

RESPONSE OF NON-TARGET ANIMALS TO A LARGE REPTILE LIVE TRAP AND TRAILING BEHAVIOR OF INVASIVE REPTILES

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TOPICS

- Why trap pythons
- Why build a better “mouse” trap
- Study areas (Phases 1-3)
- Techniques
- Results
- Future - The potential future of live trapping

WHY TRAP PYTHON

AMPHIBIAN AND REPTILE DISEASES

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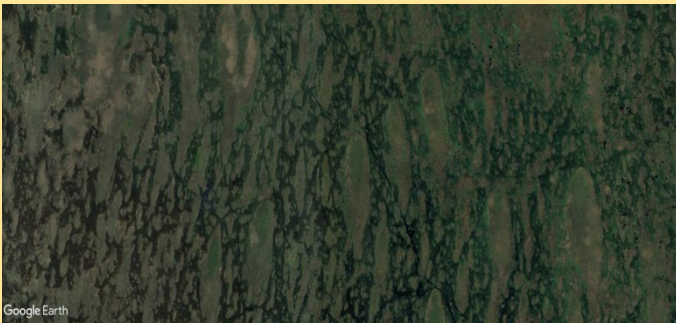
**Spillover of Pentastome Parasites from Invasive
Burmese Pythons (*Python bivittatus*) to Pygmy
Rattlesnakes (*Sistrurus miliarius*), Extending Parasite
Range in Florida, USA**

WHY BUILD A BETTER “MOUSE” TRAP

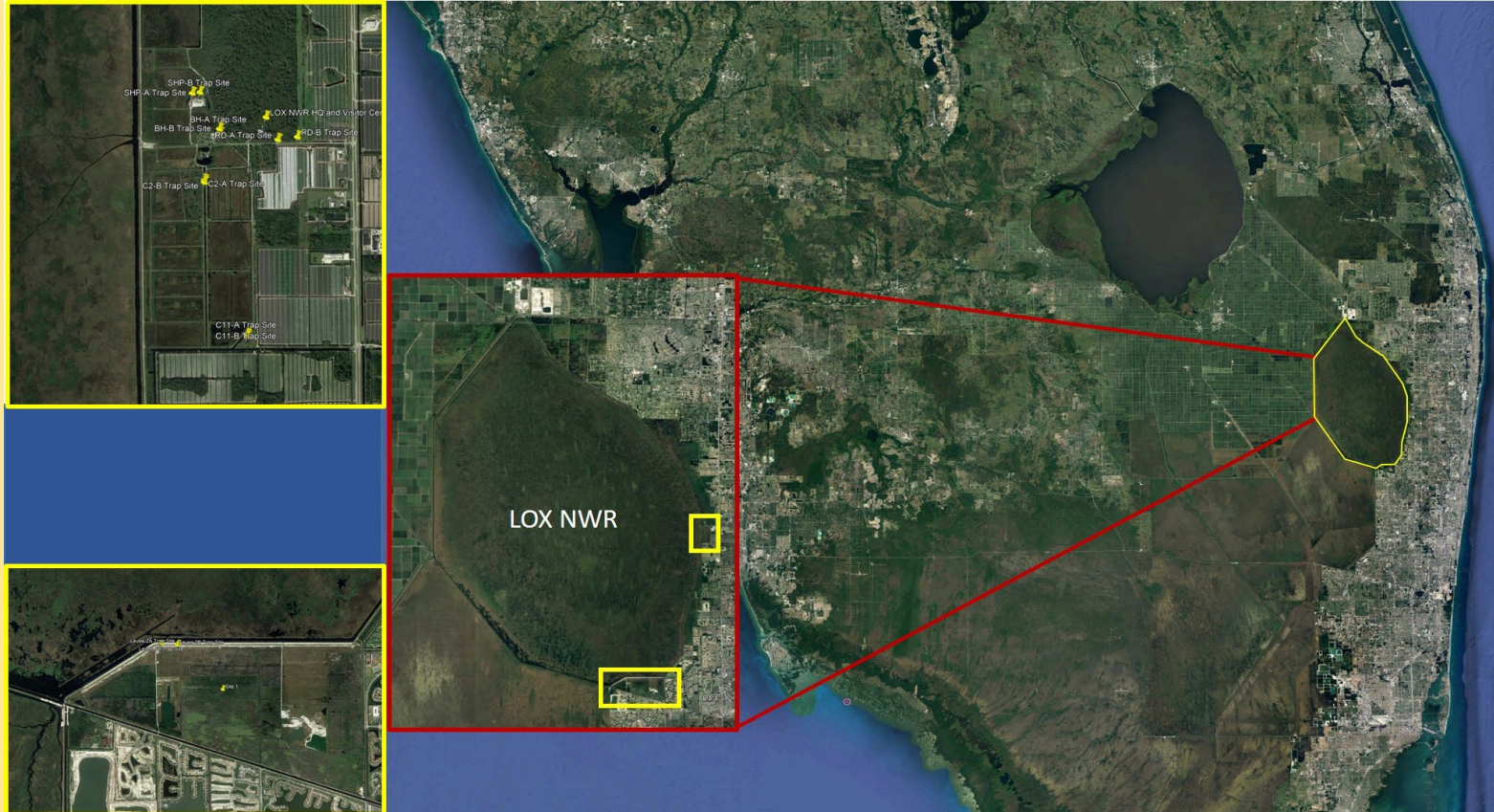
- Live trapping is among set of tools commonly used to remove unwanted wildlife populations, however has the potential for non-target captures.
- The limitation of large scale trapping is the need for daily trap checks due to non-target species capture, and “...labor is typically the most expensive component of trapping budgets and fewer trap checks per unit time would greatly reduce costs associated with operational python trapping.” (Reed et al. 2011).

