

# Everglades Cooperative Invasive Species Management Area

## Prey species composition of Burmese python diet



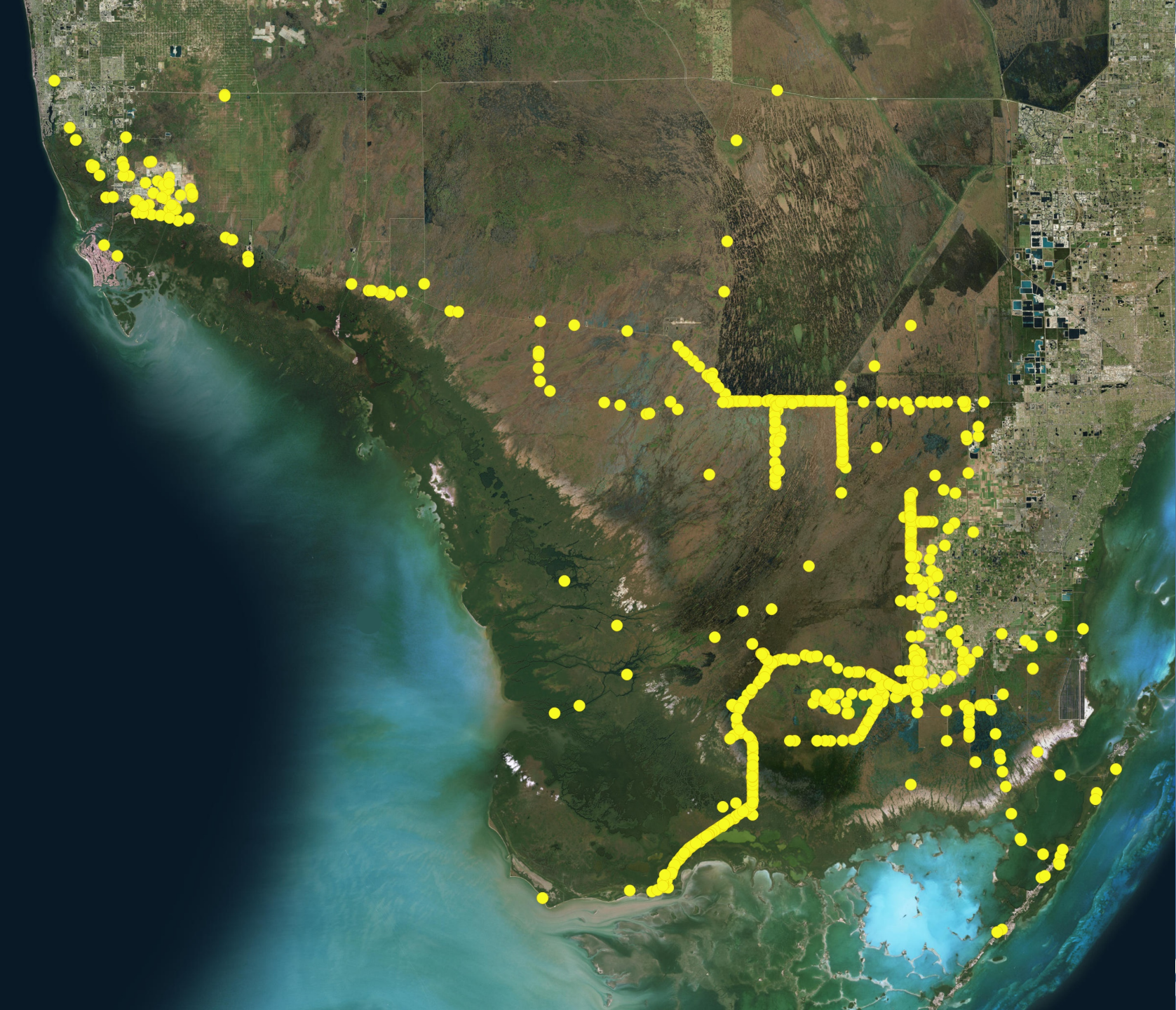
Christina Romagosa, Paul Andreadis, Ian Bartoszek, Michelle Collier, Carla Dove, Bryan Falk, Jill Josimovich, Diego Juárez-Sánchez, Kenney Krysko, Frank Mazzotti, James Nifong, Robert Reed, Michael Rochford, Brian Smith, Skip Snow, Eric Suarez, Dustin Welbourne, Laurie Wilkins, countless python capturers

UF/IFAS, UF FLMNH, Smithsonian Institution, Conservancy of Southwest Florida, Everglades National Park, USGS

# Python diet samples: the numbers (2003 – 2018)

- Pythons captured opportunistically or on road/levee surveys
- Diet contents (stomach/gut) from ~1500 pythons
- Identified ~2000 prey items
- Avg # of prey items per snake = 1.30
- F = 529, M = 725, Unknown = 283



