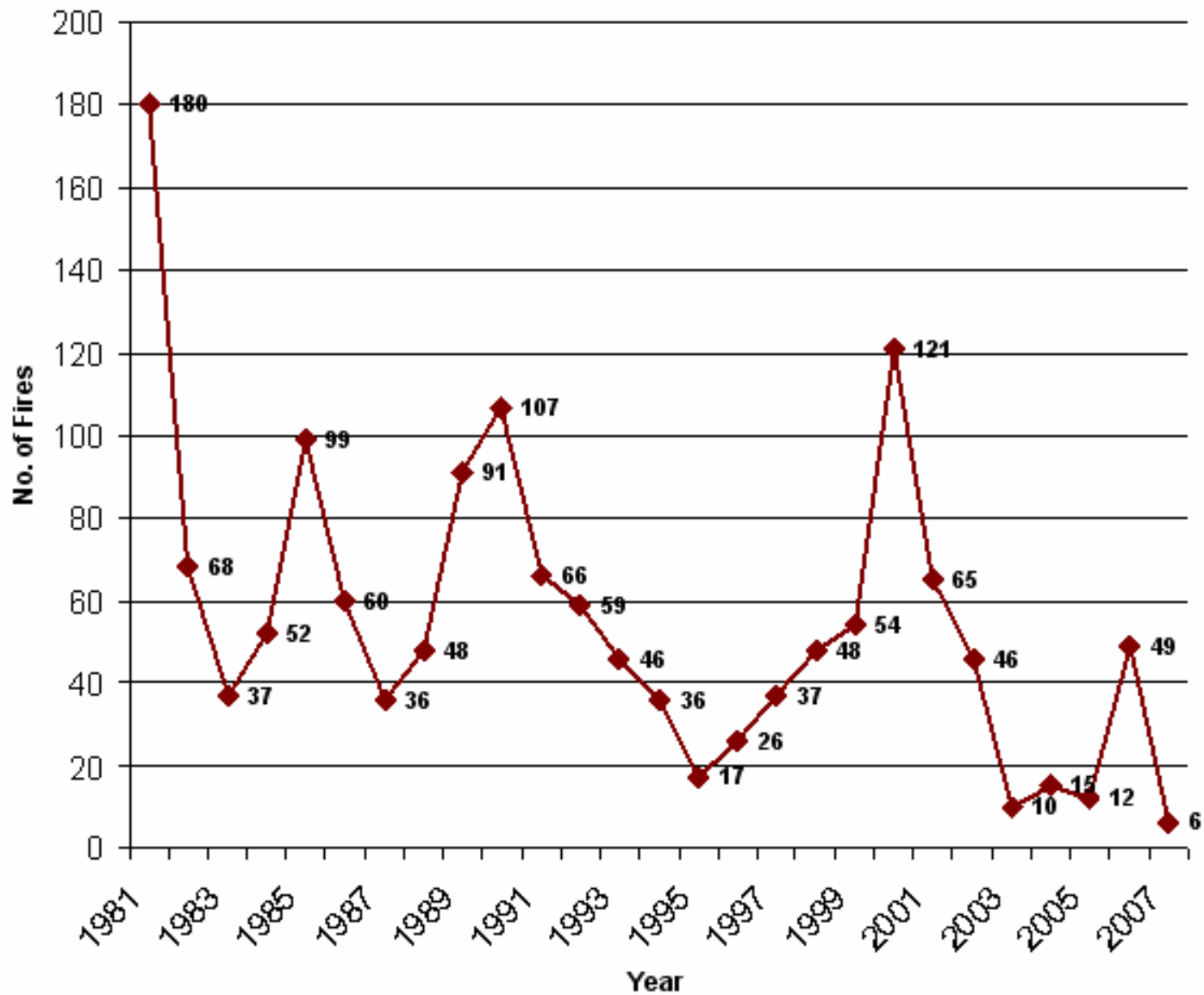




**The number and frequency are related to:**

- 1. Population growth**
- 2. Draining land for development**
- 3. Draining for agriculture practices**
- 4. Periods of drought**