WHY BUILD A BETTER “MOUSE” TRAP

- The vastness and relative inaccessibility of the Everglades, essentially precludes wide ranging use of traps to remove unwanted non-native species due the need to physically check traps daily.
- Having a trap that captures only the intended species, as well as having a means for remotely monitoring trap status, greatly reduces issues related to the above.



STUDY AREA AND COLLABORATORS



- John Humphrey**, Wildlife Biologist, USDA\NWRC – FL Field Station
- Dr. Rebekah Gibble**, Senior Wildlife Biologist, LOX NWR
- Andrew Eastwick**, Wildlife Biologist, LOX NWR
- Melissa Juntunen**, Wildlife Biologist, LOX NWR
- Garrett Wong**, Intern, LOX NWR

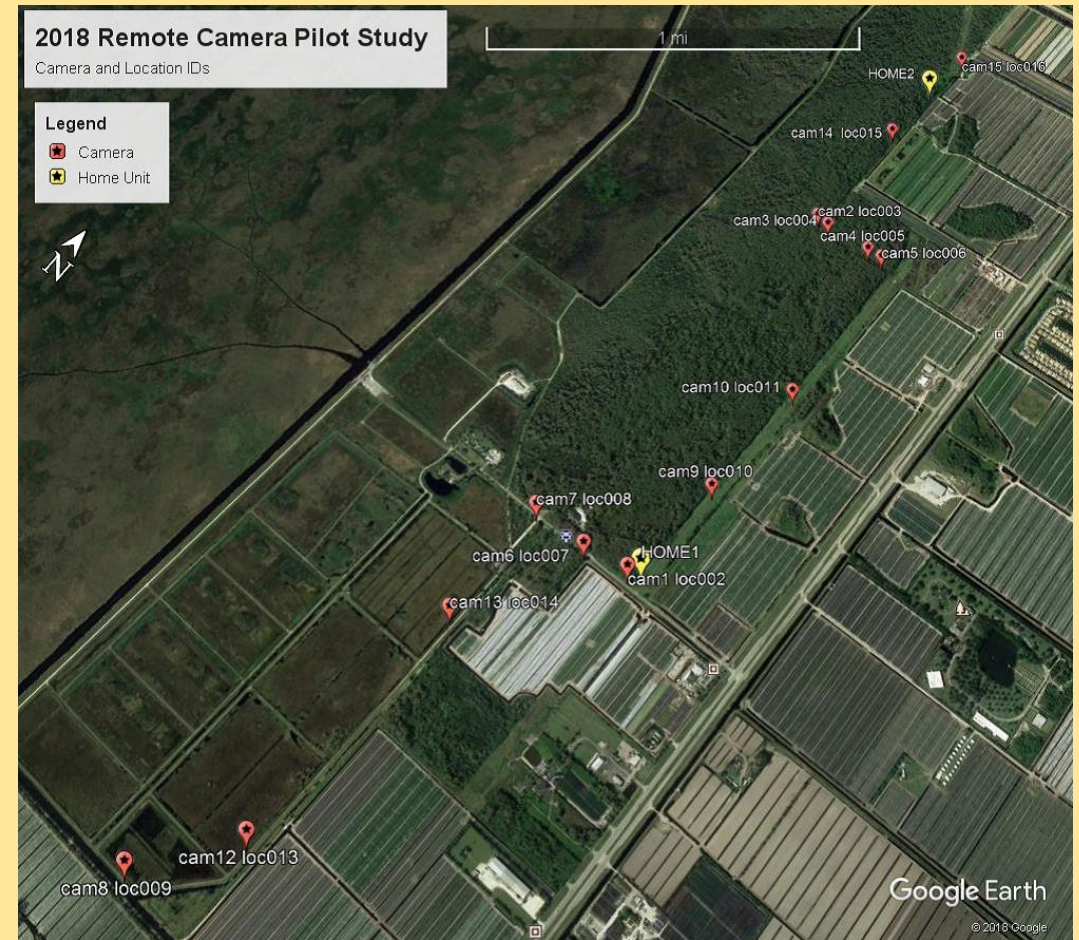
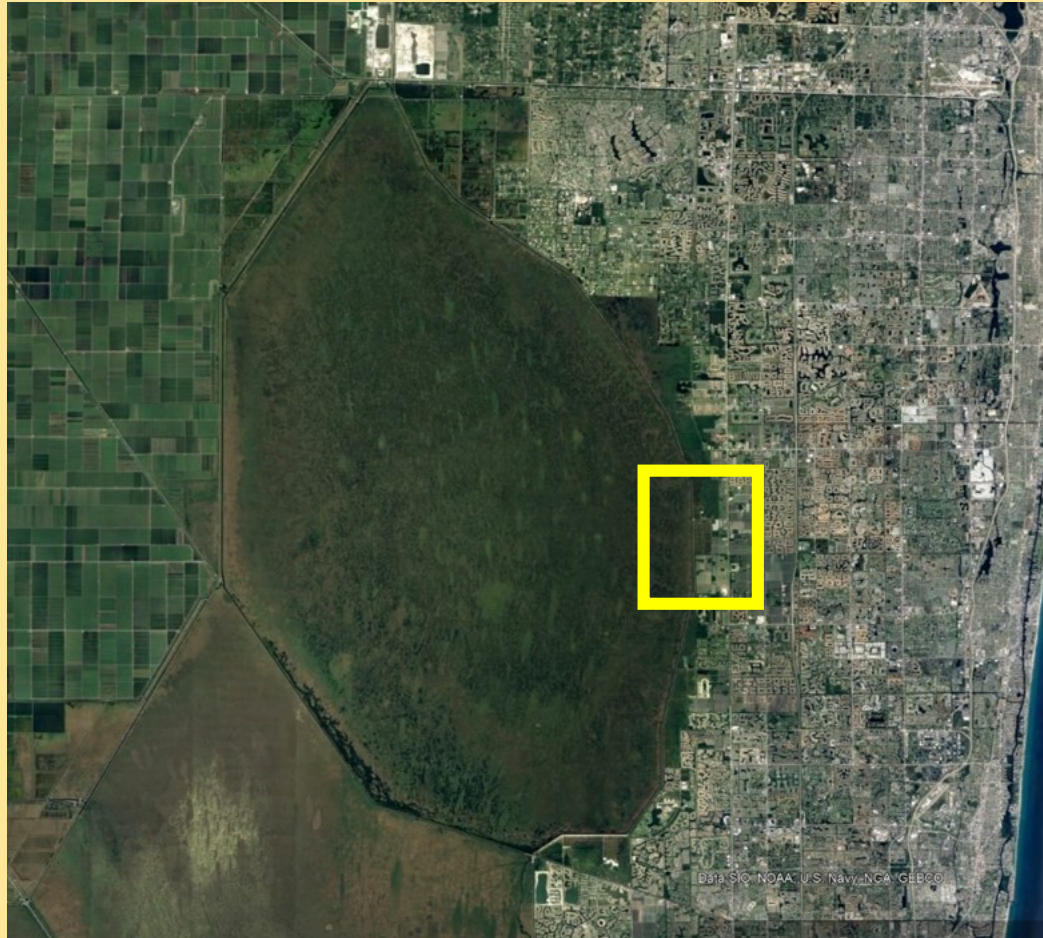
STUDY AREA – Phase 1, ~ 3 months July thru October 2017 (51 days)*



