



# Sustaining Agriculture in Indian River County- What Are the Challenges and How Can It Survive ?

Presented at the  
Sustainable Living Expo  
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by

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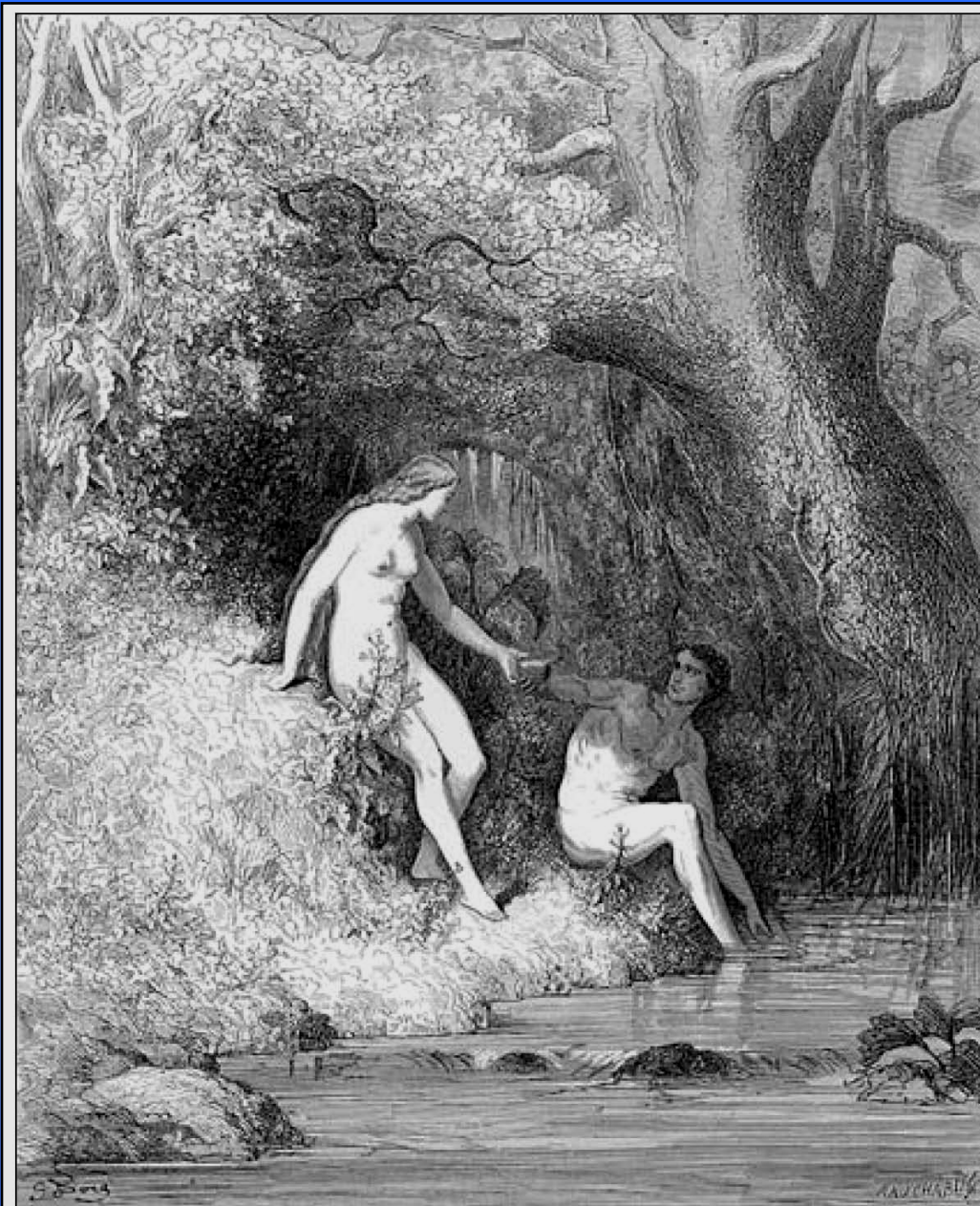
<http://www.flaresearch.com/>



**The term "sustainable agriculture" (U.S. Code Title 7, Section 3103) means an integrated system of plant and animal production practices having a site-specific application that will over the long-term:**

- Satisfy human food and fiber needs.
- Enhance environmental quality and the natural resource base upon which the agriculture economy depends.
- Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.
- Sustain the economic viability of farm operations.
- Enhance the quality of life for farmers and society as a whole.

This definition is a central element of the legislation of the Sustainable Agriculture Research and Education (SARE) program of USDA's National Institute of Food & Agriculture.



*Adam and Eve drink from the stream* [Gustave Doré]

The Garden of Eden... The only Sustainable Agricultural System

Sustainable Agriculture as defined by the United Nations World Commission on Environmental and Development:  
"that which meets the needs of the present without compromising the ability of future generations to meet their own needs"

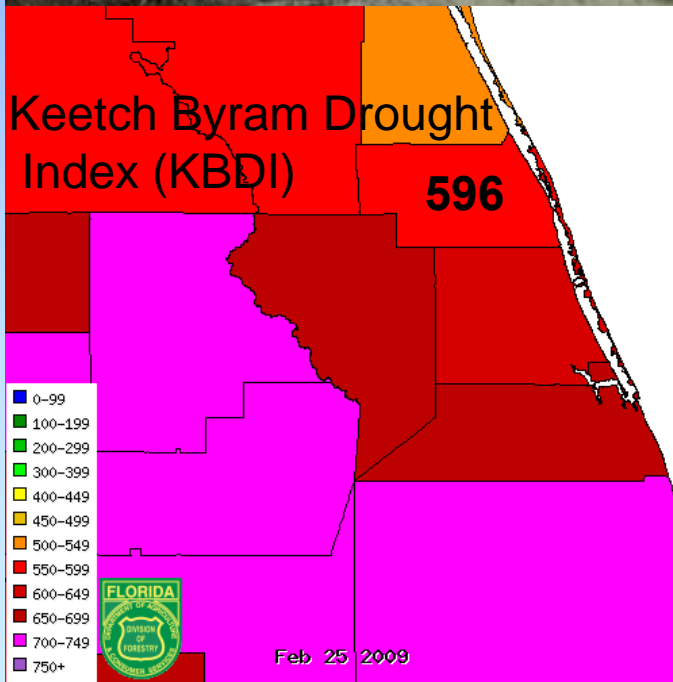


**So...**

**What are the Challenges?**

# Meteorological Impacts

Freezes



# Harvesting Costs & Labor



# Pests and Pathogens Impacting Citrus



Female *Diaprepes* Ovipositing her eggs



**Phytophthora-  
Diaprepes  
Complex**





# Pests and Pathogens

Citrus Canker



38



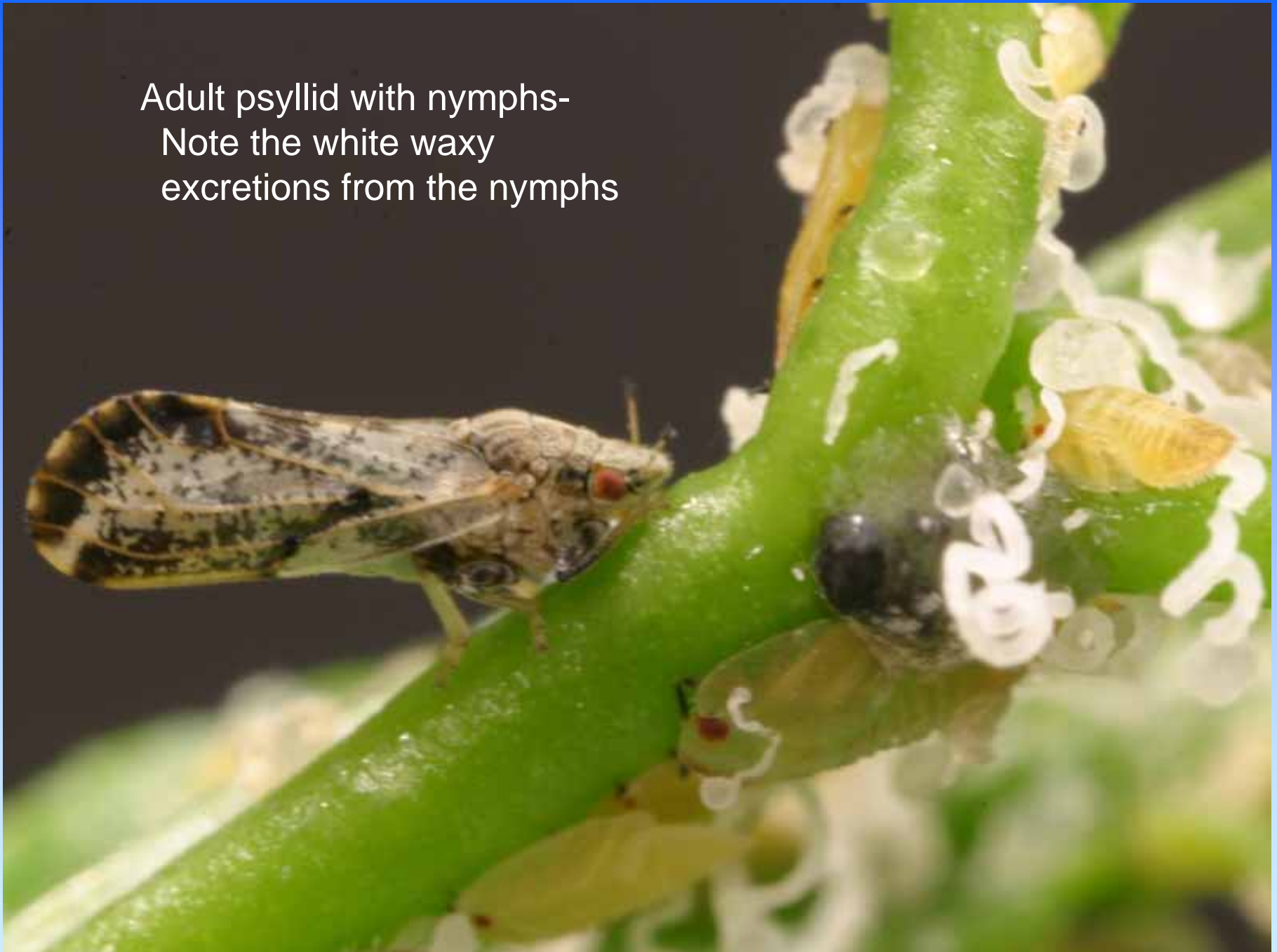
**Citrus Greening Disease or Huanglongbing (HLB)**  
**A devastating disease of citrus**



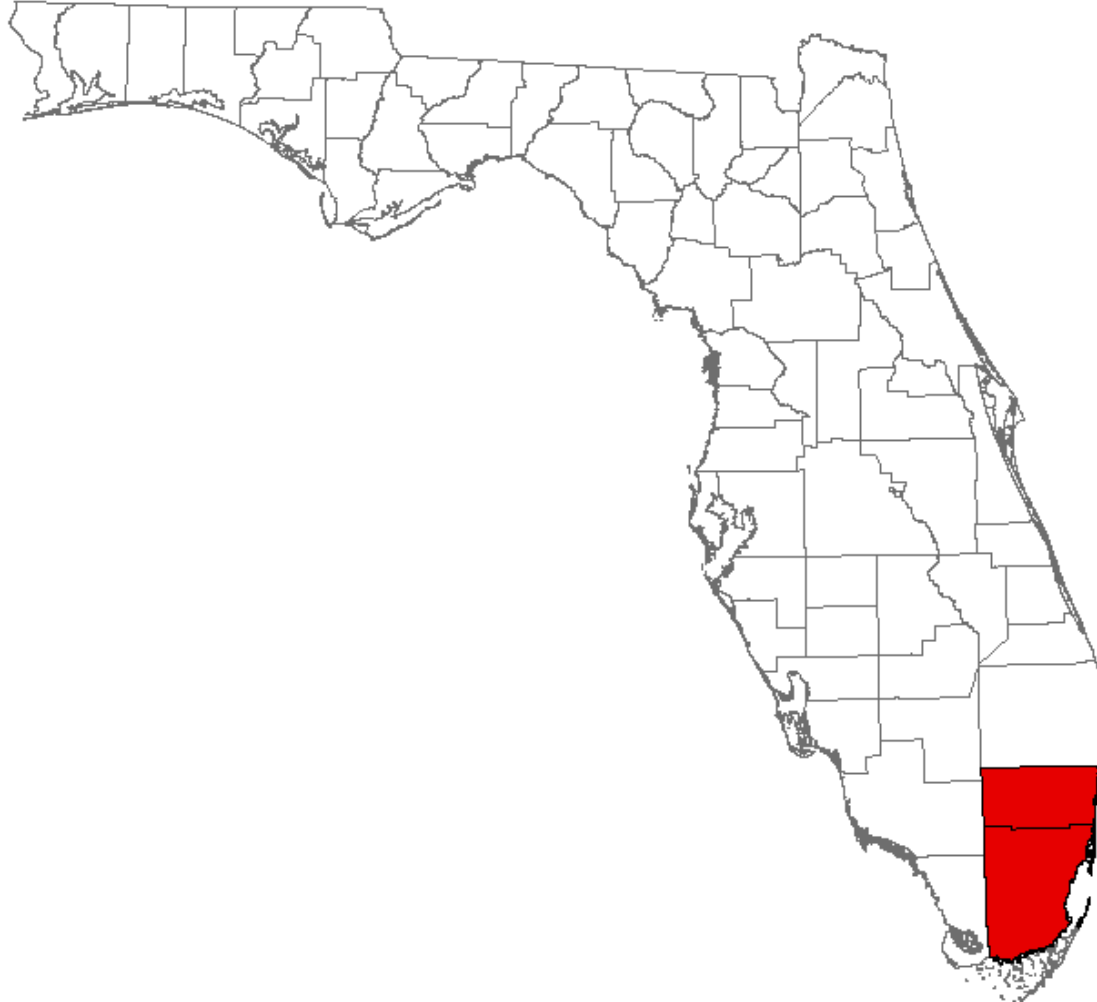
Asian citrus psyllid, *Diaphorina citri*