1981-2006 Frequency of Muck Fires per Year



# *Where do go from here?*

## Fire Information Systems and Spatial Technology

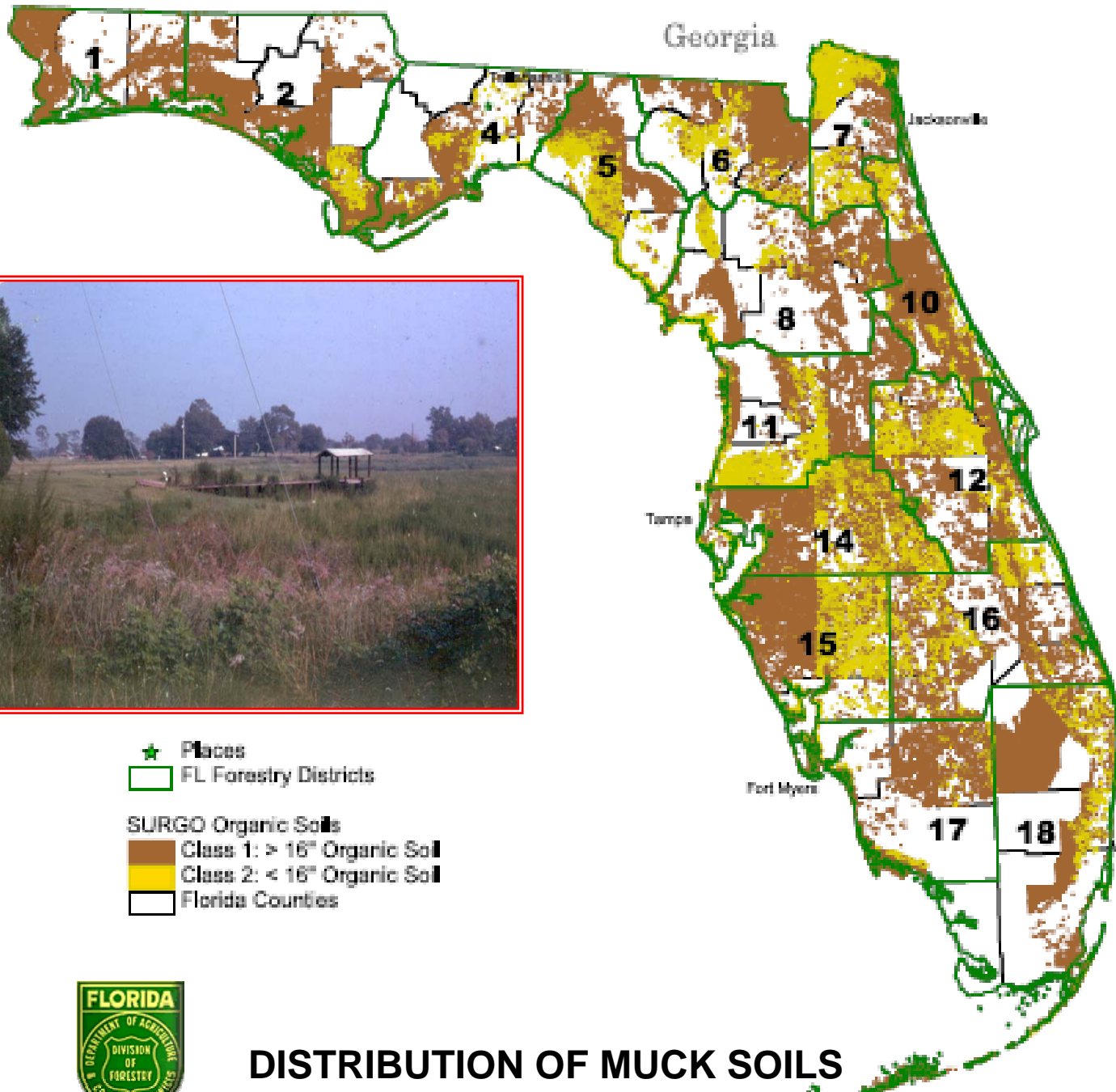
### Descriptive Statistics

- Location of muck fuels
- Location of muck fire
- Suppression Comparison
- % Size/Count by Fuel Category



Alabama

Georgia



- ★ Places
- FL Forestry Districts
- SURGO Organic Soils
  - Class 1: > 16% Organic Soil
  - Class 2: < 16% Organic Soil
- Florida Counties



## DISTRIBUTION OF MUCK SOILS

# Muck Locations

- Dry Swamps, Bays & Cypress
- Dry Freshwater Marshes / Flats
- Dry Lakebeds
- Seasonal / Man Caused Dry Areas



Thin layer of muck has burned away down to mineral soils.



# Muck Fires



Alabama

Georgia

Tallahassee

Jacksonville

Tampa

Orlando

### Number of Muck/Swamp Fires by Year






YEAR COUNT TOTAL ACRES

1981	677	35273
1982	171	3659
1983	77	507
1984	183	14123
1985	438	10839
1986	332	8169
1987	182	5291
1988	290	5623
1989	282	46137
1990	484	10941
1991	294	7039
1992	225	4529
1993	286	5994
1994	176	10862
1995	124	8369
1996	177	7919
1997	157	3489
1998	298	30924
1999	254	11829
2000	894	18239

Total 5658 263,373

Florida Forestry Districts

Muck and Swamp Fire Locations

-  ADJ (fires within one mile of muck)
-  ND (no data)
-  NO (fires not in or adjacent to muck)
-  YES (fires in a muck section)
-  Counties

~6000 Muck and Swamp Fires (~110,000 total)



# Suppression Time Compared to Other Fuel Categories: Reported Time to Controlled Time

- Muck Fires: **12 days** was the average suppression time (Total of 1,491 fires) with the most being 247 days
- Swamp Fires: **4 days** was the average suppression time (Total of 5,069 fires)
- All Other Fires: **1 day** was the average suppression time (Total of 122,792 fires)





## Fire Count and Size by General Fuel Type

Fuel Type	Fires	Avg Fires	Acres	Avg Acres
Palmetto-Galberry	45877	33.63%	1730534.5	32.54%
Dense Pine	10380	7.61%	346761.8	6.52%
Swamp	5083	3.73%	345958.2	6.51%
Blowly Leaf	8605	6.31%	57202.7	1.08%
Grass	49073	35.98%	2413079.7	45.38%
Muck	1495	1.10%	30843.9	0.58%
Other	9190	6.74%	283038.1	5.32%
Unspecified	6694	4.91%	109960.5	2.07%
<b>Total</b>	<b>136,397</b>		<b>5,317,379.4</b>	