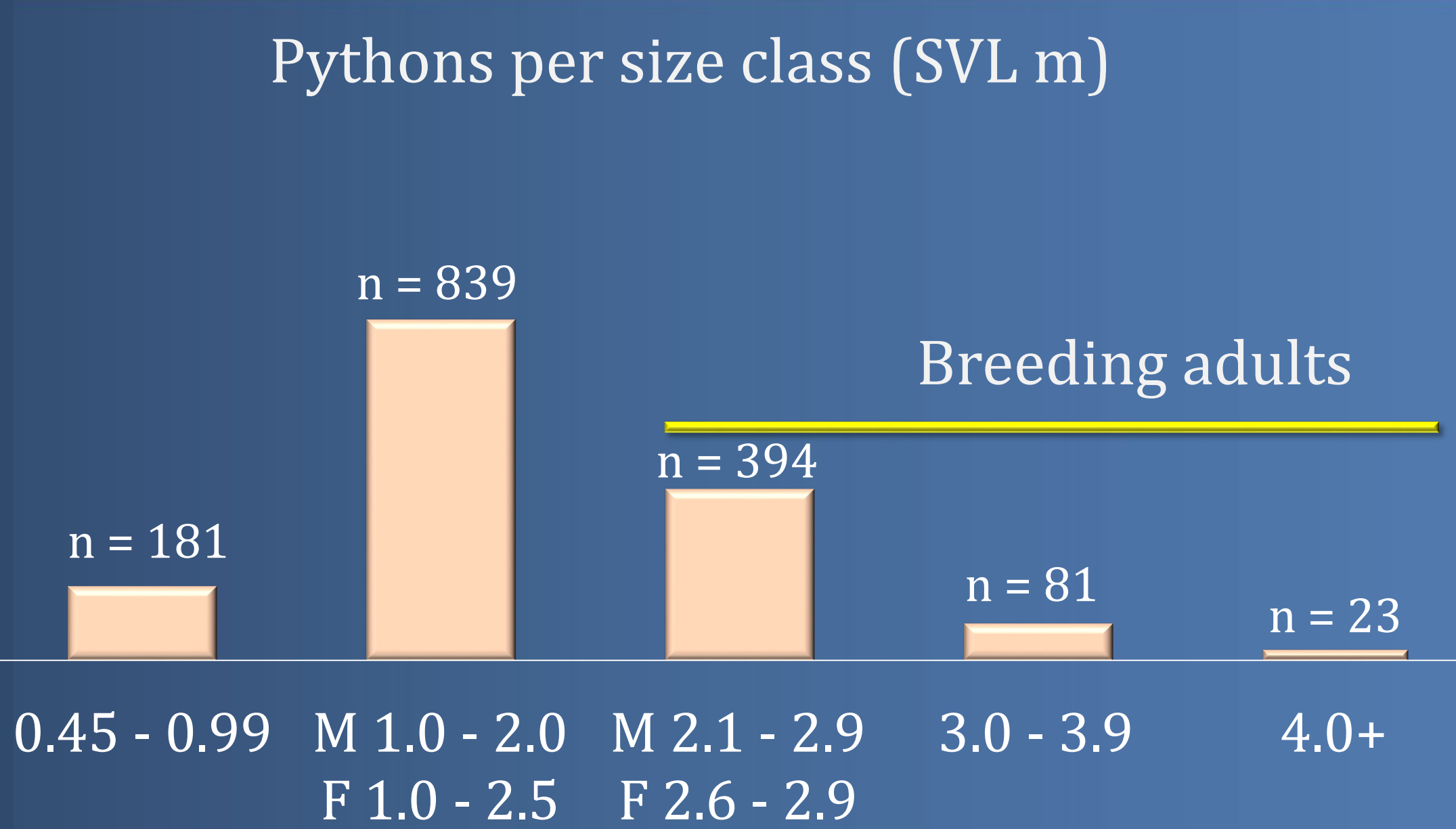


# Pythons per size class (SVL m)

Proportion

1.00  
0.80  
0.60  
0.40  
0.20  
0.00

Breeding adults



# Python diet composition



# Birds

At least 43 species

Pied-billed Grebe

Wood Duck

Green-winged Teal

Blue-winged Teal

Northern Pintail

Northern Shoveler

Domestic Goose

Domestic Chicken

Limpkin

American Coot

Common Gallinule

Purple Gallinule

Sora Rail

King Rail

Virginia Rail

Clapper Rail

Great Egret

Great Blue Heron

Green Heron

Little Blue Heron

Snowy Egret

Black-crowned

Night Heron

Least Bittern

American Bittern

White Ibis

Roseate Spoonbill

Wood Stork

Wilson's Snipe

Whimbrel

Double-crested  
Cormorant

Anhinga

Frigatebird

Black Vulture

Mourning Dove

Northern Cardinal

Bobolink

Red-winged  
Blackbird

Boat-tailed Grackle

Meadowlark

House Wren

Ruby-crowned  
Kinglet

Common  
Yellowthroat

Red-w  
Bulbul



## Mammals

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**At least 23 species**

Domestic Goat

Opossum

Cotton Mouse

White-tailed Deer

Short-tailed Shrew

Hispid Cotton Rat

Feral Hog

Least Shrew

House Mouse

Gray Fox

Eastern Cottontail

Black Rat

Feral cat

Marsh Rabbit

Fox Squirrel

Bobcat

Round-tailed

Gray Squirrel

River Otter

Muskrat

Raccoon

Key Largo Woodrat

## Reptiles

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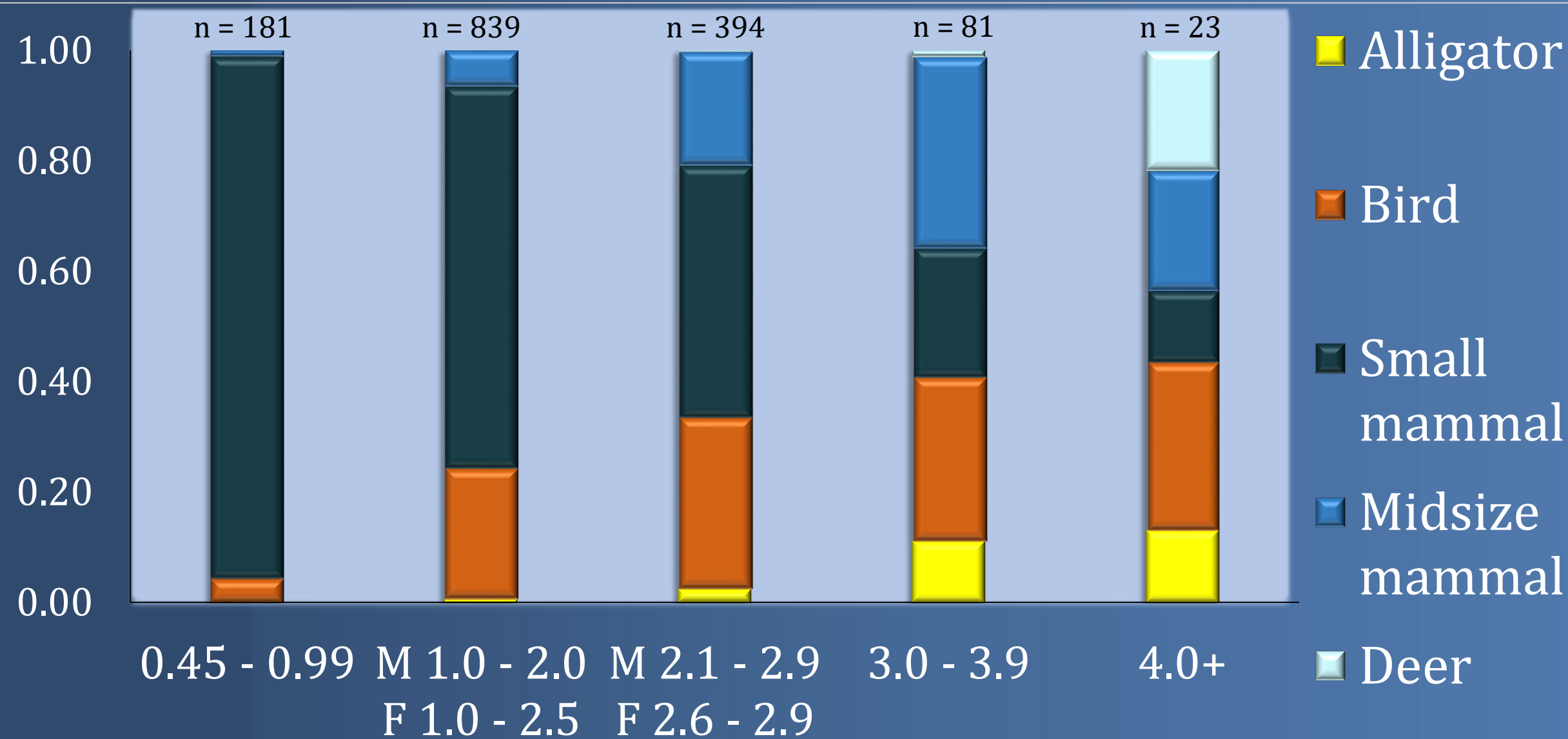
Armadillo

Marsh Rice Rat

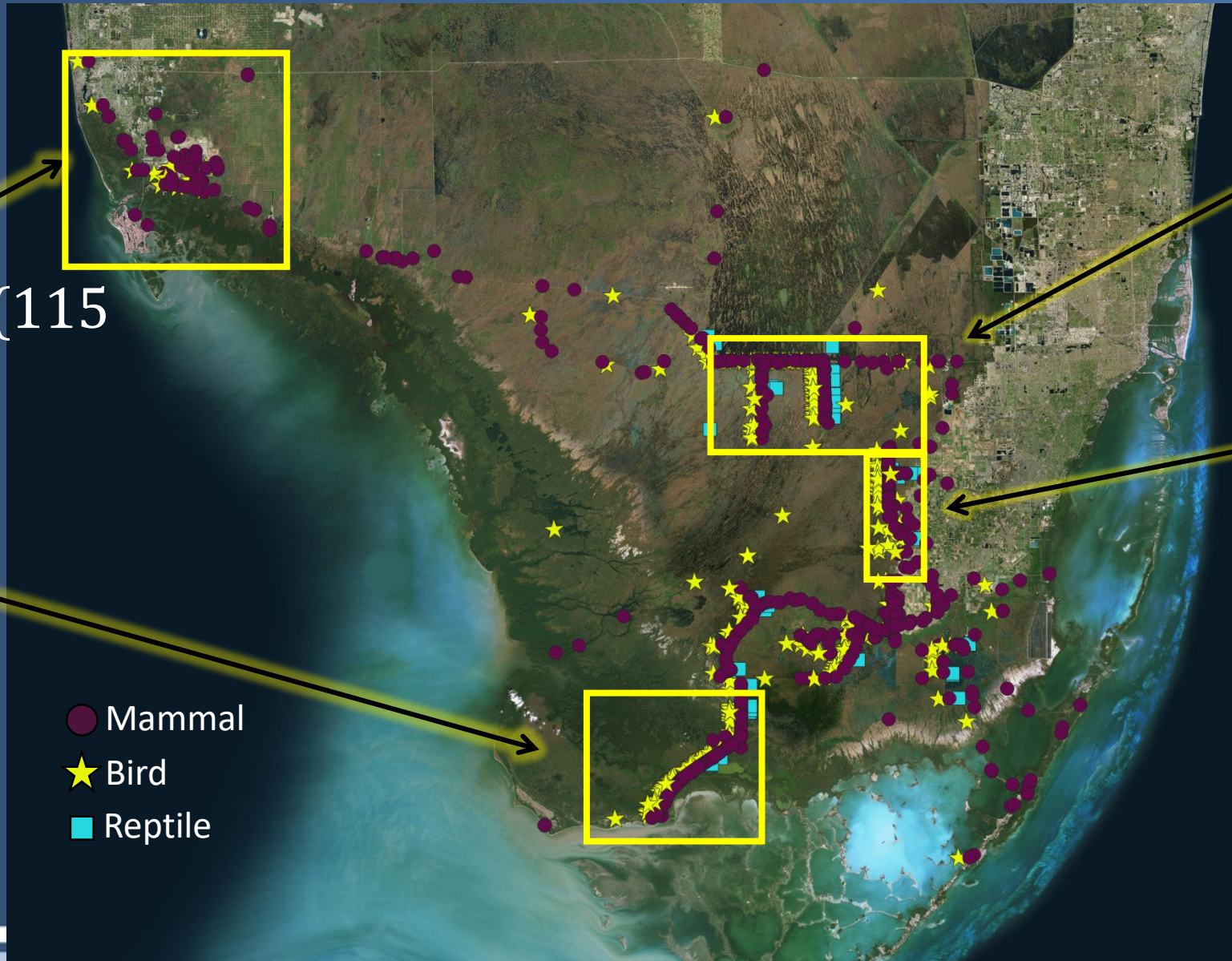
Alligator

Green Iguana

# Diet by python size class



# Locations



SW Florida (115 pythons)

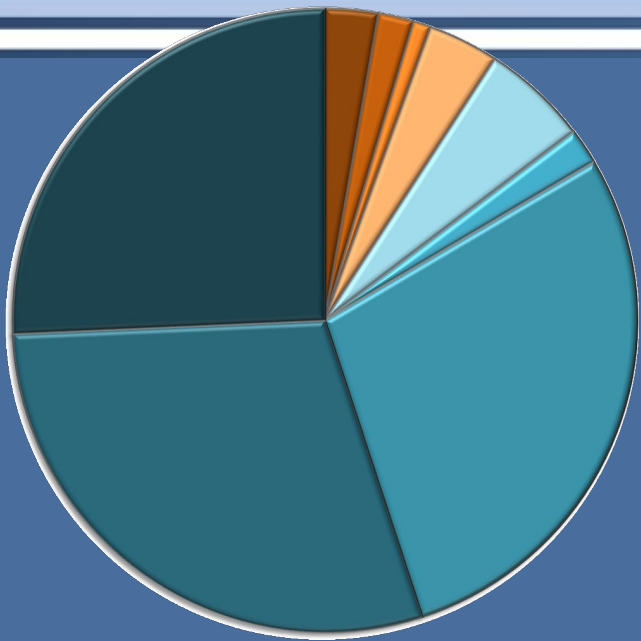
Southern EVER (234 pythons)

- Mammal
- ★ Bird
- Reptile

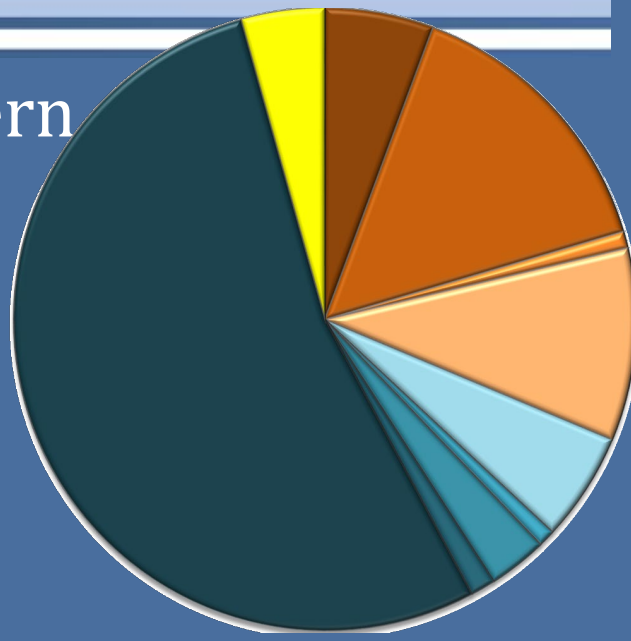
Northern EVER (293 pythons)

Eastern EVER (179 pythons)