Adult psyllid with nymphs-  
Note the white waxy  
excretions from the nymphs

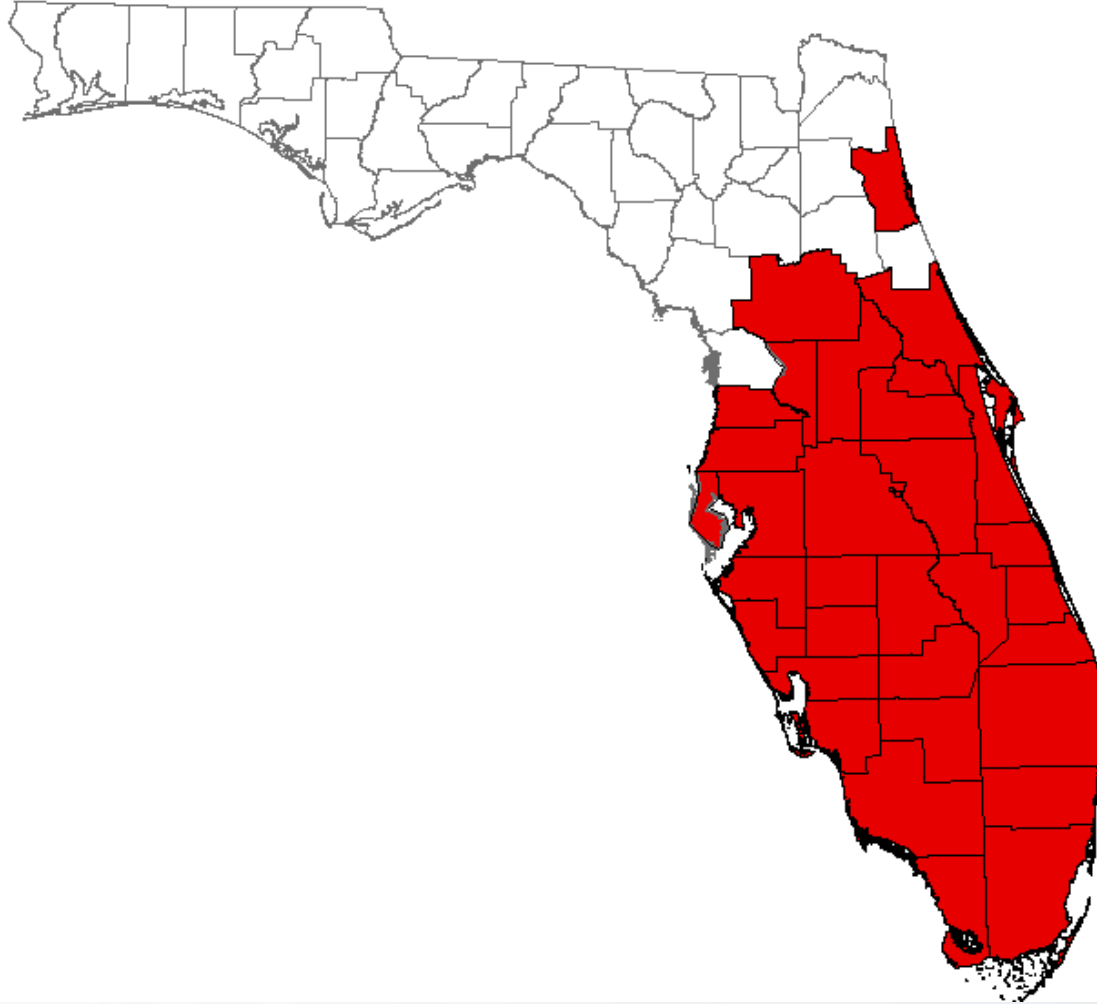


# HLB Incidence in the State as of: October, 2005



2 counties

# HLB Spread to all 32 Citrus Producing Counties the State in Less Than 3 Years August, 2008

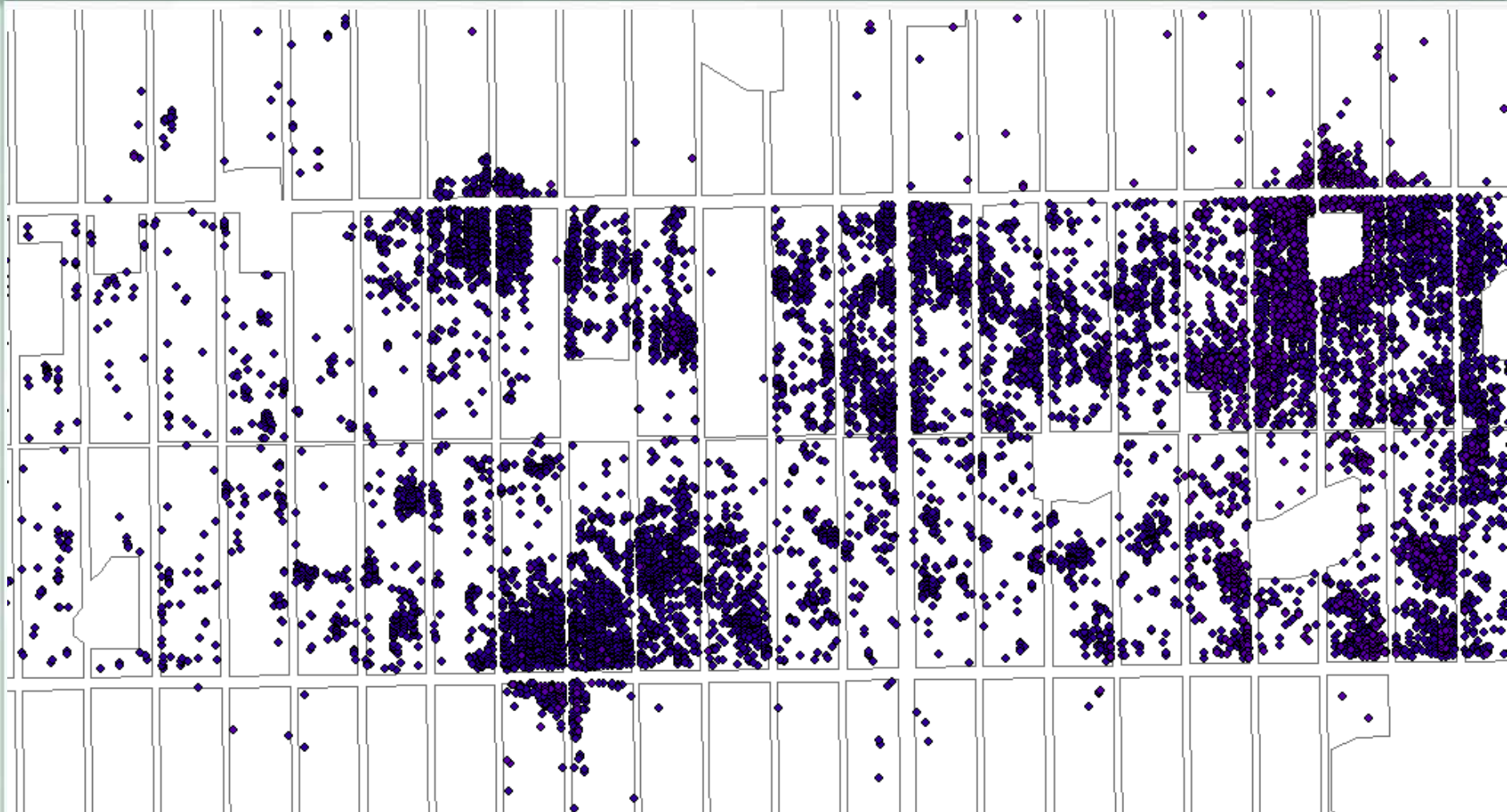


32 counties

# How Fast Does it Spread? Oct05-Mar06

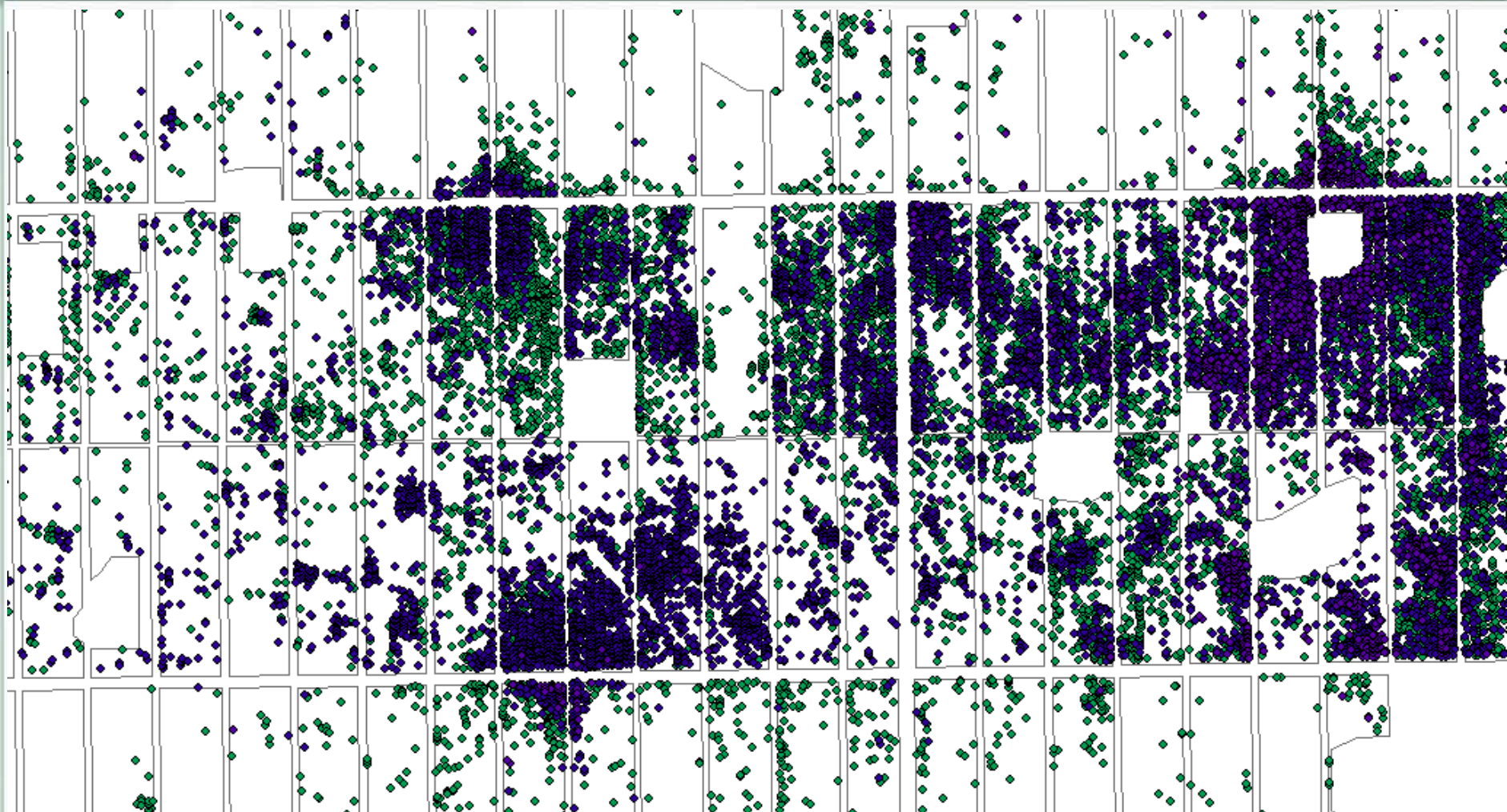


# How Fast Does it Spread? Apr06-Sep06

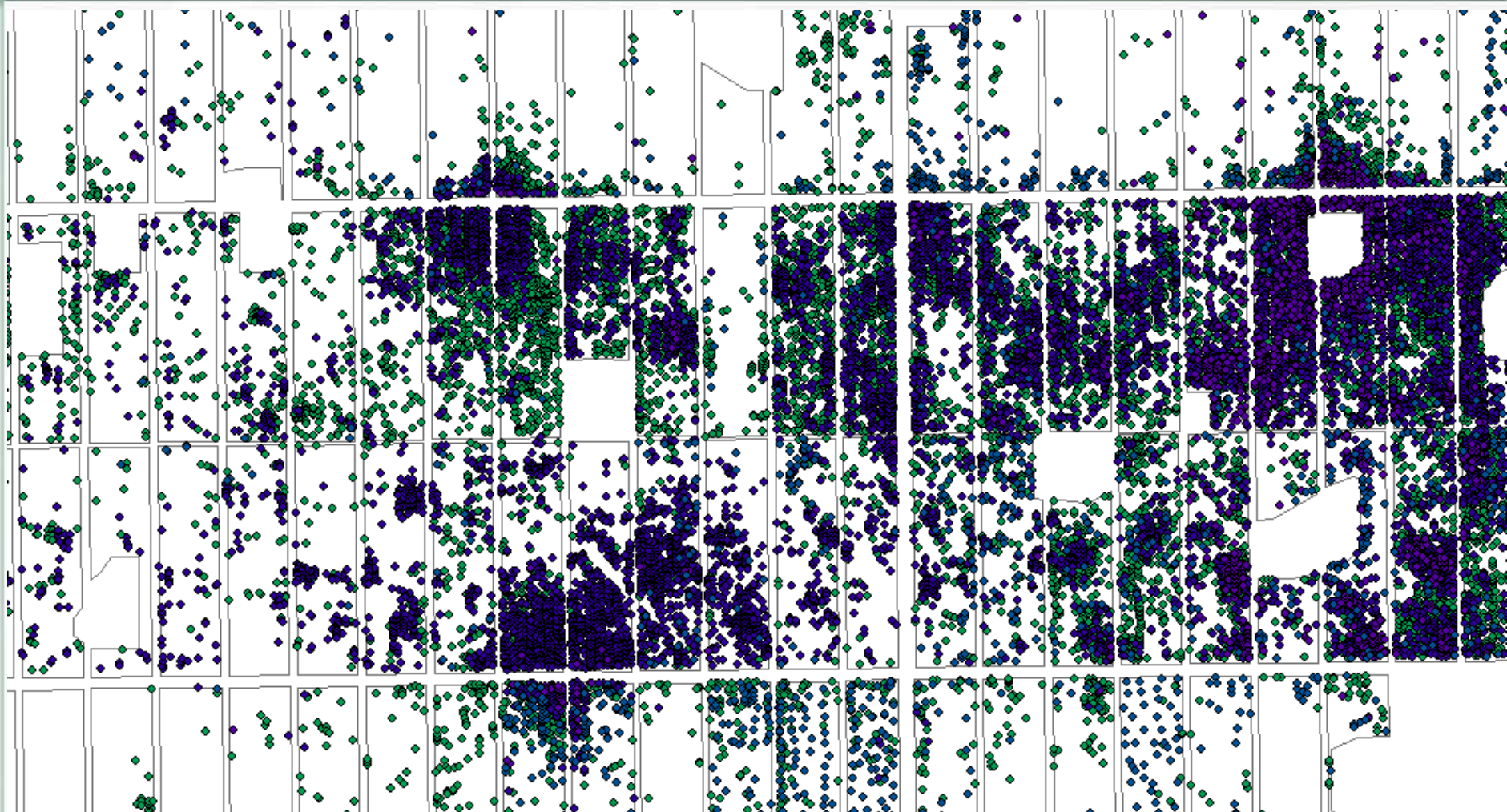




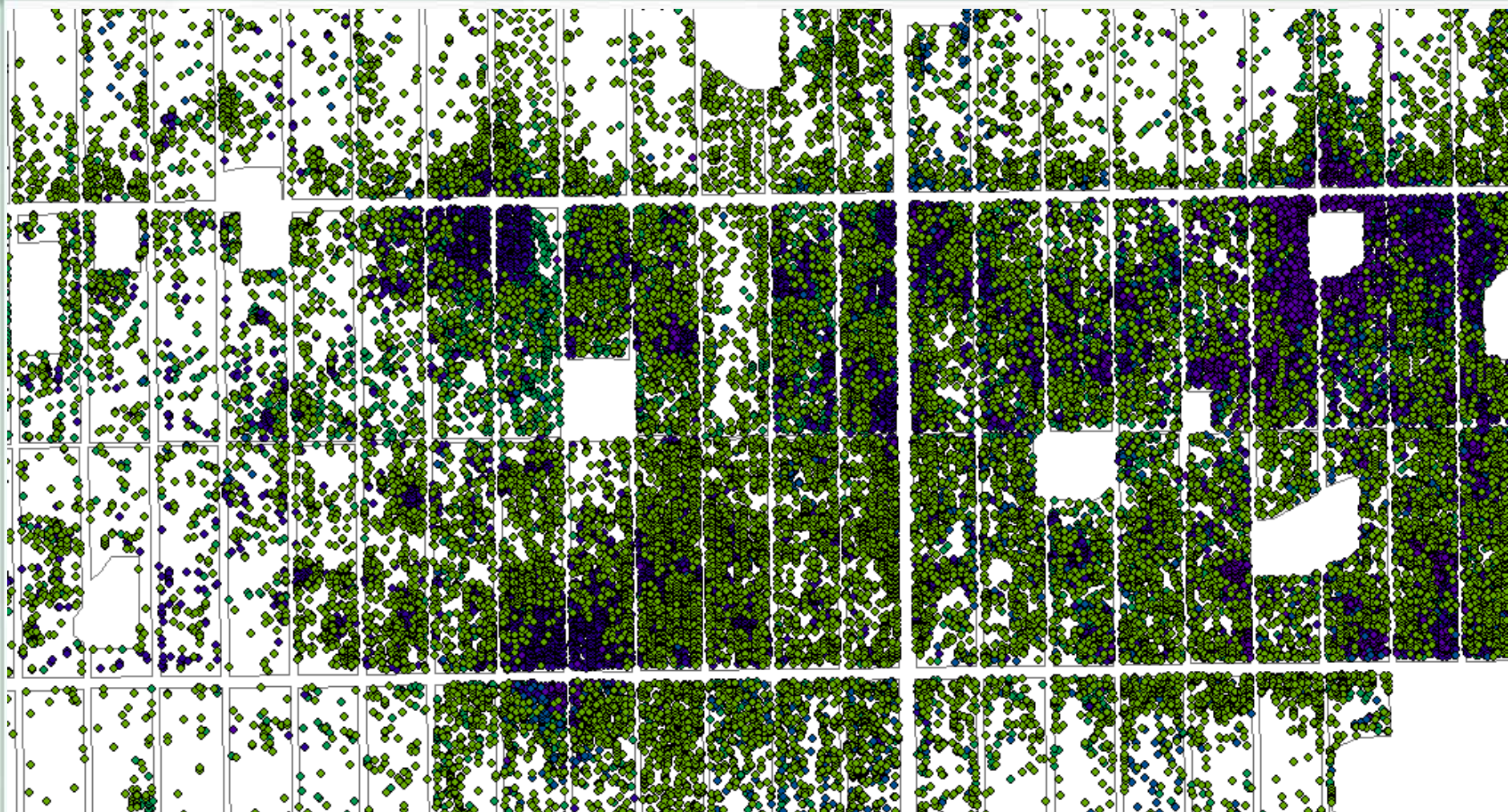
# How Fast Does it Spread? Oct06-Mar07



# How Fast Does it Spread? Apr07-Jul07



# How Fast Does it Spread? Aug07-Oct07



# PEST ALERT

WASHINGTON, April 8, 2010  
The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) today confirmed the presence of *Guignardia citricarpa*, or citrus black spot, in Florida.

CVC



# Urbanization



# Economic Profitability

- ✓ Meteorological Impacts
- ✓ ↑ Energy and Input Costs
- ✓ ↑ Harvesting Costs & Labor
- ✓ Pests and Pathogens
  - ✓ Canker
  - ✓ Citrus Greening Disease
  - ✓ Diaprepes Root Weevil

