Wild Vision Systems

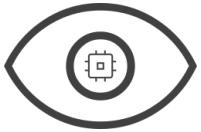
# Smart traps for the control and monitoring of black and white tegus and other invasive animals

*Everglades Invasive Species Summit*

Davie, FL - July 2023

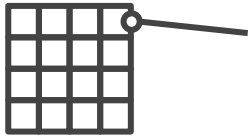
# What is Smart Trapping?

Leveraging technology to autonomously and selectively capture wildlife.



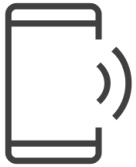
**AI:**
Computer Vision

Watch for the desired target animal



**Trapping:**
Traditional Live-capture

Capture target when identified



**IoT:**
Remote Management

Send notifications; respond to commands

**Analytics:**
Data Platform

Collect data about captures

**AI:**
Computer Vision

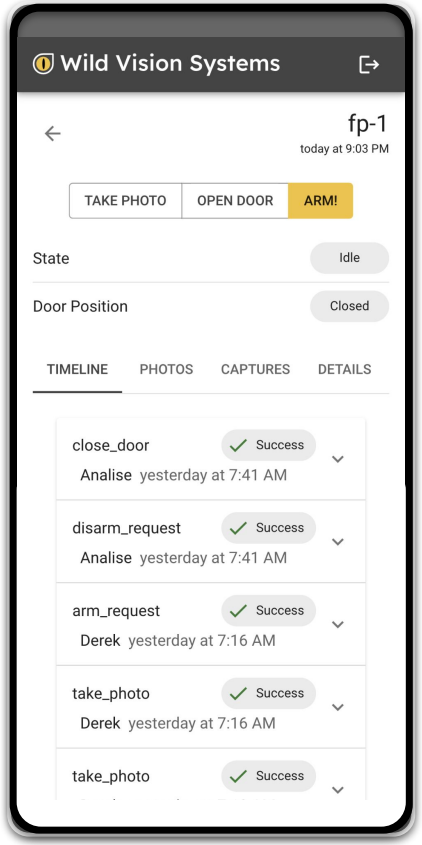
- ➔ Trap *knows* what it's looking at
- ➔ Target *specific* species
- ➔ Limit bycatch
- ➔ Gather data about other species

**Trapping:**
Traditional Live-capture

- ➔ Easy to adopt
- ➔ Familiar approaches/equipment
  - ◆ Adaptable to many trap styles
  - ◆ Drift Fences
  - ◆ Baits & Lures
  - ◆ Trap placement
- ➔ Proven animal safety track records

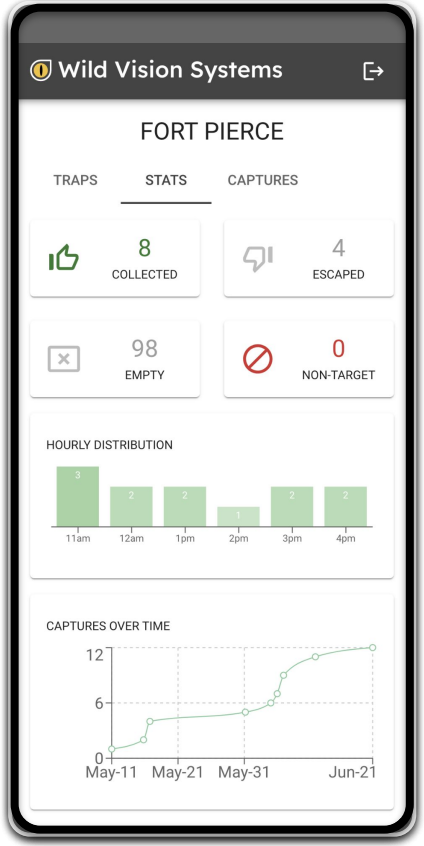
**IoT:**
Remote Management

- ➔ Remote control and monitoring
- ➔ Real-time notifications of captures
- ➔ Cell or even satellite connectivity
- ➔ Schedulable
- ➔ Remote updates



**Analytics:**
Data Platform

- ➔ Track progress
- ➔ Estimate populations
- ➔ Inform strategy
- ➔ Evaluate trap placement
- ➔ Improve AI



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# What are the advantages?

