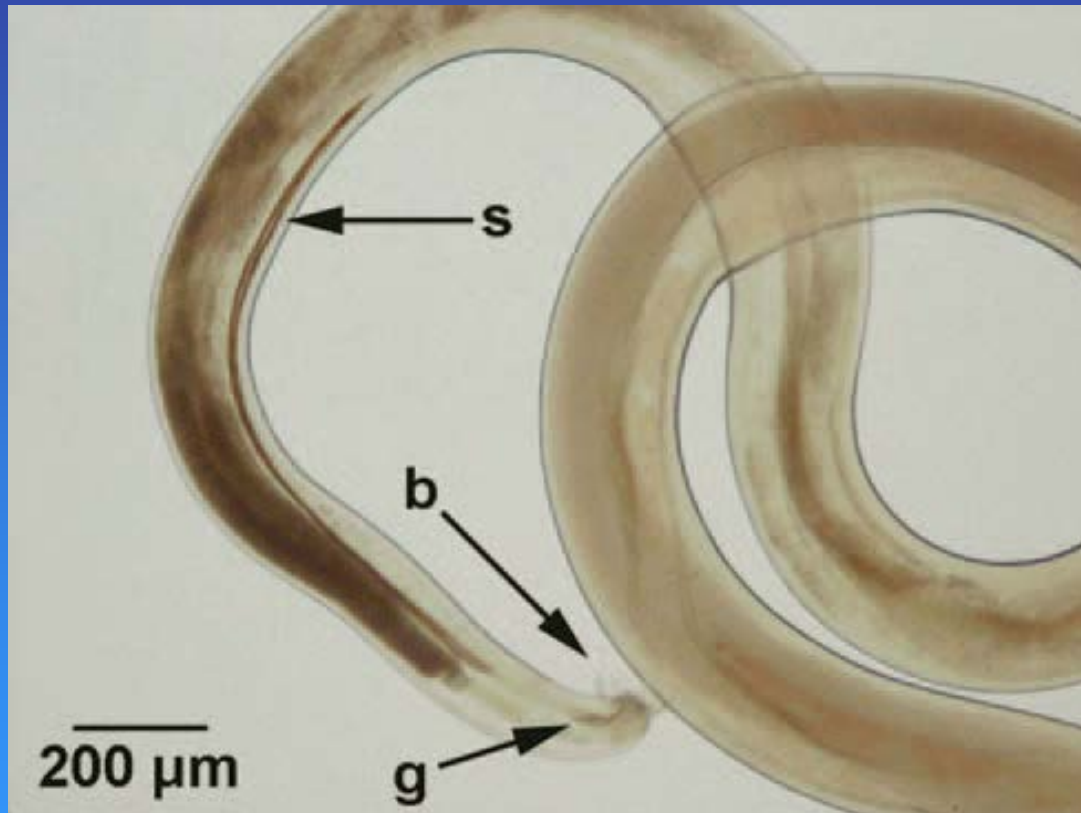# Human Health Risks Associated with Channeled Apple Snails in the GSARP Region