**Increased Crop Losses and Production costs to the Farmer**

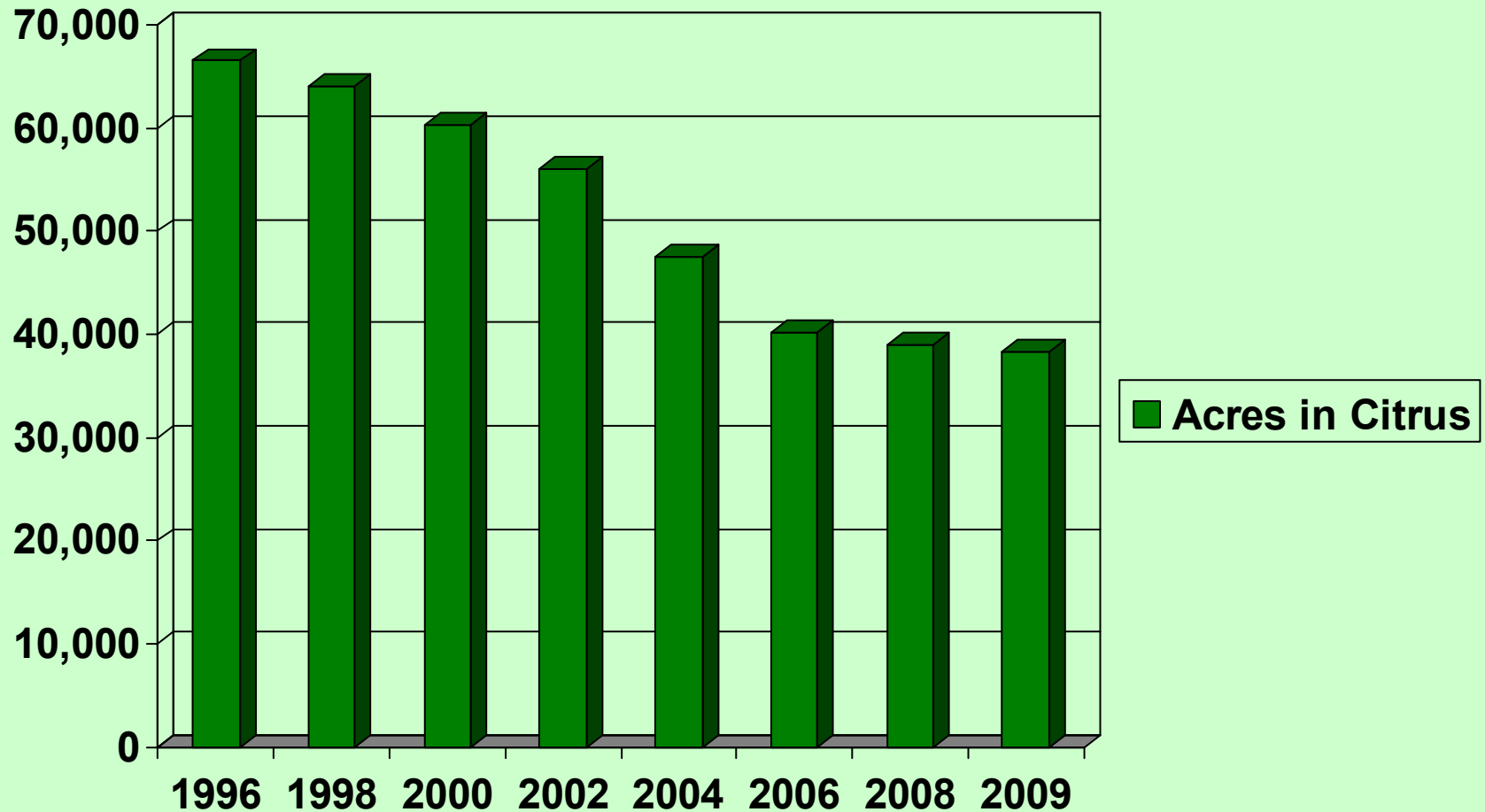
- ✓ Urbanization
- Foreign Competition (Brazil)
- Large Juice Inventory
- Reduced Consumption
  - Drug Interaction (Lipitor)
  - Bottled Water
  - Low Carb Diets
  - Multi Tasking Population

**Poor Returns to the Farmer**

# The Challenges Facing Ag:

- Meteorological Impacts
- Increases in Energy and Input Costs
- Harvesting Costs & Labor
- Pests and Pathogens
  - Canker
  - Citrus Greening Disease
  - Diaprepes Root Weevil
  - And Now Citrus Black Spot
- Urbanization
- Economic Profitability

# Change in Citrus Acreage For Indian River County





# Western View From The Citrus Tower in 1960 Clermont, Florida




# Western View From The Citrus Tower in 2007 Clermont, Florida

## **The Citrus Tower became the Tower of Sprawl**

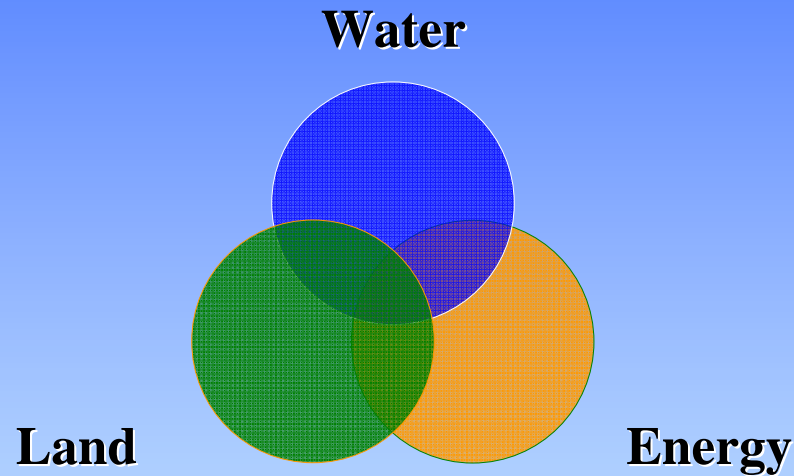
The conversion of citrus land to urban area was largely due to the impact of three devastating freezes that occurred in the eighties wiping out thousands of acres of citrus in this region.