Effective @ landscape-scale

## Reduce Labor

- Only visit a trap when it catches your target

  **and for routine re-baiting and inspections*
- **Impact multiplier**: cover more ground with less work!

## Limit Negative Impacts

- Only trigger on your target animals
- Vulnerable species: less disruption
- Immediately release non-targets remotely
- Ecosystem: reduce visits to sensitive areas

## Increase Uptime

- **Good**
  - Armed when targets are active
- **Bad**:
  - Armed when they aren't active
  - When non-targets are active
- Traps with bycatch aren't "up" until removed
- Schedule arming on Sunday mornings


## Improve Data Collection

- Know exact times of capture
- Impact of weather on captures
- Detect populations of other species
- Inform strategy / trap placement
- Instantaneous reporting
- Real-time Analytics
- Integrations with national databases
- Export data



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## Low-density & Remote Sites

- Autonomous operation
- Operate where labor costs can’t be justified
- Continuous pressure on populations
- Perfect for early detection, rapid response
- Detection-only modes of operation

## Continuously Improve

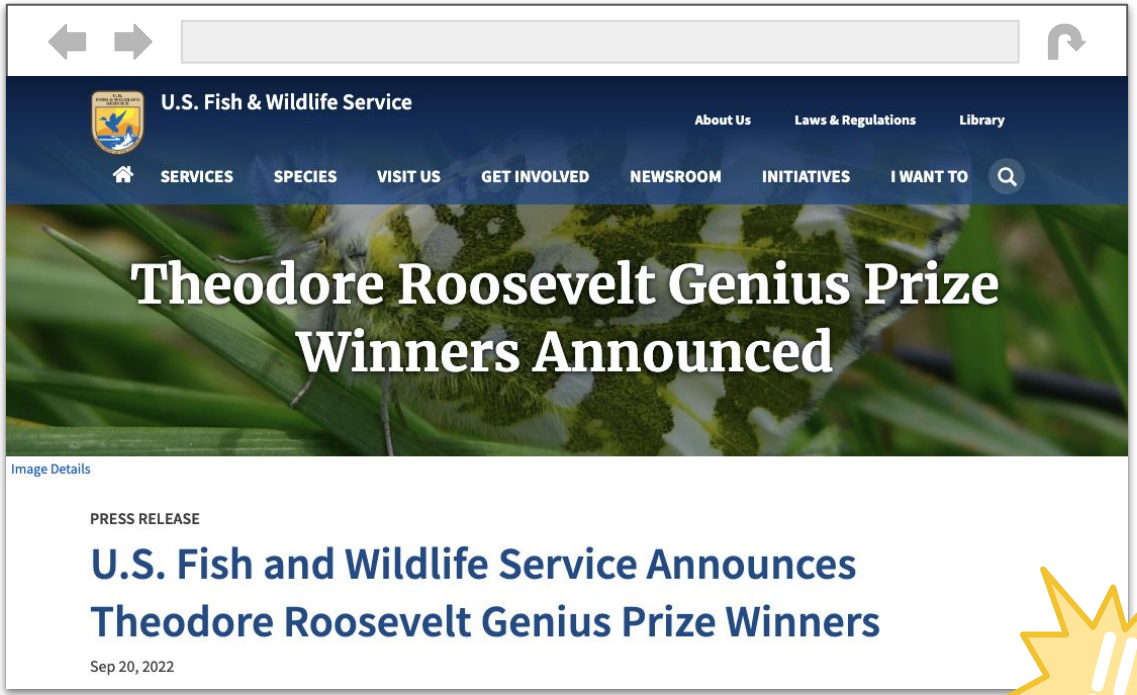
- Make changes mid-season
- AI updates
- Respond to analytics in real-time
- Software updates
- Application improvements

# Scenarios

- ➔ Know how long an animal has been in a trap
- ➔ Open traps on Sundays
- ➔ Only visit x% of traps for any given site-visit
- ➔ Place a trap on a remote tree island
- ➔ Leave a trap in “monitoring” mode
- ➔ Bycatch occupied traps? How much time are you losing?