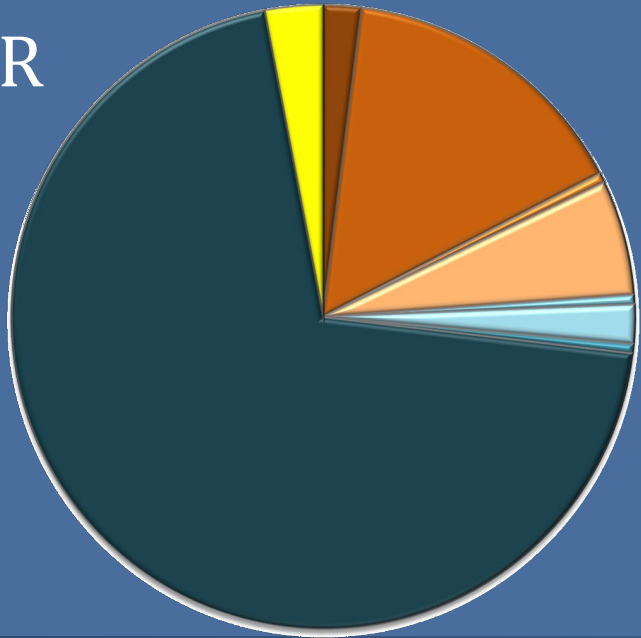
SWFL



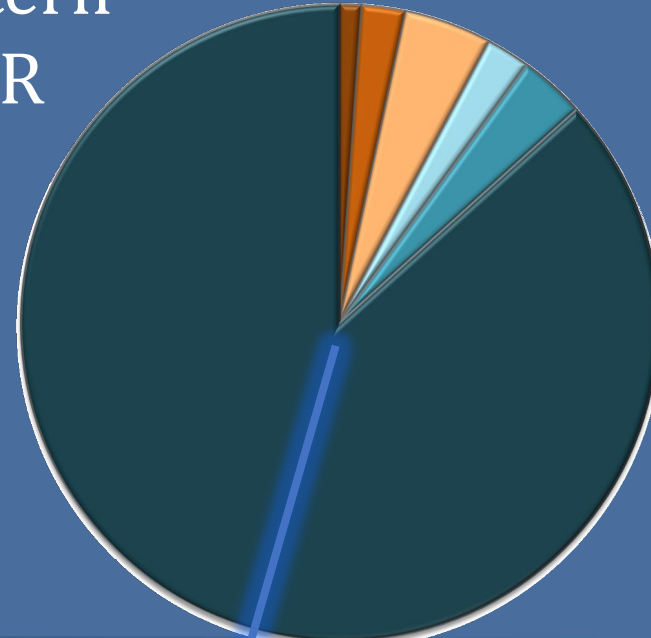
Northern  
EVER



Southern  
EVER



Eastern  
EVER

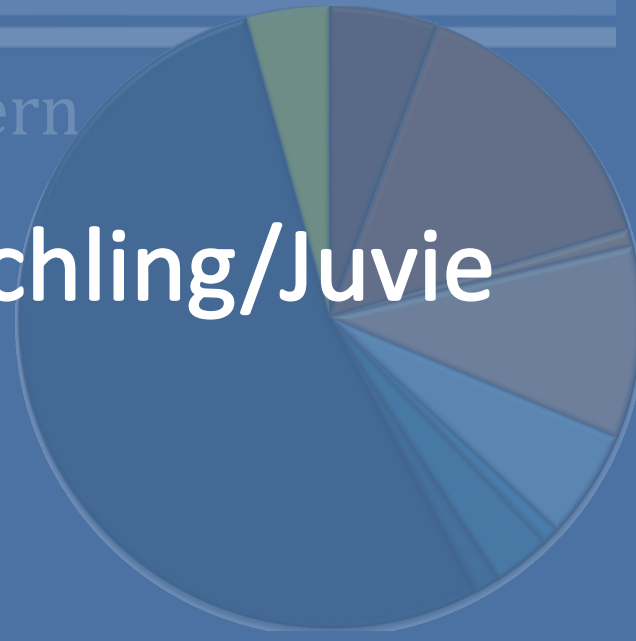
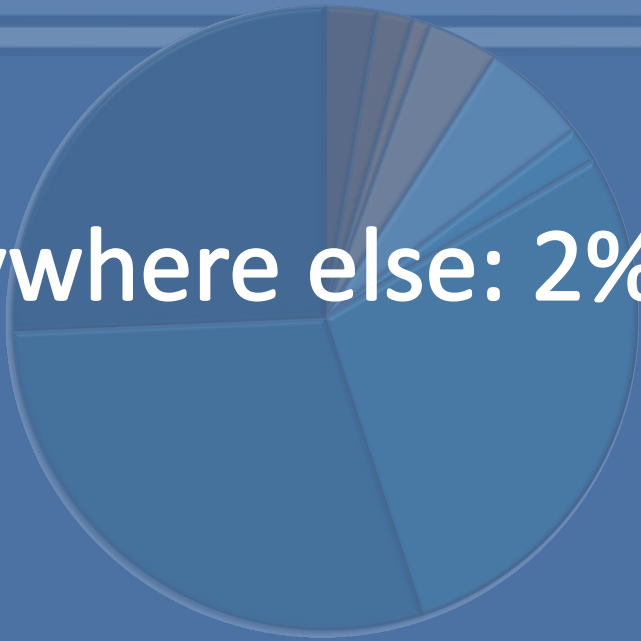


- Aquatic Birds
- Wading/Marsh Birds
- Other Bird
- Unkn Bird
- Other Mammal
- Unkn Mammal
- Deer
- Mesomammal
- Rabbit
- Rodent
- Alligator

SWFL

Northern  
EVER

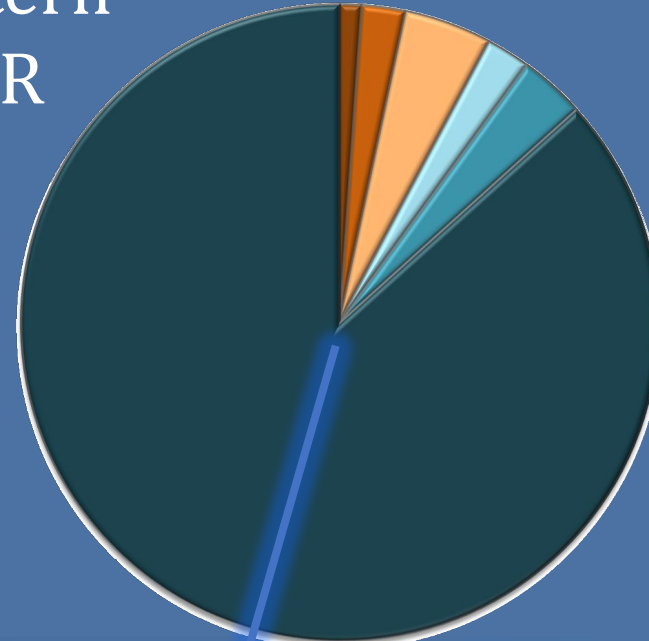
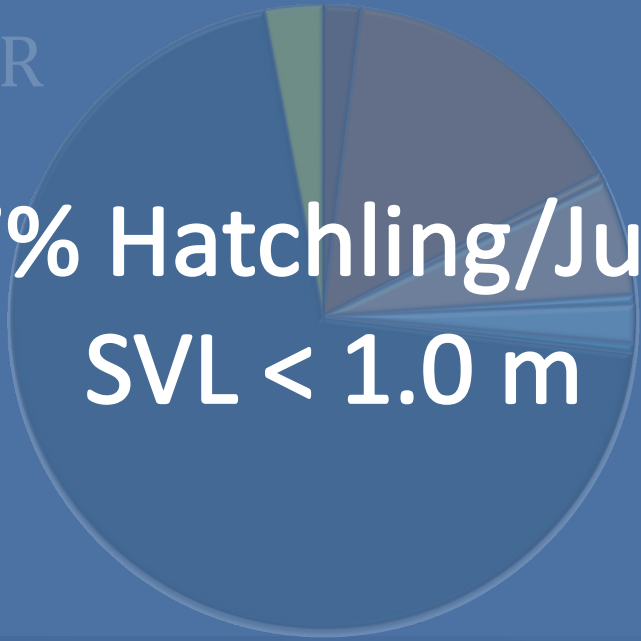
Everywhere else: 2% Hatchling/Juvie



Southern  
EVER

Eastern  
EVER

57% Hatchling/Juvie  
SVL < 1.0 m



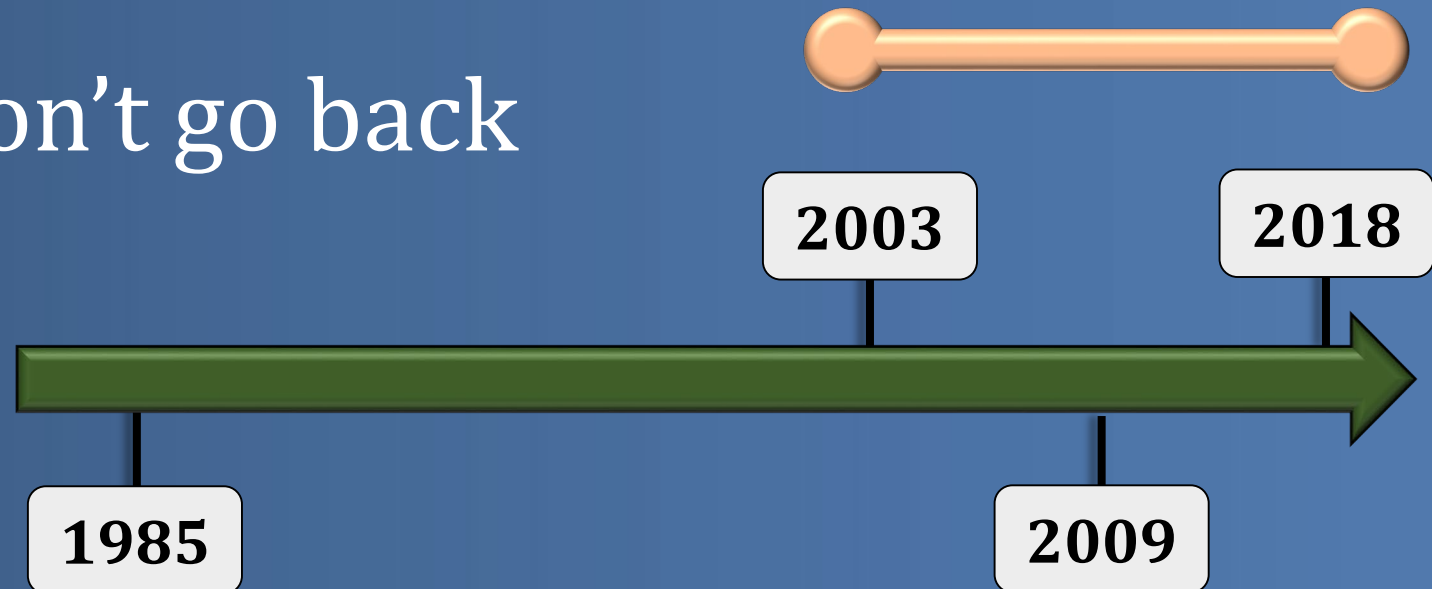
- Aquatic Birds
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- Unkn Mammal
- Deer
- Mesomammal
- Rabbit
- Rodent
- Alligator



# Has diet changed over time?

- In some areas data don't go back far enough
- Inconsistent sampling
- Not enough representative samples

