

Occurrence of Non-native Amphibians in Everglades Ecosystems

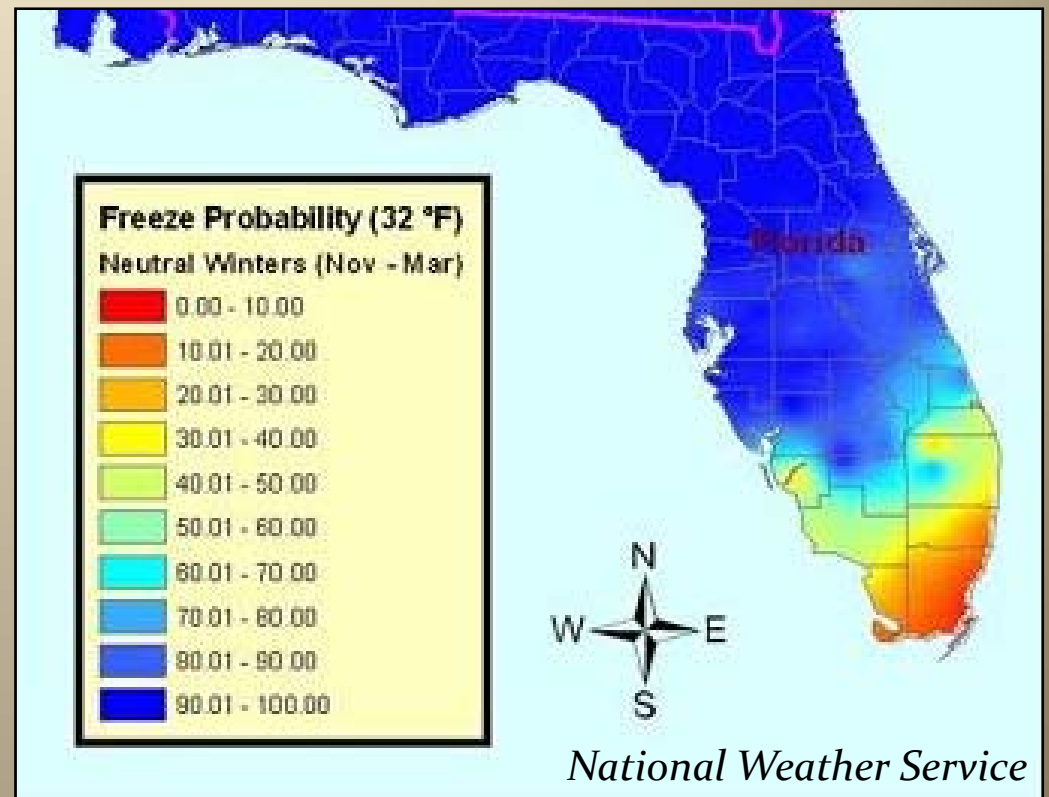


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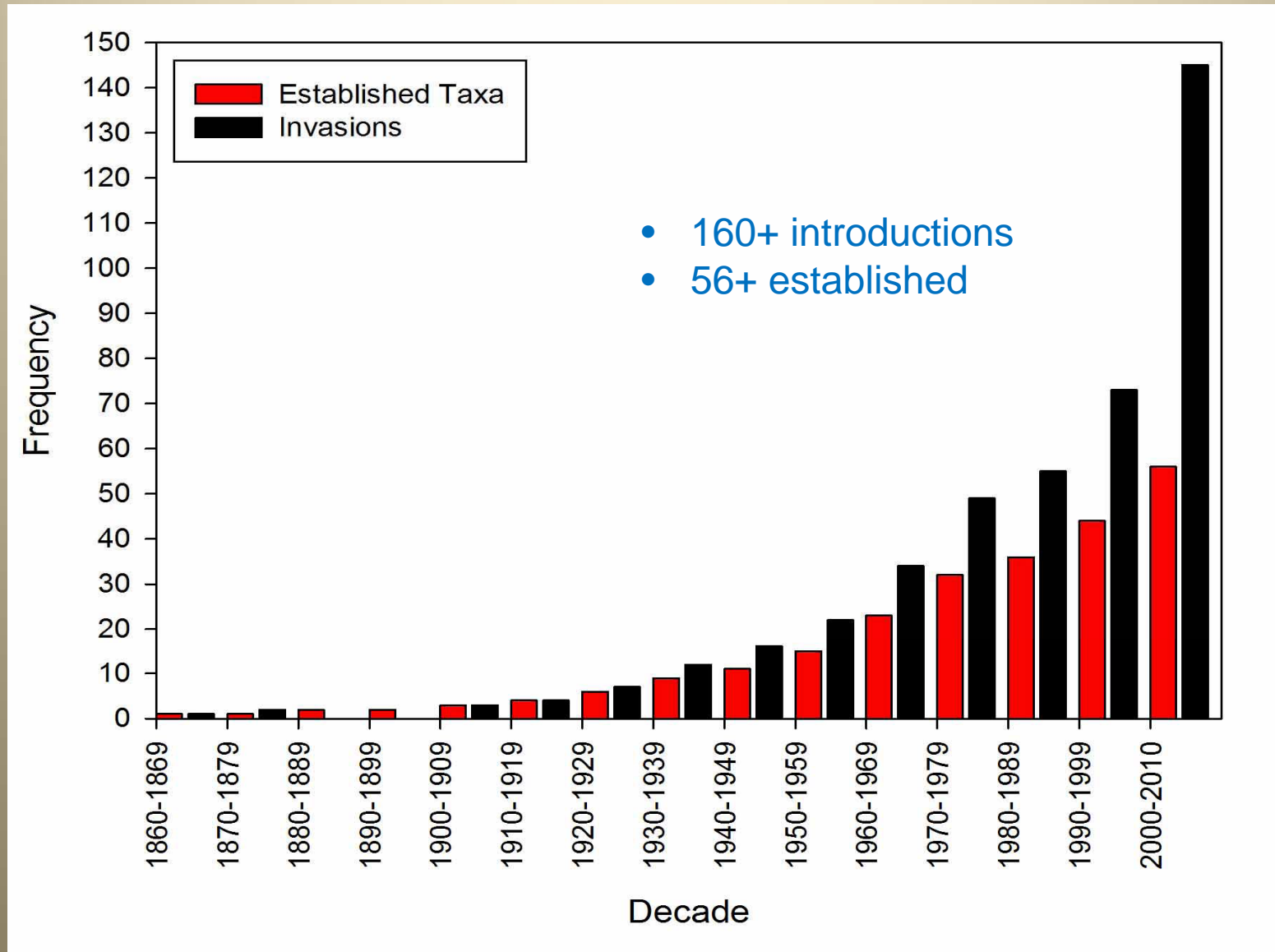