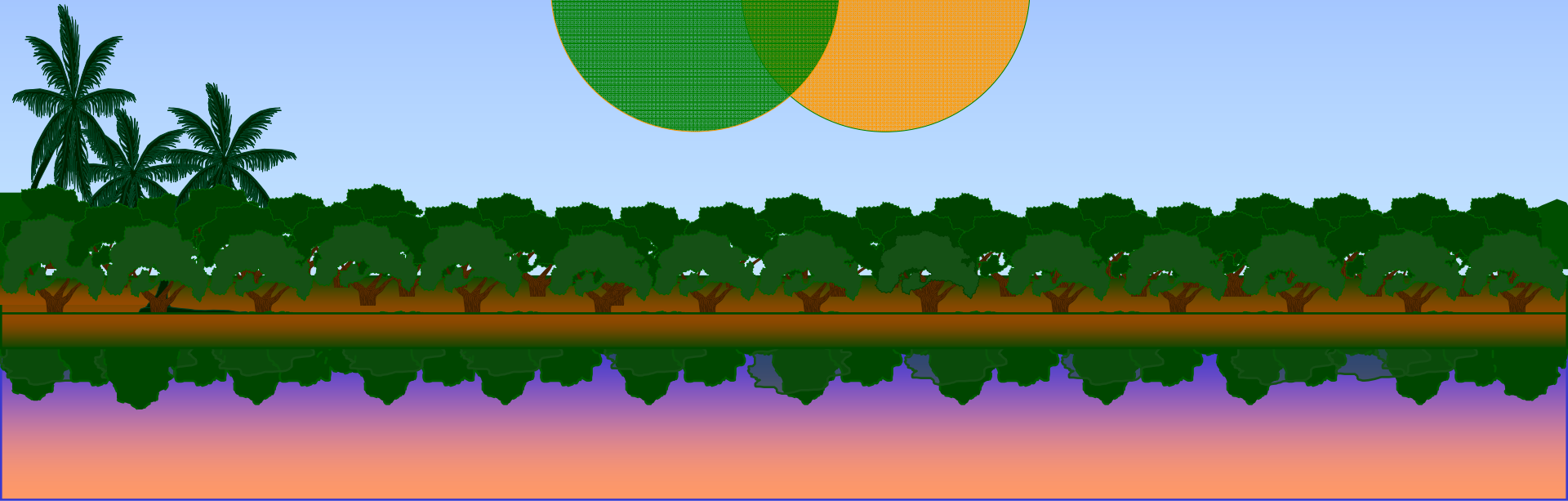
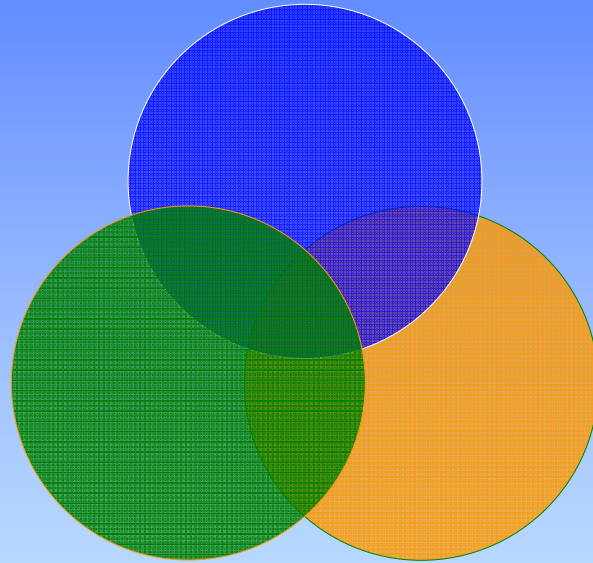
Or....  
Can Agriculture Survive in  
What Can Be Done  
To Indian River County?  
Agriculture In Our County?

# The Natural Resource Spheres of Agricultural Sustainability



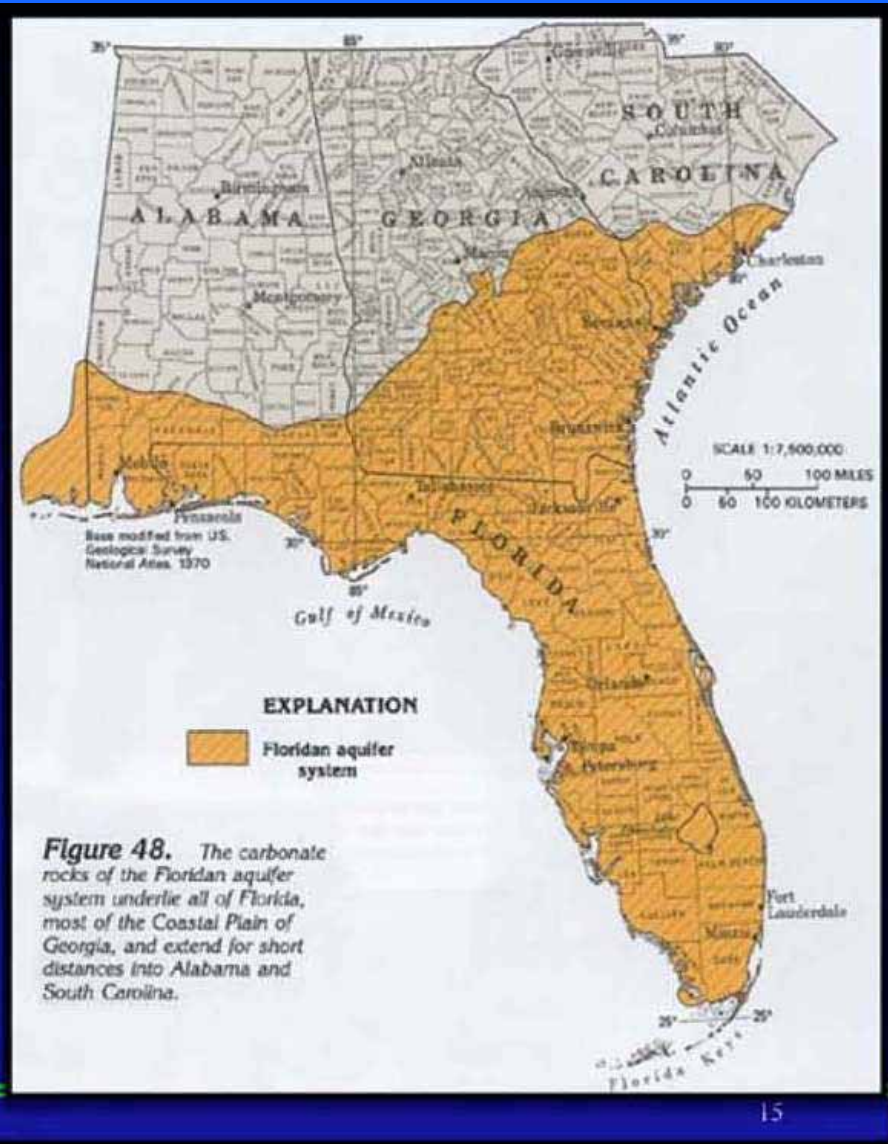
# The Natural Resource Spheres of Agricultural Sustainability

## Water





## Extent of the Floridan Aquifer system



1. The Floridan aquifer system underlies all of Florida, most of the Coastal Plain of Georgia, and extends for a short distances into Alabama and South Carolina.

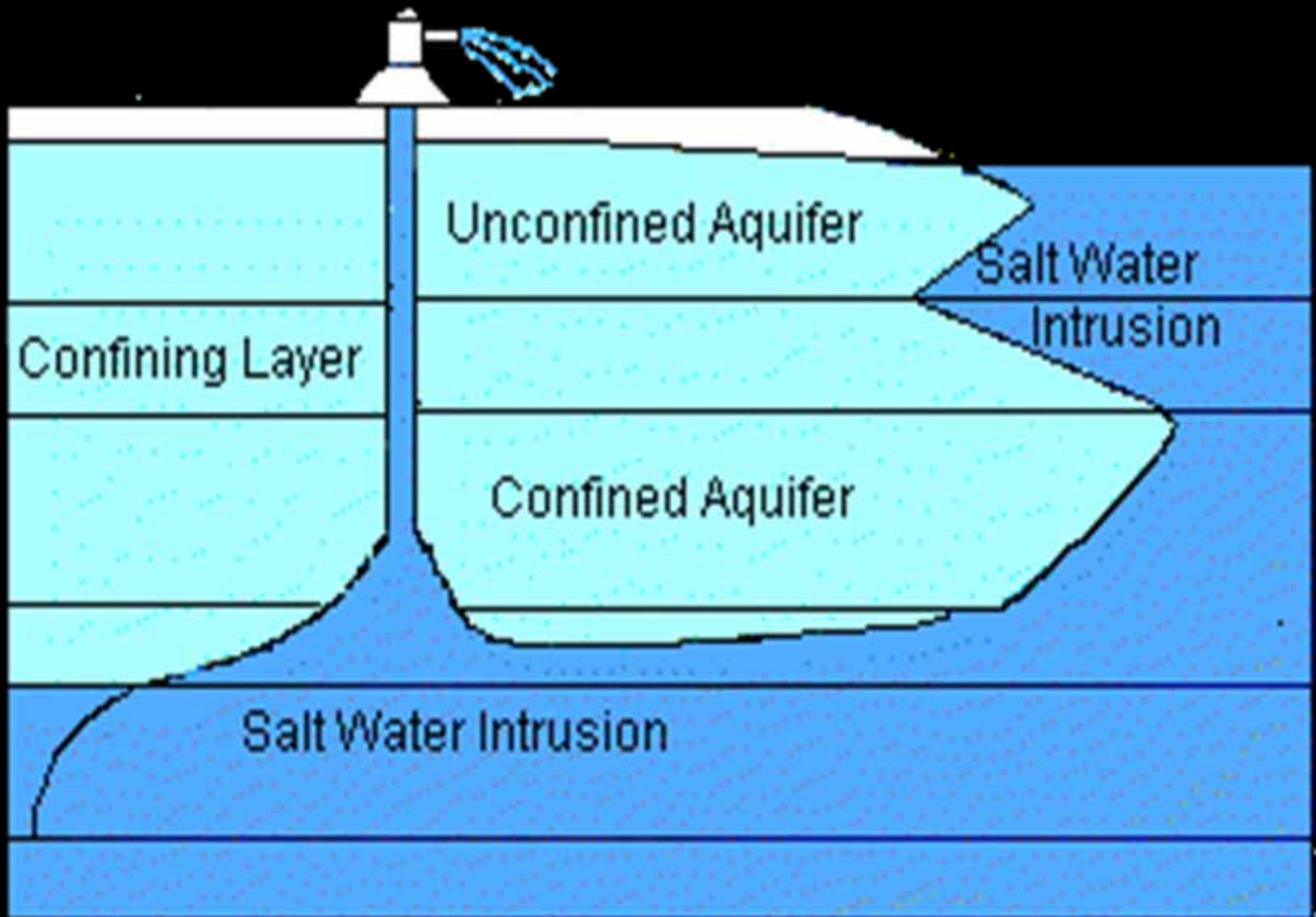
# Artesian Wells



Farmers rely on Artesian flow to supply their irrigation pumps and to flood their groves for freeze protection.

Rural homes located outside the Urban Service Area require the same Artesian flow to supply their potable water.