STUDY AREA – Phase 2, January thru March 2018 (61 days)



STUDY AREA – Phase 3, Remote Camera Pilot Study



TECHNIQUES – Trap Development

- Prior live trap designs for pythons used live bait which required frequent maintenance
- Non-target species capture possible and problematic for remote trapping
- Burmese pythons unique in size and weight at year 1 relative to all but the most mature/largest native snake species
- 2010 two conjoined Havahart live traps tested at NWRC FL Field Station in drift fence pen to determine reaction to triggering trap door on body
- Mocked up designed, full size trap produced by Tomahawk Live Trap Co. for testing

TECHNIQUES – Trap Development



TECHNIQUES – Trap Development

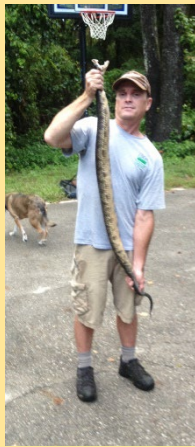
- Tomahawk live trap modified with 2 spring loaded trip pans separated by 60cm (24"). Trap 152cm x 20cm x 20cm (5'x 9"x9")
- Trap triggered ONLY with simultaneous depression of both pans, otherwise trap remains open
- Trap configurable by Mfgr. for other long bodied species per patent specs (trip pan weight, pan separation distance, trap mesh and overall size, etc.)



TECHNIQUES – Trap Development

- Patent issued for Large Reptile Trap (LRT) due to unique design in 2013
- Tested on largest available wild native species, including three 152cm+ (60”) water moccasins, and three approximate 152cm yellow rat snakes in a drift fence corral
- No traps were triggered with native species snakes in captive trials
- Field validation needed of patented design to exclude non-target native wildlife species. Study conducted in collaboration with USFWS A.R.M. Loxahatchee N.W.R. staff 2017-2018, two 3 month phases

TECHNIQUES – Trap Development



TECHNIQUES – Non-target trapping validation study

- Paired LRT traps separated by 20 m and monitored with Reconyx game cameras for animal activity and trap status (open/closed)
- Dark green plastic trap covers provided by Tomahawk Live Trap Co. used for shading and assisting in camouflaging trap
- One of each paired traps baited with sardine can, fish based dry cat food, and bird seed to attract greatest variety of non-target species (python prey “Golden Corral” effect)
- Memory cards swapped weekly and traps closed over weekends

TECHNIQUES – Non-target trapping validation study



RESULTS – Non-target interactions and captures

- Of 1120 Trap days, there were 244 picture days where camera traps caught images of animals visiting traps
- A total of 990 animals were caught on game camera in individual events, delimited by a 10 minute or greater interval without activity.
- 11 different identifiable types of animals seen in, on, or under trap

Raccoon	Opossum	Armadillo	Rat	Mouse	Rabbit	Squirrel	Deer M/F	Bobcat	Bird	Lizard	Total
469	130	84	20	10	5	2	6	16	5	0	990

RESULTS – Non-target interactions and captures



RESULTS – Non-target interactions and captures

- Of 990 animals seen at trap, only 4 opossums were caught in two traps determined to have not been appropriately maintained
- The data supports that the Large Reptile Trap (LRT) operates as patently designed in excluding capture of non-target animals to which the traps were baited for
- Only long and heavy body, non-native species such as the Burmese Python, appear to trigger the LRT, with the potential exception of American alligators which were not seen on camera during the study

TECHNIQUES – REMOTE TRAP CHECK VIA NOVEL CAMERA SYSTEM

- Novel camera system, uses mesh networking to link up to 15 cameras to one cellular base camera
- Mfgr. specs camera range between ¼ to 1 mile dependent on line of sight
- 8 cameras and two home units tested along with solar charging option

The screenshot displays the CuddeLink website interface. At the top, there is a navigation bar with links for CUDELINK, PRODUCTS, SHOP, PHOTOS, CUDDEBACKER, SUPPORT, PRODUCT REGISTRATION, and CELL MANAGEMENT. Below the navigation bar, a banner reads "CHECK ONE, CHECK THEM ALL" and "IMAGES FROM UP TO 16 CAMERAS COLLECTED ON ONE CAMERA". The main content area features a large image of a rural landscape with a network of cameras connected by dotted lines. A circular inset shows a close-up of a camera mounted on a tree. To the right, a text box titled "HOW IT WORKS" lists key features: cameras connect to a single home camera, range is up to 1/2 mile in woods, cameras daisy chain, and they can operate for up to 3 months. Below this, a section titled "WHY CUDELINK IS RIGHT FOR YOU" lists benefits such as convenience, frequency, no intrusion, no sound, no human scent, no fees, and cell remote access.