South Florida: An invasive species hotspot

- Subtropical climate
- Multiple ports of entry
- Captive wildlife industry
- Hurricanes
- Geographic isolation = fewer native species



Non-native Reptiles and Amphibians in Florida



Old Invaders

- Small-bodied lizards and frogs
- Insectivores
- Associated with people and disturbed habitat
- Most introduced through cargo



New Invaders

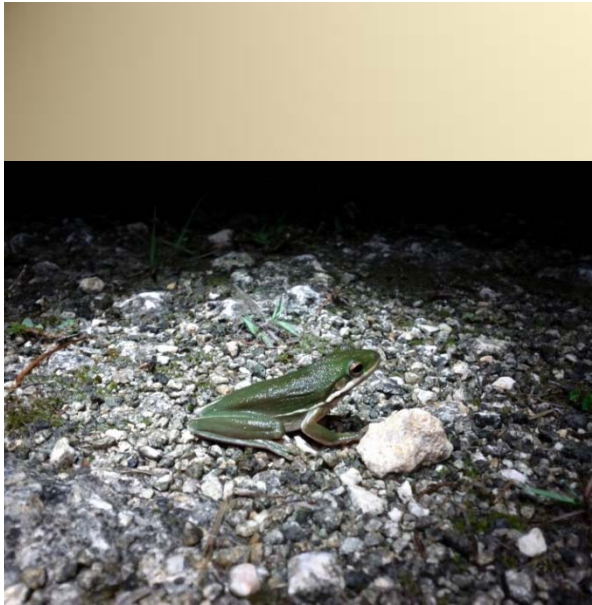
- Large-bodied lizards and snakes
- Vertebrate prey
- Habitat generalists
- Most introduced through the pet trade



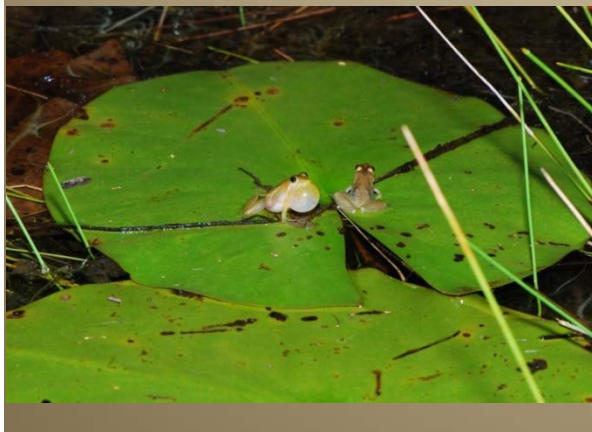
EIRAMP: Everglades Invasive Reptile and Amphibian Monitoring Program

- Status and spread of non-natives
- Assess impacts
- Enhance removal
- Help establish effective control methods
 - **Surveys of native and non-native reptiles, amphibians, mammals**