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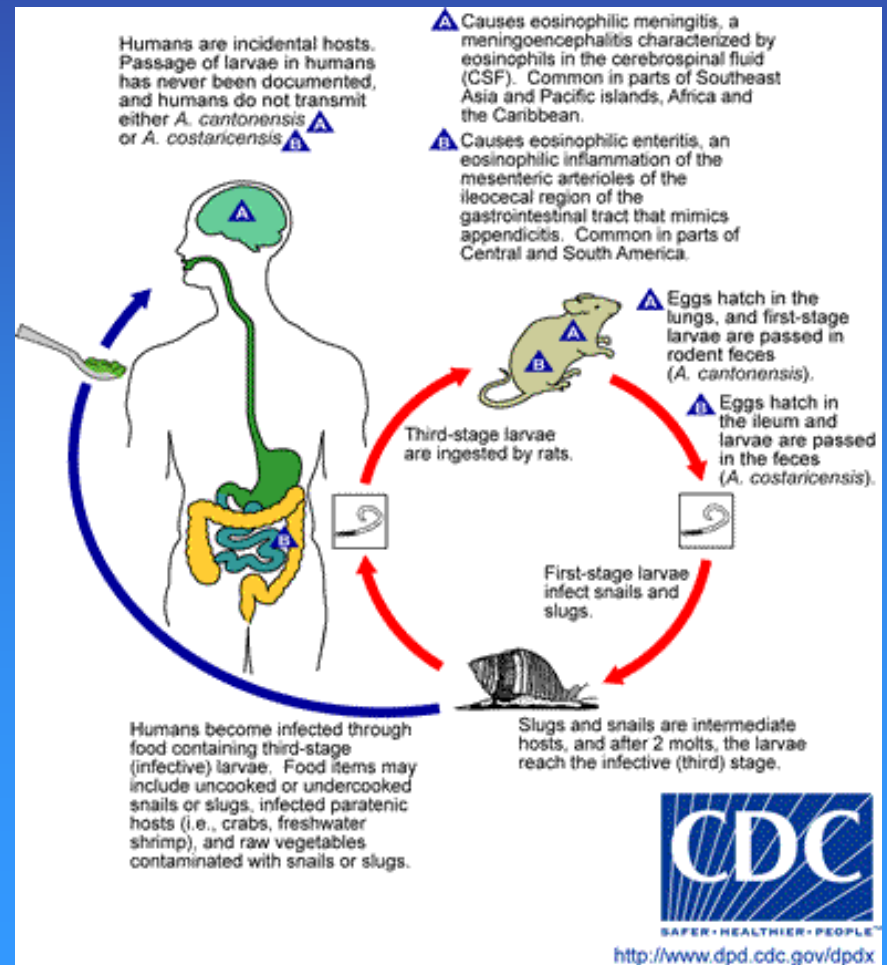
Angiostrongylus cantonesis

(Duffy et al, 2004)

The Life Cycle of *A. cantonesis* Requires Infection of a Rat Host in Addition to a Snail Host

Paratenic hosts- an animal acting as a substitute intermediate host of a parasite, usually having acquired the parasite by ingestion of the original host; no development of the parasite takes place but the phenomenon aids in the transmission of infection. Called also transfer or transport host.

Humans	**Birds**
Monkeys	**Shrimp**
Horses	**Land Crabs**
Pigs	
Frogs	
Snakes	

Humans are incidental hosts. Passage of larvae in humans has never been documented, and humans do not transmit either *A. cantonensis* or *A. costaricensis* **A**

A Causes eosinophilic meningitis, a meningoencephalitis characterized by eosinophils in the cerebrospinal fluid (CSF). Common in parts of Southeast Asia and Pacific islands, Africa and the Caribbean.

B Causes eosinophilic enteritis, an eosinophilic inflammation of the mesenteric arterioles of the ileocecal region of the gastrointestinal tract that mimics appendicitis. Common in parts of Central and South America.

A Eggs hatch in the lungs, and first-stage larvae are passed in rodent feces (*A. cantonensis*).

B Eggs hatch in the ileum and larvae are passed in the feces (*A. costaricensis*).

Third-stage larvae are ingested by rats.

First-stage larvae infect snails and slugs.

Humans become infected through food containing third-stage (infective) larvae. Food items may include uncooked or undercooked snails or slugs, infected paratenic hosts (i.e., crabs, freshwater shrimp), and raw vegetables contaminated with snails or slugs.