# Stagecoach Fire

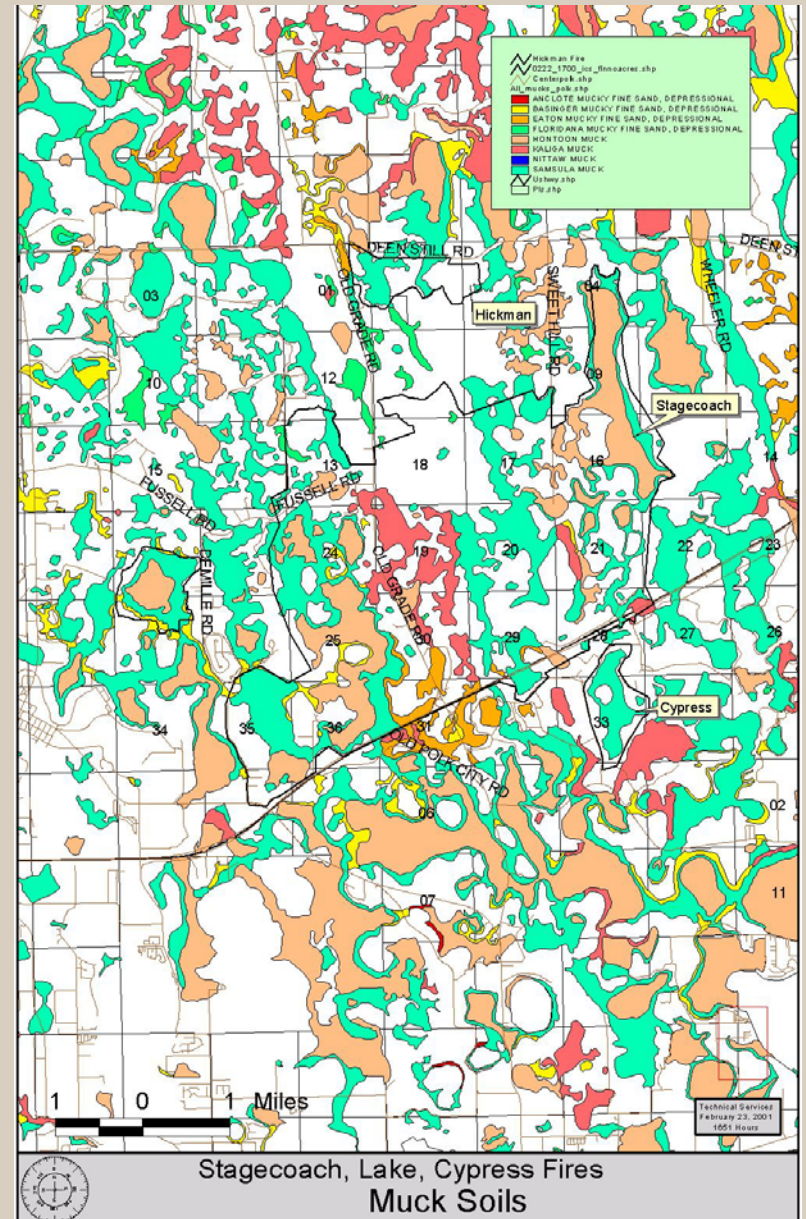
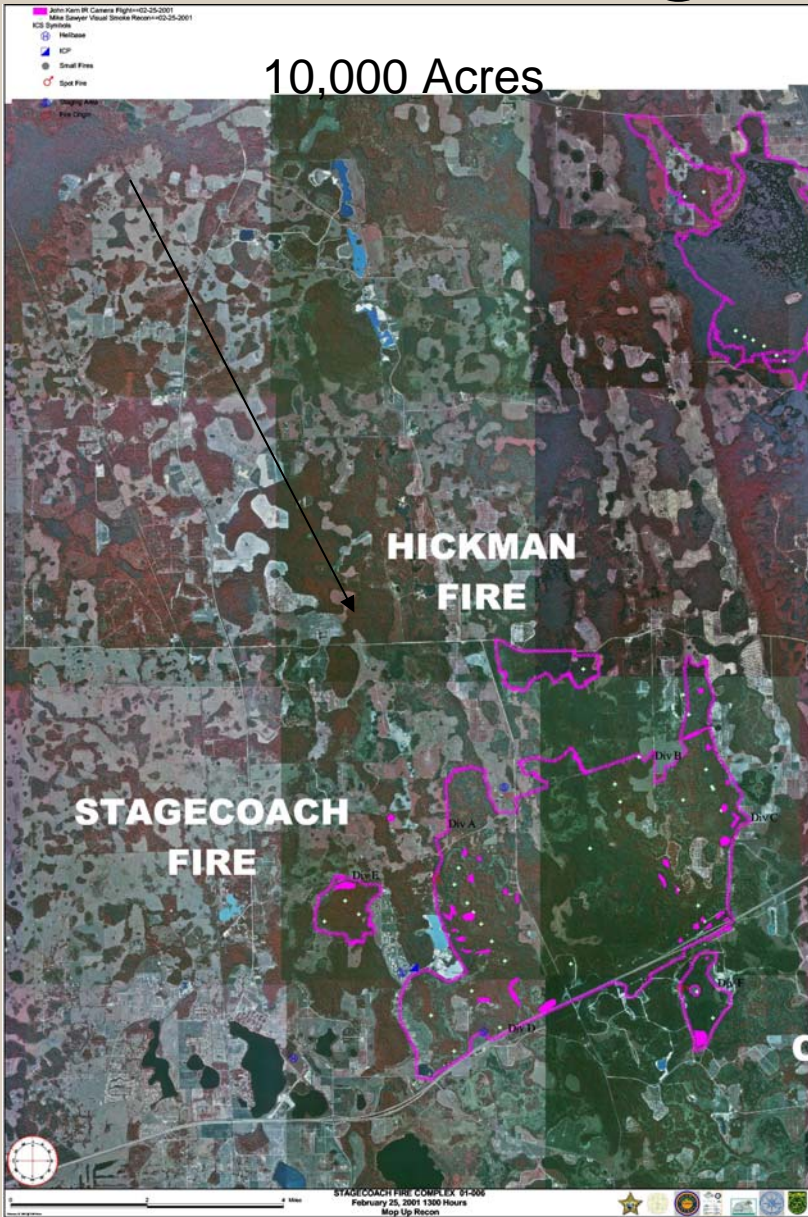
“A 46-year-old Polk City resident, decided to burn some canceled checks, despite outdoor burning being banned virtually statewide.