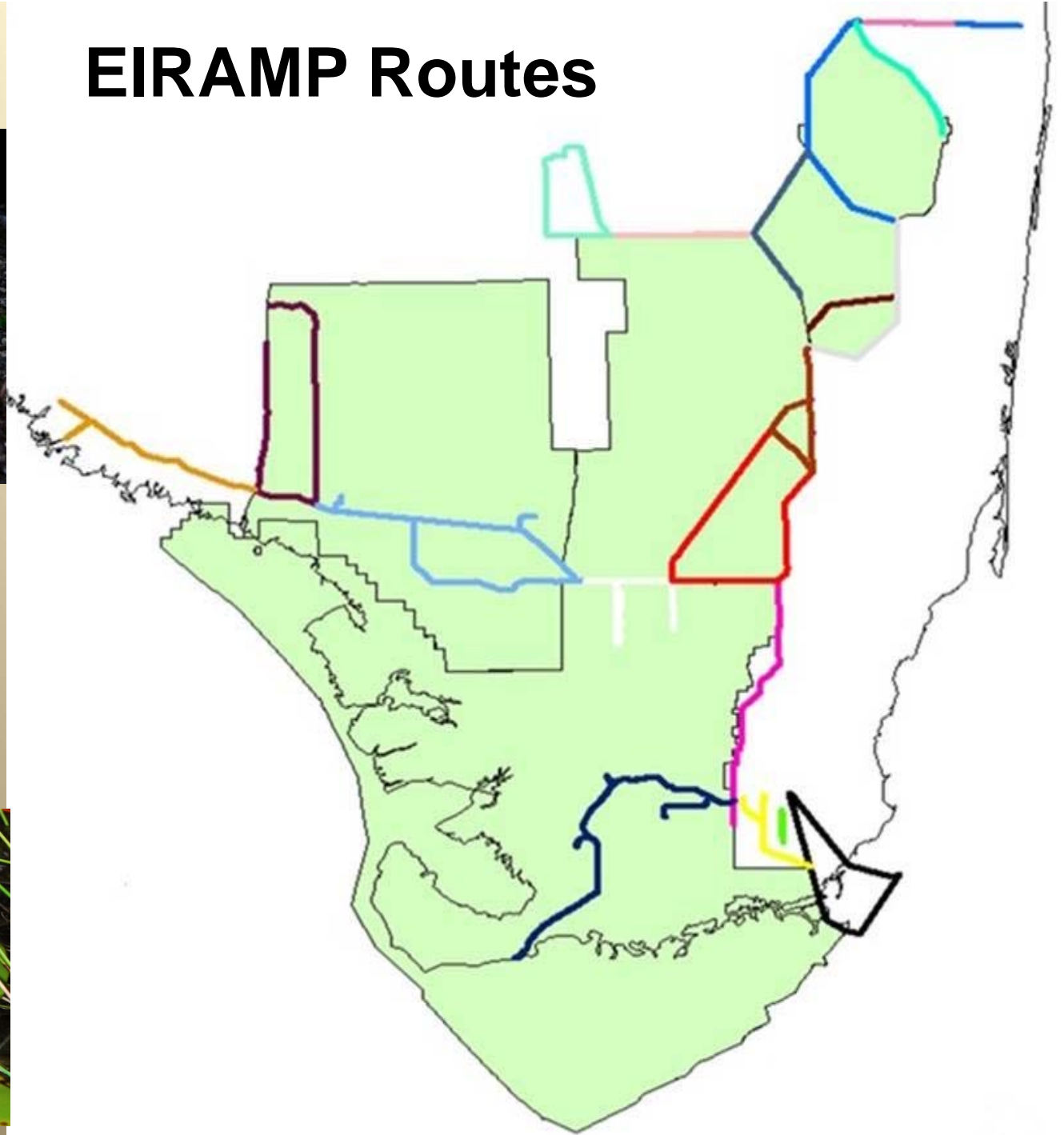




**Visual &
Acoustic
surveys**



EIRAMP Routes

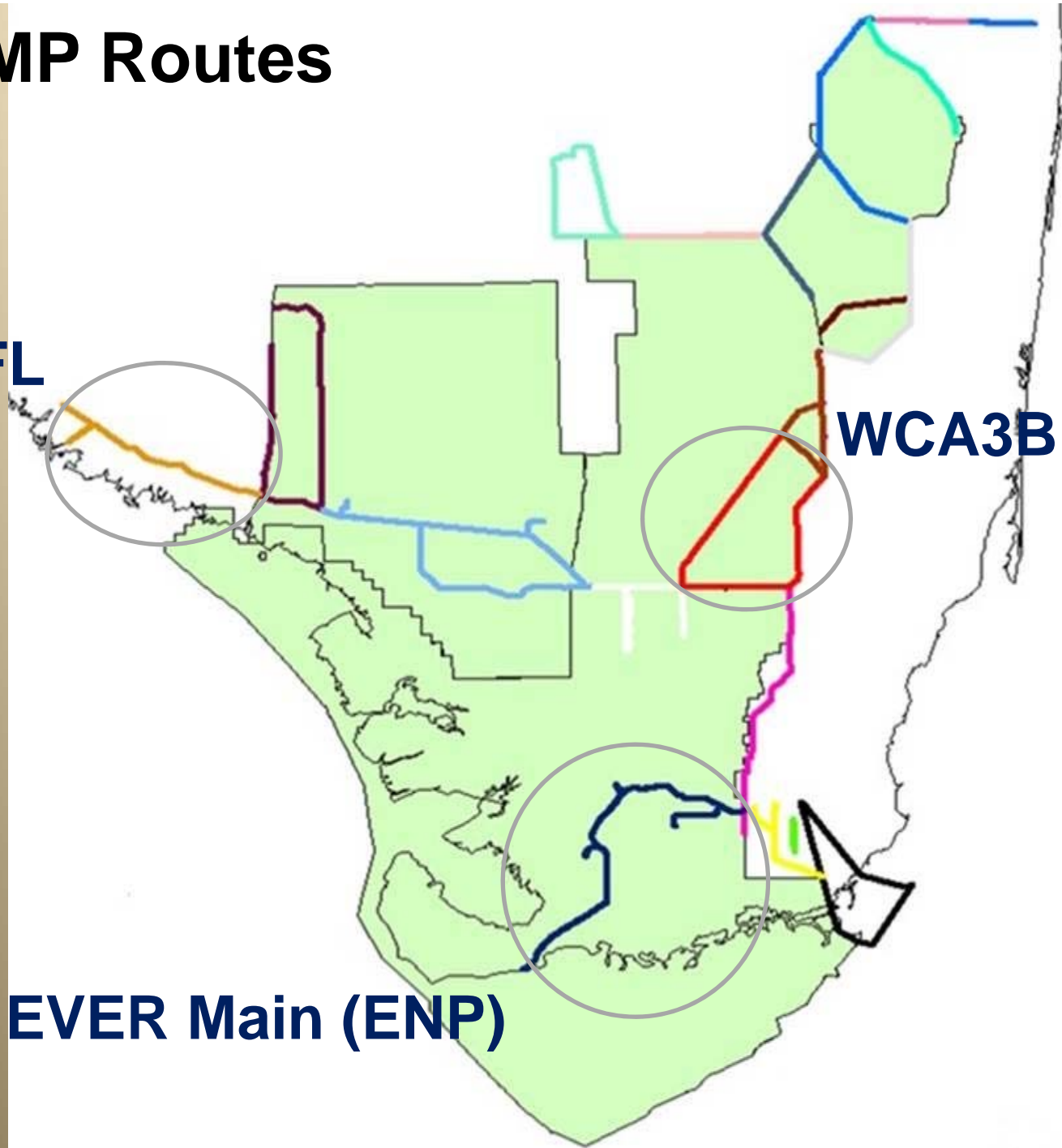


EIRAMP Routes

SWFL

WCA3B

EVER Main (ENP)



Questions:

- What is amphibian species richness in Everglades?
- Does species composition differ?

