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

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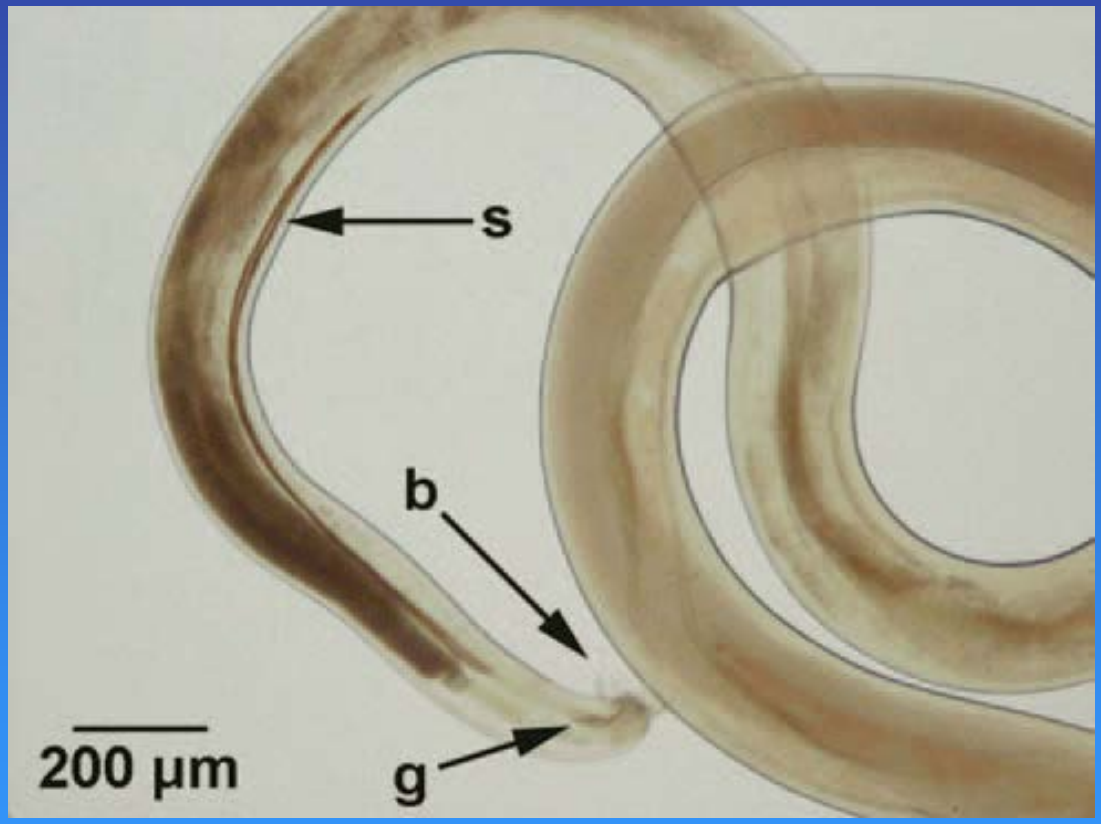
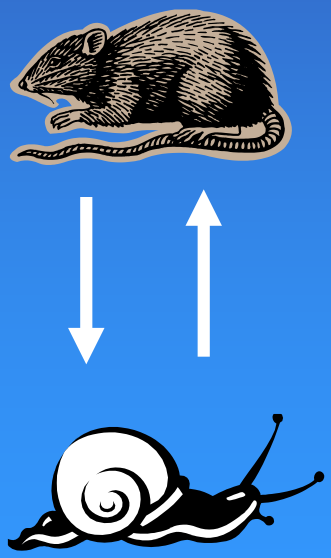
The Predominate Channeled Apple Snail in the GSARP Region is *Pomacea insularum*