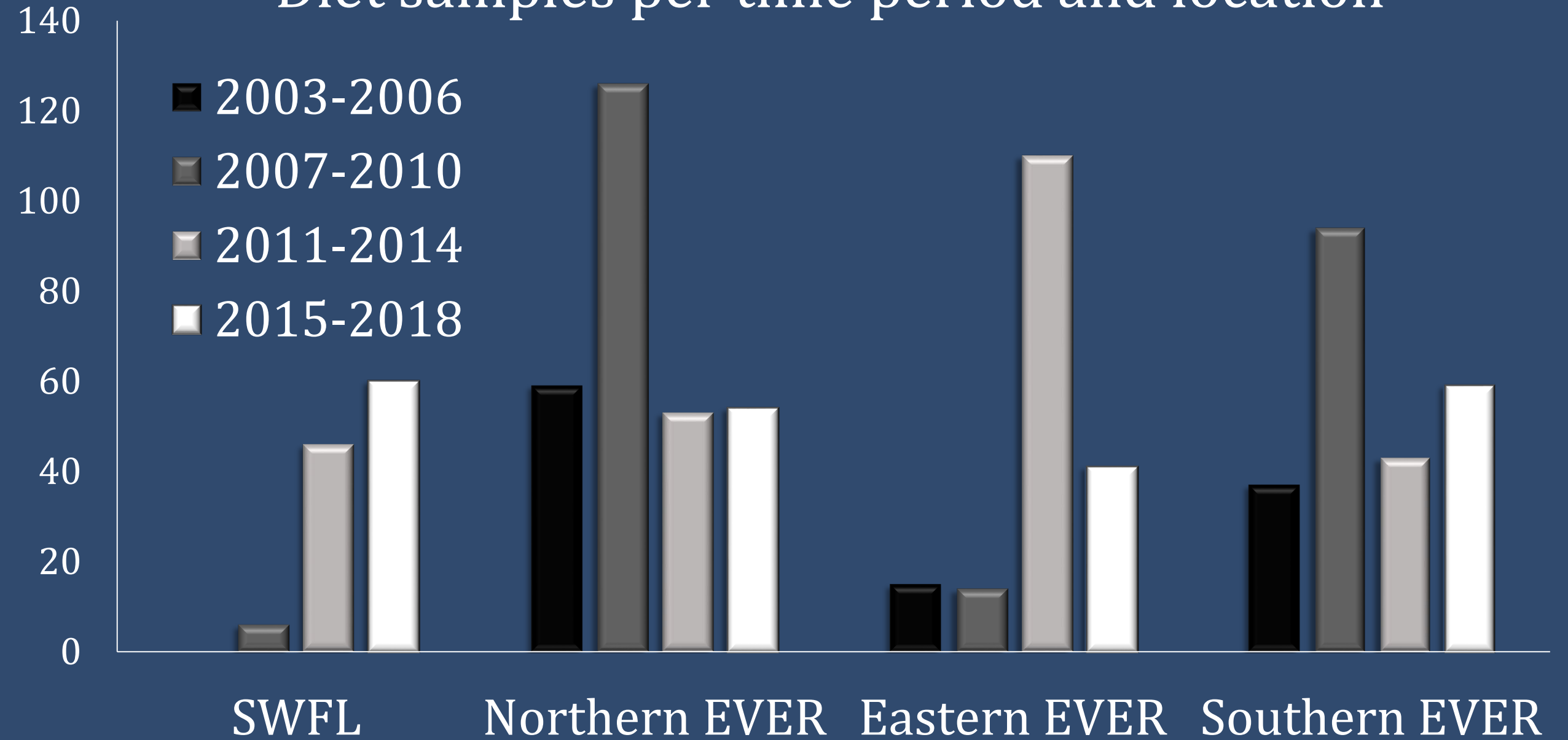
Lower Everglades



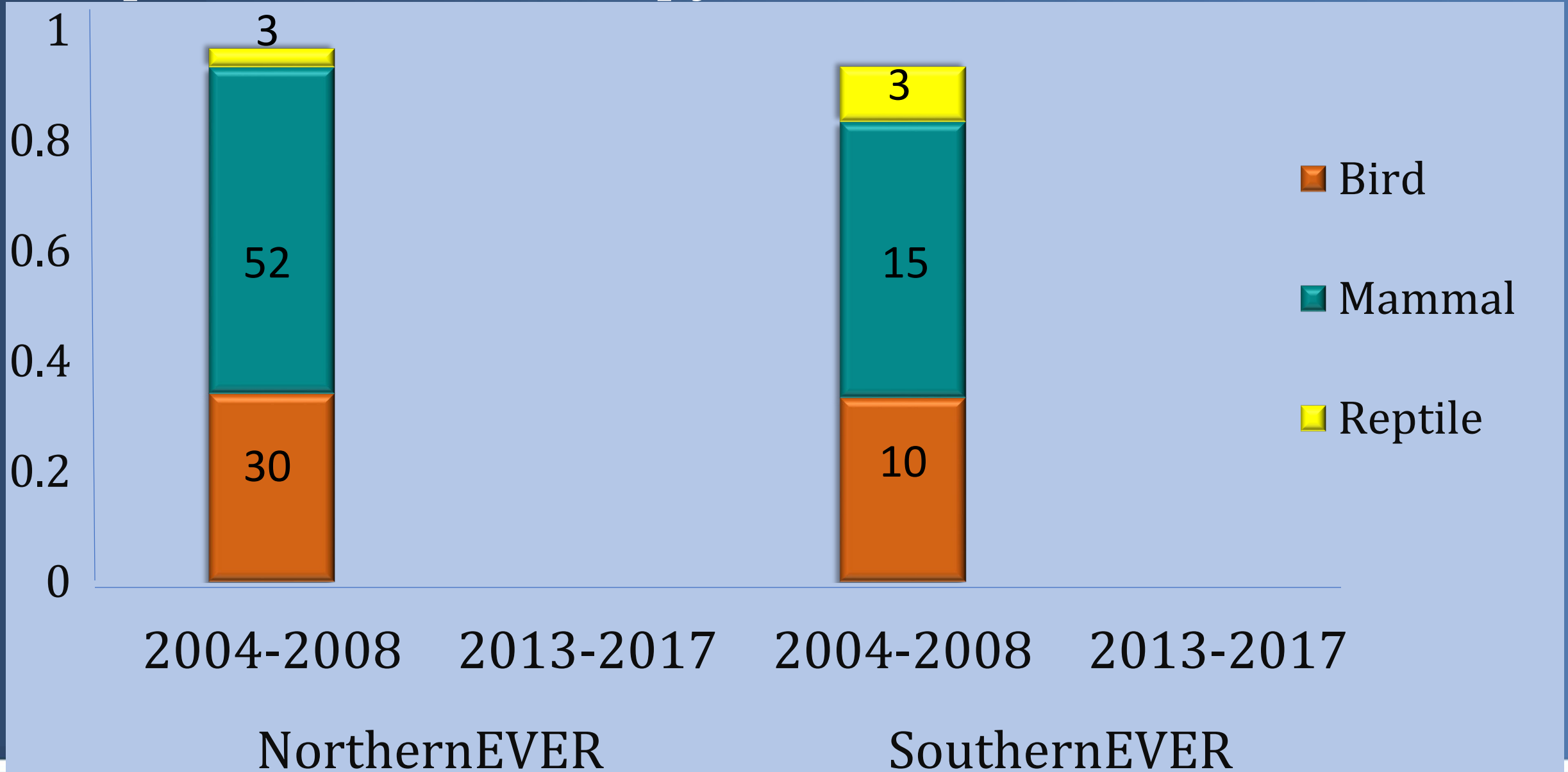
Southwest Florida



# Diet samples per time period and location



# Proportion of diet for pythons between SVL 2 – 4 m



# Has diet changed over time?

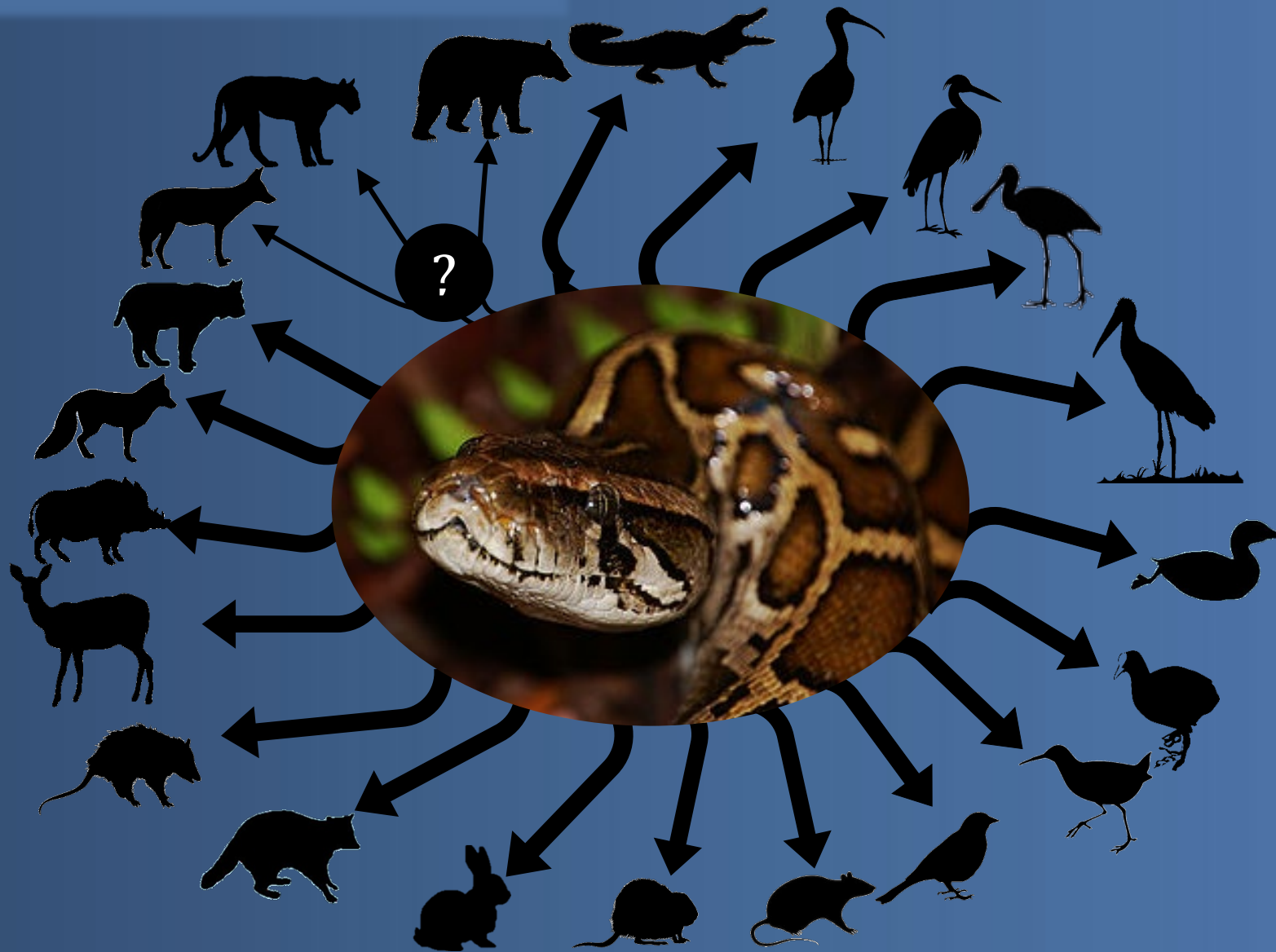
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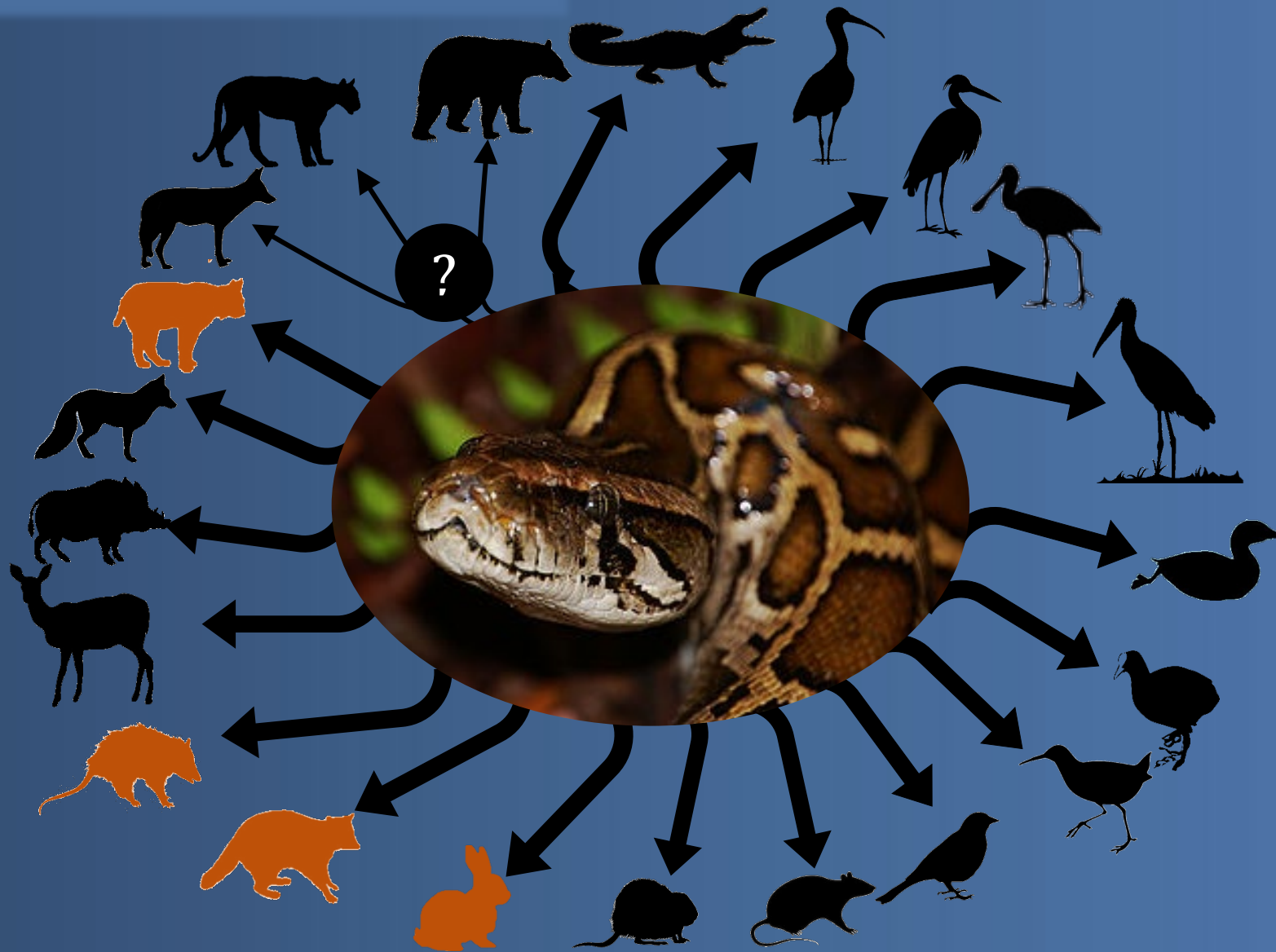
- **MUST** look at trends by location
- Needs:
  - Targeted sampling
  - Specific locations
  - Size classes
  - Seasonal