# Our Prototypes

Beta-testing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# Tegu Traps




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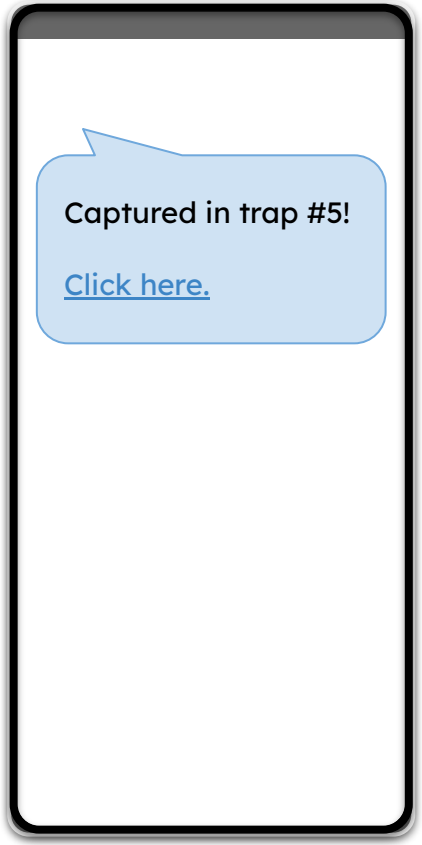
## App Walk Through

Captures!

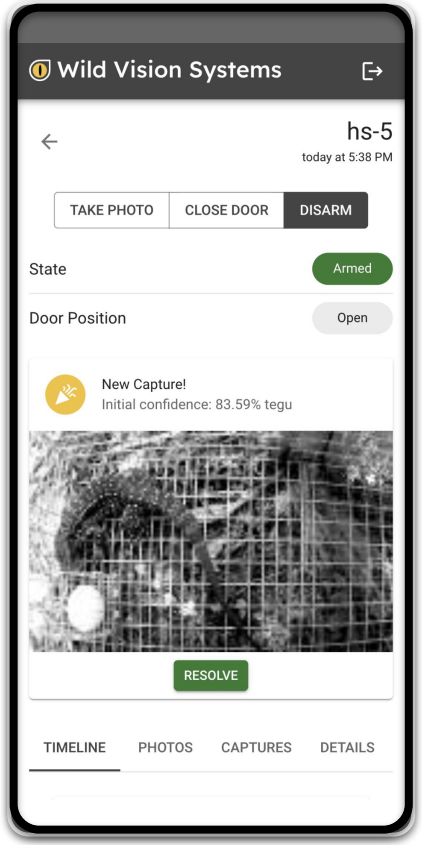
➔ Receive a text notification



## App Walk Through

Captures!

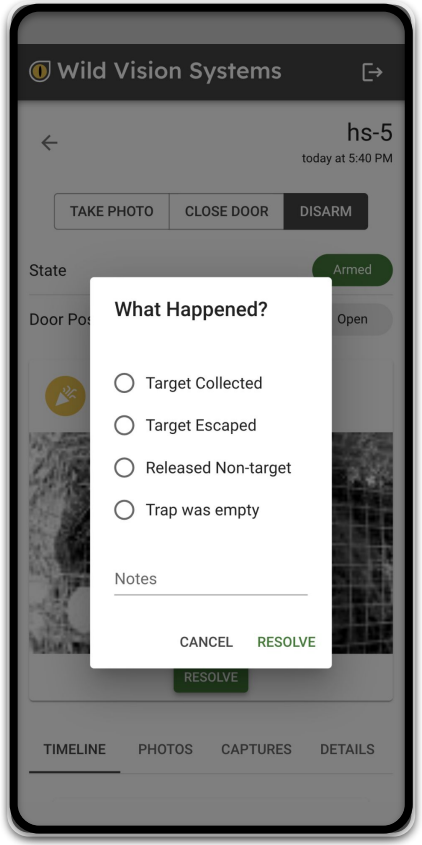
- ➔ Receive a text notification
- ➔ Review the capture



## App Walk Through

Captures!

