Long-Term Effects of Water Use, Surrounding Land Use, and Introduced Species on Native Frogs and Toads at Morris Bridge Wellfield

Kym Rouse Campbell, Senior Ecologist,
Biological Research Associates

Todd S. Campbell, Assistant Professor,
University of Tampa

Steven A. Johnson, Assistant Professor,
University of Florida

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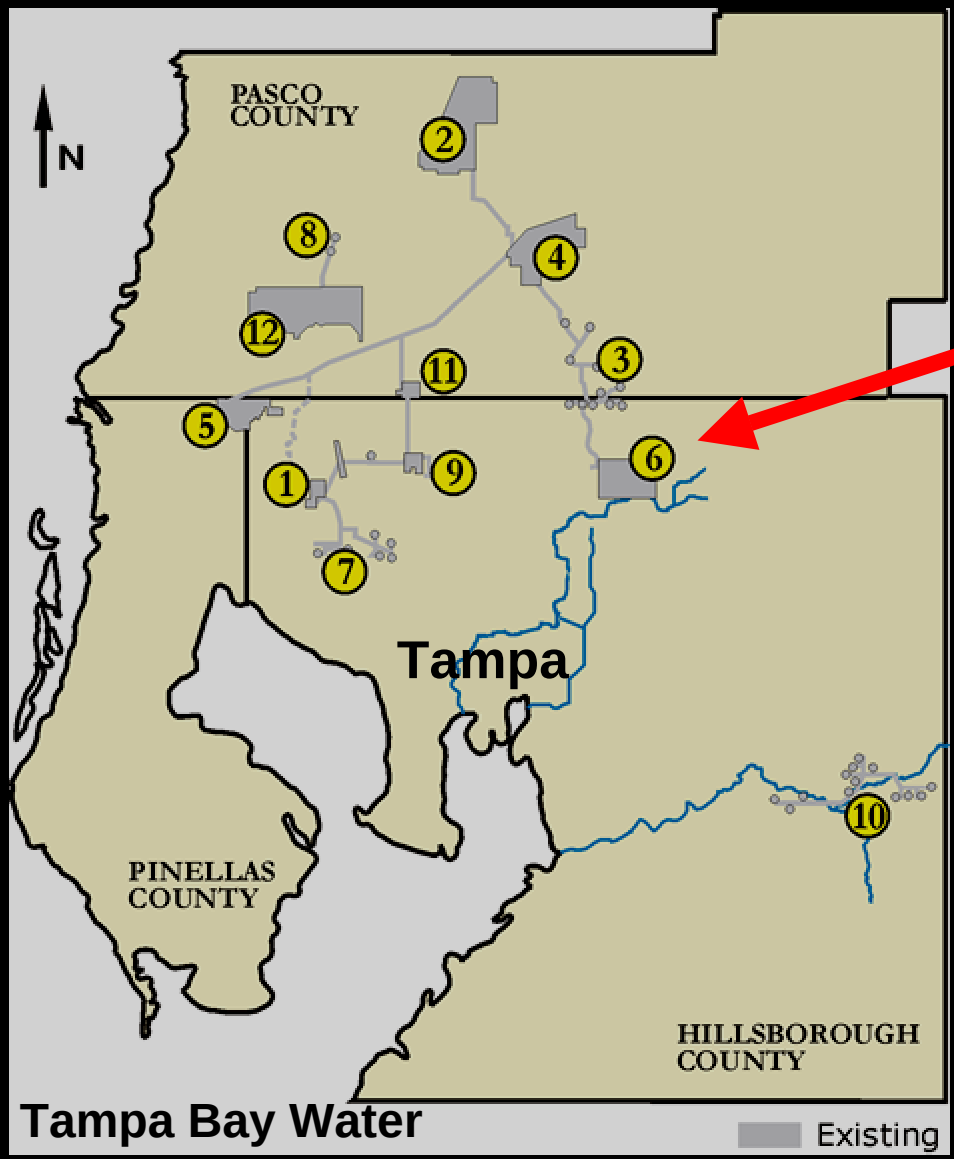
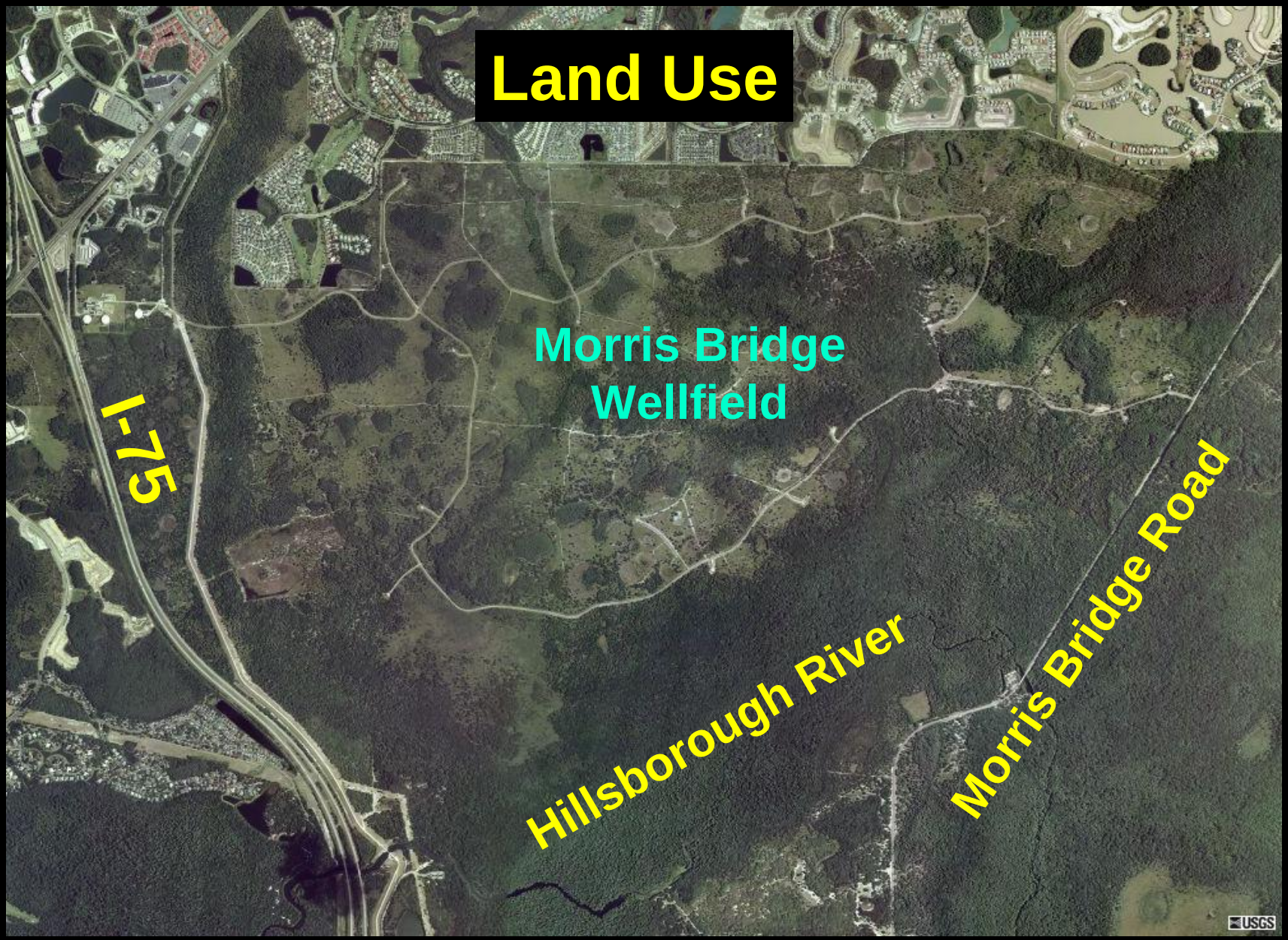
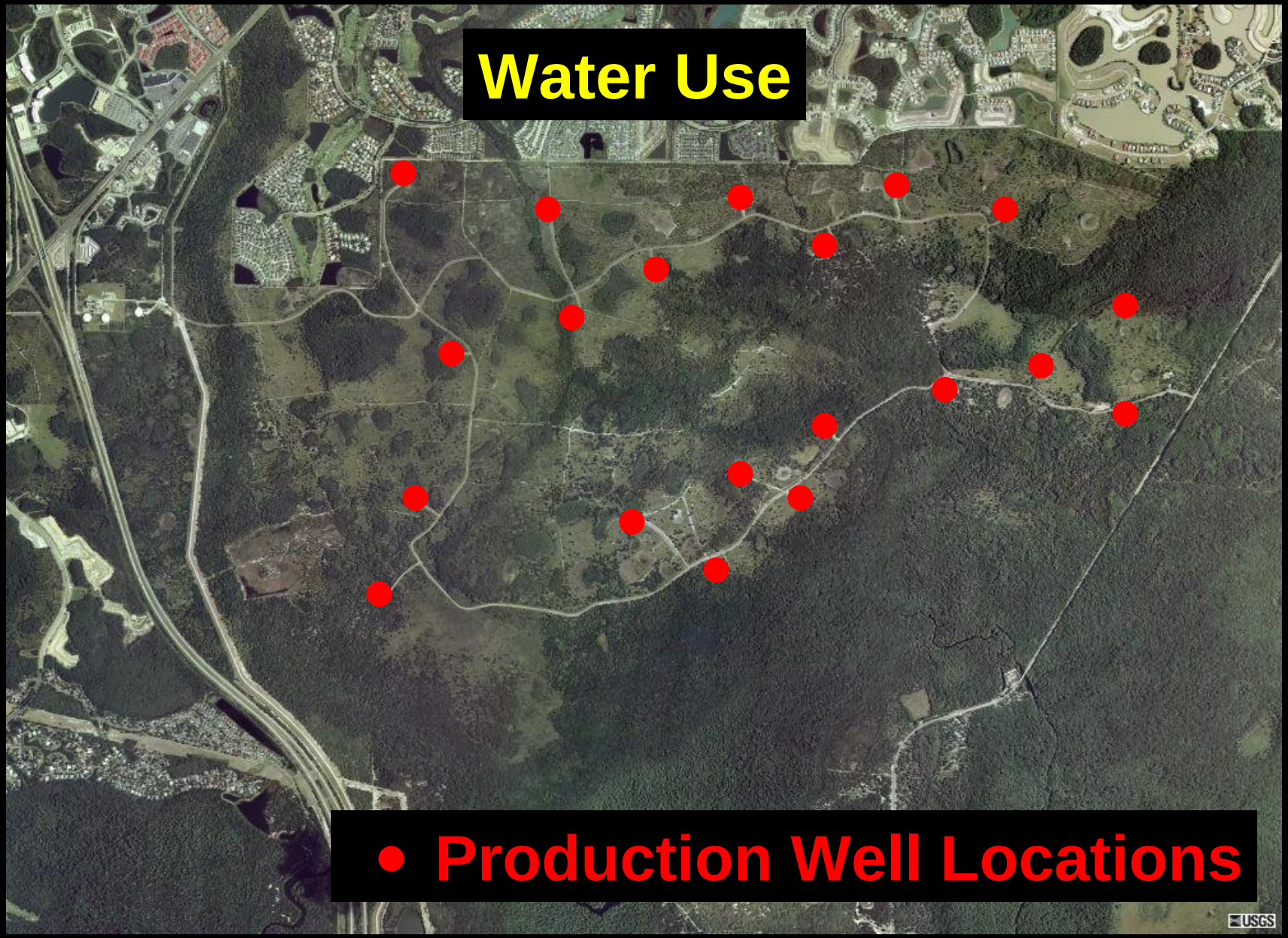
Tampa Bay Water Facilities