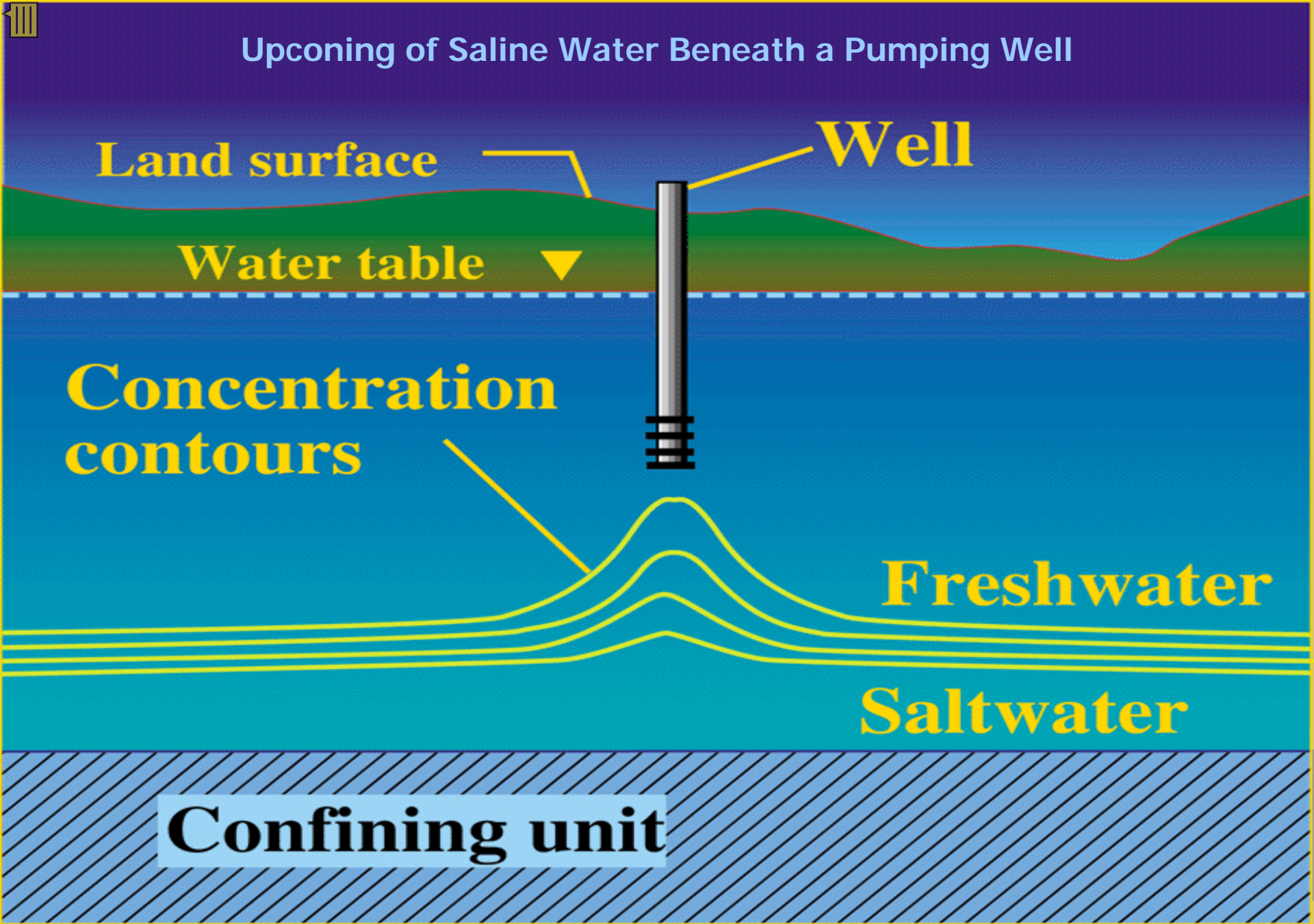
-Photo taken September 1987



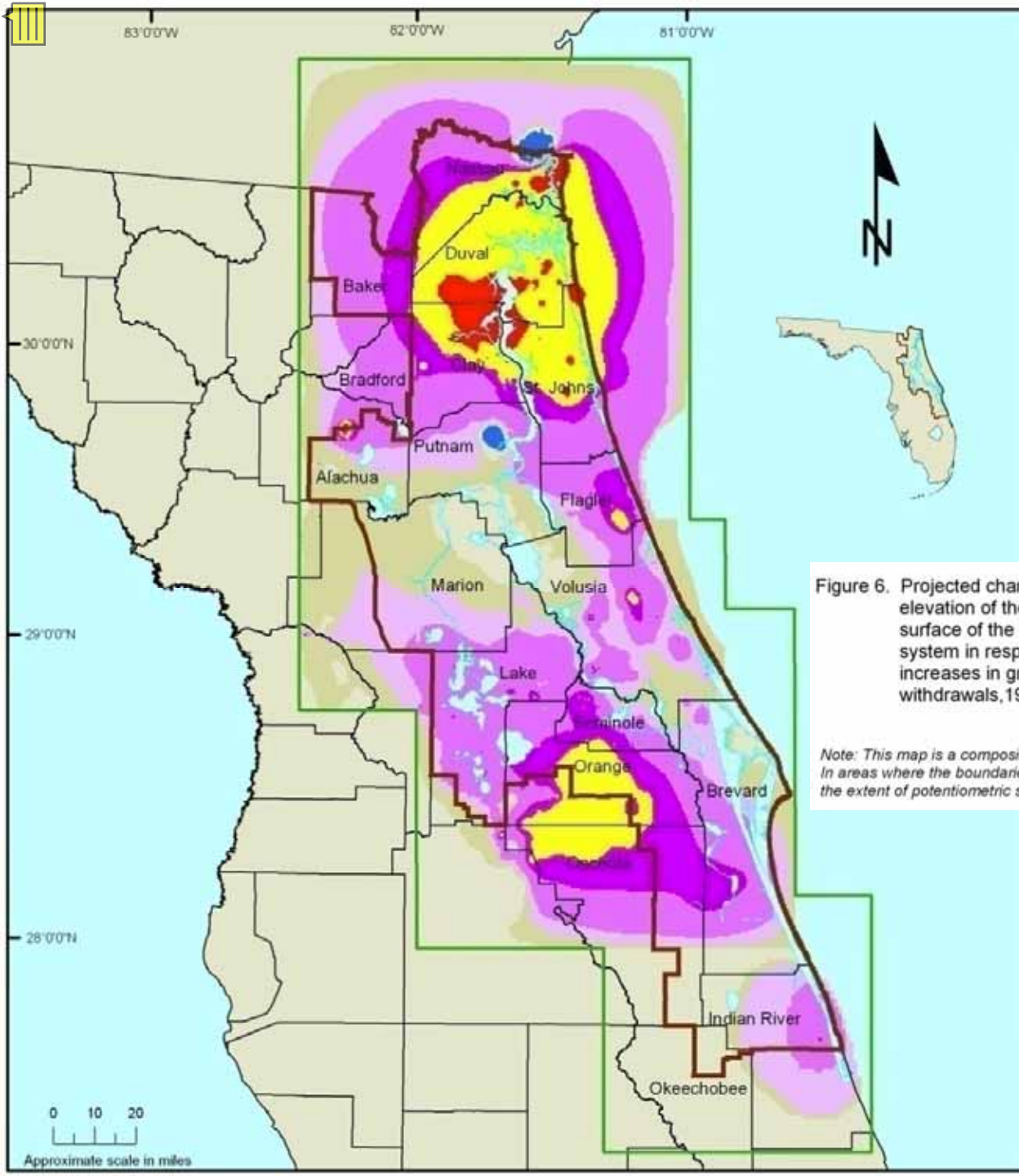
**Lateral Salt Water Intrusion resultant from  
Ground Water Pumping near Saline Water Interface**



# Upconing of Saline Water Beneath a Pumping Well



Saltwater is denser than freshwater



“it should be noted that during drought conditions the natural artesian flow could be marginal” and “the projected drawdowns”.. “may lead to vertical saltwater upconing in the Floridan aquifer.” D. Toth, 2005, SJRWMD

Figure 6. Projected changes in the elevation of the potentiometric surface of the Floridan aquifer system in response to projected increases in groundwater withdrawals, 1995-2030

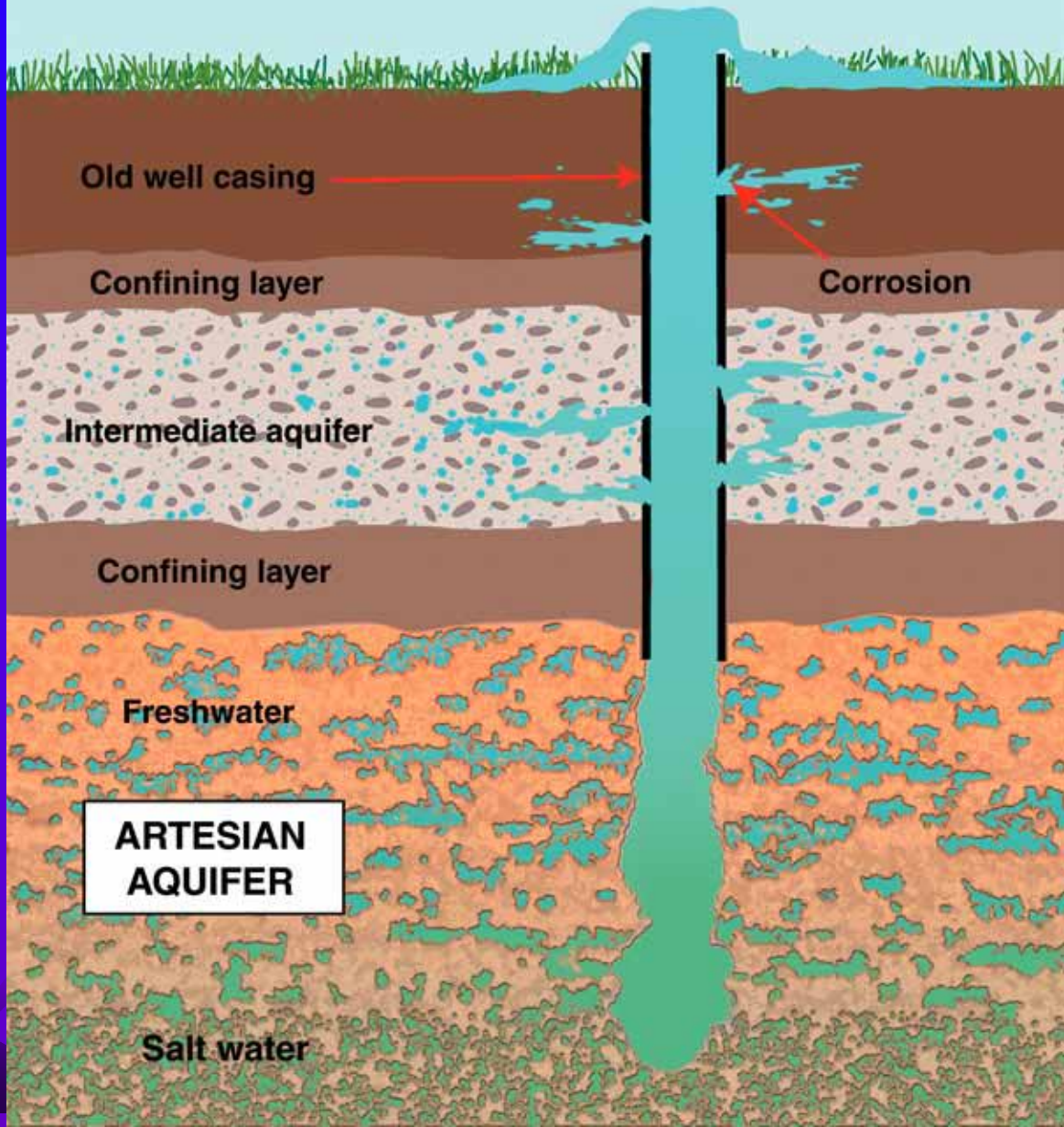


Note: This map is a composite of the results of simulations of five regional groundwater flow models. In areas where the boundaries of these models overlap, professional judgment was applied to determine the extent of potentiometric surface changes.

**Source:**  
**Technical Publication SJ2009**  
**WATER SUPPLY ASSESSMENT 2008**  
**SJRWMD**



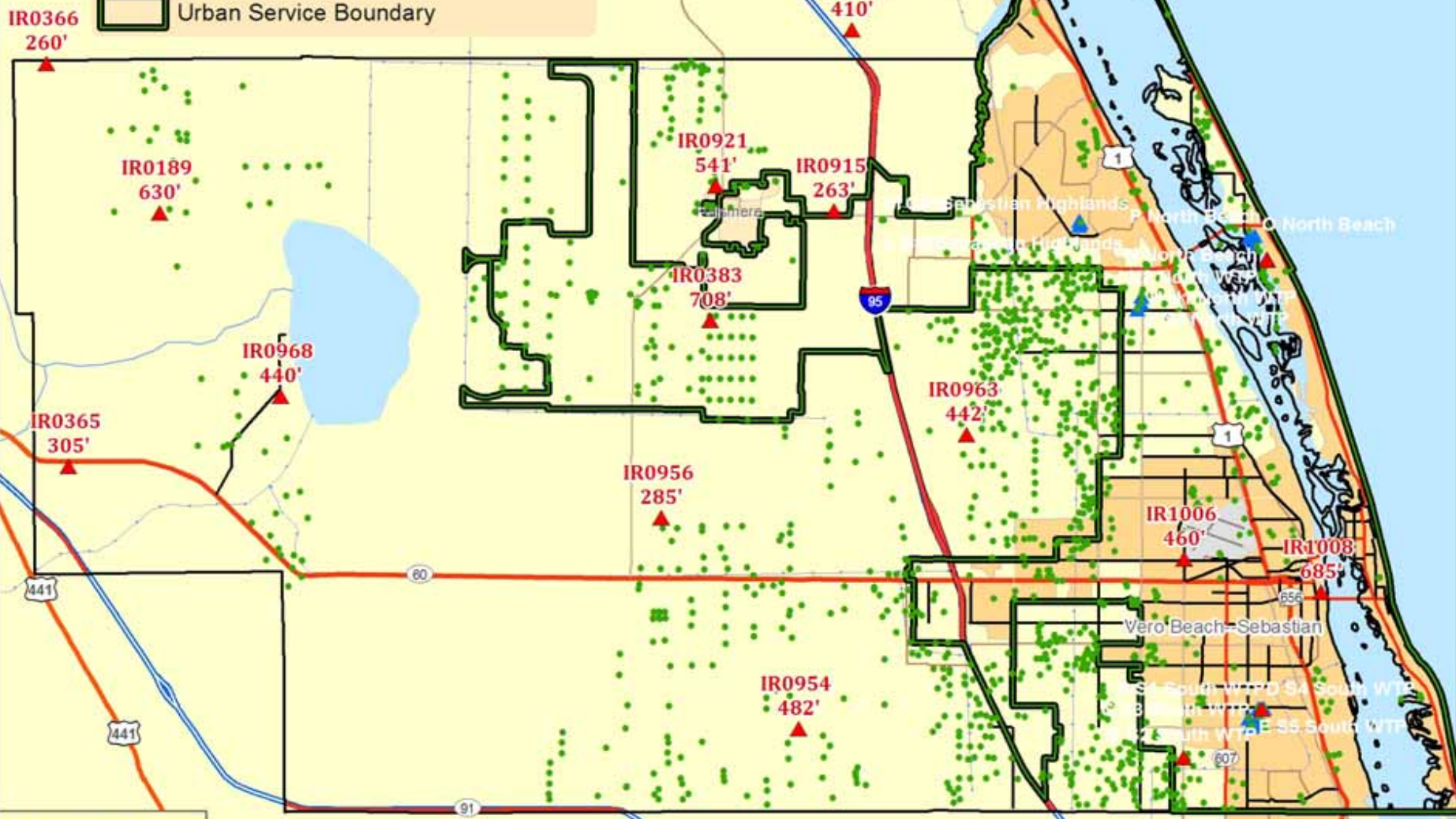
# Free-flowing artesian well



**ARTESIAN  
AQUIFER**

# Floridan Aquifer Well Locations

- ▲ Groundwater Monitoring Wells
- IRC Floridan Aquifer CUP Wells (1315)
- ▲ County Wells
- ▭ Urban Service Boundary