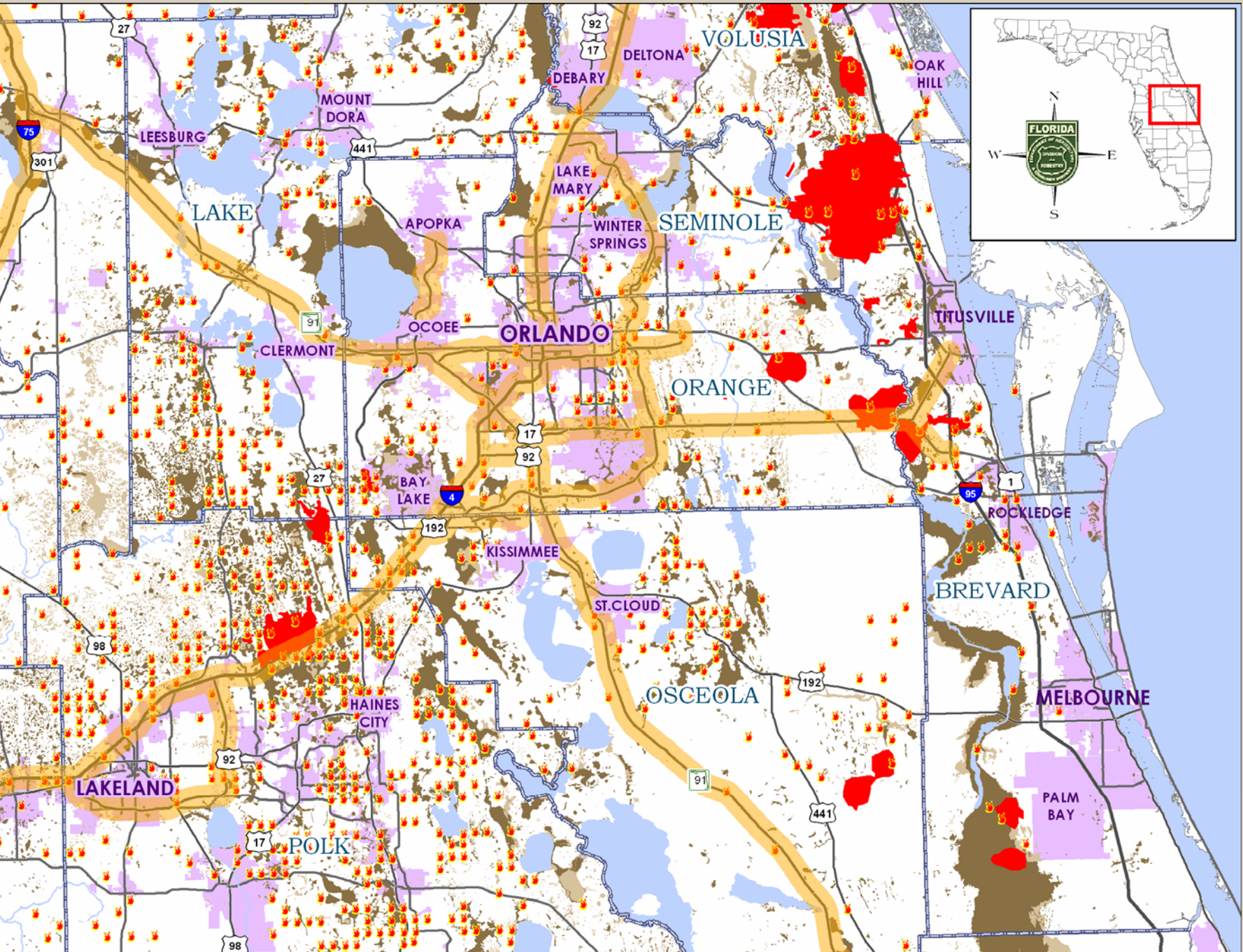
Normally about 66,000 cars and trucks travel I-4 east of U.S. 27 every day.” Local Newspaper

- **Closed I-4 for several days  
Major Corridor to Orlando  
Theme Parks**
- **Falling trees in the Medians**
- **Burned for several Weeks**
- **State Incident Management  
Teams deployed**
- **Human Caused**
- **Classic Example**



# Stagecoach Fire





- Suppression Techniques Used on the Swamp Fires

- Rain Birds
- Hose Lays
- Pipelines
- Stirring and mixing (with or without H<sub>2</sub>O)



# Rainbirds



# Hose-lays



Small diameter Hose-Lays are used to concentrate sparse water supplies on isolated spots of muck.



# Stirring & Mixing



# Geospatial Technologies Can Provide Mitigation Efforts:

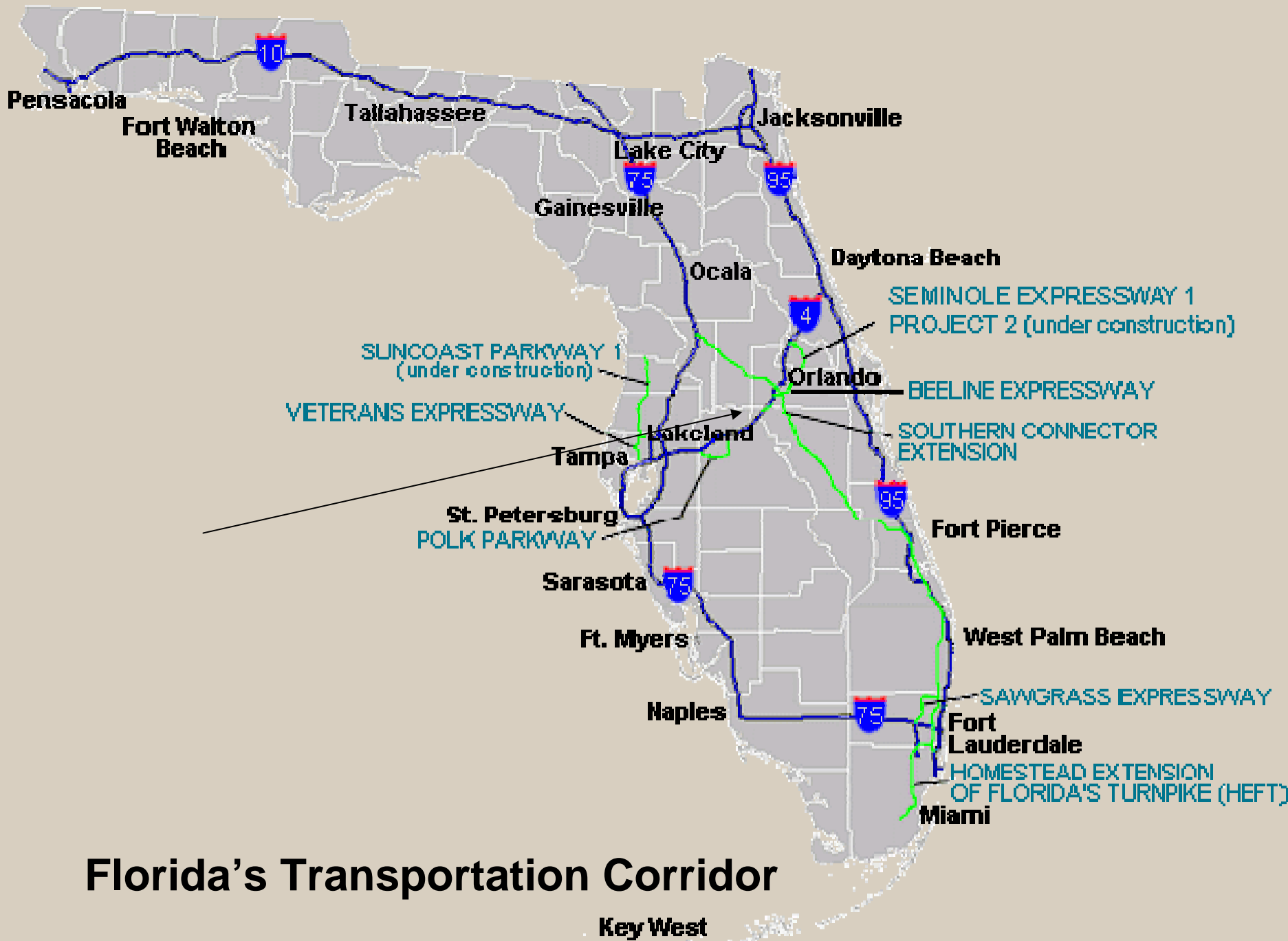
1. Identify a “high-smoke-risk” travel corridor.
2. Locate and map potential problem wetlands.
3. Locate and map surface water sources for pumping.