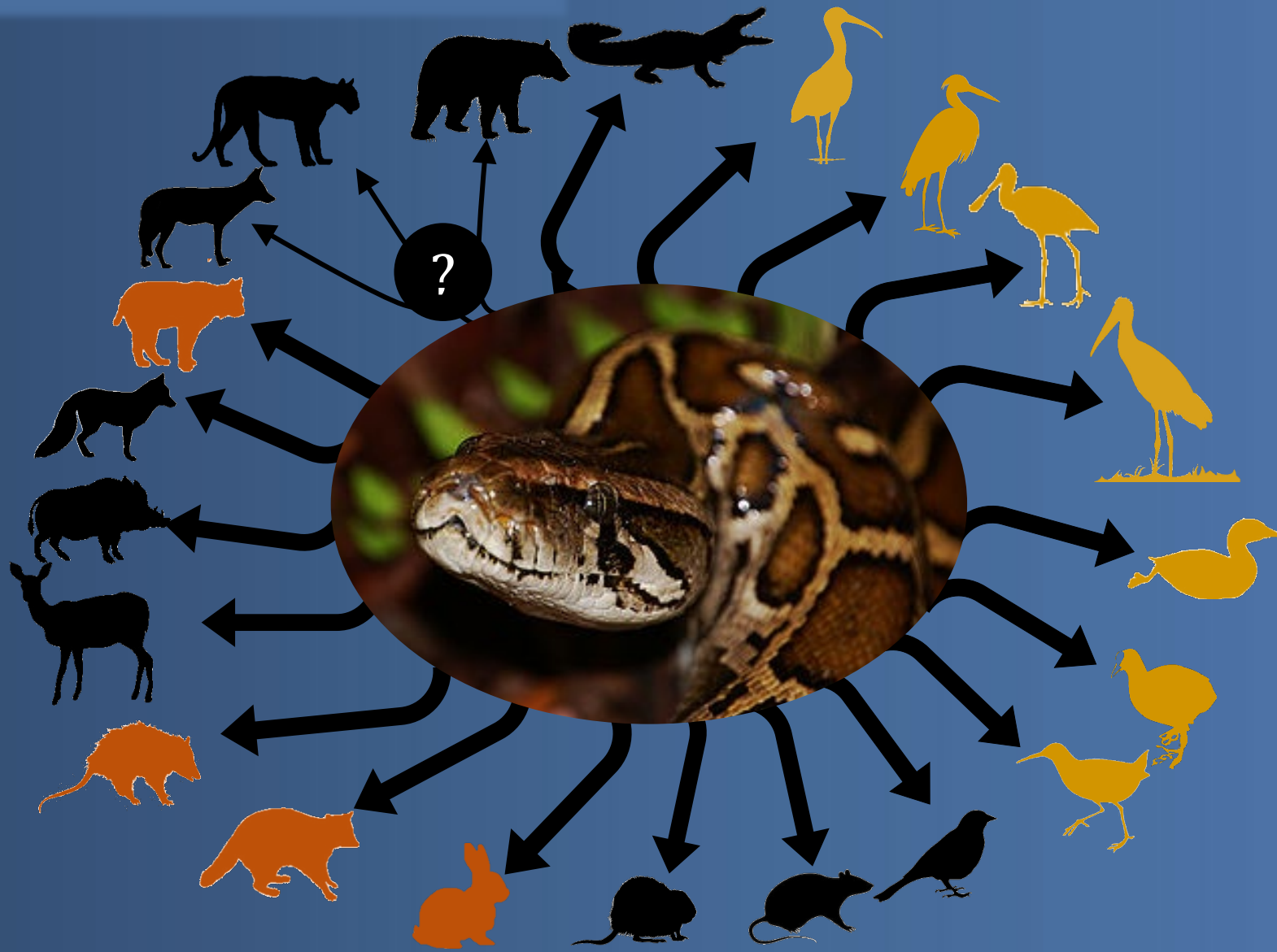
# Ecosystem level effects



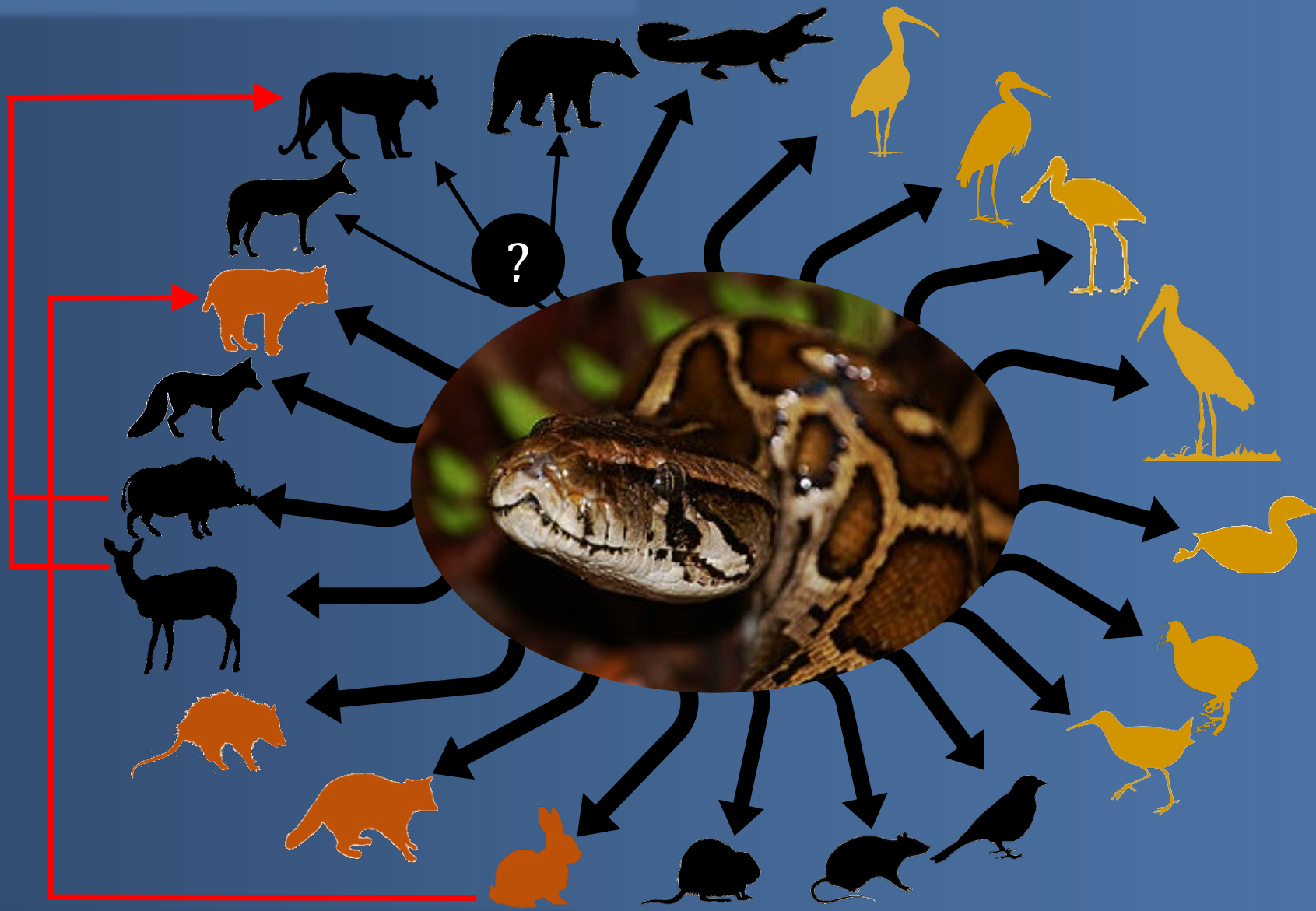
# Ecosystem level effects



# Ecosystem level effects

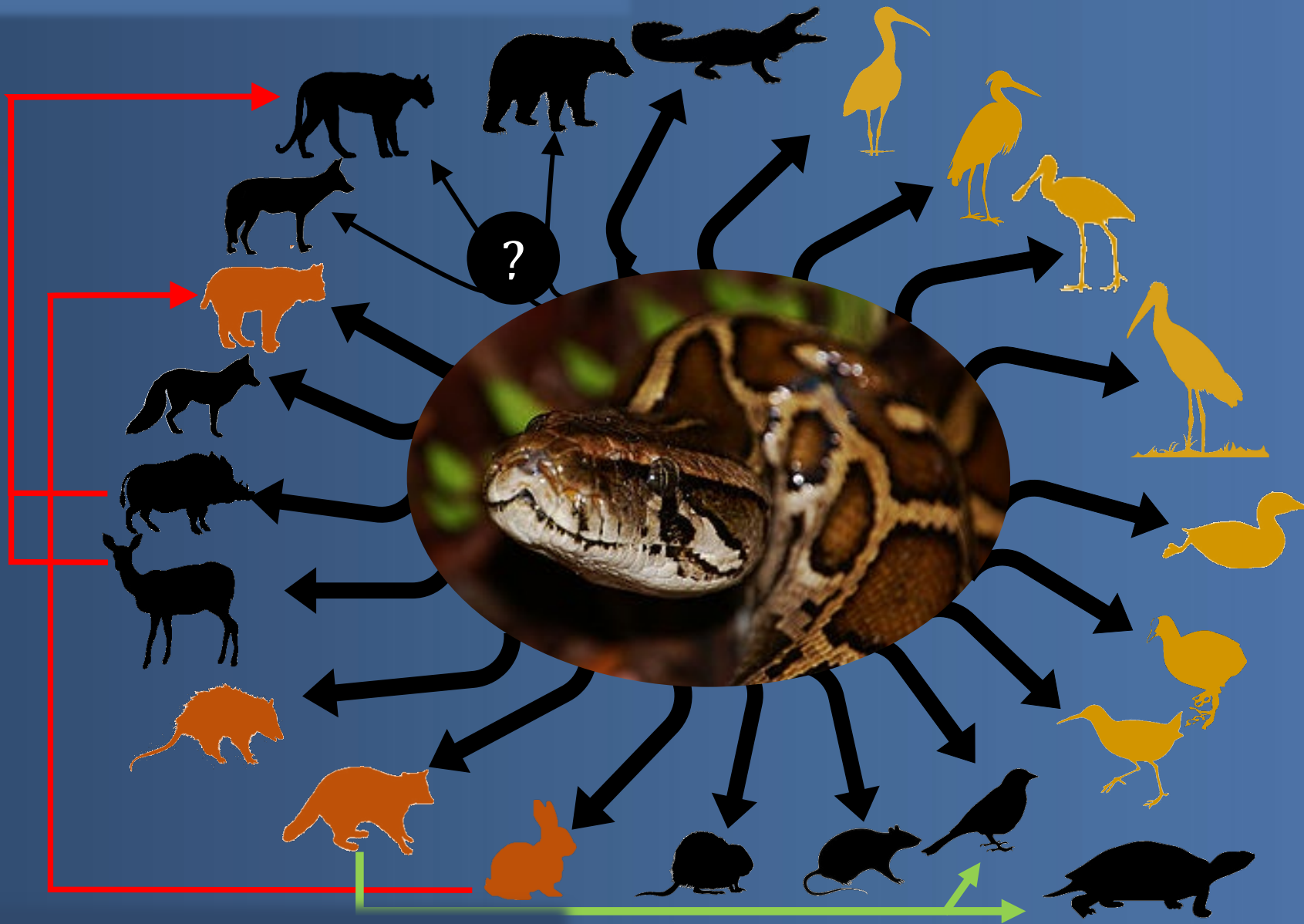


# Ecosystem level effects



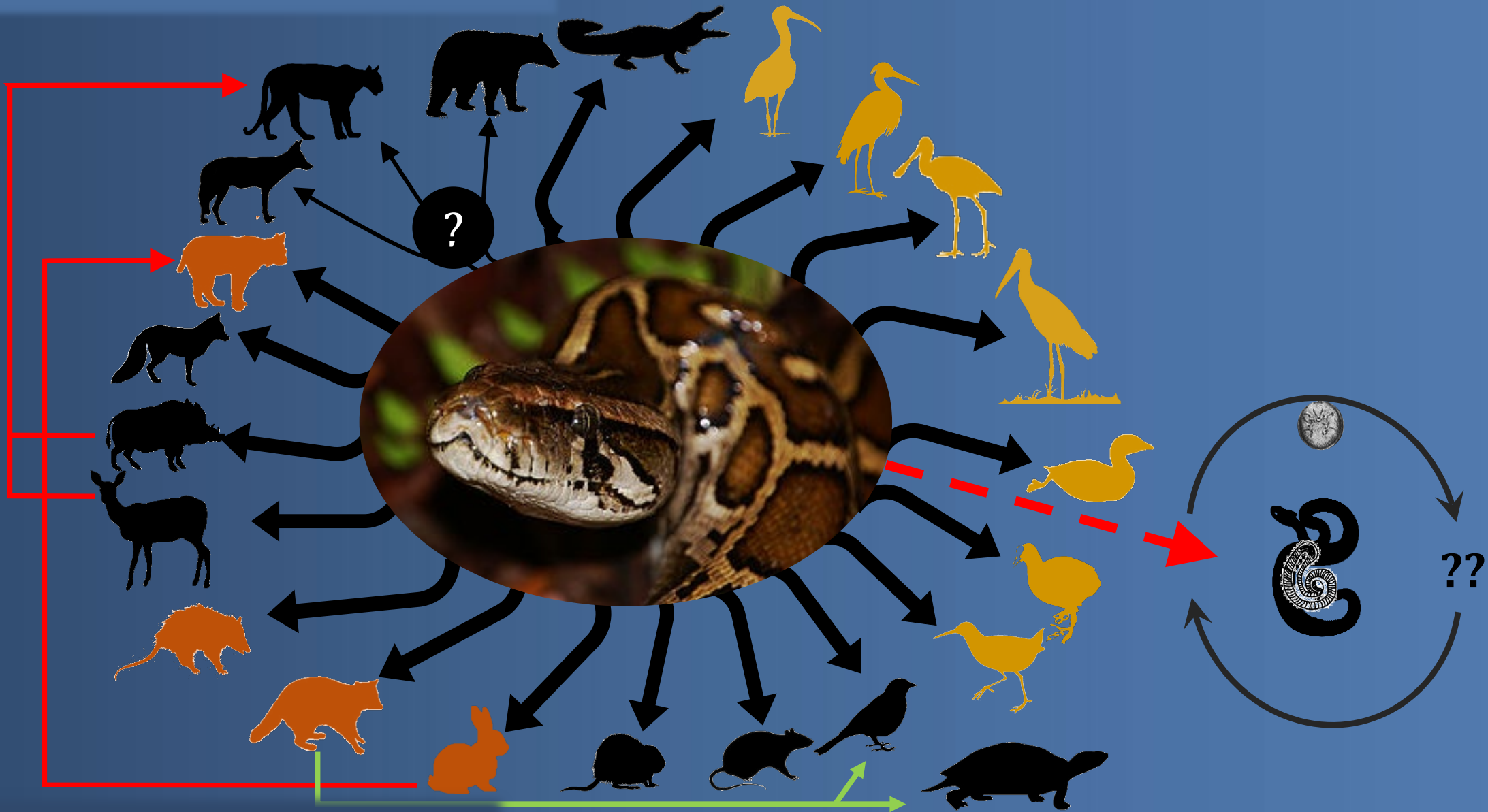
Indirect effects (  $-$  ,  $+$  )

# Ecosystem level effects

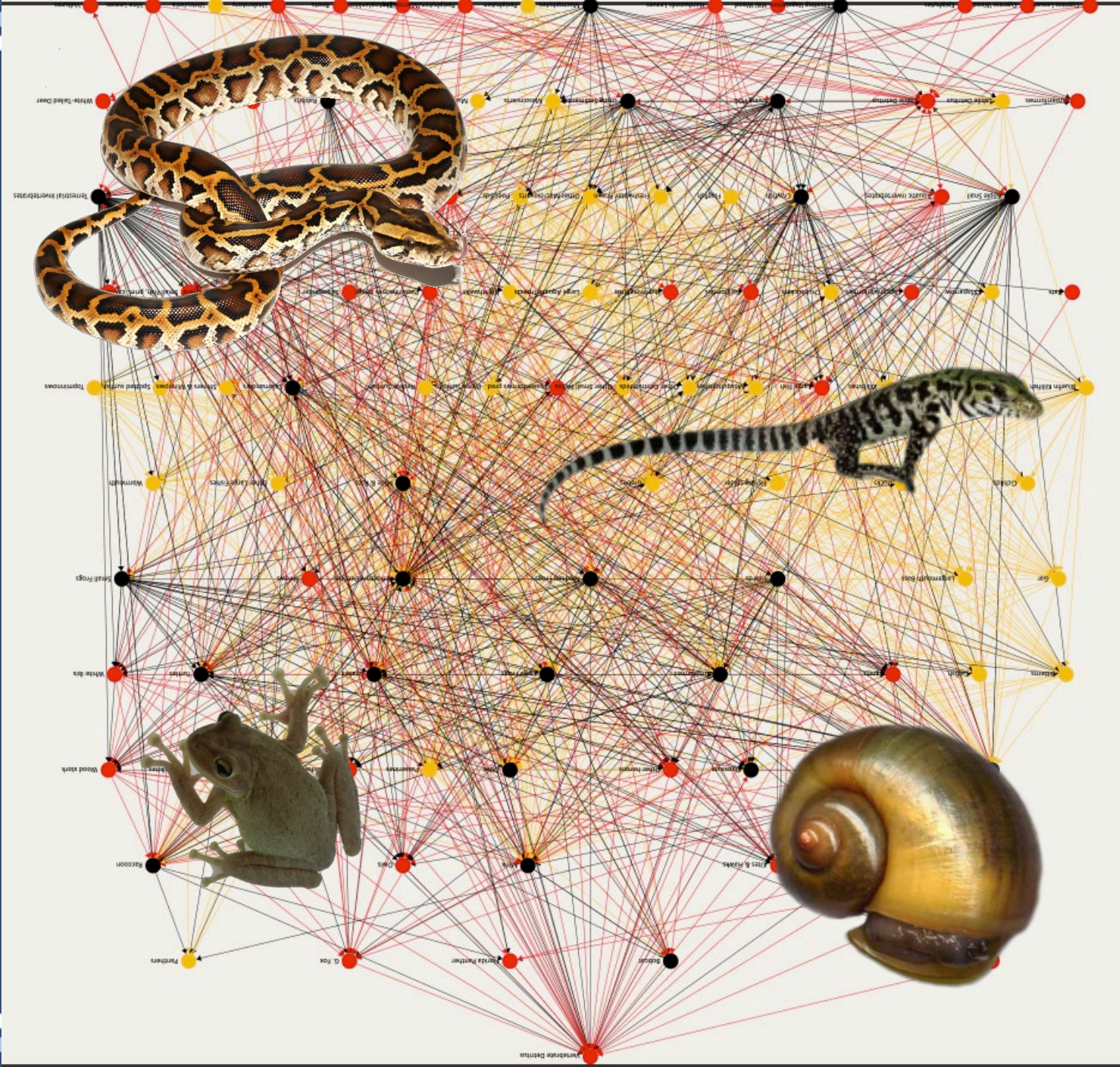


Indirect effects (  $-$  ,  $+$  )

# Ecosystem level effects



Indirect effects (  $-$  ,  $+$  )

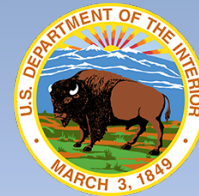


# Acknowledgements



USGS – Fort Collins Science Center and Everglades National Park

Everyone who has ever caught a python and brought it in



# Everglades Cooperative Invasive Species Management Area



## Identification of Divergent Nidoviruses in Free-Ranging Invasive Pythons

Steven Tillis, Melissa Miller, Jillian Josimovich, Natalie Claunch,  
Ian Bartoszek, John Humphrey, Bryan Kluever, Robert Reed,  