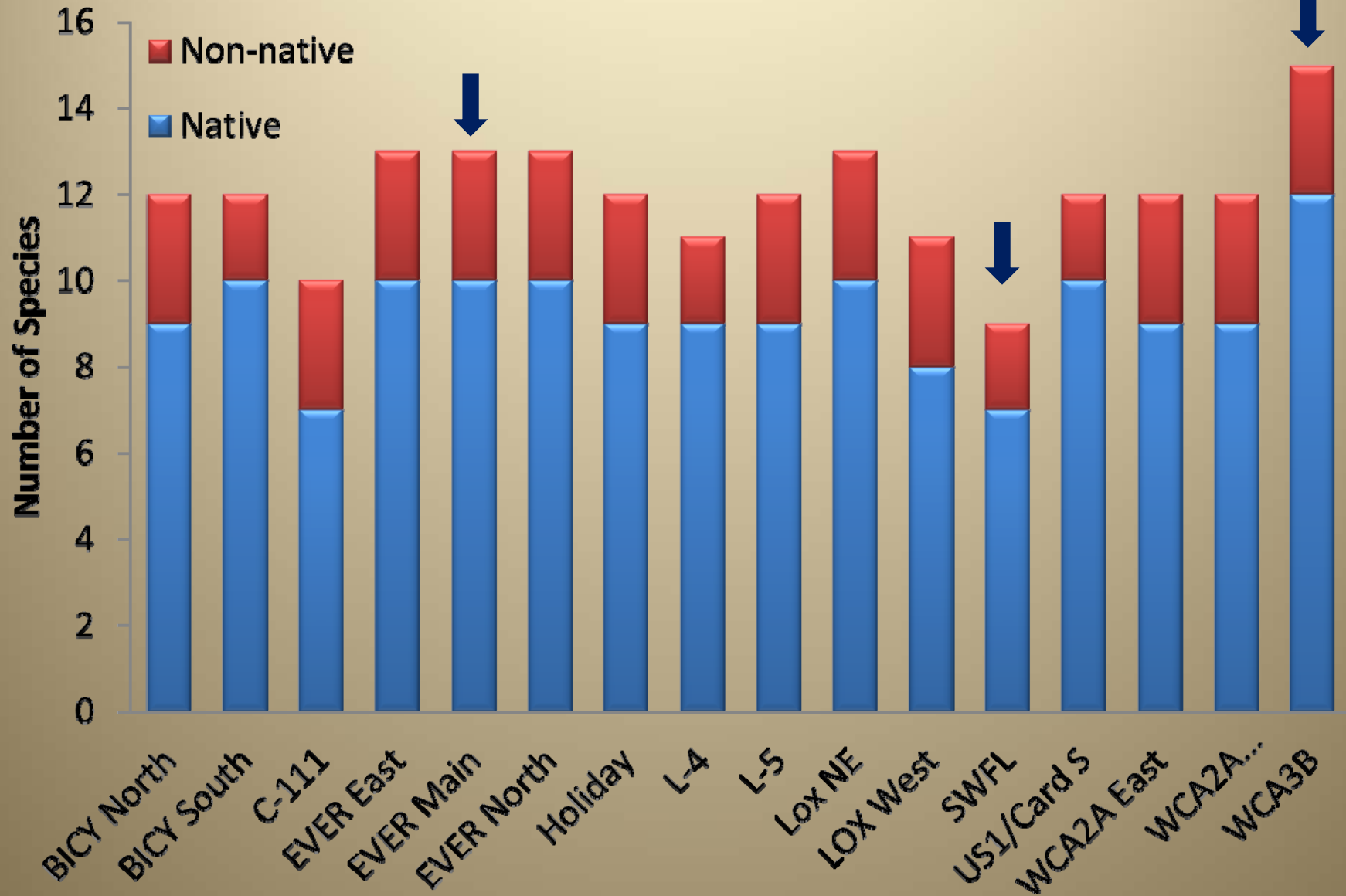


Questions:

- Are non-native species widespread and abundant?
- How does presence of non-native species, esp. Cuban treefrogs (*Osteopilus septentrionalis*) affect native species?



Species Richness



Amphibian species NOT included



Two-toed amphiuma
(*A. means*)



Peninsula newt
(*N. viridescens*)

Amphibian species: Widespread & Abundant



Cricket Frog (*A. gryllus*)



Green Treefrog
(*H. cinerea*)



Squirrel Treefrog (*H. squirella*)



Oak Toad (*A. quercicus*)



Southern Toad (*A. terrestris*)



Narrowmouth Toad
(*G. carolinensis*)



Pig Frog (*L. grylio*)



Southern Leopard Frog
(*L. sphenoccephalus*)



Greenhouse Frog (*E. planirostris*)

Amphibian species: Widespread



Little Grass Frog
(*P. ocularis*)



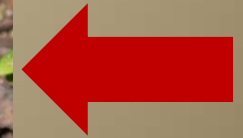
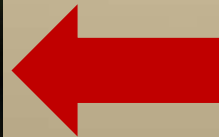
Southern Chorus Frog
(*P. nigrita*)



Cuban Treefrog
(*O. septentrionalis*)



Marine/Cane Toad (*R. marina*)



Amphibian species: Uncommon (& Rare)