**BEFORE THE FIRE STARTS**



# Geospatial Technologies Can Provide:

- **Identify a “high-smoke-risk” travel corridor.**

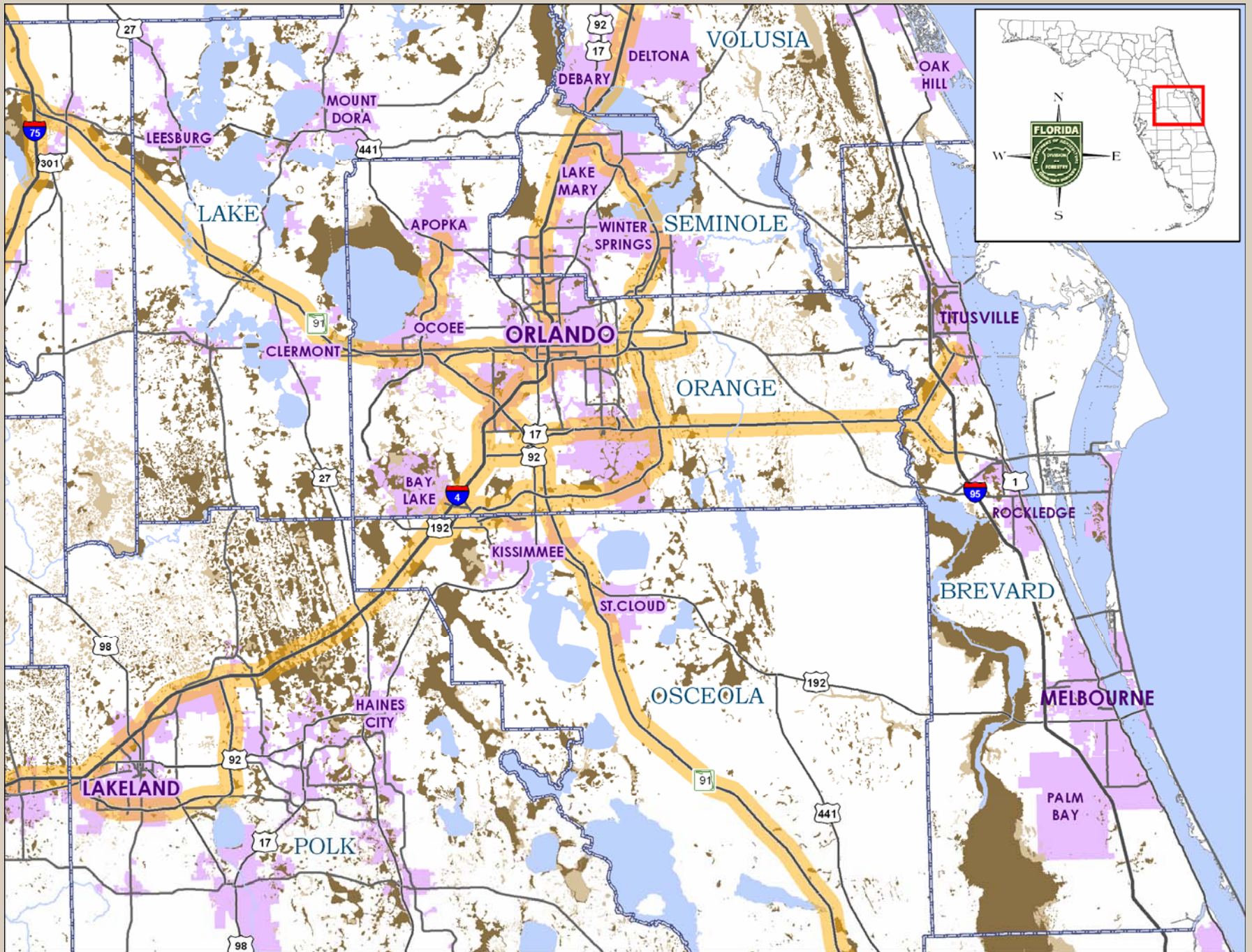


# Florida's Transportation Corridor

Key West

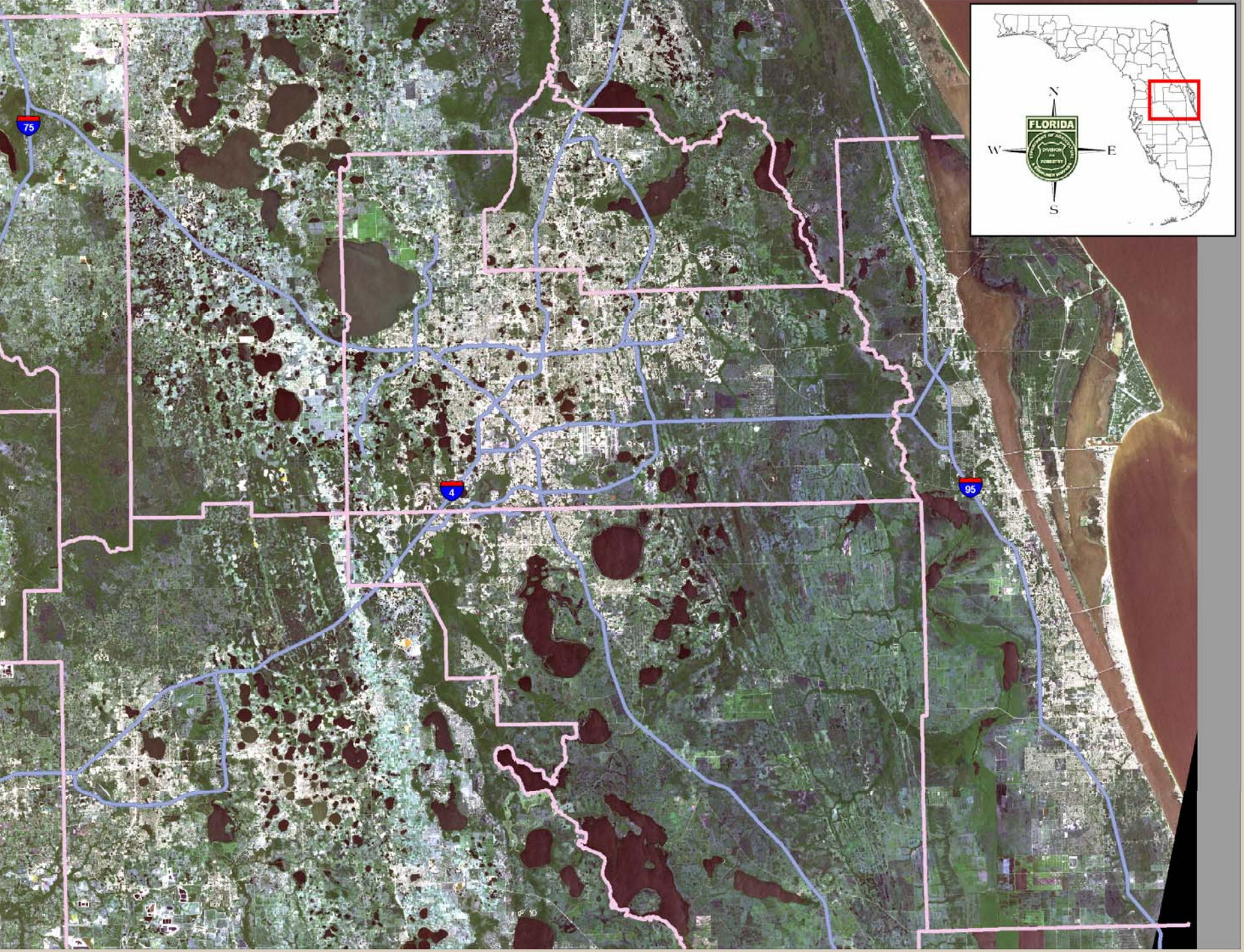
# Geospatial Technologies Can Provide:

- **Locate and map potential problem wetlands.**



# Geospatial Technologies Can Provide:

- **Locate and map surface water sources for pumping.**

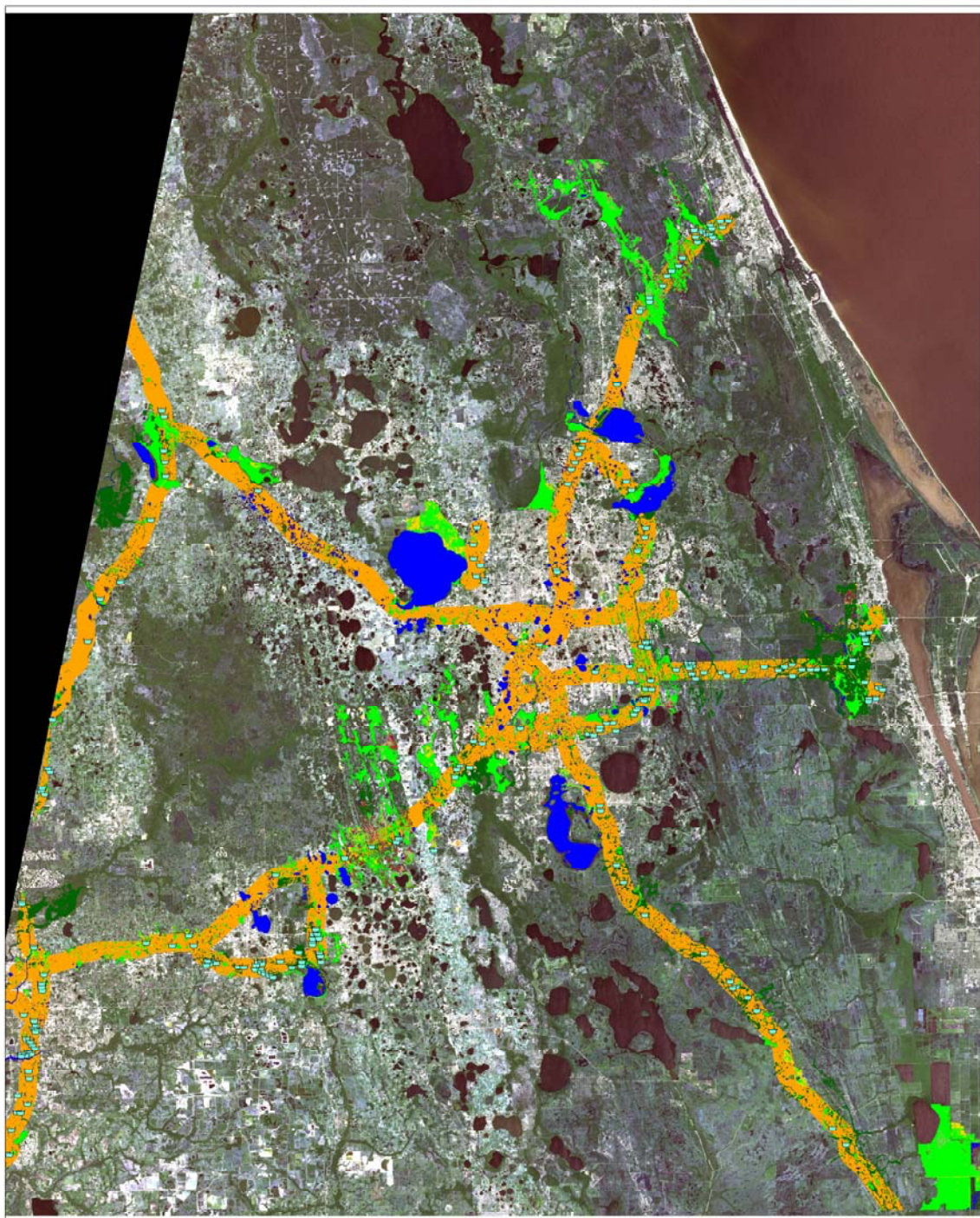




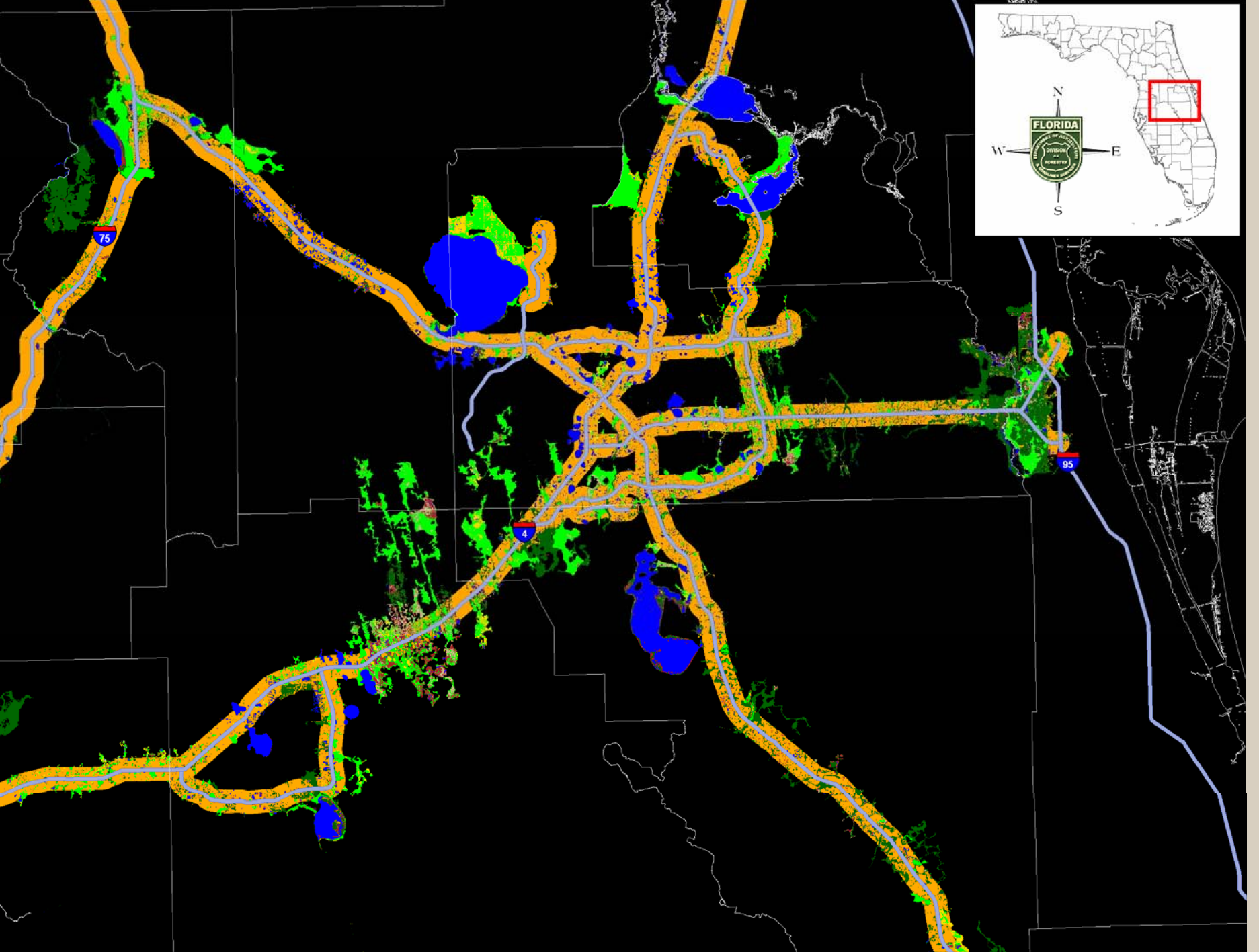