Slugs and snails are intermediate hosts, and after 2 molts, the larvae reach the infective (third) stage.
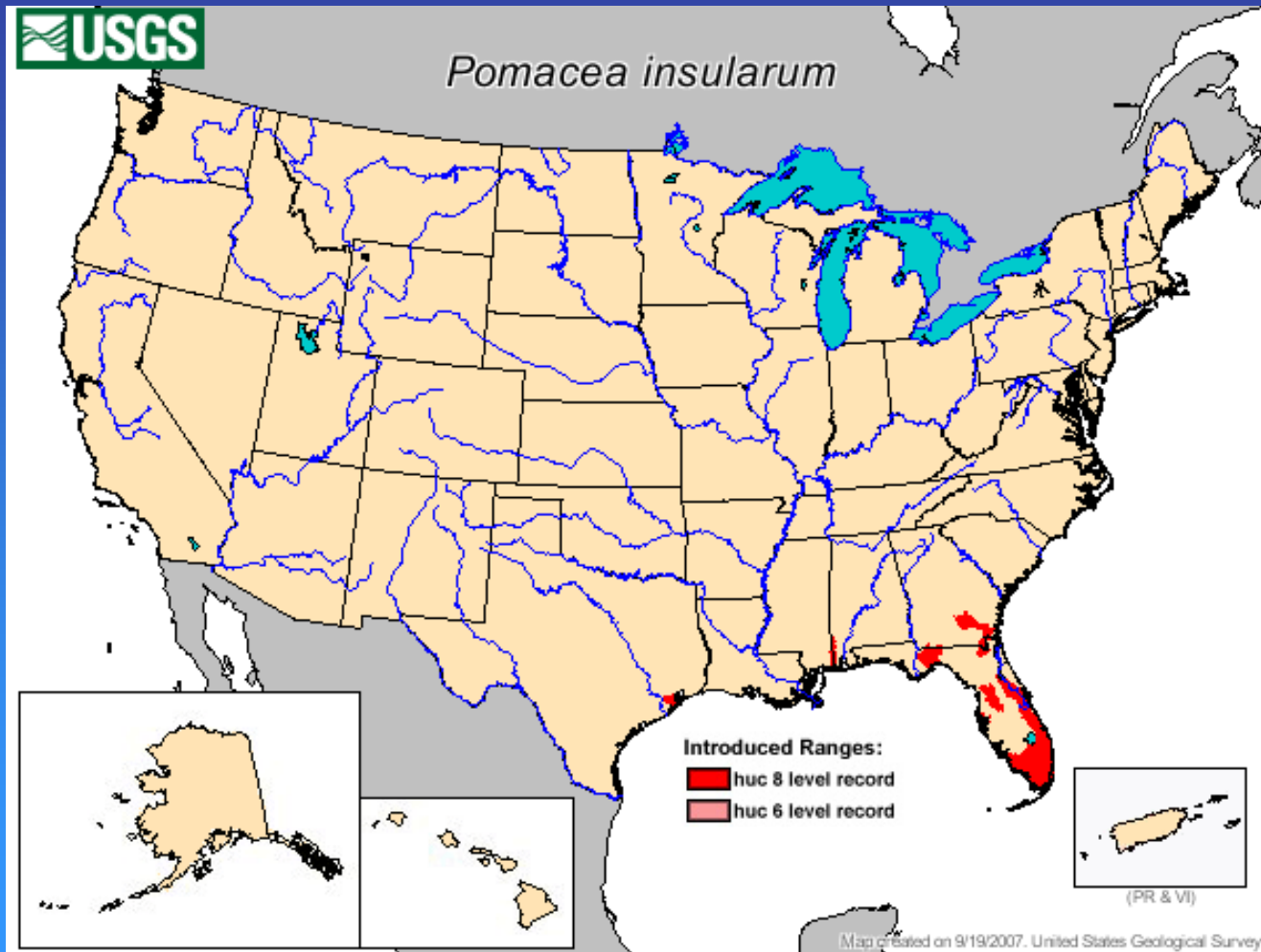
CDC
SAFER • HEALTHIER • PEOPLE™
http://www.dpd.cdc.gov/dpdx