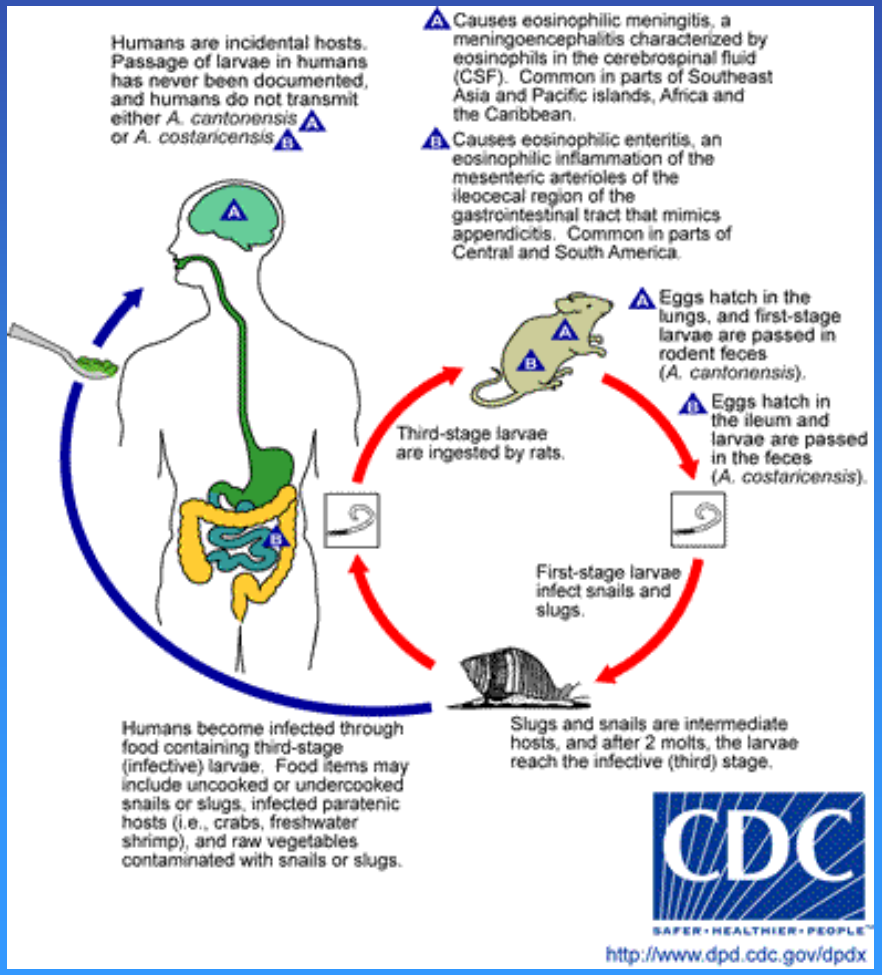
Angiostrongylus cantonesis



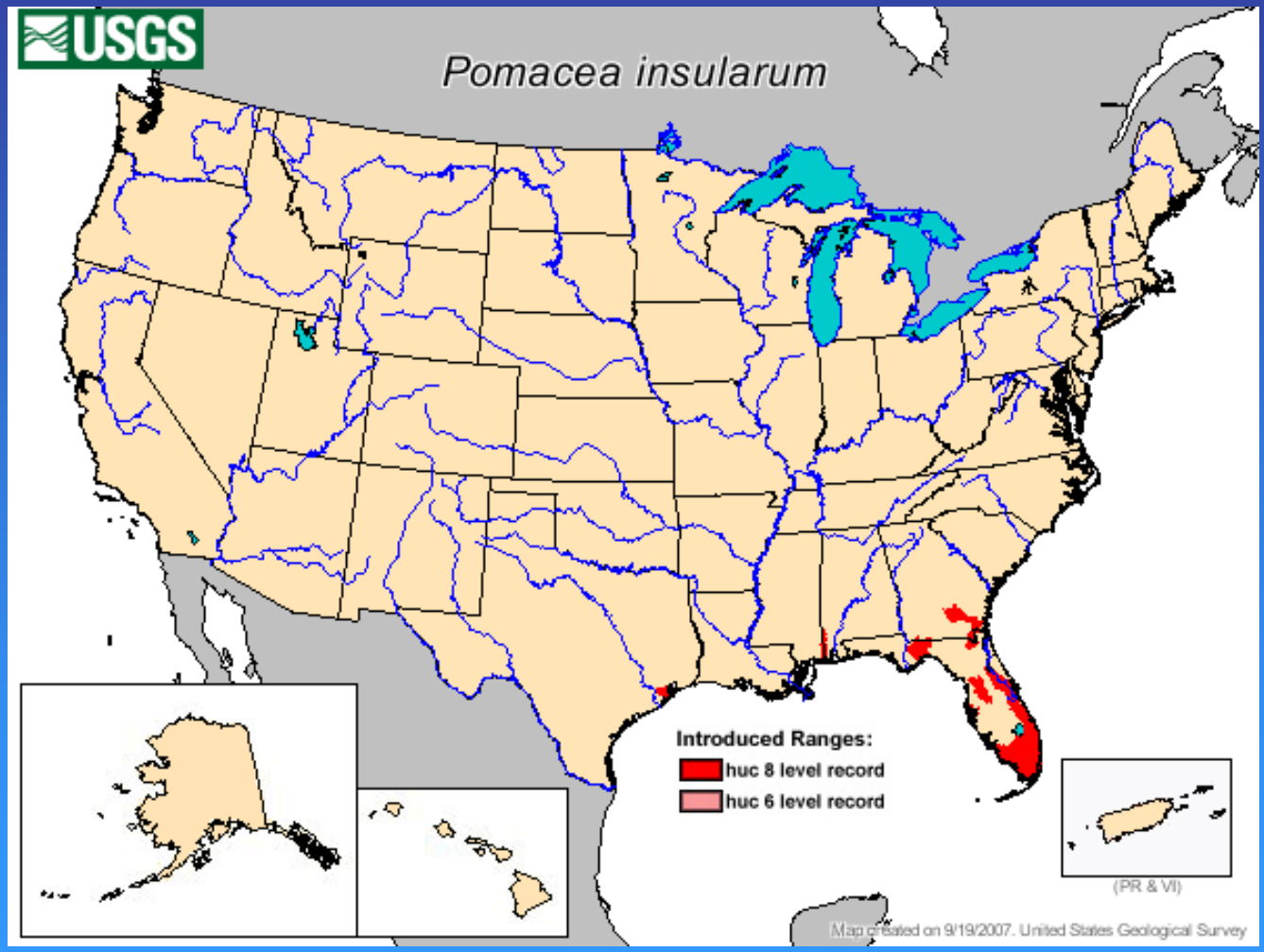
(Duffy et al, 2004)