# GIS Methodology

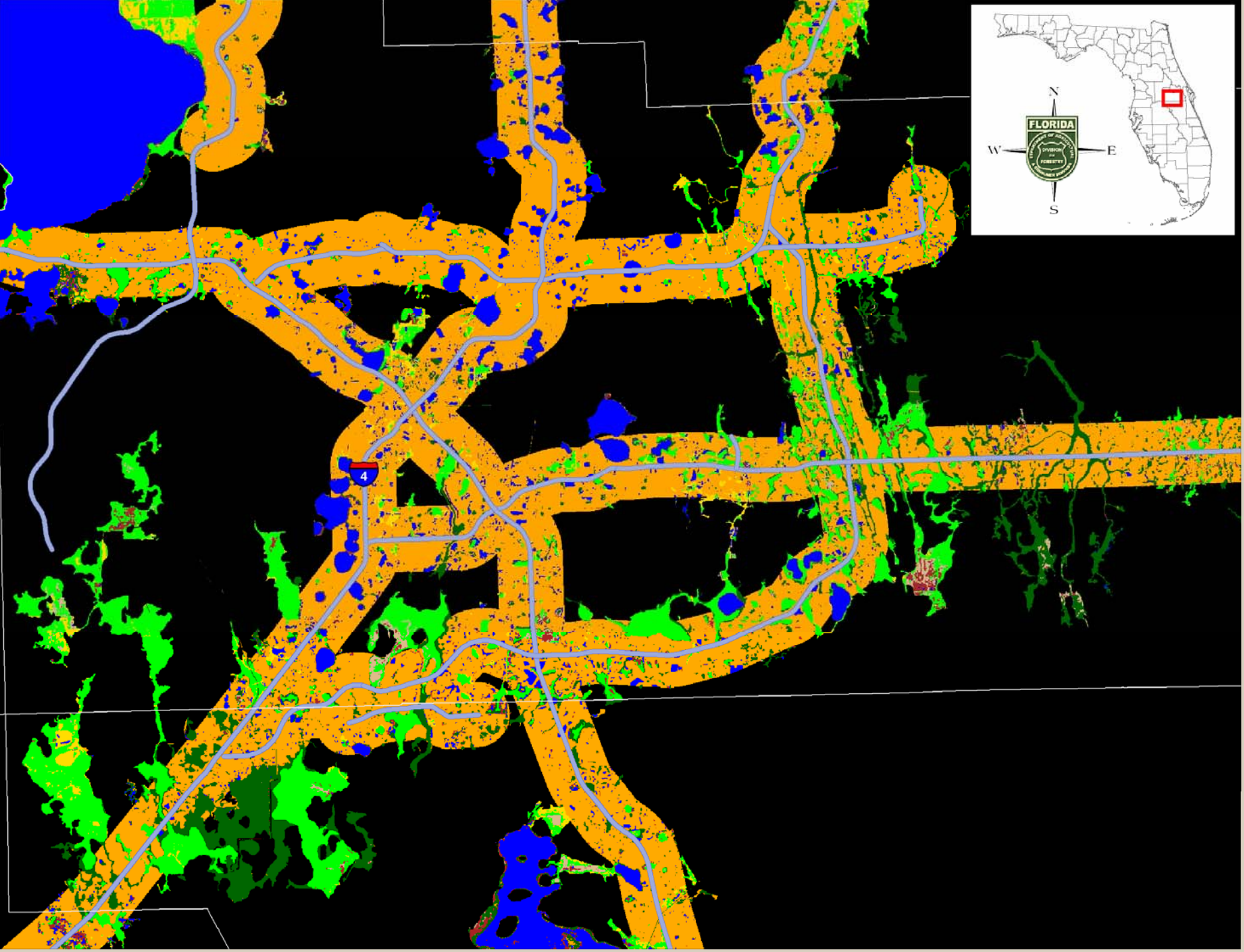
1. Transportation buffer (1 Mile)
2. Merge with Wetlands, Water, and Muck Soils
3. Landsat Imagery Clip
4. Unsupervised Classification
5. Irregular Water Features