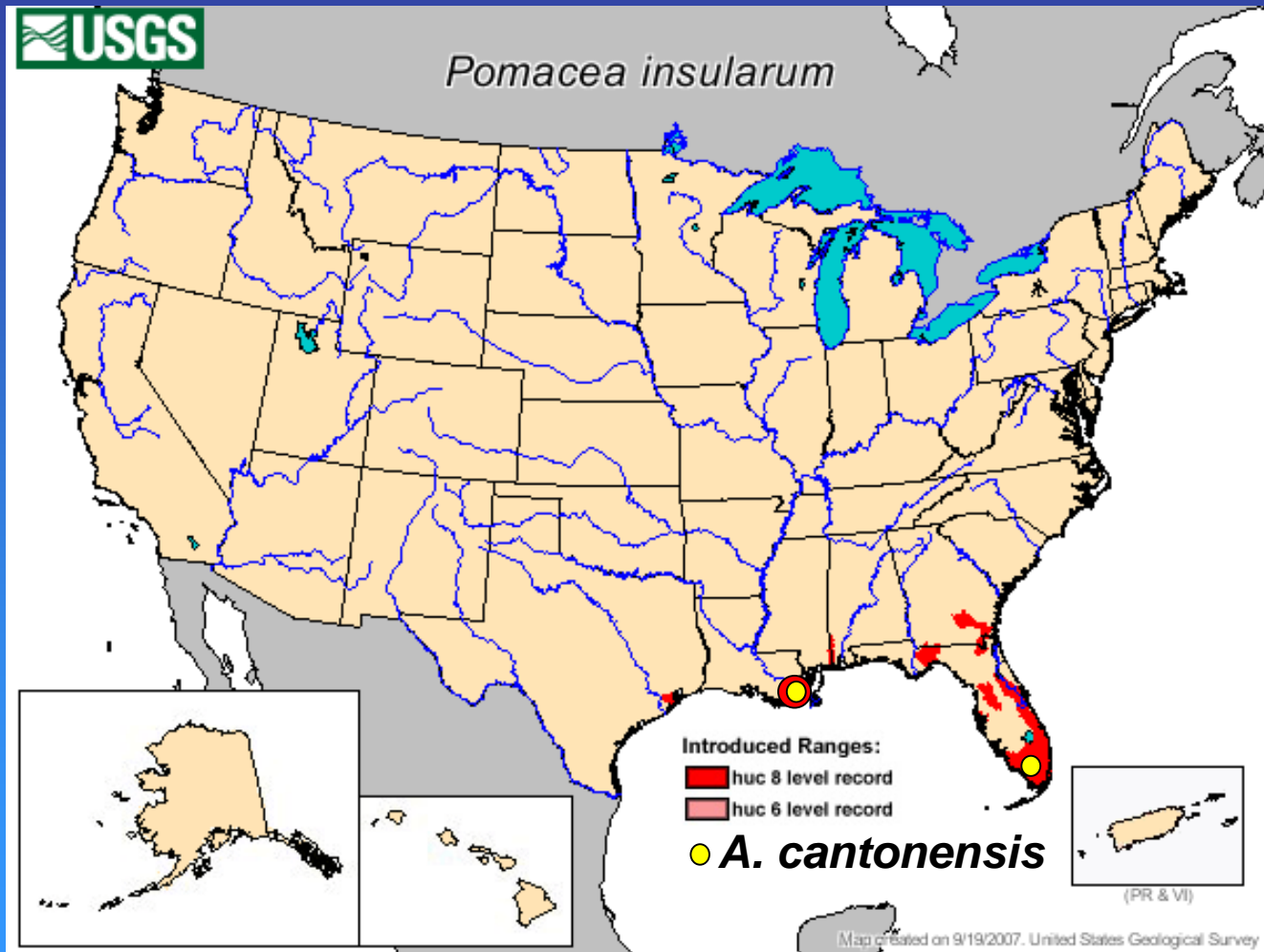# The Predominate Channeled Apple Snail in the GSARP Region is *Pomacea insularum*

# Pomacea insularum

Pomacea insularum

Assessing the Health Risks Associated with Channeled Apple Snails in the GSARP Region

Collect apple snails from New Orleans and Miami, send samples to the CDC in Atlanta to assay for the presence of the rat lung worm using DNA-based detection assays (PCR)

Develop an in-house capacity to detect the rat lung worm using PCR. Test channeled apple snails from a third location (to be determined).

Develop a mathematical model to predict the spread of channeled apple snails.