Christina Romagosa, Jim Wellehan, Robert Ossiboff



# What is Nidovirus?



- Large viral group causing respiratory illness in many animals
- Causative agent of respiratory infection in captive reptiles with large diversity of virus species found in pythons and boas
- Species of virus seen in wild population of shingleback skinks and Bellinger River snapping turtle
- Host range of each virus species still being investigated



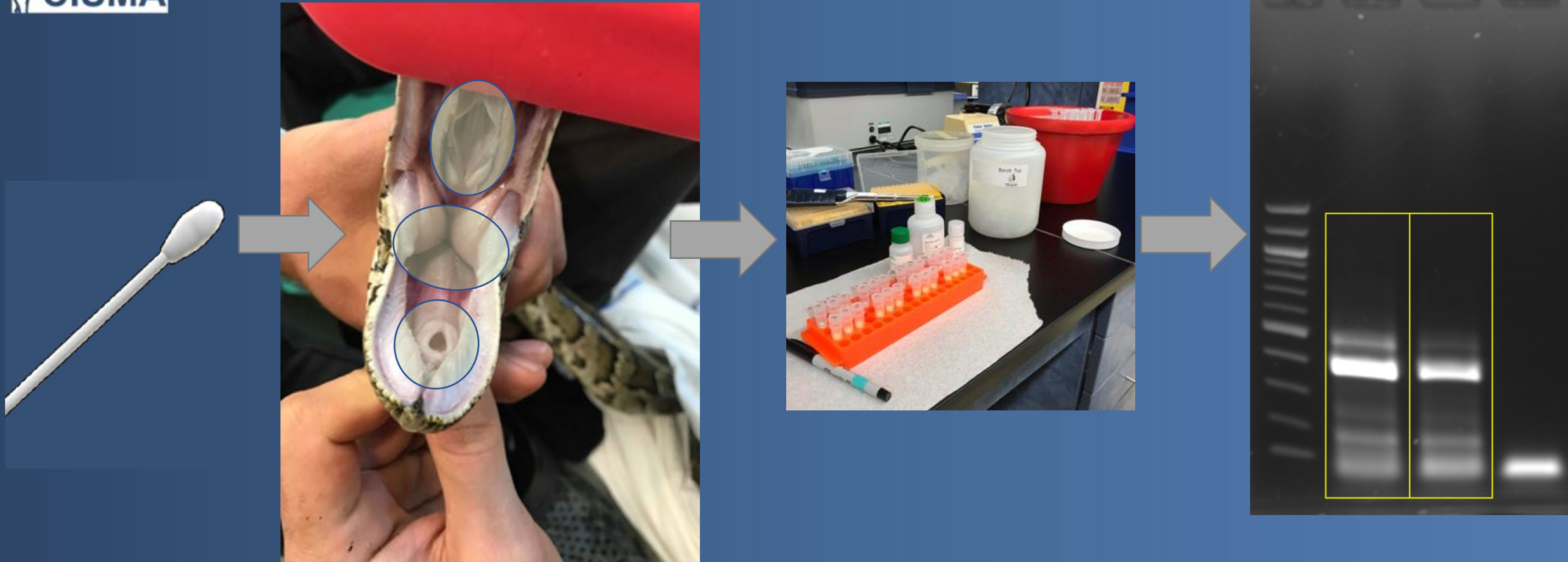
# How the Project Was Started



- USDA Gainesville Field Station BPNV outbreak (seen in captive snake colonies) in their Burmese pythons
  - Did they have the virus when caught or was there exposure along the python-chain?
- Expanded testing to recently captured pythons from USGS, FWC, and Conservancy of Southwest Florida
- Didn't find any pythons with ball python nidovirus
  - Many were positive for divergent nidovirus most closely matching a Burmese python nidovirus found in a zoo

