

# Finding NiMo: eDNA detection of Nile monitors (*Varanus Niloticus*)

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# National Wildlife Research Center

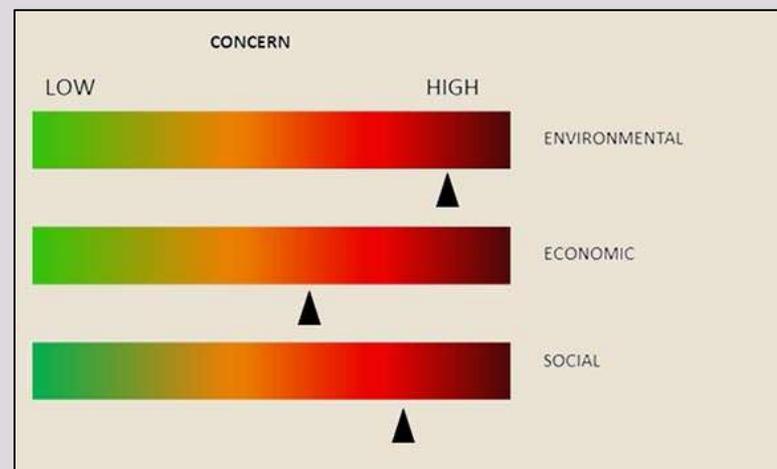


Fort Collins, Colorado



# Nile Monitors: a destructive invasive species

- Opportunistic - habitat and diet
  - Invertebrates, burrowing owls, insects, carrion, fish, young alligators and crocodiles, snakes, turtles...
  - Native egg laying animals such as birds, turtles, and alligators



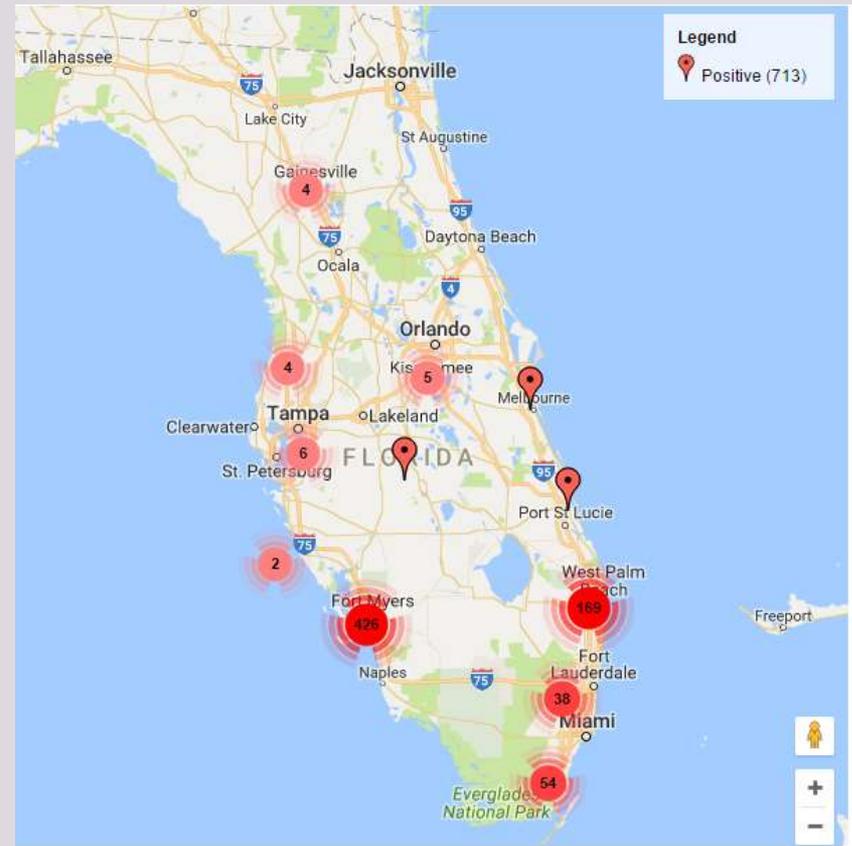
<http://myfwc.com/wildlifehabitats/nonnatives/reptiles/nile-monitor/>