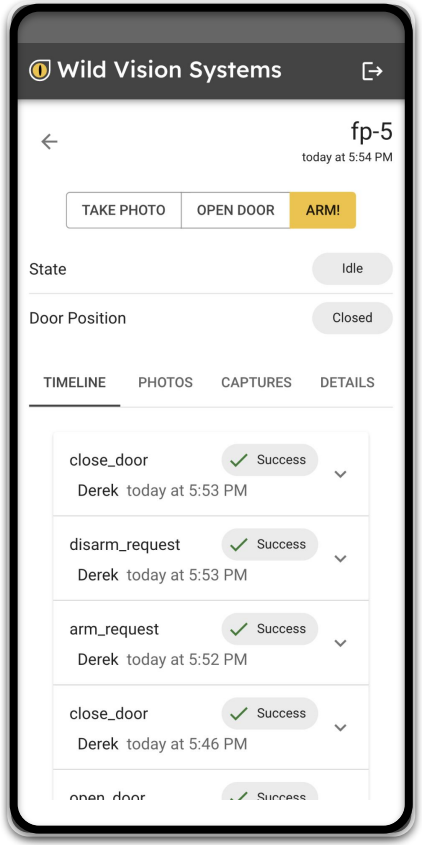
- ➔ Receive a text notification
- ➔ Review the capture
- ➔ Resolve the capture and rearm