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

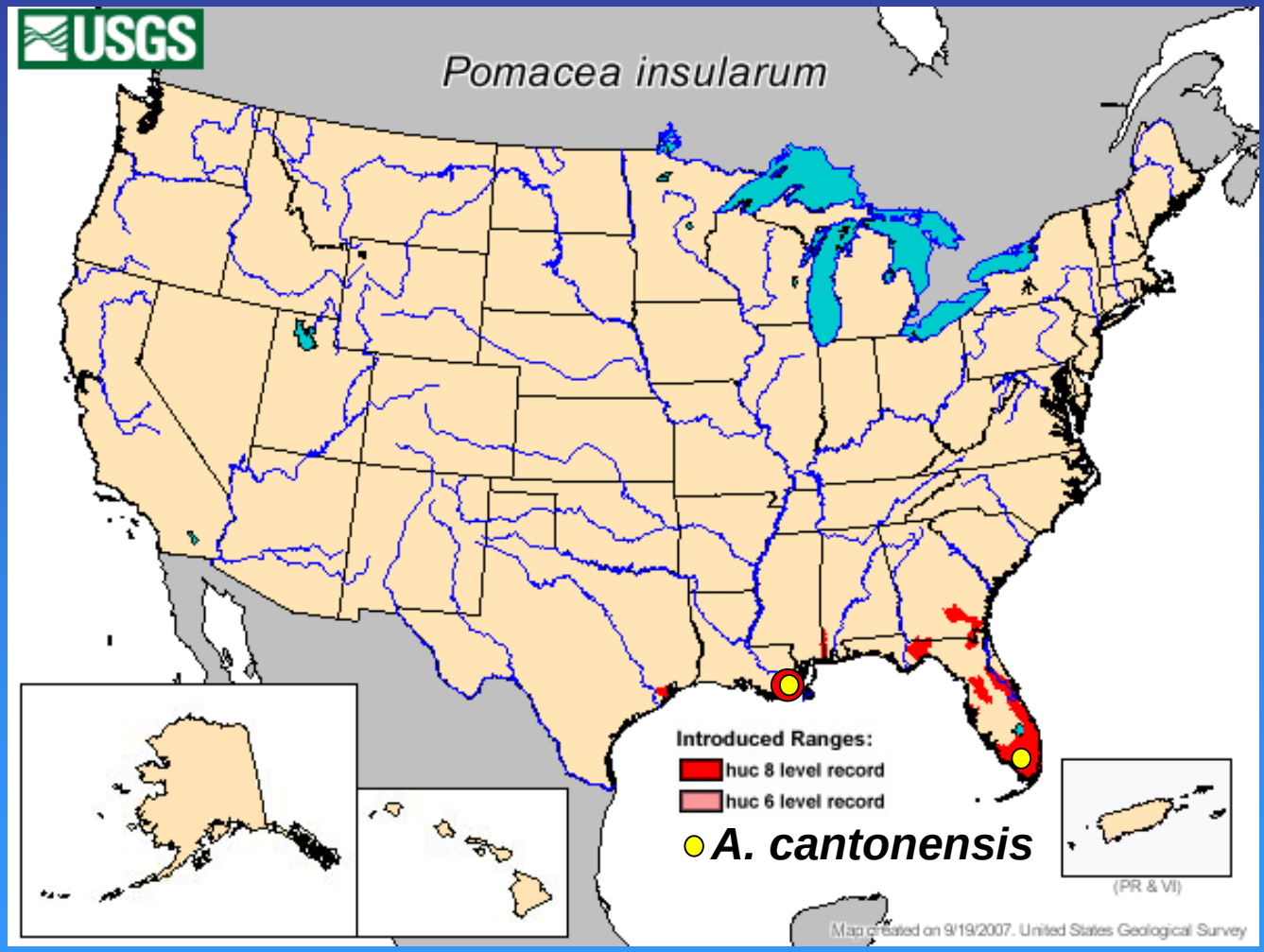




Pomacea insularum



Pomacea insularum



