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 PYTHONS

Burmese pythons in south Florida consume a wide variety of native wildlife, including endangered species (Greene et al. 2007; Snow et al. 2007; Dove et al. 2011). Severe mammal declines in Everglades (Dorcas et al. 2012; McCleery et al. 2015) preying on wading bird nests (Orzechowski et al. 2019).

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

• 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.

<table>
<thead>
<tr>
<th>Raccoon</th>
<th>Opossum</th>
<th>Armadillo Rat</th>
<th>Mouse</th>
<th>Rabbit</th>
<th>Squirrel</th>
<th>Deer M/F</th>
<th>Bobcat</th>
<th>Bird</th>
<th>Lizard</th>
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<td>84</td>
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<td>10</td>
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<td>2</td>
<td>6</td>
<td>16</td>
<td>5</td>
<td>990</td>
</tr>
</tbody>
</table>
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.
• 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
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 that 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?)

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

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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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