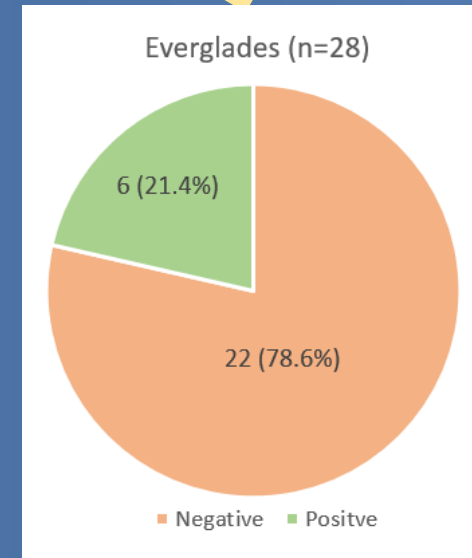
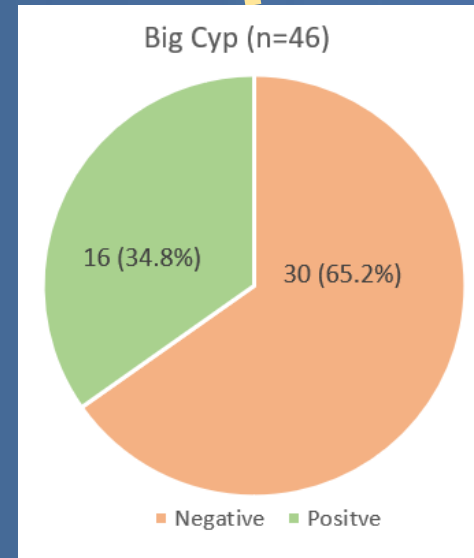
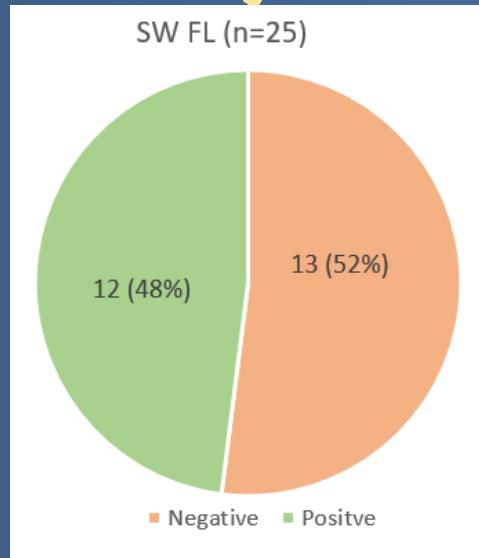
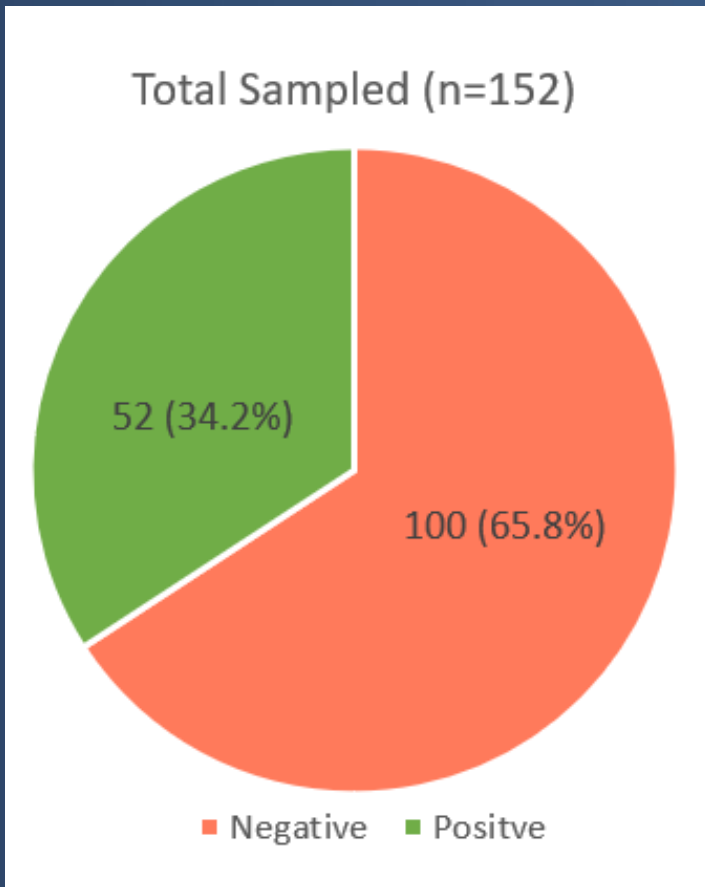
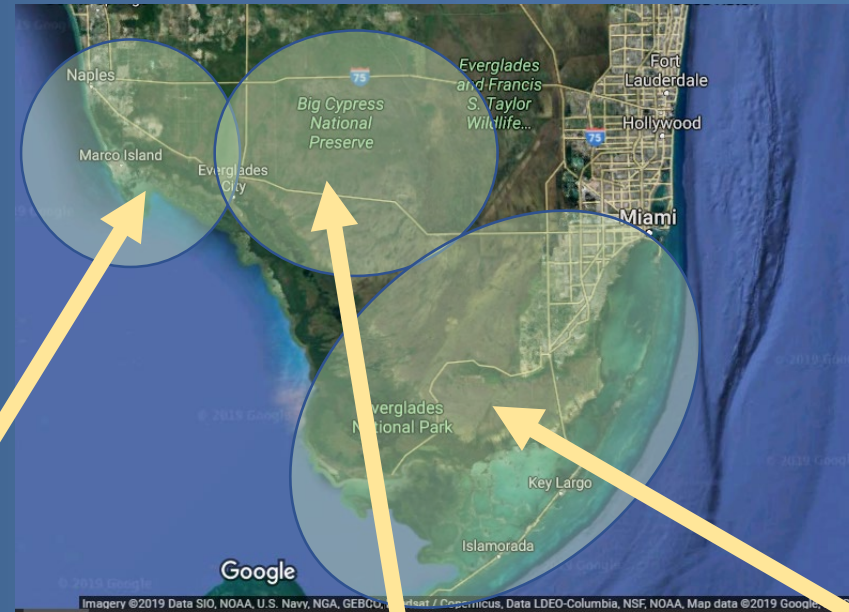


# How Samples are Taken and Run



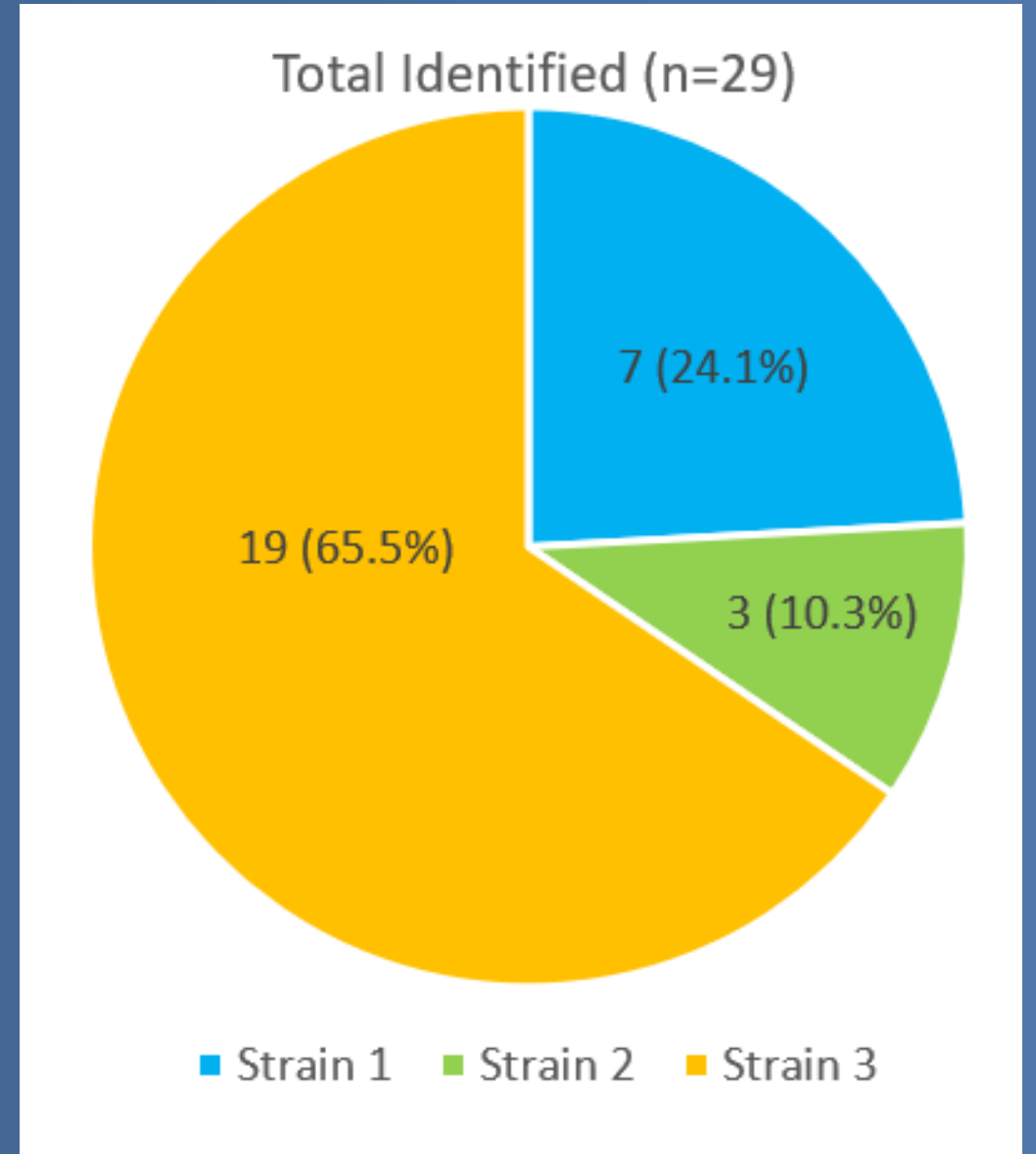
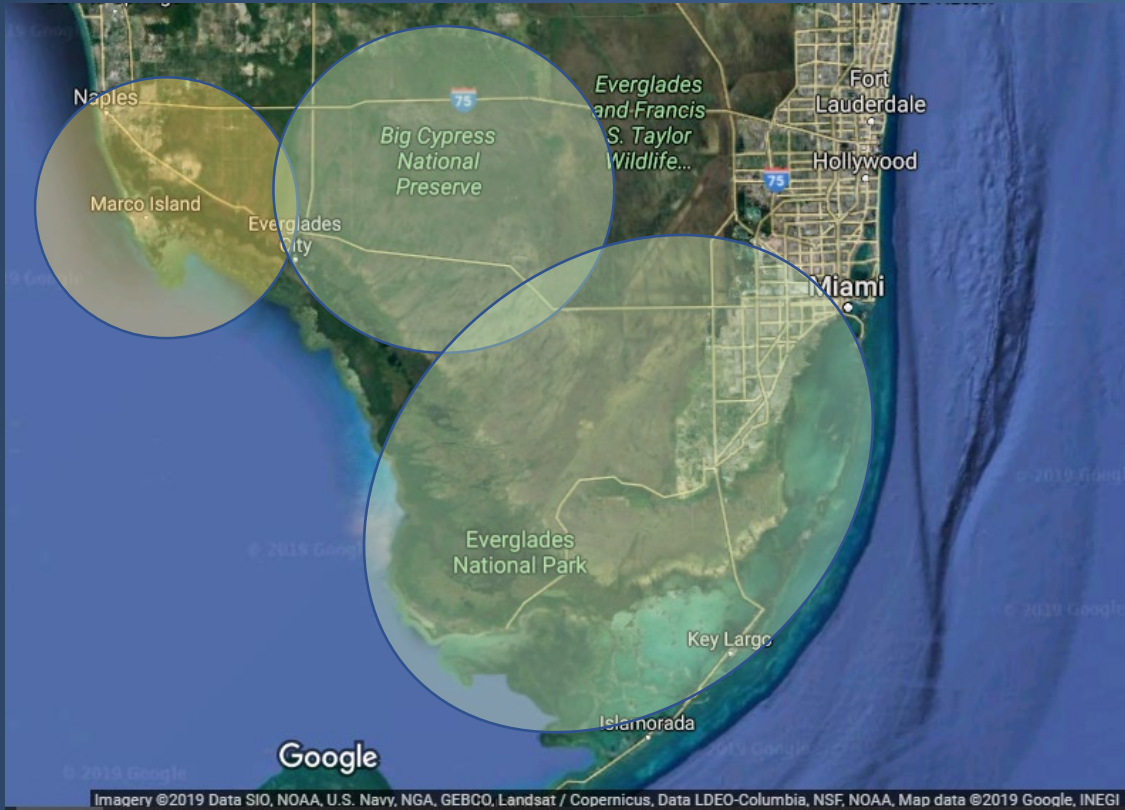