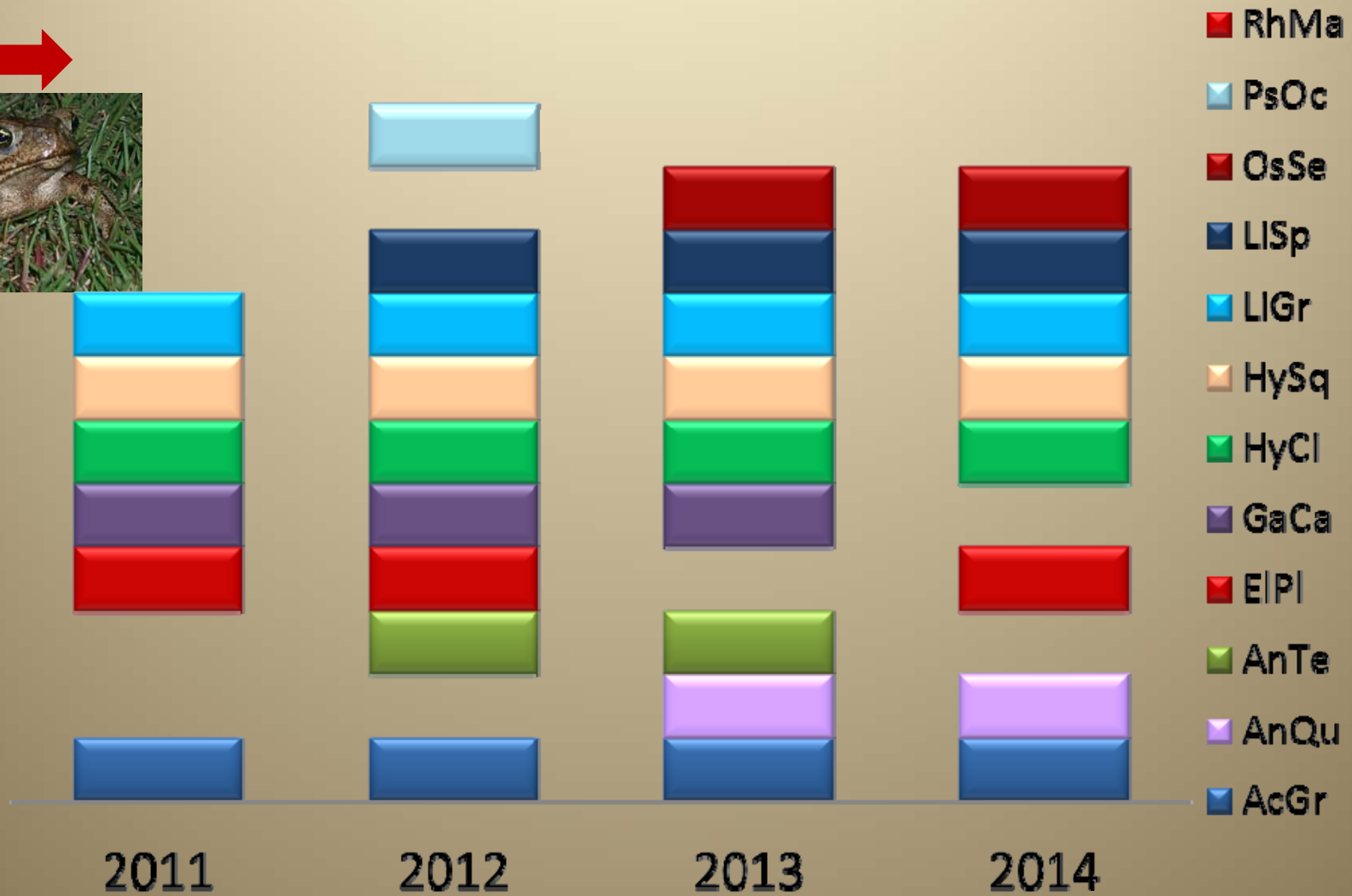


Pinewoods Treefrog
(*H. femoralis*)