## App Walk Through

Remote Control

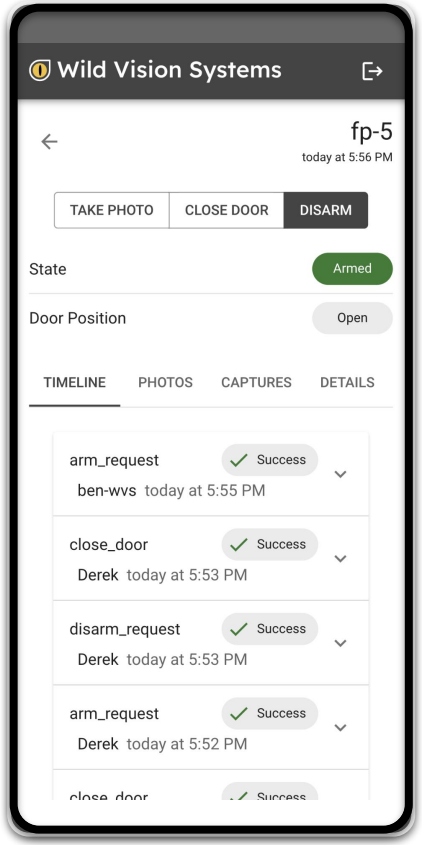
➔ Arm



## App Walk Through

Remote Control

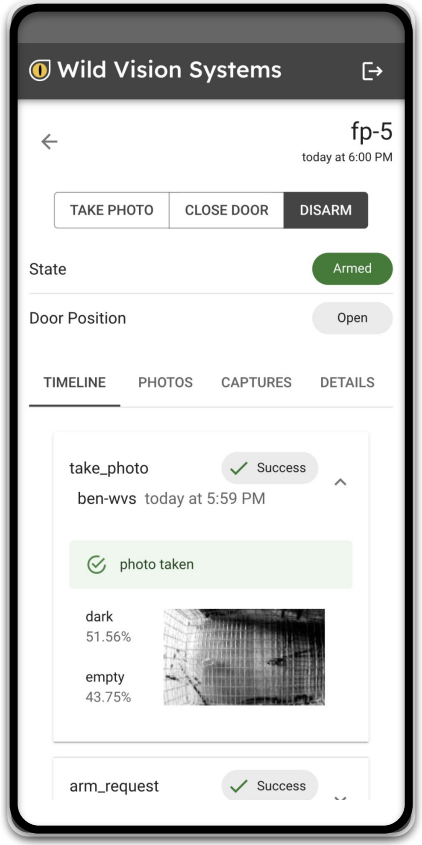
- Arm
- Disarm
- Open/Close



## App Walk Through

Remote Control

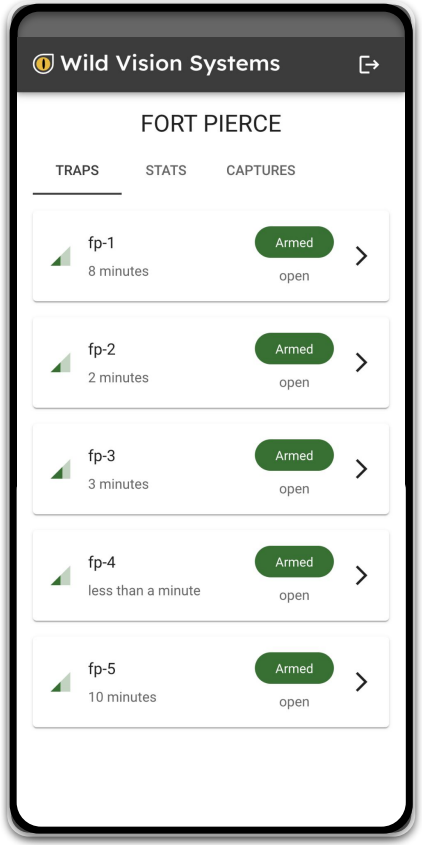
- Arm
- Disarm
- Open/Close
- Take Photo



## App Walk Through

Data

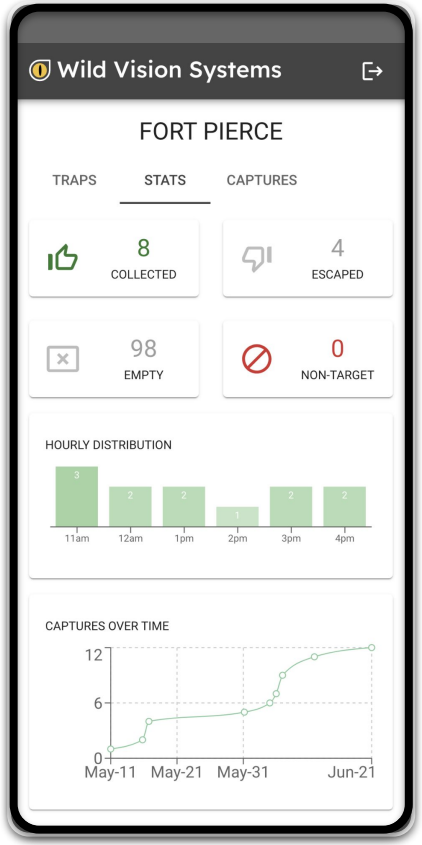
➔ List all traps in a given group (site)



## App Walk Through

Data

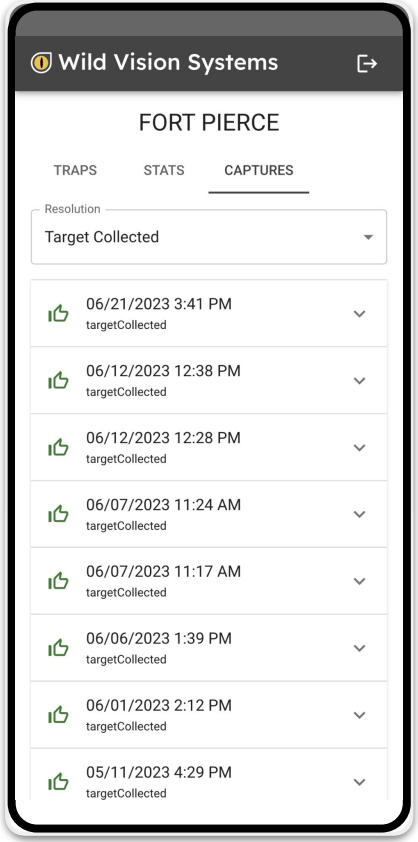
- List all traps in a given group (site)
- View statistics for a group