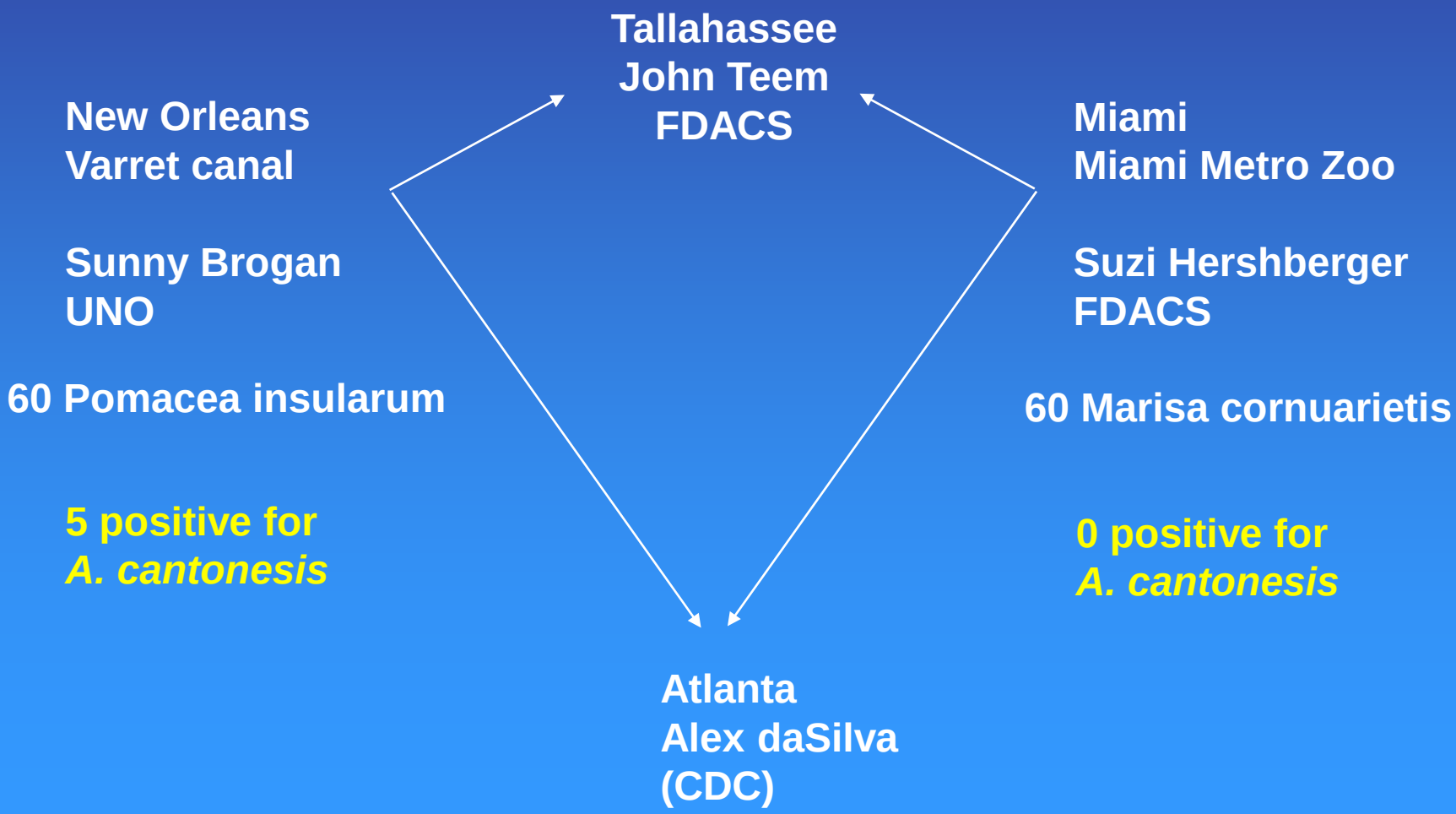
Assessing the Health Risks Associated with Channeled Apple Snails in the GSARP Region

