The Everglades Invasive Reptile and Amphibian Monitoring Program (EIRAMP) at the Arthur R. Marshall Loxahatchee National Wildlife Refuge

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Why Florida?

http://agroclimate.org
Why Are We Concerned?

Krysko et al. 2016

- **Introduced Taxa**
- **Established Taxa**

Bar chart showing the number of introduced and established taxa by decade from 1860 to 2015.
Everglades Invasive Reptile and Amphibian Monitoring Program (EIRAMP)

Objectives

• Capability for early detection and rapid response (EDRR) to new invasions

• Evaluate status and trends of nonnative and native species

• Determine effects of invasives to facilitate removal
EIRAMP Methods

- Road-cruising
- Visual Encounter Survey
- Vocalization Surveys at Checkpoints
- Rapid Response
  - Remove nonnatives if possible
EIRAMP History


- Over 3,200 nonnative animals removed
- 1,864 surveys of 28 routes
- 227 opportunistic surveys
- Over 100,000 trap nights
- 1,834 necropsies of 15 species
- 5,670 site surveys
- 496 person-hours of walking surveys
- 176 rapid responses to nonnative reptiles
How long have we been monitoring?

- **LOX West**: March 2011 - Present
- **LOX North East**: May 2012 - Present
# Non-native species found in Loxahatchee NWR

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Number of Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Anole</td>
<td>498</td>
</tr>
<tr>
<td>Cuban Treefrog</td>
<td>416</td>
</tr>
<tr>
<td>Greenhouse Frog</td>
<td>221</td>
</tr>
<tr>
<td>Northern Curly-tailed Lizard</td>
<td>231</td>
</tr>
<tr>
<td>Tropical House Gecko</td>
<td></td>
</tr>
<tr>
<td>Brown Anole</td>
<td></td>
</tr>
<tr>
<td>Green Iguana</td>
<td>198</td>
</tr>
<tr>
<td>Cuban Treefrog</td>
<td></td>
</tr>
<tr>
<td>Marine/Cane Toad</td>
<td>126</td>
</tr>
<tr>
<td>Mediterranean Gecko</td>
<td></td>
</tr>
<tr>
<td>Wild Hog</td>
<td>59</td>
</tr>
<tr>
<td>Indo-Pacific Gecko</td>
<td></td>
</tr>
<tr>
<td>Domestic Cat</td>
<td>34</td>
</tr>
<tr>
<td>Common House Gecko</td>
<td></td>
</tr>
<tr>
<td>Brahminy Blind Snake</td>
<td>22</td>
</tr>
<tr>
<td>Domestic Cat</td>
<td></td>
</tr>
<tr>
<td>Black Rat</td>
<td>8</td>
</tr>
<tr>
<td>Red-eared Slider</td>
<td>8</td>
</tr>
<tr>
<td>Non-native species</td>
<td></td>
</tr>
<tr>
<td>Number of Individuals</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- Red-eared Slider
- Black Rat
- Cuban Knight Anole
- Brahminy Blind Snake
- Common House Gecko
- Domestic Cat
- Wild Hog
- Indo-Pacific Gecko
- Mediterranean Gecko
- Marine/Cane Toad
- Brown Basilisk
- Green Iguana
- Cuban Treefrog
- Greenhouse Frog
- Northern Curly-tailed Lizard
- Tropical House Gecko
- Brown Anole
<table>
<thead>
<tr>
<th></th>
<th>Species</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Burmese Python</td>
<td><em>Python bivittatus</em></td>
</tr>
<tr>
<td>2</td>
<td>Nile Monitor</td>
<td><em>Varanus niloticus</em></td>
</tr>
<tr>
<td>3</td>
<td>Argentine Black and White Tegu</td>
<td><em>Salvator merianae</em></td>
</tr>
</tbody>
</table>
Pythons

- Native to S.E. Asia
- Large, generalist predator
  - Mammals, wading birds, alligators
- High fecundity
- Low probability of detection

https://www.edmaps.org
**Nile Monitors**

- Native to Sub-Saharan Africa
- Large, carnivorous predators
- Variable foraging behavior
- Semi-aquatic
- High fecundity
- LOX concern
- Surveys by FWC and UF

https://www.edmaps.org
Argentine Black and White Tegus

- Native to Brazil, Paraguay, Uruguay and Argentina
- Medium-sized omnivores
- Spread non-native plants
- Egg predators
- Tolerant to cooler temperatures

https://www.edmaps.org
EDRR Success Story

Veiled chameleons outside of LOX

LOX Boundary

Veiled Chameleons Found
EDRR Success Story

Public Awareness Began

Resource Protection & Long-term Management

CONTROL COSTS

TIME

Introduction

Species absent
Small number of localized populations; eradication possible
Rapid increase in distribution and abundance; eradication unlikely
Invasive species widespread and abundant; long-term management aimed at population suppression and resource protection

Prevention
Eradication
Containment
Area Infested

Control Costs
Summary and Implications

- EDRR makes a difference
  - Cost and time effective
  - Outreach

- Continue to monitor LOX
  - Determine impacts, increase monitoring efforts

- Stay vigilant about removal of priority invasives
Acknowledgments