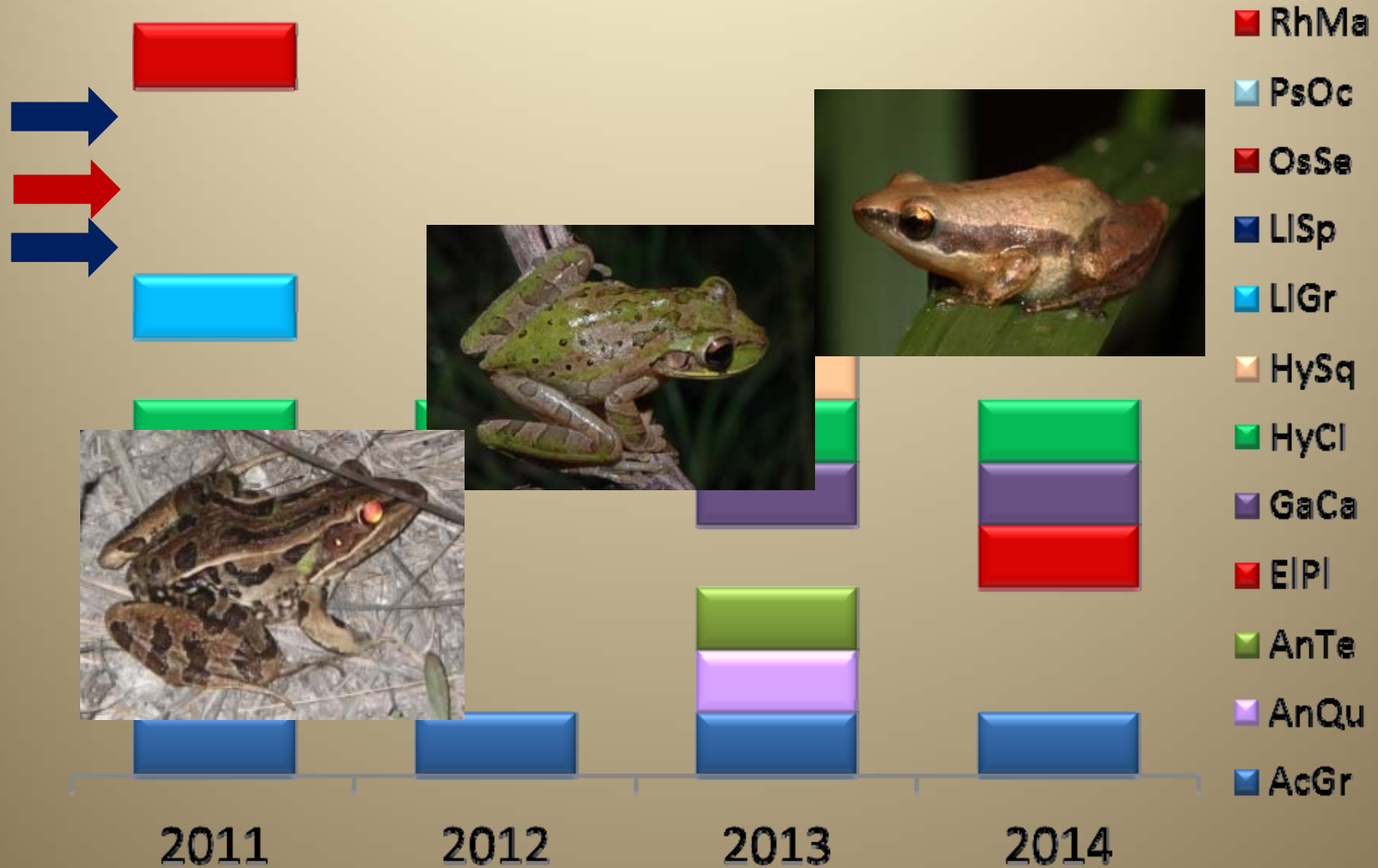


Barking Treefrog
(*H. gratiosa*)

Species Composition: EVER Main



Species Composition: WCA3B



Adjacent Habitat

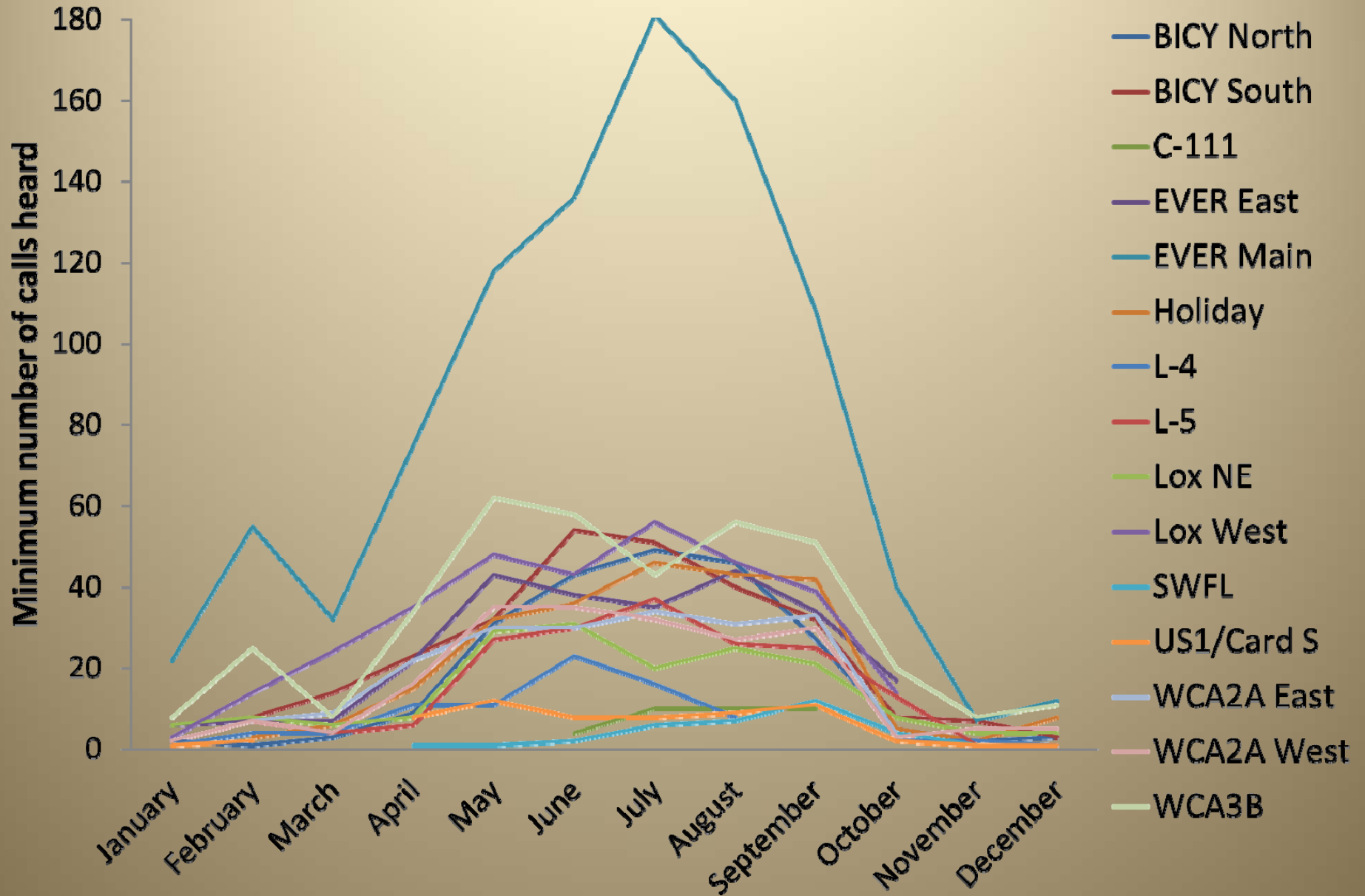
Native species: marsh, open water, wet hammocks