# Initial Results





# Virus Diversity





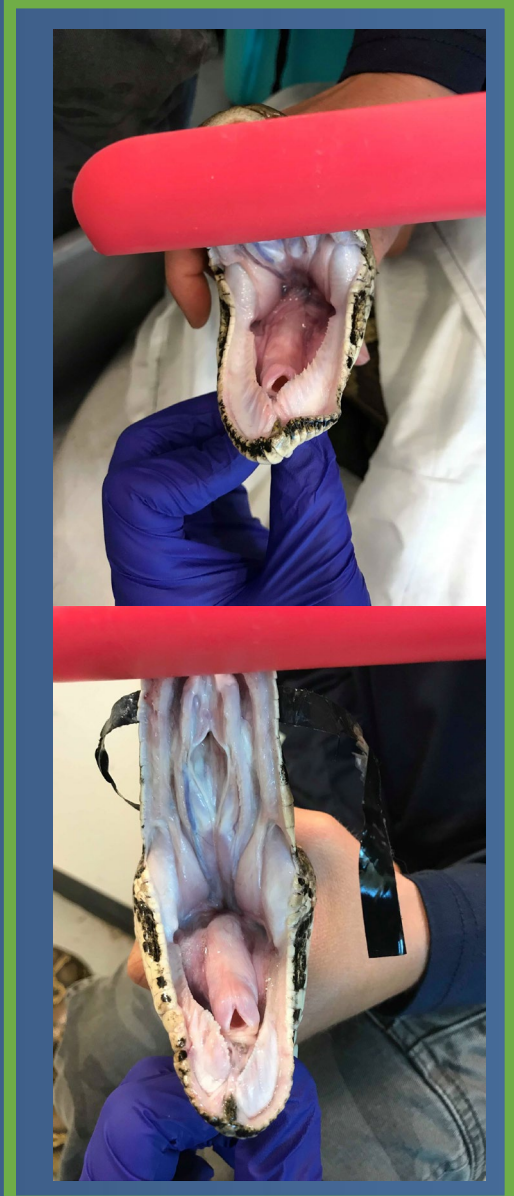
Ball Python Nido Neg:



Ball Python Nido Pos:



Burmese Python Nido Pos:



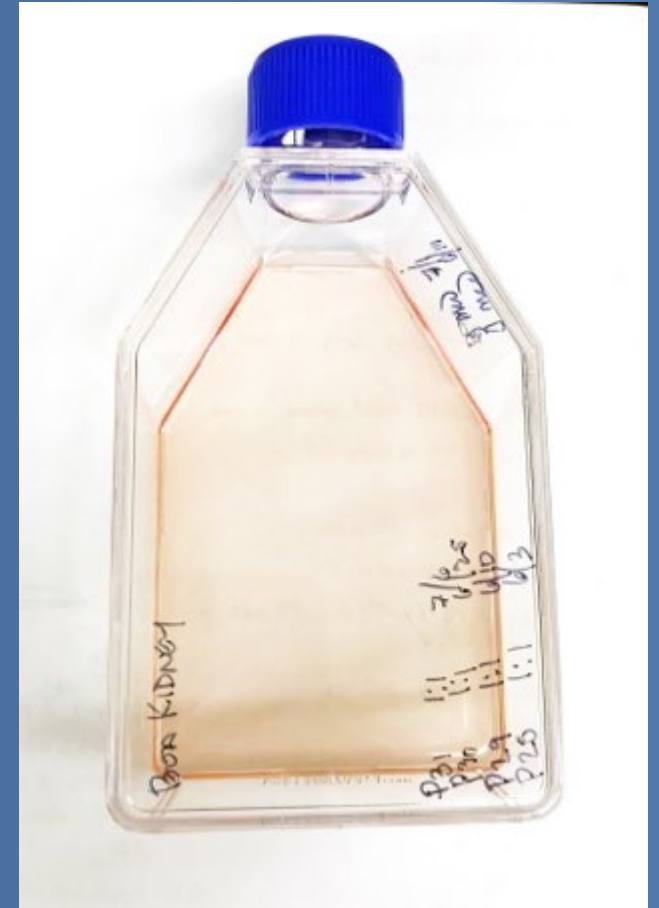
Burmese Python Nido Neg:





# Next Steps of the Project

- Screening native snake species
- Getting larger viral genetic sequences to map out virus diversity and distribution
- Growing the virus in culture for In-vitro experimentation





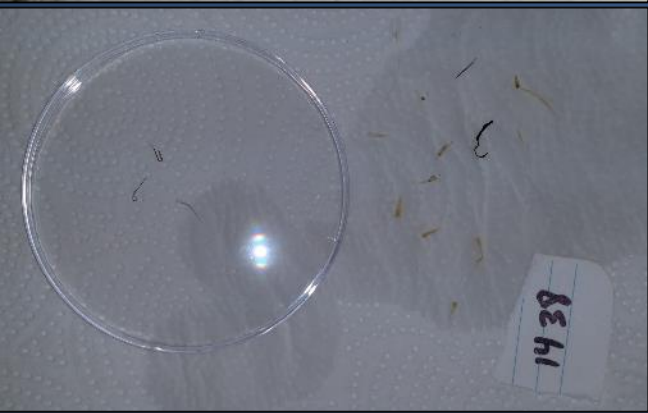
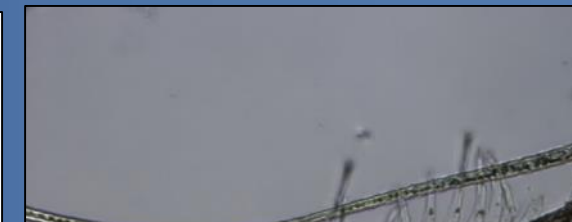
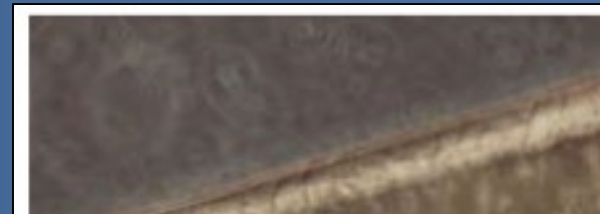
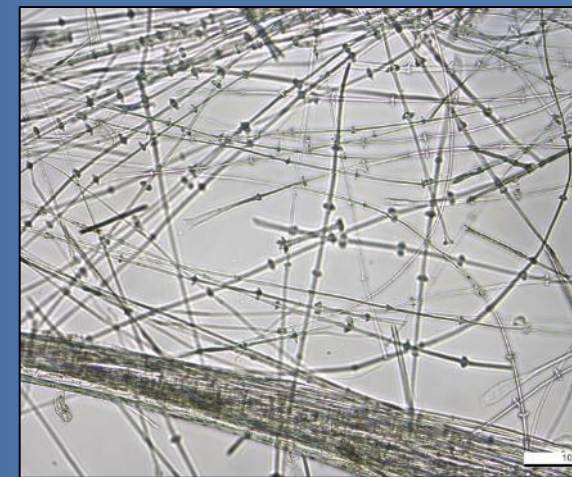
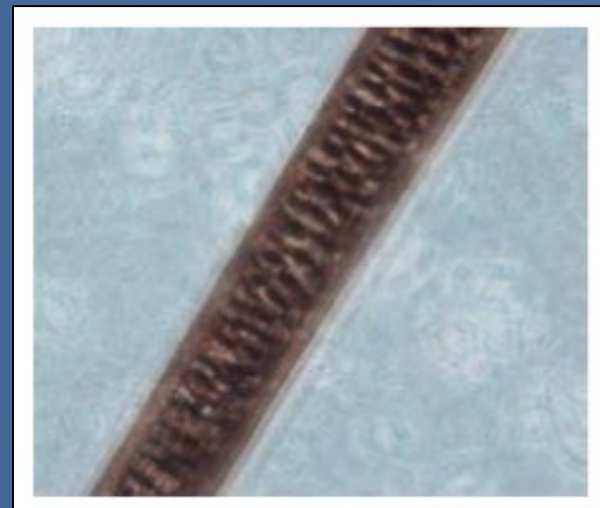
# Acknowledgements & Questions

Department of Comparative, Diagnostic, and Population Medicine at UF College of Veterinary Medicine & Department of Wildlife Ecology and Conservation at University of Florida, FWC, USGS, USDA APHIS, Conservancy of Southwest Florida, Colorado State University





# Identifying prey



Challenges to a molecular approach to prey identification in the Burmese python, *Python molurus bivittatus*

Bryan G. Falk and Robert N. Reed

US Geological Survey, Fort Collins Science Center, Fort Collins, CO, USA