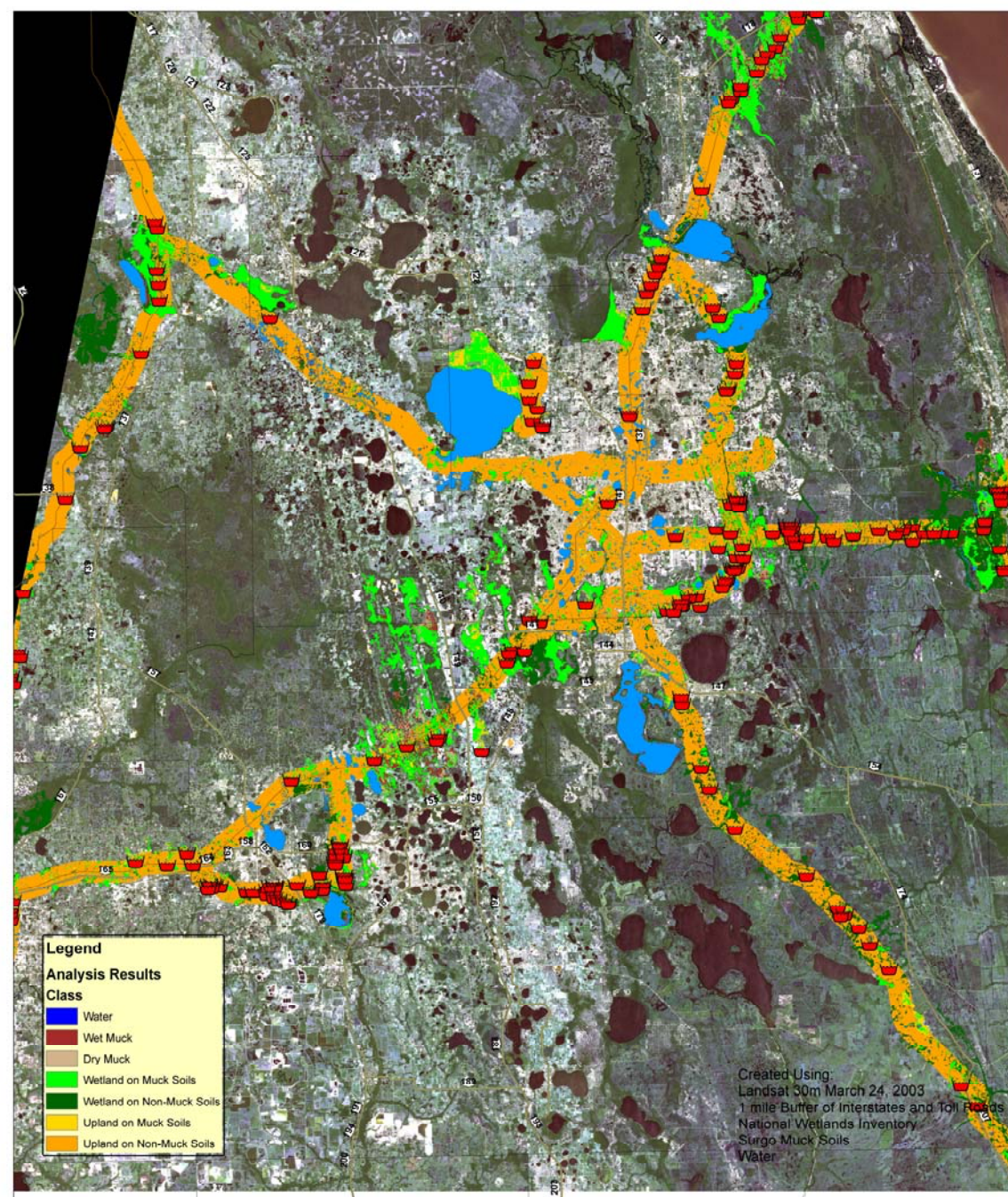


Roads





# 228 Borrow Pits Identified





# Future Statewide Application:

- Assess hydrologic conditions of targeted wetland areas, water sources, and ground water recharge potential.
- Obtain appropriate permits from the local Water Management Districts.
- Evaluate restoration methods, i.e. ditch plugs, flashboard risers, weirs
- Explore funding for equipment, testing, reporting and monitoring.
- Investigate the development of a DOF “Hydrology Strike Team” with specialized equipment and training.



# Objectives

- Define Muck
- Problems with Muck Fires
- Explore Florida Fire Occurrence
- Provide Practical Application for Mitigation Using Spatial Technology and Analysis







**THANK YOU**

**Acknowledgement:**

**Mark Calhoun, 20 year Ranger in  
Polk County "Muck Capital of  
Florida"**

**Dr. Basil Savitsky, Florida State  
University**