PCR Detection of Rat Lung Worm
In Infected Snails
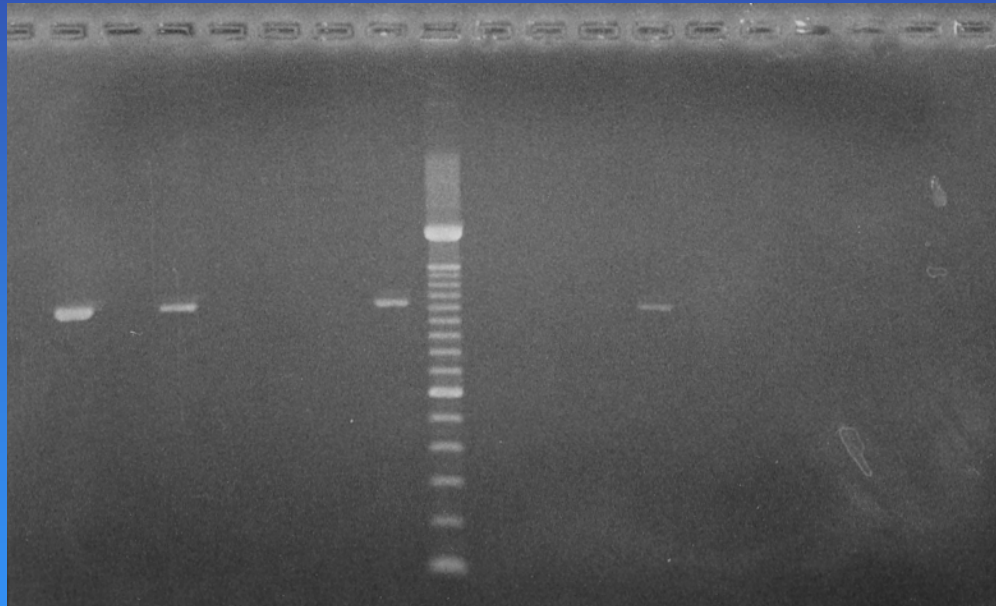
Miami: 60 analyzed, all negative
New Orleans: 60 analyzed, 5
positives

DNA-based detection of rat lung worm in channeled apple snails in the GSARP region

Location	Samples assayed	Species	Positive for A. cantonensis
New Orleans, LA	60/60	Pomacea insularum	5
Miami, FL (Miami Metro Zoo)	60/60	Marisa cornuarietus	0
Picayune, MS	60/60	Pomacea insularum	0
Houston, TX	30/60	Pomacea insularum	0
Everglades National Park, FL	0/60	Pomacea insularum	Pending

Mathematical Model Objectives

Create partial differential equations that model the diffusion of a species over time through a spatial domain.

Create a grid of polygons representing the spatial domain, in which each polygon represents a geographic area with specific properties related to the diffusion of the species.

Model the diffusion of the species through the grid, calibrating the diffusion rate with experimental data.

Generate new grids using existing GIS data maps.

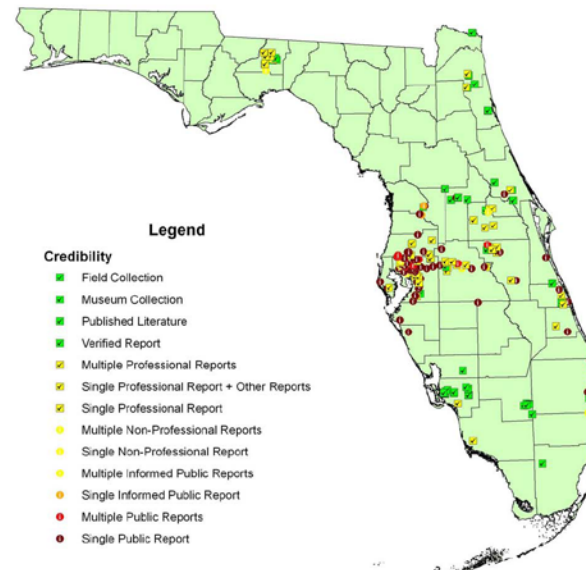Model the effects of biocontrol efforts on spread.