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)

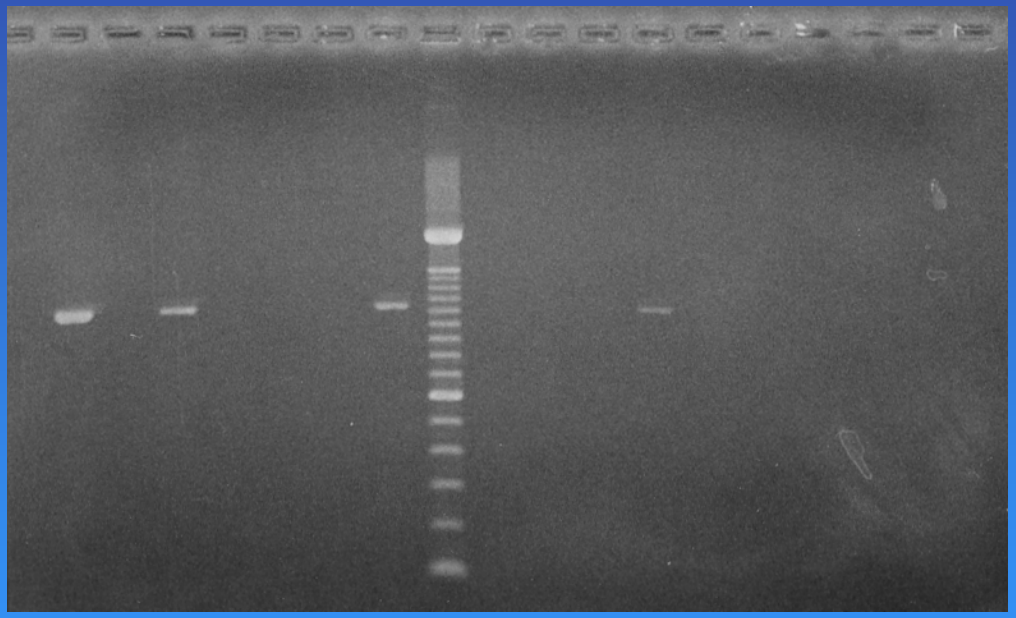
Develop an in-house capacity to detect the rat lung worm using PCR. Test channeled apple snails from a third location (to be determined).