CuddeLink

CHECK ONE, CHECK THEM ALL
IMAGES FROM UP TO 16 CAMERAS COLLECTED ON ONE CAMERA

THE EASIEST & FASTEST WAY TO CHECK MULTIPLE CAMERAS

HOW IT WORKS

- Cameras automatically connect and send images from up to 15 Remote cameras to 1 Home camera. **SO INSTEAD OF CHECKING MULTIPLE CAMERAS, YOU ONLY CHECK 1.**
- **CAMERA-TO-CAMERA RANGE IS UP TO ½ MILE IN THE WOODS** (½ mile is typical) and over 1 mile in open terrain.
- Camera's will automatically daisy chain to extend their range, allowing camera deployment on property **FROM 40 ACRES TO OVER 1000 ACRES.**
- Cameras can operate for up to 3 months on their batteries. **ALLOWING YOU MONTHS WITHOUT CHECKING THE CAMERA OR DISTURBING GAME.** Auxiliary batteries and solar power is available to extend battery life indefinitely.
- To maximize performance **CUDELINK® TRANSMITS HIGH QUALITY THUMBNAIL IMAGES.** The original full resolution images are retained on the Remote camera's SD card. See inside back cover for thumbnail photo examples.

WHY CUDELINK IS RIGHT FOR YOU

CONVENIENCE – Home cameras can be placed close to deer camp or near property entry points, making it fast and simple to collect trail camera photos.

FREQUENCY – Since you only have to check 1 camera and this camera can be conveniently placed, you are able to check trail camera photos more often.

NO INTRUSION – CuddeLink® allows you to check trail cameras photos without disrupting your property, deer and/or other game animals.

NO SOUND – If you don't intrude, you don't startle the animals with sound.

NO HUMAN SCENT – If you don't intrude, you don't leave any human scent.

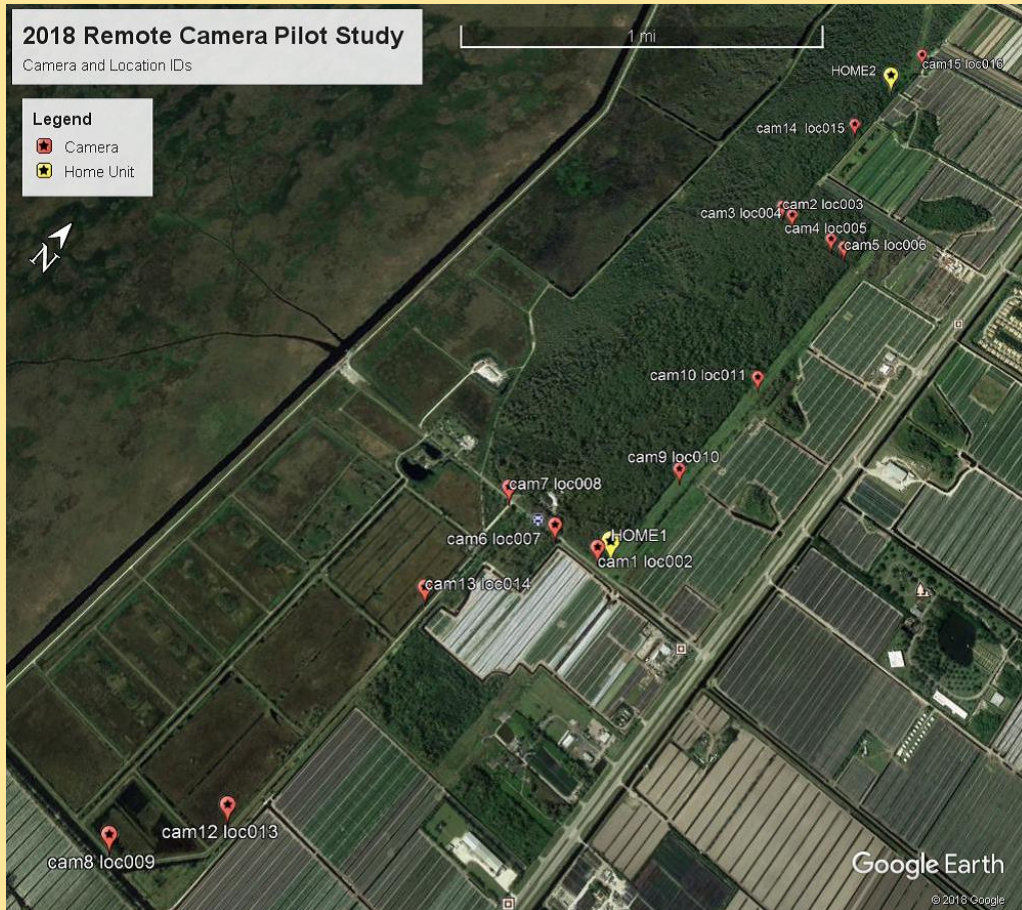
NO FEES – CuddeLink® proprietary wireless technology does not have a monthly fee.