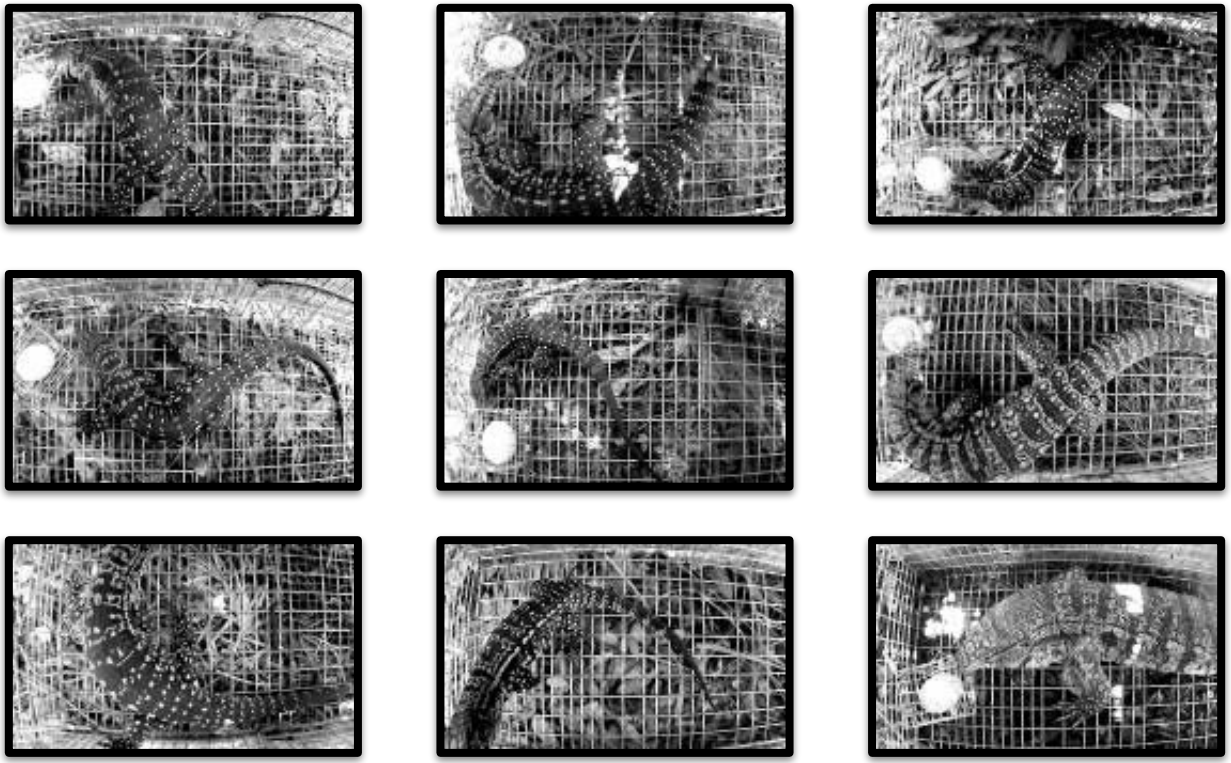
## App Walk Through

Data

- ➔ List all traps in a given group (site)
- ➔ View statistics for a group
- ➔ See your history of captures



# Captured Tegus



# Field Study with UF

Comparison study with smart and traditional traps

First field deployment of smart traps!