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

Duplicate Samples from New Orleans and Miami Sent for DNA Analysis by PCR



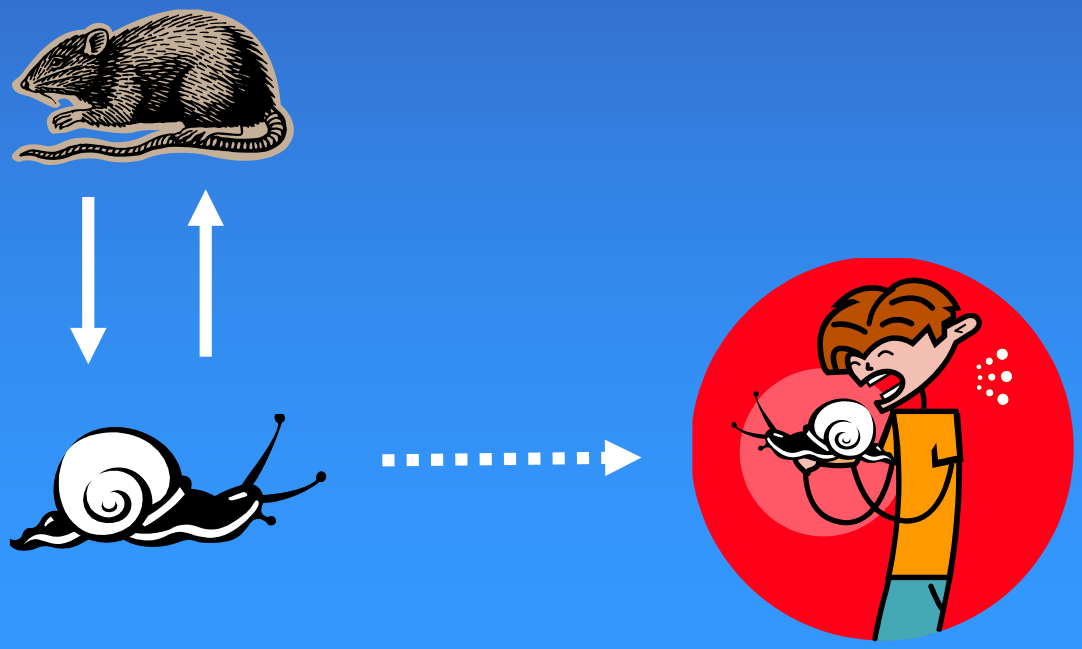
PCR Detection of Rat Lung Worm In Infected Snails



Miami: 60 analyzed, all negative
New Orleans: 60 analyzed, 5 positives

Human Consumption of Apple Snails Occurs in New Orleans

(Education Work Group?)



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.

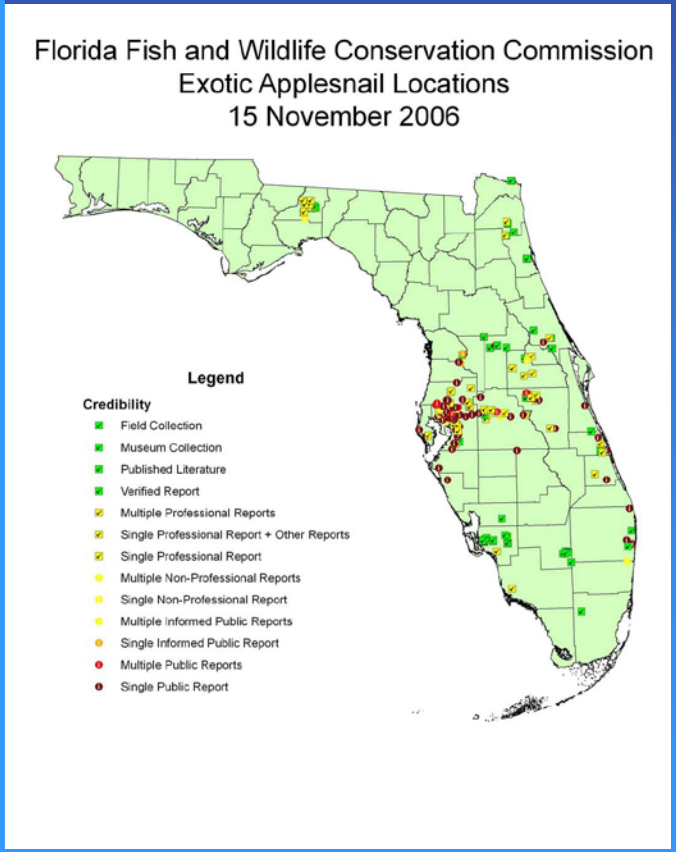
Generate new grids using existing GIS data maps.

Model the effects of biocontrol efforts on spread.