CELL REMOTE ACCESS – CuddeLink® Cell allows images to be emailed on 1 cell plan. Instead of paying for multiple cell phone plans you only need 1 plan for up to 16 cameras (CuddeLink® Cell functions independent of your personal cell phone provider).

TECHNIQUES – Remote Trap Monitoring via Novel Camera System

- Traps located at 8 sites in areas along powerline easement and canal levee to E and N of HQ Visitor Center, areas with greater tree coverage to test camera communication capability
- Traps baited with sardines or dog food, cameras set to email photos of trap status (open/closed) at 6am and 3pm
- Staff checked closed traps, and swapped memory cards weekly for 3 months with data archived for analysis

TECHNIQUES – Remote Trap Monitoring via Novel Camera System



RESULTS – Remote Trap Monitoring via Novel Camera System

- Cameras communicated per Mfgr Specs with open line of sight
- Maximum functional distance less than 0.5 mi, with most effective being less than 0.2
- Vegetation and sloping landscapes greatly impacted communication between cameras
- Solar charging of units limited without full sun exposure, considerations for tree island placement

FUTURE – Python Chemical Ecology (Trap lures?)

- Collaboration with Dr. M. Rockwell Parker since, chemical communication expert, James Madison University, VA since 2014
- Male pythons will trail females in a Y-maze and show sex-specific behaviors that are connected (Richard et al. 2019 *Integrative Zoology*)
- Snakes rely on chemical cues to track mates in their environment, and our work showed that female skin lipid trails might be useful in leading males toward traps

FUTURE – Python Chemical Ecology (Trap lure?)



FUTURE – Python Chemical Ecology (Trap lures?)

INTEGRATIVE ZOOLOGY

ORIGINAL ARTICLE

Male Burmese pythons follow female scent trails and show sex-specific behaviors

Shannon A. Richard, Eric A. Tillman, John S. Humphrey, Michael L. Avery, M. Rockwell Parker 

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- See Rocky's poster on his work at Wednesday Poster Session.

FUTURE RESEARCH - Test of “Trap System” to capture pythons

“Assessment of Python Trapping within the Everglades Region Using a Patented Large Reptile Trap”

- Funded by FWC Non-Native Wildlife Fish and Wildlife Program Research Grant, begins July 2019
- Document interactions and captures of pythons with the LRT
- Document interactions and captures of non-target animals with the LRT.
- Evaluate a novel game camera system to remotely monitor traps where cellular signals permit.

FUTURE – Test of “Trap System” to capture pythons

- Combination of LRT trap and CuddeLink Cameras into a “Trap System” to evaluate capture of pythons while excluding non-target animals, remote daily trap status
- Expand number of traps and locations including LOX interior and areas of the Everglades with higher density of pythons
- Collaboration between USDA, USFWS, Florida Fish and Wildlife Conservation Commission (FWC), and UF’s Croc Docs



FUTURE DIRECTIONS – New Traps, New Trapping Regulations

- Evidence from LRT and CuddeLink game camera testing provide evidence for conversations on trapping regulation changes to begin, including options for daily required trap checking
- Need to design traps to eliminate non-target captures
- Live traps monitored remotely reduces labor costs and unnecessary risk of venturing out for physical trap checks
- Trap systems can be used for other species and locations
- Future results may provide support to passively trap pythons at a large scale within the remote Everglades

FIELD ACKNOWLEDGEMENTS

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