Invasion Modeled Within a Spatial Domain

Create partial differential equations (PDEs) that model the diffusion of a species over time through a spatial domain.
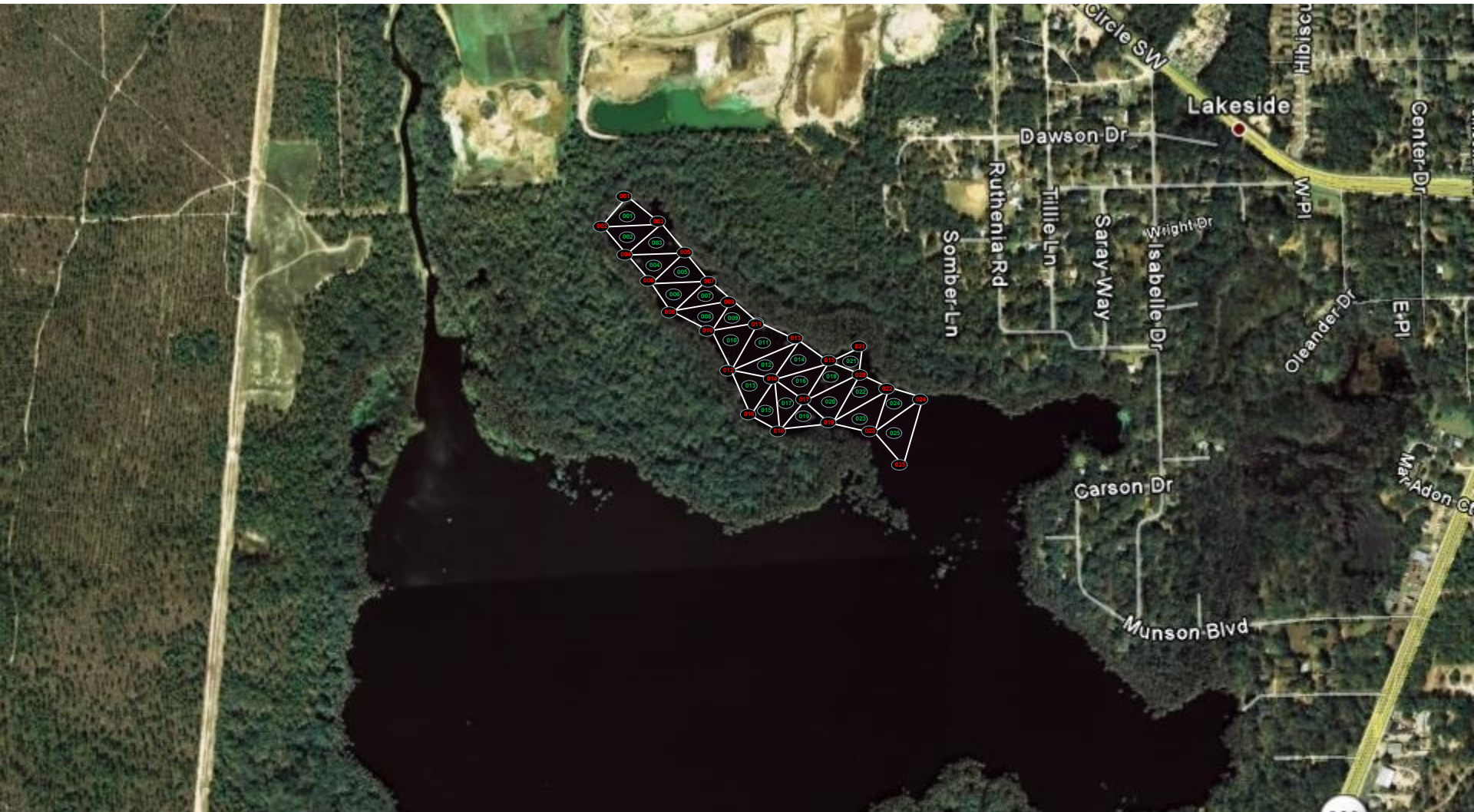
Ideally, the spatial domain will be represented in the format of geographic map which will show the spread of the species from points of introduction over time.

Florida Fish and Wildlife Conservation Commission
Exotic Applesnail Locations
15 November 2006

Legend

Credibility

- Field Collection
- Museum Collection
- Published Literature
- Verified Report
- Multiple Professional Reports
- Single Professional Report + Other Reports
- Single Professional Report
- Multiple Non-Professional Reports
- Single Non-Professional Report
- Multiple Informed Public Reports
- Single Informed Public Report
- Multiple Public Reports
- Single Public Report

Modeling the Channeled Apple Snail Invasion at Lake Munson (Tallahassee, FL)

Conclusions

Five snails from New Orleans were found to be positive for rat lung worm.

No samples were positive the for parasite in snails taken from Miami, FL or Picayune, MS. However, both sites had previously had cases of infected paratenic hosts (a gibbon and a horse, respectively).

Samples from Texas and Everglades National Park still pending.

Results thus far suggest that rat lung worm infections of channeled apple snails are not widespread throughout the GSARP region.