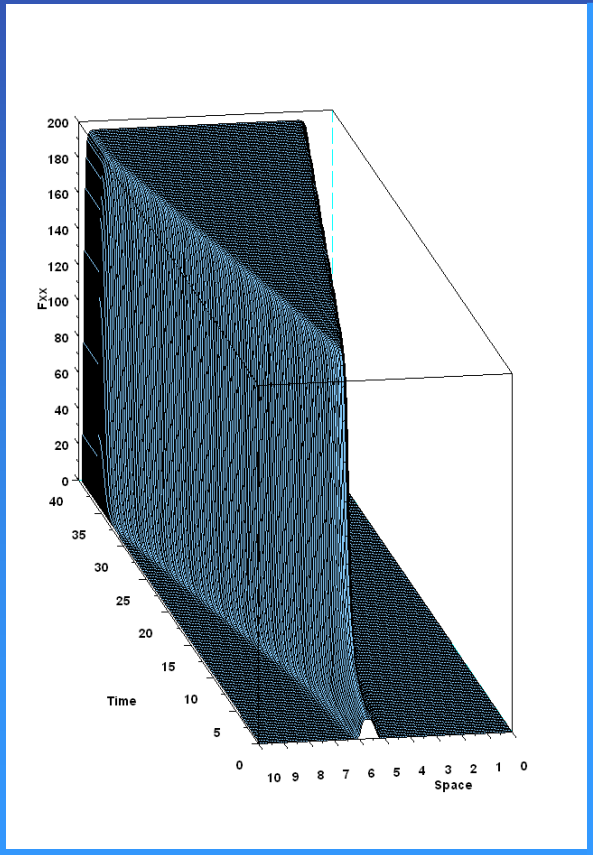
Invasion Modeled Within a Spatial Domain

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.



Invasion Modeled Within a Linear Spatial Domain



Currently, the spatial domain is represented by a line (analagous to a riverine system).

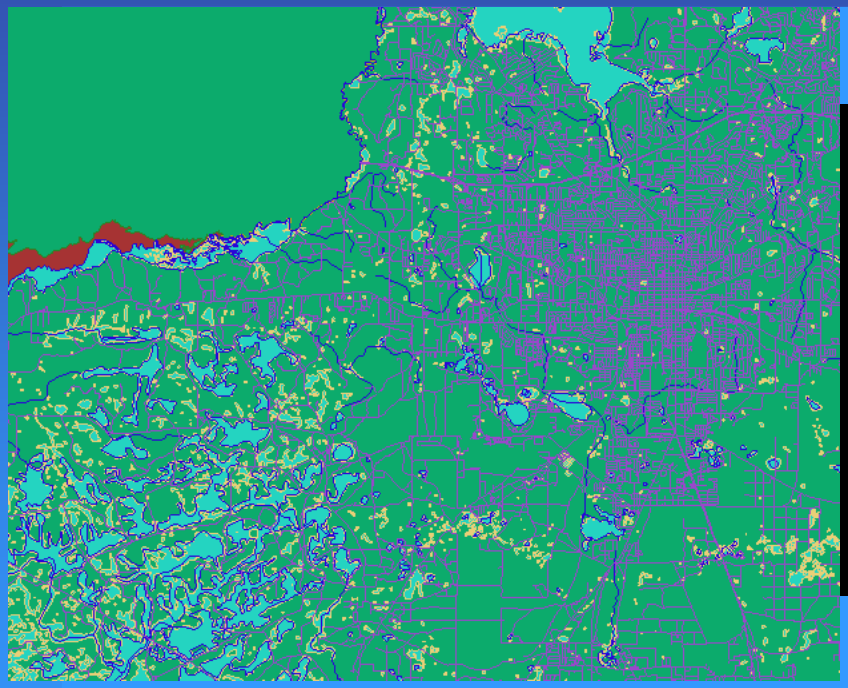
Invasion over time is represented by a 3-D graph showing the increase in the population over time and through space.