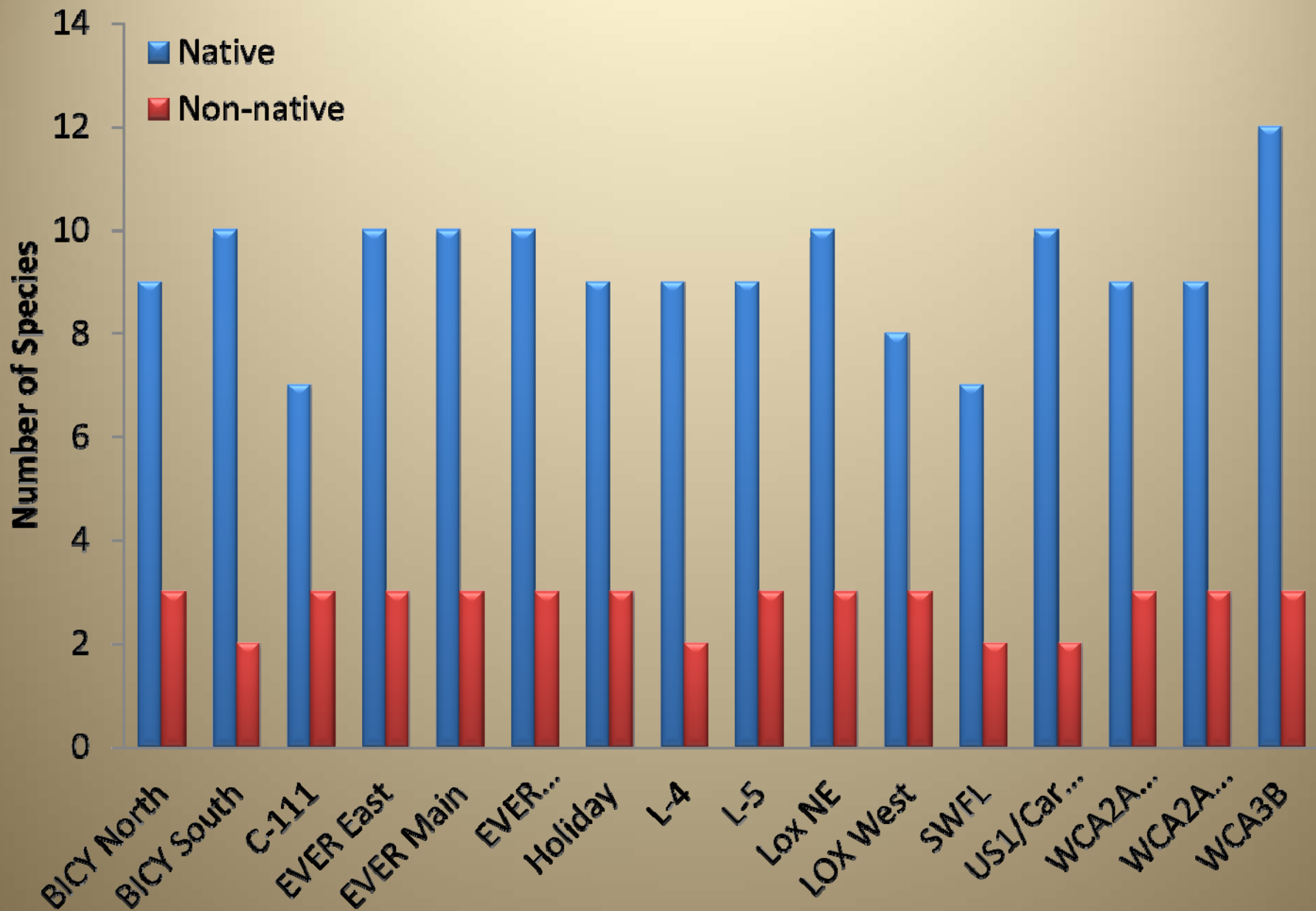
Non-native species: levee banks, disturbed areas, roads