IR County CUP Wells.mxd

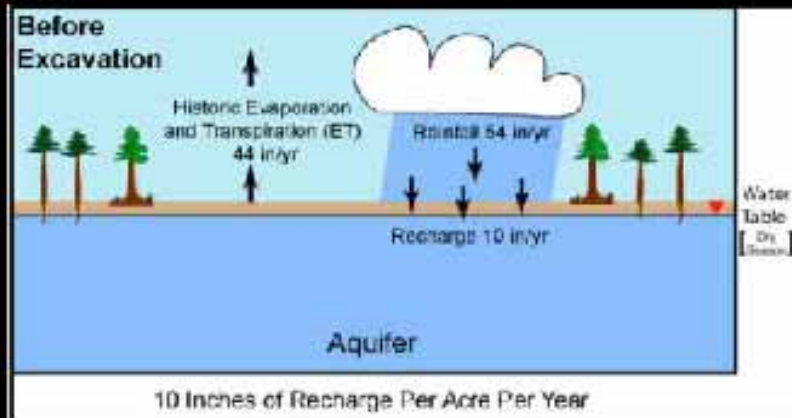
FLARES File Created: 10/28/2008

Port St. Lucie

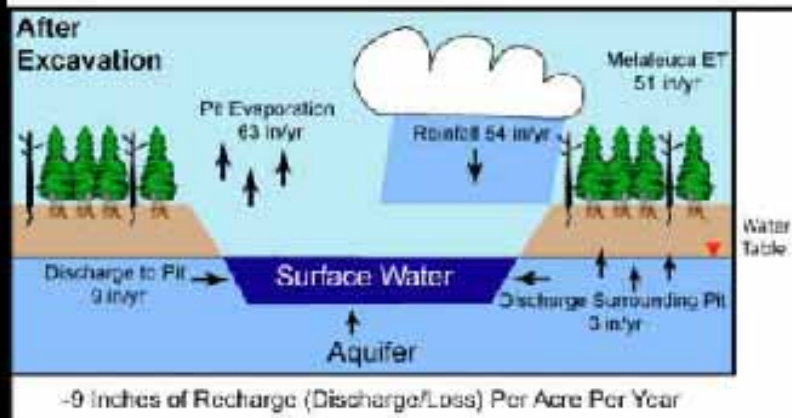
# Sand Mining



# Non-Mechanical Dewatering by Excavations



**Pre-pit RECHARGE = 10"/yr**



**Post-pit DISCHARGE = -9"/yr to pit**

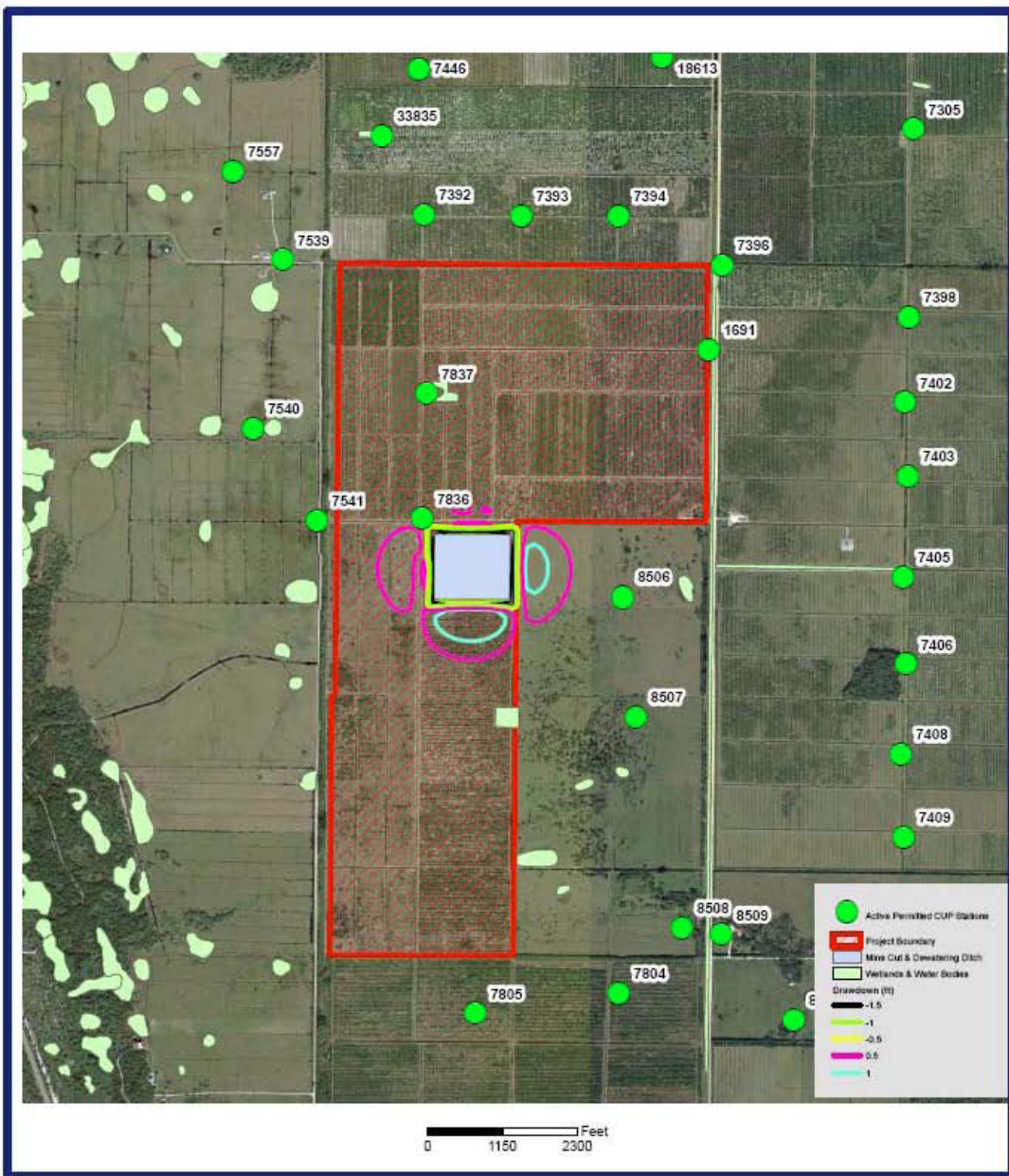
**Post-pit NET LOSS OF WATER = 19"/yr for each acre of pits**  
**308 ac pit = 158,906,880 gallons/yr**



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A 308 acre citrus grove equipped with a good microirrigation system would use approximately 50,000,000 gallons/yr (assuming no freeze)



Mining adjacent to active agricultural operations without irrigation (e.g. pastures) can adversely and possibly irreversibly lower their water table. This is would most likely occur during the dry season and drought when water is most needed.

Notes:  
1- Image Data - 2004 DOQQ (SJRWMD)

2- This map is intended to be used for planning purposes. It is not a survey.

**Figure 12. Simulated Drawdown with Active Mining Using MODFLOW**



# What Can Be Done to Maintain A Viable Agriculture In Our County?

## Water Use & Conservation:

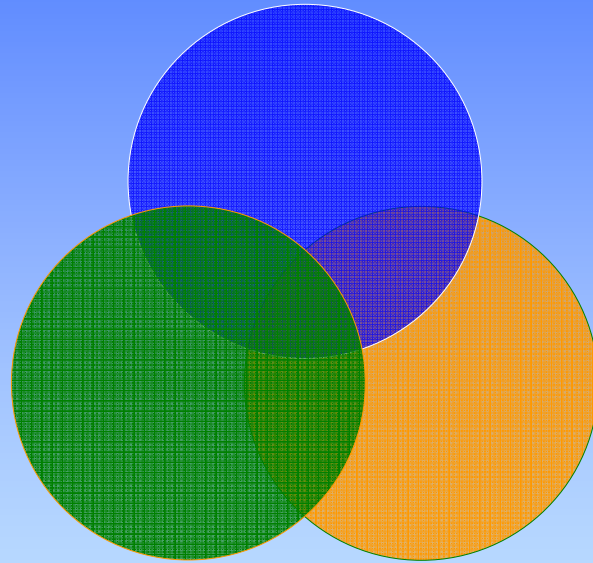
- Avoid permitting sand mines near active agricultural operations
- Develop and expand a waste water reuse system to conserve water
- Fund an Urban Mobile Irrigation Lab to evaluate irrigation systems to conserve water
- Water Farming- reservoir, aquaculture, algae for biofuel, water recharge, etc.
- Pursue alternative water supply for County