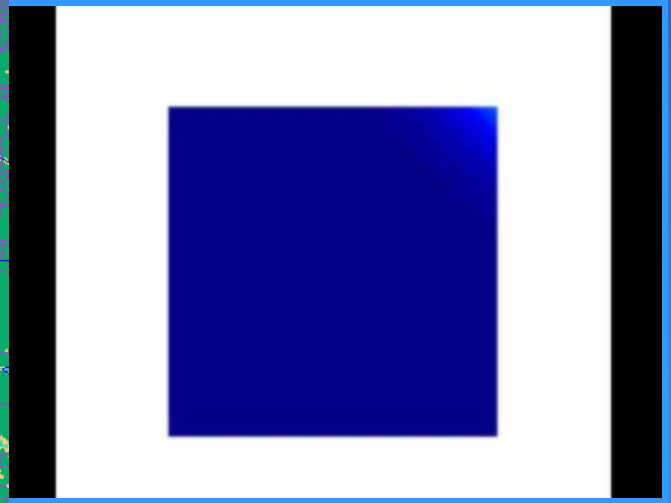
X axis-space
Y axis- time
Z axis- population

Graphic representation of a successful invasion using PDE model

Invasion Modeled Within a Spatial Domain

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

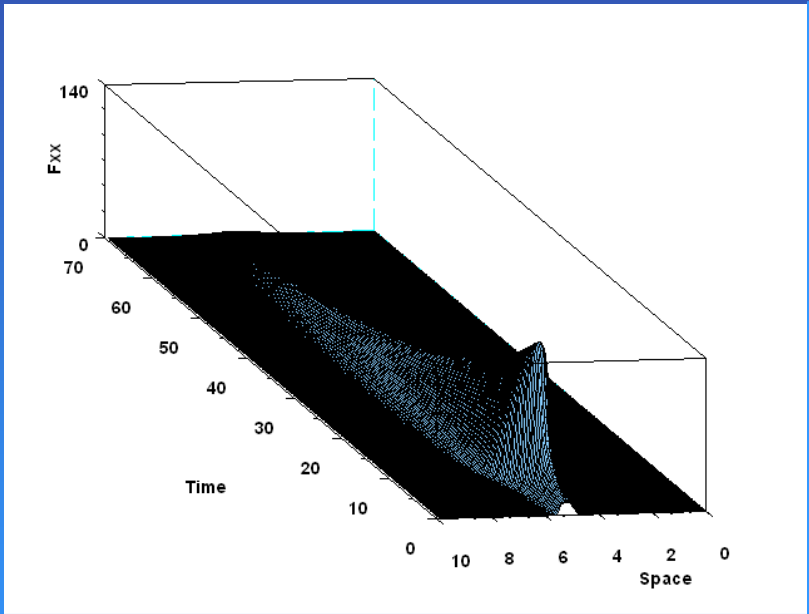


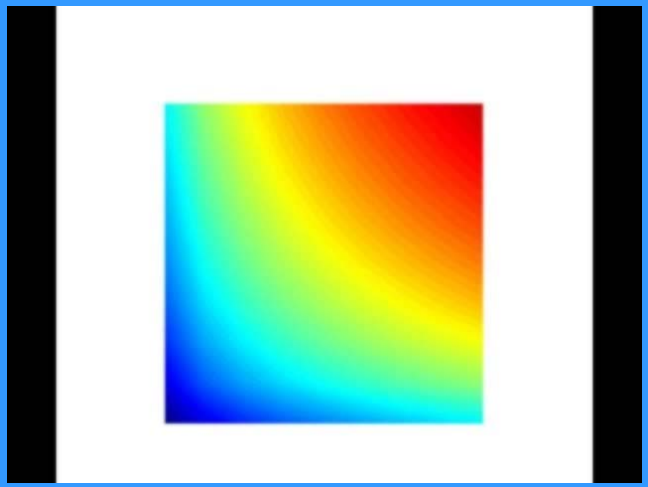


Ideally, the spatial domain will be represented in the format of geographic map which will show the spread of the species from points of introduction over time.

Biocontrol Modeled Within a Spatial Domain

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





Graphic representation of an aborted invasion following biocontrol (Trojan YY eradication used as a biocontrol example)

Conclusions

Snails were collected at sites in Miami and New Orleans and samples sent to the CDC in Atlanta for DNA analysis.

No snails from New Miami Zoo were found to be positive for parasite.

5 snails from New Orleans were found to be positive for parasite.

What next?
Survey additional P. insularum snails from Miami, Tallahassee, and Texas.

Complete invasion modeling software using Florida as a template spatial domain

Information transfer (publication and education)