# A Growing Problem

- 713 observations
- Identify and remove populations
- Trapping
- Elusive



<http://www.tampabay.com/news/environment/wildlife/nile-monitor-lizards-invaded-florida-and-theyre-winning-the-battle/1011745>



<https://www.eddmaps.org/florida/distribution/viewmap.cfm?sub=18353>

# Environmental DNA

- Need sensitive method of detection
- eDNA: fragments of DNA suspended in water, air, or soil
- Challenge – low quality/quantity DNA

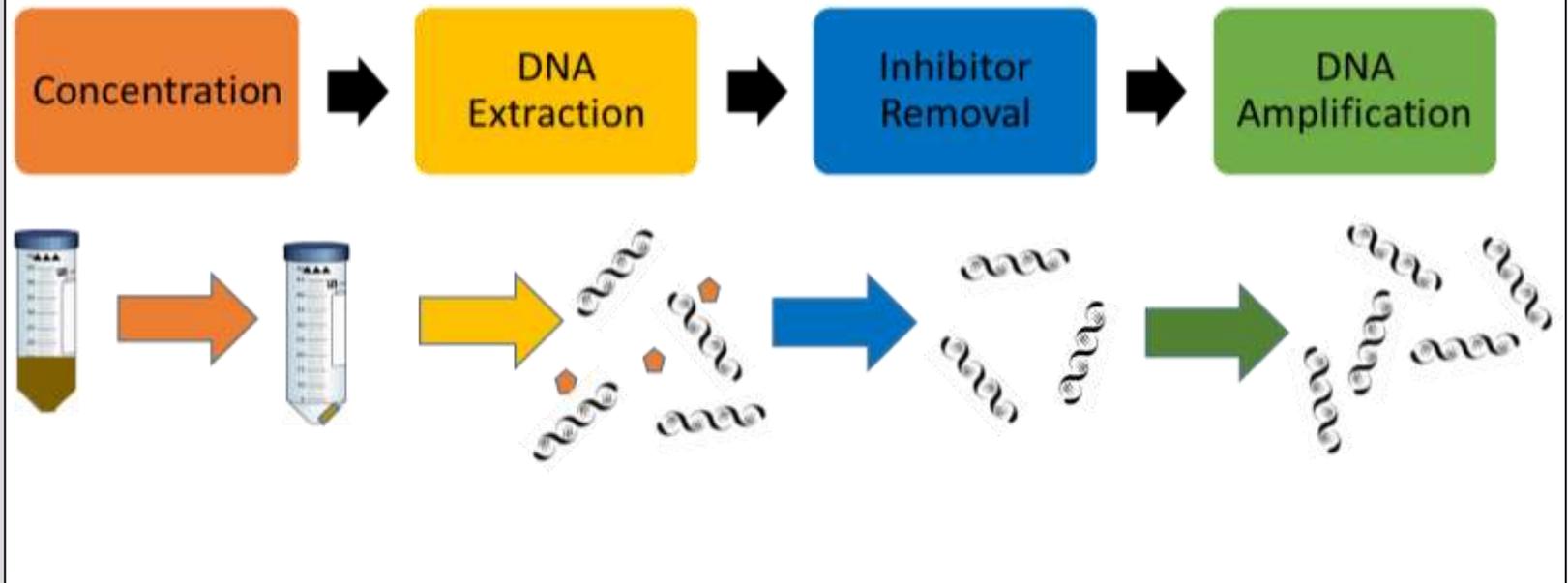


# Benefits of eDNA detection

- Detect last few individuals after control
- Detect first individuals on invasion front
- Monitor areas thought to be free of Nile monitors
- Confirm reported sightings
- Use in remote areas where other monitoring efforts are costly and time-consuming



# Process of eDNA capture and detection



# Primer and qPCR Optimization

- Primers designed to amplify region of DNA specific to Nile monitor
  - BLAST (Basic Local Alignment Search Tool)
  - Tissue derived DNA
  - Tested against tissue of closely related species (i.e. *Varanus salvator*)