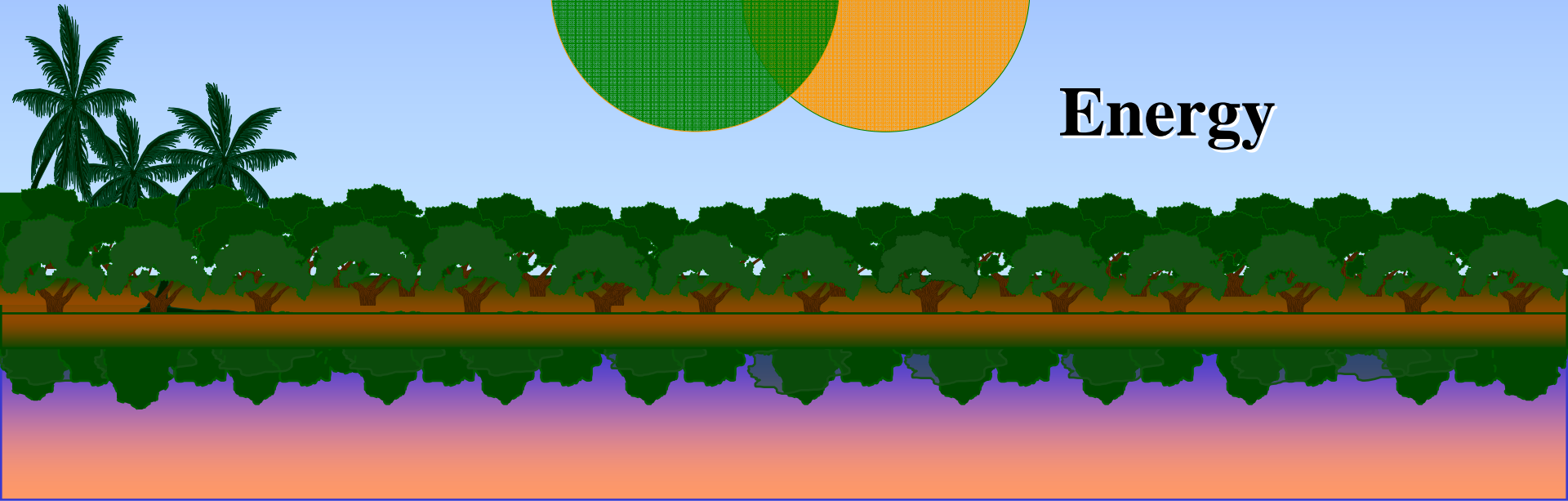
# Water Management



# The Natural Resource Spheres of Agricultural Sustainability



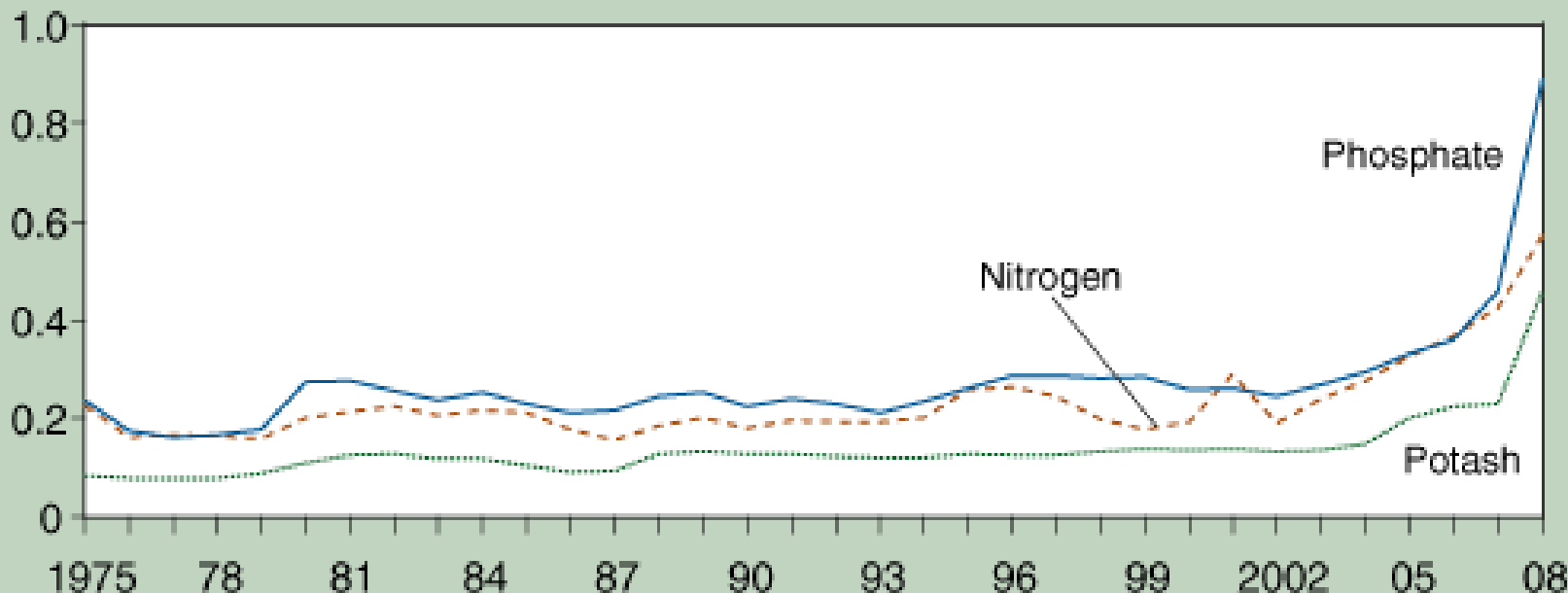
**Energy**



# Increasing Energy and Input Costs

Prices of fertilizer nutrients increased sharply to historical highs in 2008

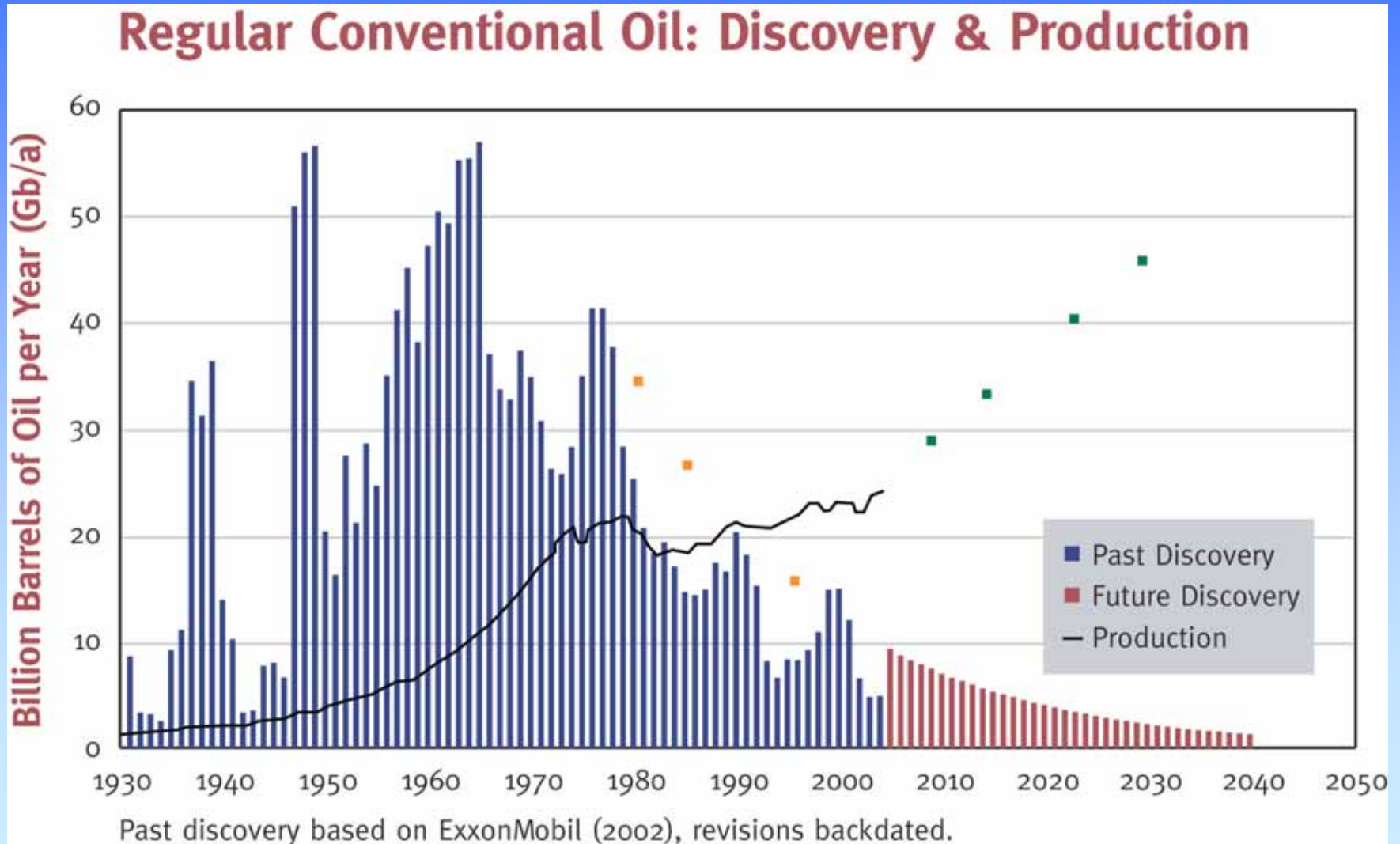
Dollars/pound of nutrient



Price is the average for April of each year. Nitrogen prices are average prices of nitrogen nutrient in anhydrous ammonia, nitrogen solution, and urea. Phosphate prices are the  $P_2O_5$  prices of superphosphate. Potash prices are the  $K_2O$  prices of muriate of potash.

Source: USDA, Economic Research Service.

# Hubbert curve of discovery and production for conventionally sourced crude oil.



# **What Can Be Done to Maintain A Viable Agriculture In Our County?**

## **Energy Conservation**

- Use biologically renewable fertility sources
- Use natural systems, IPM, biocontrol to control pest and pathogens.