## Objectives

*Quantify and compare efficacy, effort and cost*

- Captures per unit effort (tegus/trap nights)
- Uptime (time trap is open and armed)
- Effort (staff time)
- Cost

## Site

**UF Indian River Research and Education Center**
Fort Pierce, St. Lucie County

*May - October 2023*

## Study Design

- 10 trap pairs
- Captive bait: single egg in wire cages
- Traps covered with shade cloth
- Traditional: Havahart 1079
- Smart Prototypes: Havahart 1085 Easyset
    - Improving AI Model over time

## Data Collection

- Effort: time spent checking traps
- Number of tegus captured
- Number of bycatch by species
- Cost to operate the trap line

# Preliminary Results

| | Smart Traps | Traditional Traps |
|---|---|---|
| Total # of tegus captured | 12* | 0 |
| Total # of bycatch captured | 0 | 10 |
| Combined CPUE** | 0.040 | 0 |
| Cost Estimate | tbd | tbd |
| Effort (staff time) | tbd | tbd |

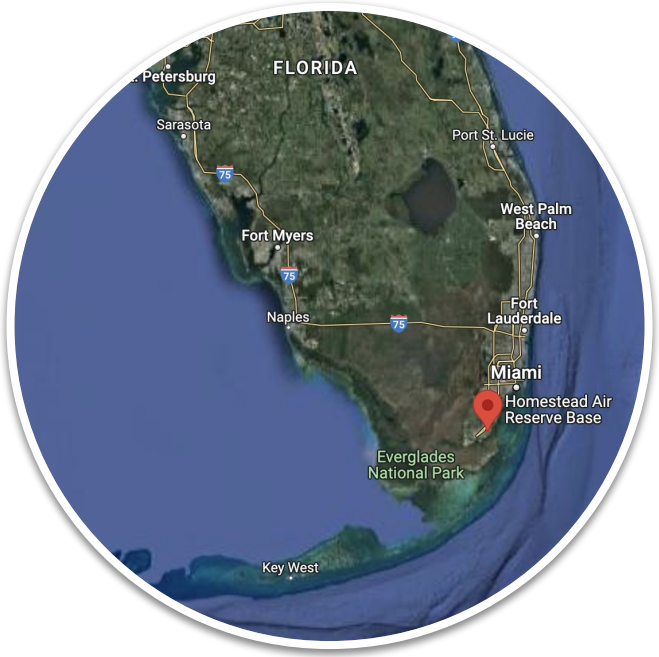
*includes 4 early juvenile escapes
**total # tegus combined / total # trap nights combined

## Challenges and Solutions

- False positives on empty traps
  - Improving model
  - Shade cloth
- Juvenile tegus escaping
  - Added additional hardware cloth
- Ant infestation
  - Considering deterrents and new designs
- Racoons flipping traps
  - Trap stabilization
- Power supply from solar to battery
  - Single occurrence

# What’s Next

More trials...




# Additional Locations

## Homestead Air Reserve Base

USDA-APHIS

*Traps currently deployed and catching tegus.*

## Additional Applications

**Maine Coastal Islands National Wildlife Refuge**

USFWS

Garter snakes

...preying on eggs and chicks of:

- Leach's Storm Petrels
- Arctic & Common Terns
- Roseate Terns

*potential for other animals beyond invasive species*

Photo courtesy of Eric Tillman, USDA-APHIS

## Breakout Session Tomorrow

@ 9:30am

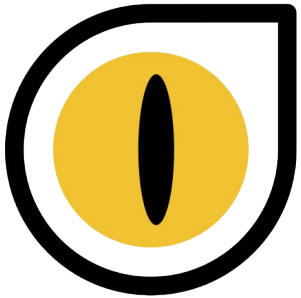
- Live demo
- Q&A
- Discussion

# Thank you!

## Huge thanks to…

Melissa Miller, Jenna Cole, Kelly McCaffrey, and team **@ UF Croc Docs**

Bryan Kluever, Eric Tillman, Ben Stone, Aaron **@ USDA APHIS**



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