# Captive Nile monitors – FL field station



# Time Trials

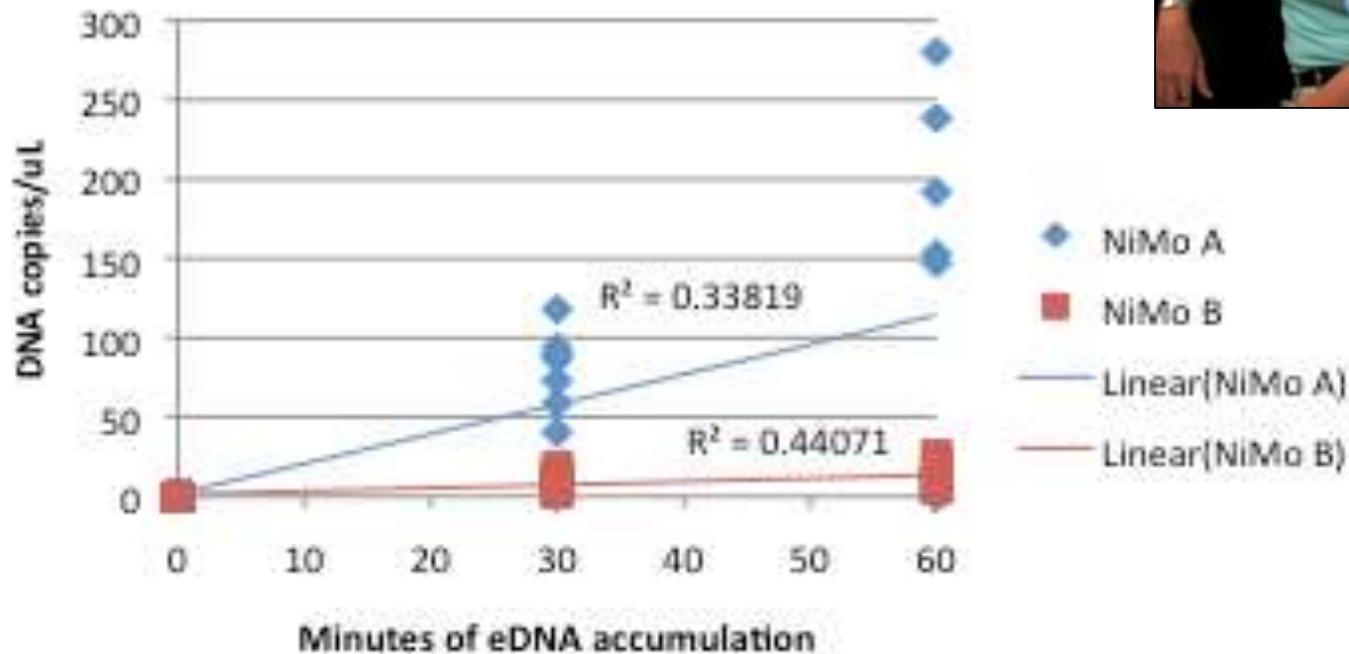
- 2 Nile monitors used (A&B)
- Detection
  - Time zero water sampled
  - Nile monitor placed in water
  - Water collected at 30 mins and 1 hour (3 reps)
  - Monitors removed
- Degradation
  - Water left out for 3 weeks
  - Samples collected on days 1,3,7,11,14,18, 21 (3 reps)