# Fertility Management



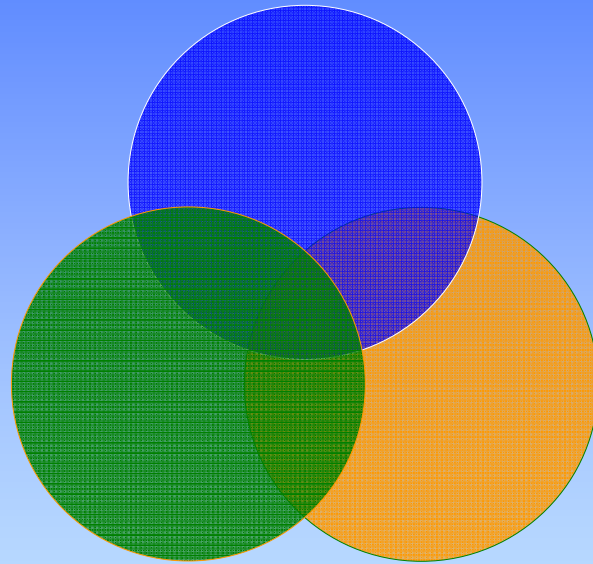
Feed your soil with compost

# Insect & Disease Management

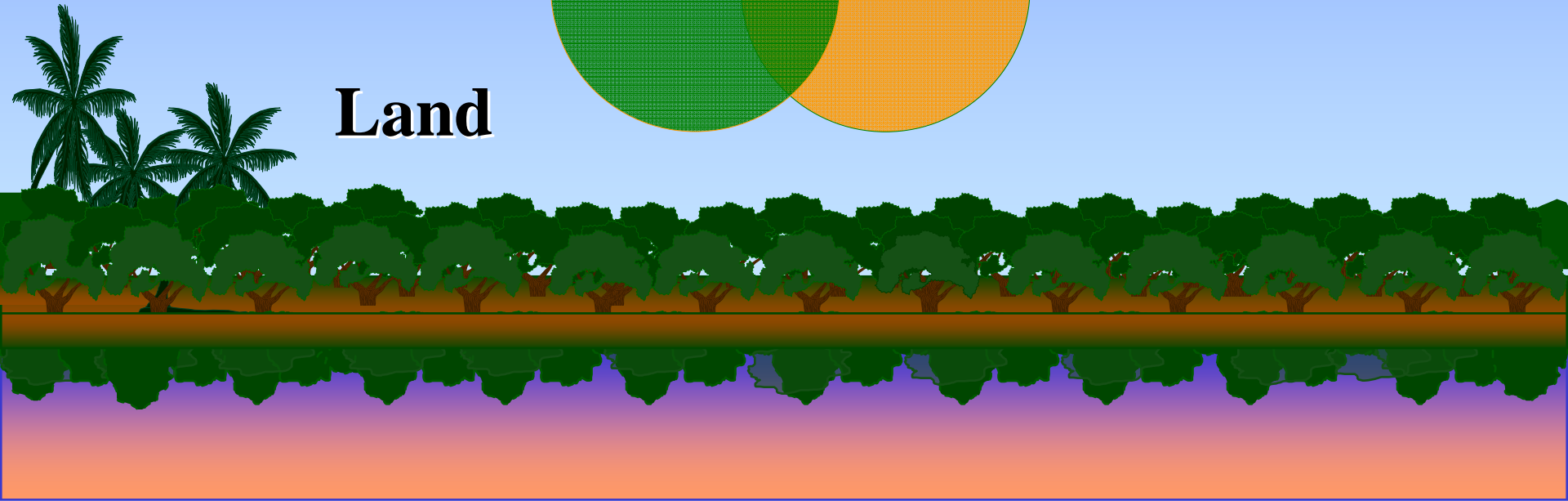


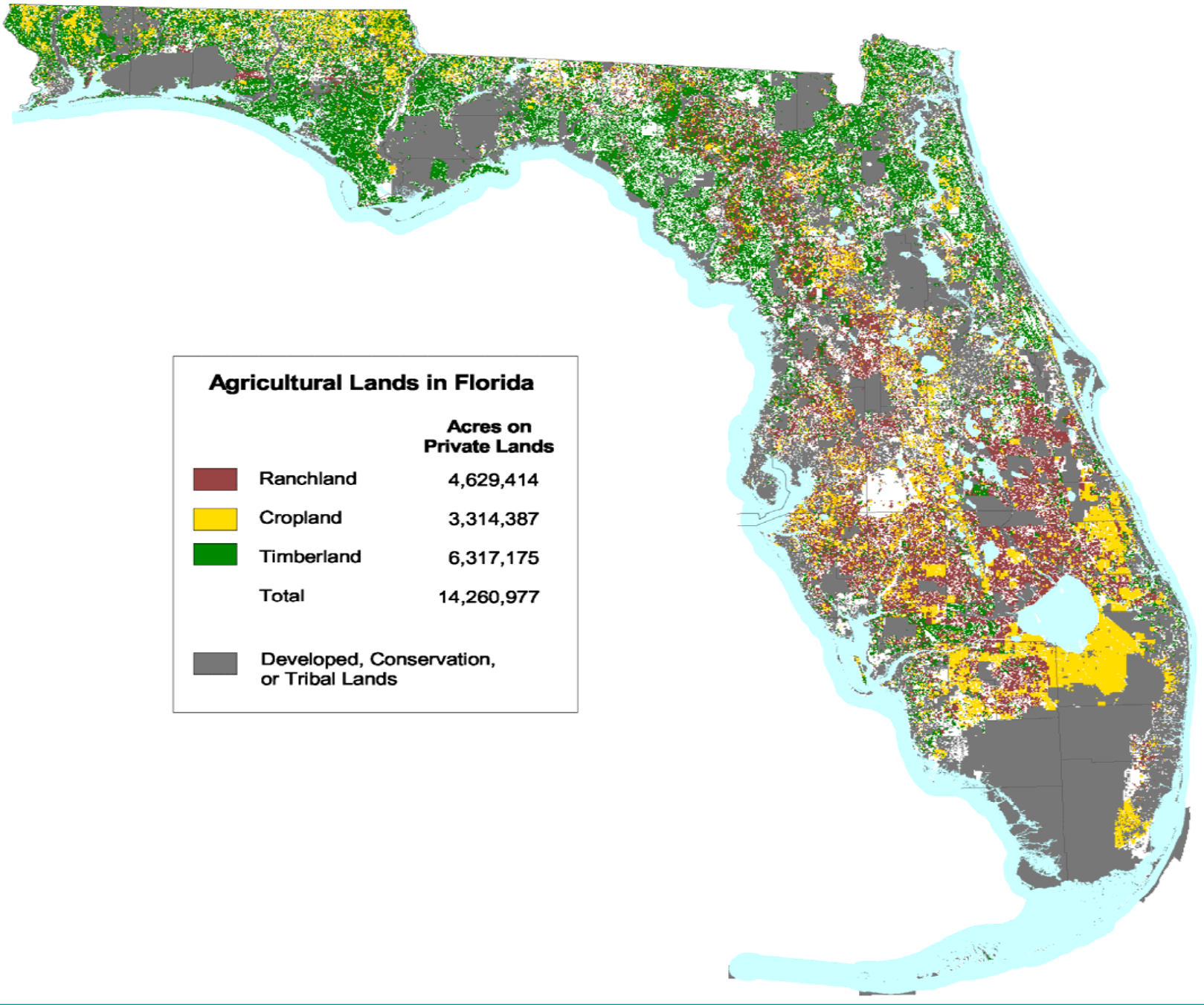


# The Natural Resource Spheres of Agricultural Sustainability



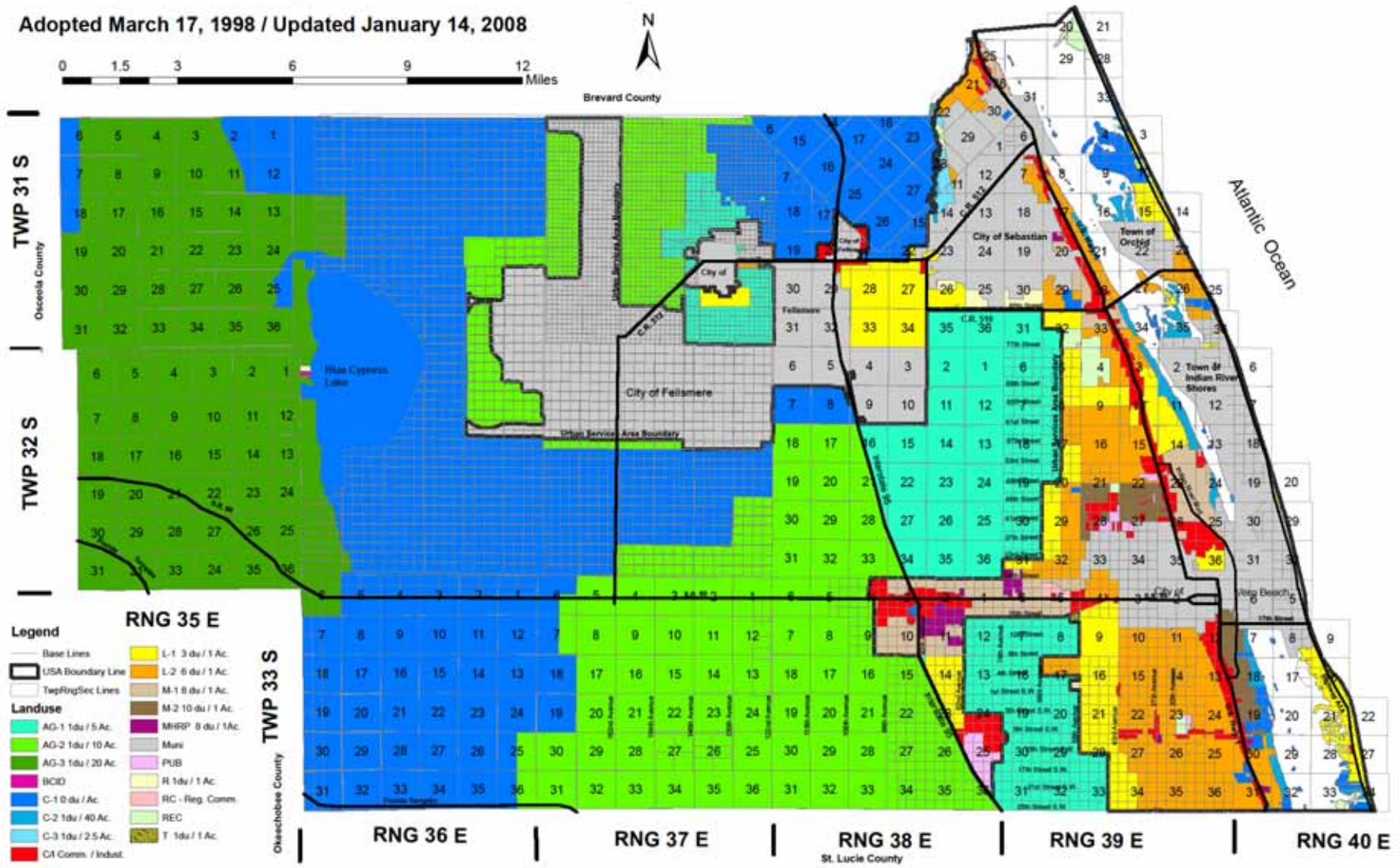
**Land**





# Indian River County Future Land Use Map

Adopted March 17, 1998 / Updated January 14, 2008



**Legend**

- Base Lines
- USA Boundary Line
- Twp/Rng/Sec Lines

**Landuse**

- AG-1 1du / 5 Ac.
- AG-2 1du / 10 Ac.
- AG-3 1du / 20 Ac.
- BCID
- C-1 0 du / Ac.
- C-2 1du / 40 Ac.
- C-3 1du / 2.5 Ac.
- CI Comm. / Indust.
- L-1 3 du / 1 Ac.
- L-2 6 du / 1 Ac.
- M-1 8 du / 1 Ac.
- M-2 10 du / 1 Ac.
- MHRP 8 du / 1Ac.
- PUB
- R 1du / 1 Ac.
- RC - Reg. Comm.
- REC
- T 1du / 1 Ac.

**RNG 35 E**

**TWP 33 S**

**RNG 36 E**

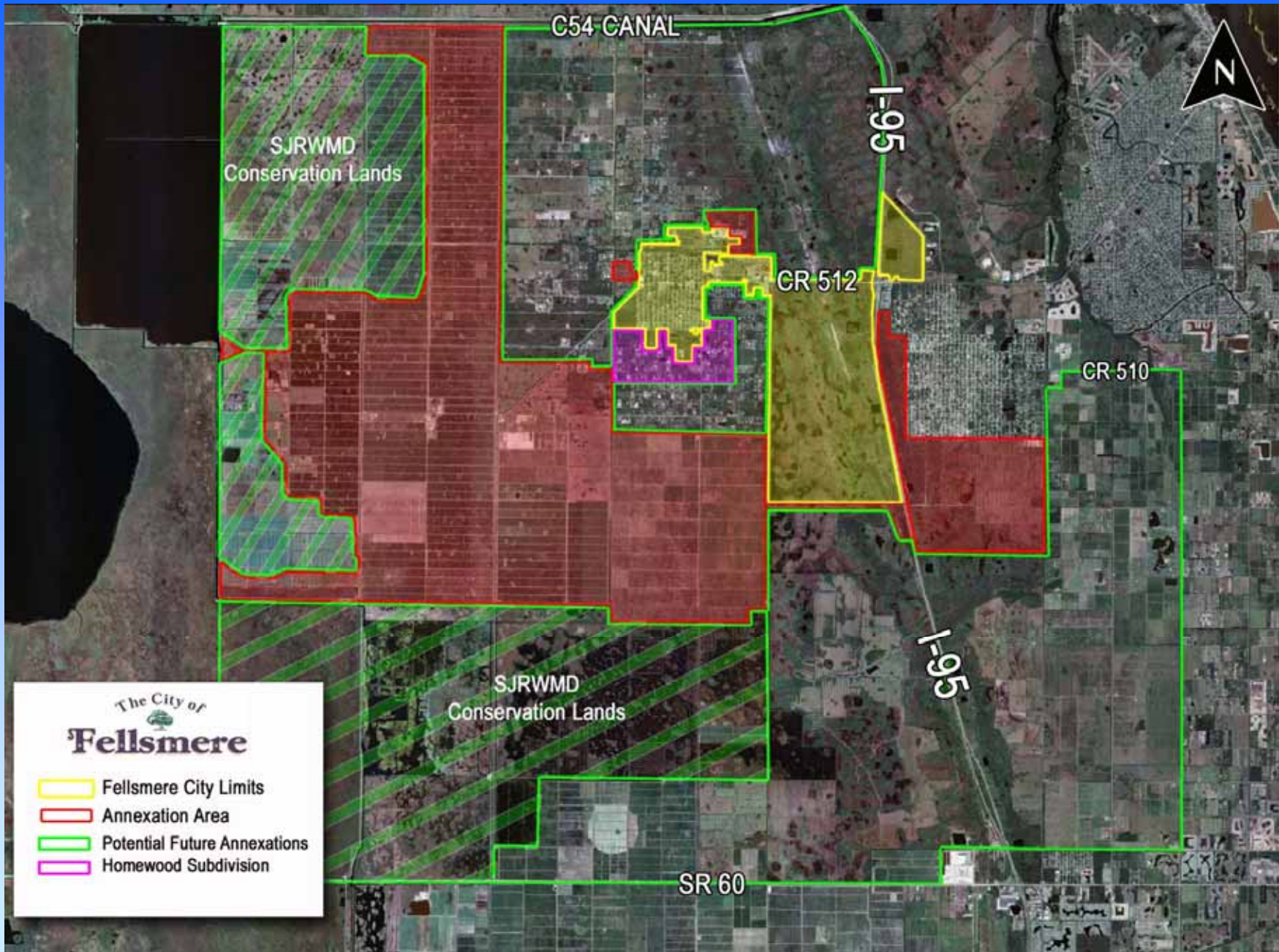
**RNG 37 E**

**RNG 38 E**

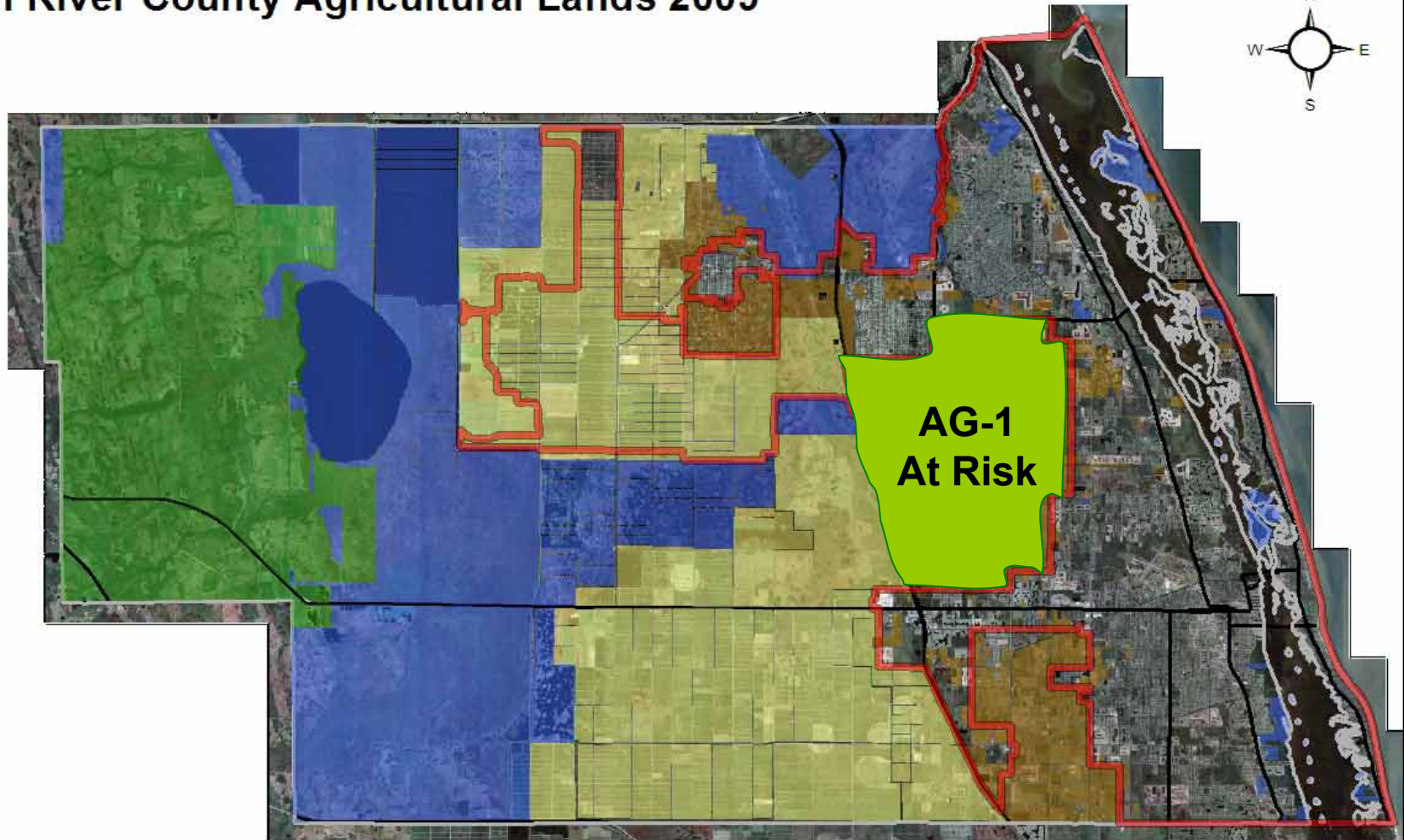
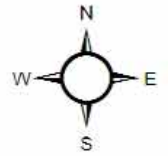
**RNG 39 E**







**RNG 40 E**

St. Lucie County



# Indian River County Agricultural Lands 2009



-  Urban Service Boundary
-  Agriculture Zoned Land 2009
-  Agricultural-1 (1unit/5ac)
-  Agricultural-2 (1unit/10ac)
-  Agricultural-3 (1unit/20ac)
-  Conservation-1

Data current as of 02/17/2009

Data reference: Indian River County Property Appraiser

DATE: 02/17/2009

FILE: Indian River County Ag Lands .mxd



# What Can Be Done to Maintain A Viable Agriculture In Our County?

## Land Use and Planning:

- Create mutually beneficial solutions for stakeholders involved with Community Planning
- Implement Transfer of Development Rights (TDRs)
- Determine best use for undeveloped land based on assessment by GIS (CARL)
- Purchase Conservation Easements of key agricultural lands with demonstrable benefits
- Consider an Ag Reserve for AG-1 land (using TDRs)

**Ag Reserve- A designated area with a plan based on a matrix of theme based hamlets embracing agricultural, equestrian and natural habitat components each with wide open spaces**





# The Natural Resource Spheres of Agricultural Sustainability

**Water**



**Land**

**Energy**



# Explore the Use of Alternative Crops





# What Can Be Done to Maintain A Viable Agriculture In Our County?

## **Agricultural Activities:**

- Look for alternative crop(s) for Citrus
- Develop new means of control for diseases
- Encourage and expand farmers markets
- Farm to Table Programs (connects schools, restaurants, institutions, etc.)
- Develop Community Food Systems
  - Community Supported Agriculture (CSA)
  - Buy local, buy direct, u-pick, organic



***But the fields of common land belonging to their cities may not be sold; for that is their perpetual possession.*** Leviticus c25, v34 Revised Standard Version