Amphibians and Seasonality



Species Composition

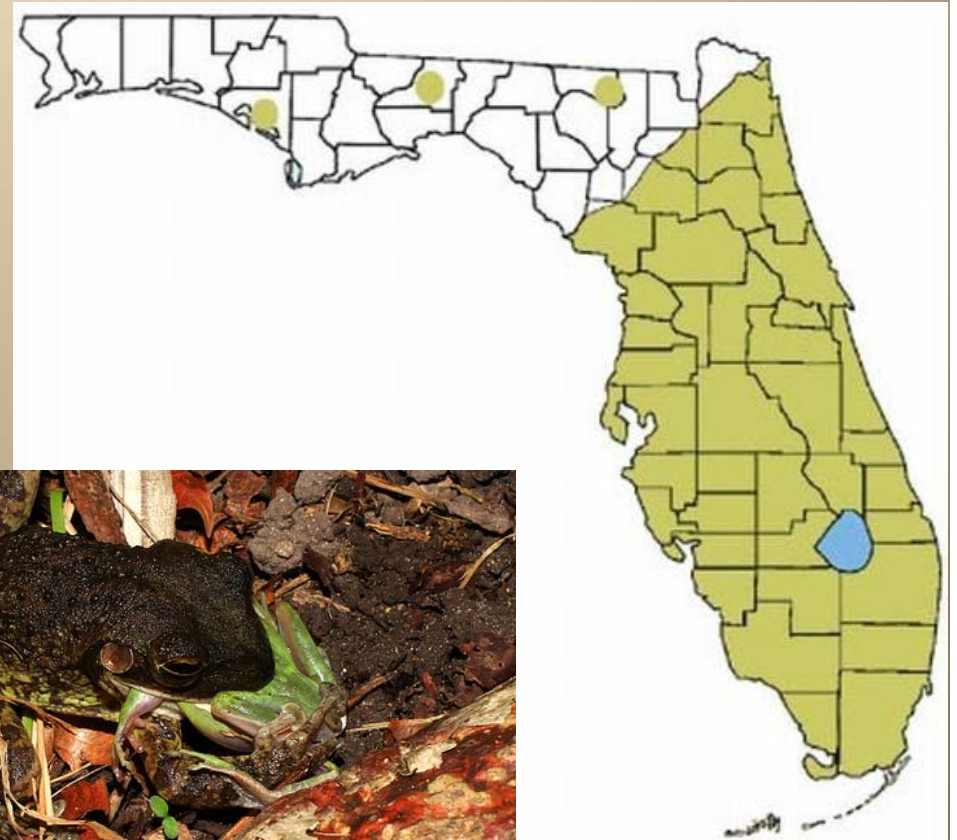


Effects of Cuban treefrogs on Native treefrogs

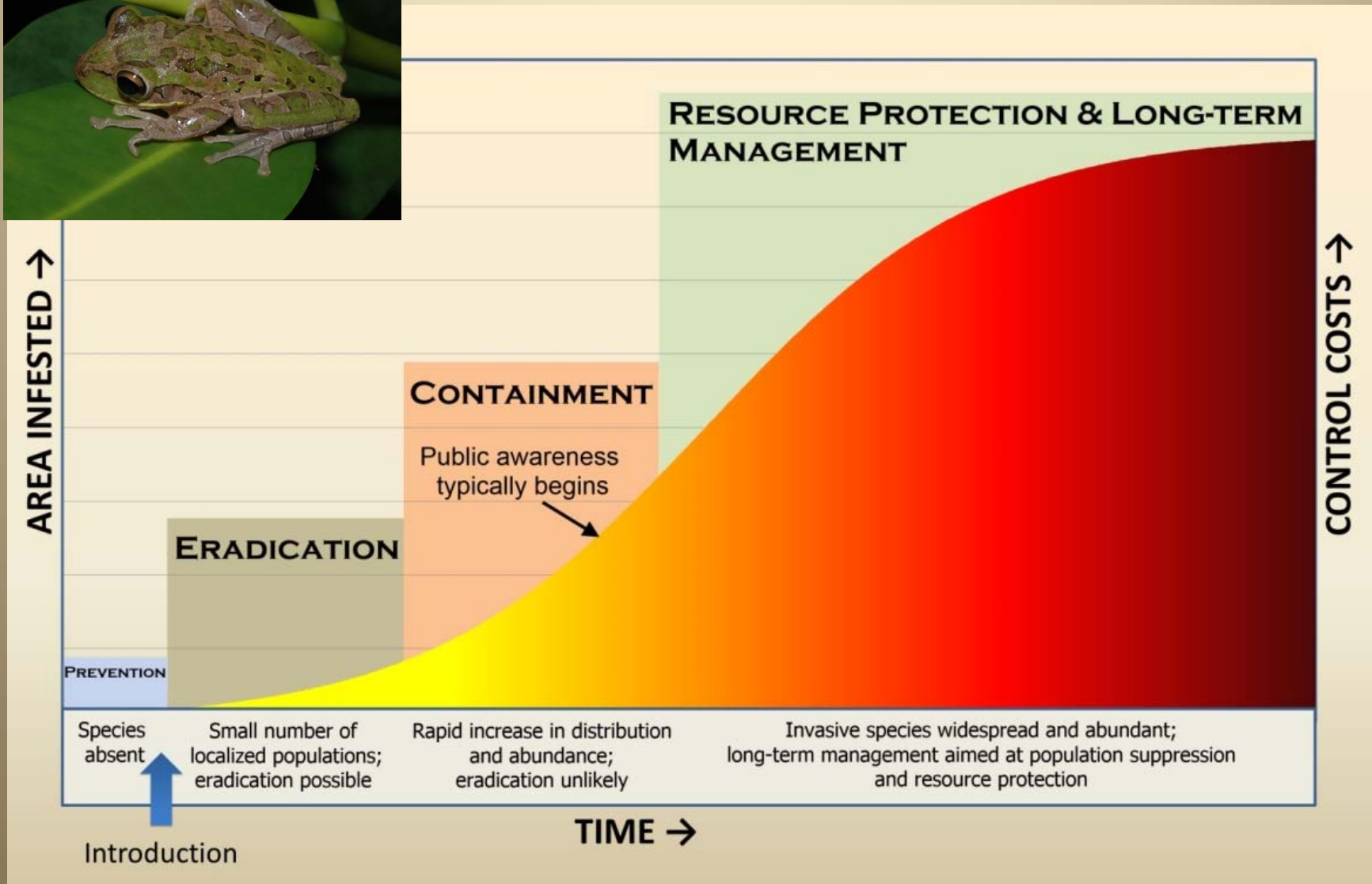


Impacts of Non-native species

- Prey on native species
- Outcompete for resources = displacement of native species (i.e. Cuban treefrog presence & removals)
- Alter food chain/ecosystems
- Spread disease
- Affect quality of life



The Invasion Curve



Summary

- South Florida: 15 species, 12 overall
- Everglades (ENP): high amphibian biomass
- Survey routes capture amphibian activity and patterns
- Species composition affected by habitat, seasonality
- Non-native species affect native species abundance/presence
- Future work: detection, presence/absence, and interaction of environmental conditions



Acknowledgements

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- Croc Doc Volunteers
- Croc Docs past & present
Colleen Closius**, Sergio Gonzalez
- Photo credits: Mike Rochford, Michiko Squires,
The Croc Docs



Amphibian species

Cricket Frog	<i>Acris gryllus</i>
Two Toed Amphiuma	<i>Amphiuma means</i>
Oak Toad	<i>Anaxyrus quercicus</i>
Southern Toad	<i>Anaxyrus terrestris</i>
Greenhouse Frog	<i>Eleutherodactylus planirostris</i>
Southern Narrowmouth Toad	<i>Gastrophryne carolinensis</i>
Green Treefrog	<i>Hyla cinerea</i>
Pinewoods Treefrog	<i>Hyla femoralis</i>
Barking Treefrog	<i>Hyla gratiosa</i>
Squirrel Treefrog	<i>Hyla squirella</i>
Pig Frog	<i>Lithobates grylio</i>
Southern Leopard Frog	<i>Lithobates sphenoccephalus</i>
Cuban Treefrog	<i>Osteopilus septentrionalis</i>
Southern Chorus Frog	<i>Pseudacris nigrita</i>
Little Grass Frog	<i>Pseudacris ocularis</i>
Marine/Cane Toad	<i>Rhinella marina</i>



EIRAMP Routes

- Legend**
- Holiday
 - C111
 - C110
 - L37
 - L4
 - WCA2A West
 - WCA2A East
 - LOX East
 - C-51 West
 - C-51 East
 - WCA3B
 - US1 & Card Sound
 - SWFL
 - LOX West
 - L5
 - L35B
 - EVER North
 - EVER Main
 - EVER East (& Refuge Route)
 - BICY South
 - BICY North