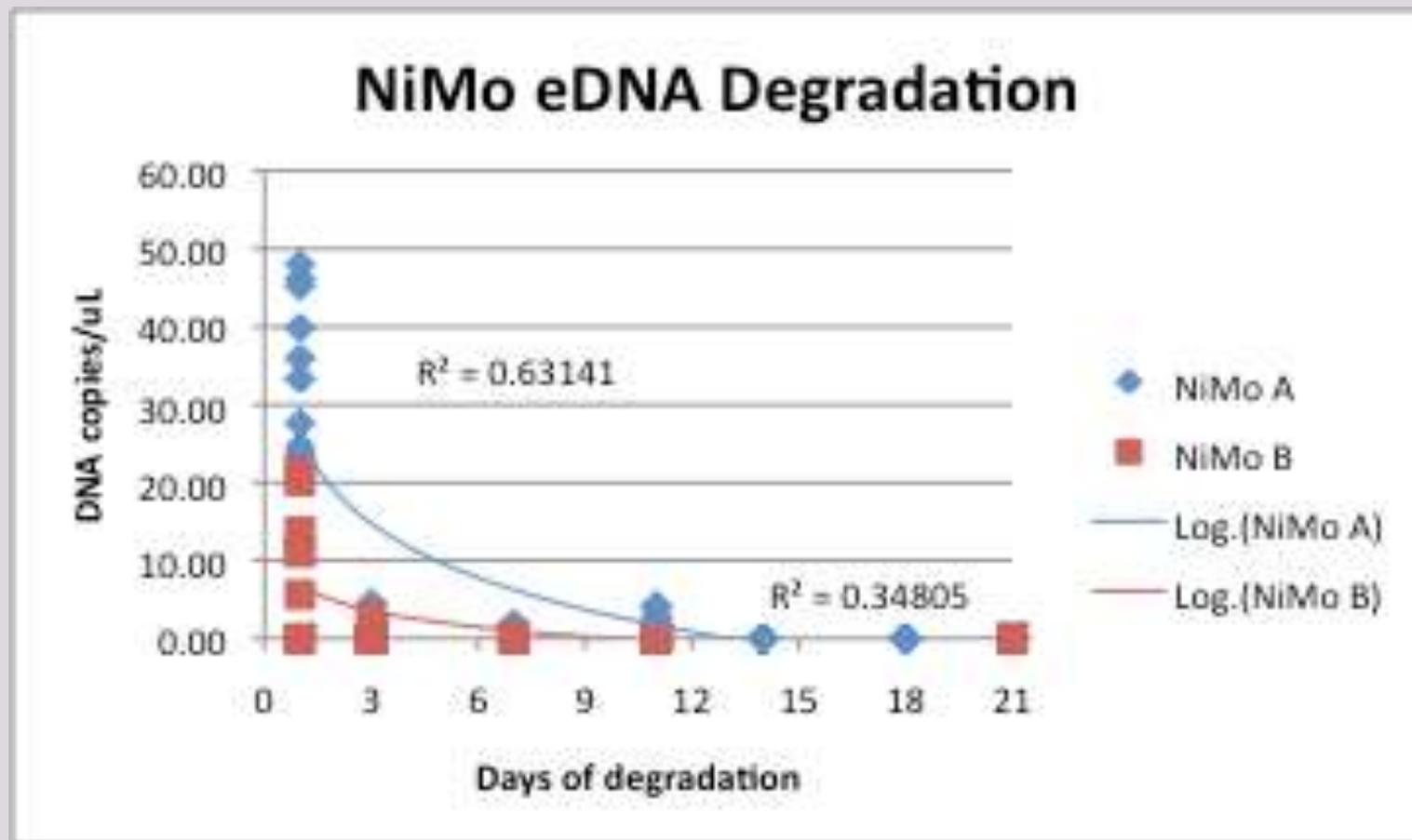
# Lab Results - Detection



## NiMo eDNA Accumulation



# Lab Results - Degradation



# Field Test



# Future Direction

- Analyze field samples collected along transects
- Develop surveillance sampling/analysis methods to monitor invasion and elimination efforts

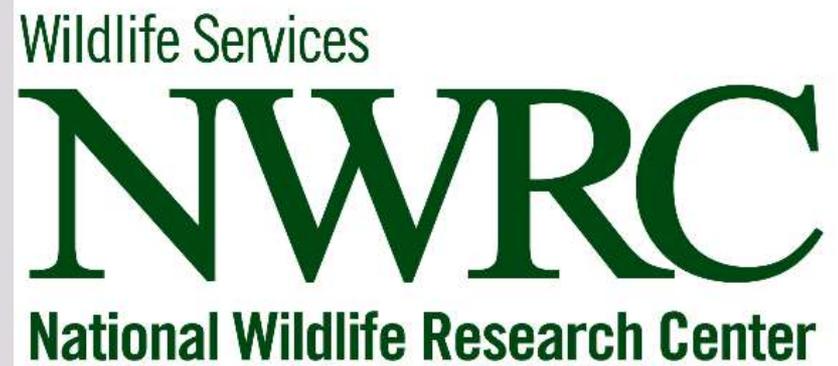


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Questions?

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