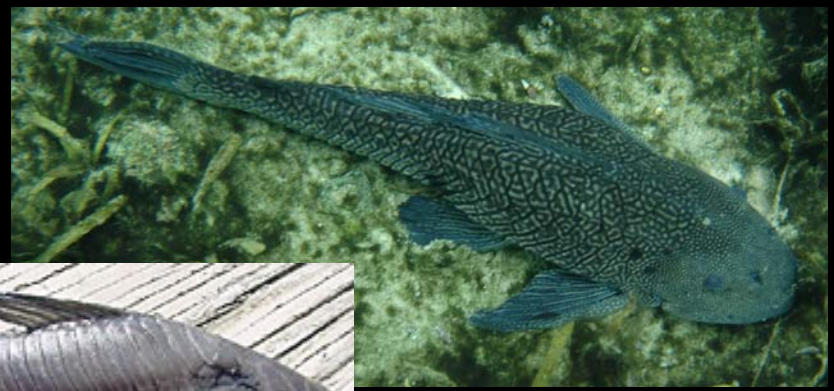
Morris Bridge Wellfield


Land Use
Morris Bridge
Wellfield
I-75
Hillsborough River
Morris Bridge Road
USGS


Water Use
• Production Well Locations
USGS

Wetland Impacts

Introduced Species




Habitat Alteration and Fragmentation
Hydrological Alterations
Introduced Species

Long-Term Hydrological and Ecological Monitoring Program (BRA)

- Surface Water
- Groundwater
- Vegetation
- Wildlife

Amphibians as Ecological Indicators

Morris Bridge Wellfield

Research Questions

- Effect of surface water hydrology on frog and toad reproductive effort (calling males)?
- Effect of surface water hydrology on frog and toad reproductive success (tadpoles)?

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Tadpole Sampling Methodology

- 16 wetlands representing a wide range of hydrological impacts
- Five 1-meter sweeps in shallow (< 0.5 m) zone
- Five 1-meter sweeps in deep (> 0.5 m) zone

Nighttime Frog Call Surveys

- Used NAAMP Sampling Protocols
- Visited each wetland for 5 minutes
- Estimated number of calling males

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Results

- Wetland hydroperiod correlated with tadpole density.
- No correlation between hydroperiod and tadpole species richness or diversity.
- No correlation between hydroperiod and the number of calling males.
- The number of species calling did not correlate with the number of tadpole species present.
- 2004 was a very wet year.

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Cuban Treefrog
Large size
Eat native frogs


Tadpole Competition

Wetlands with Cuban Treefrog Tadpoles (2004)

Numerous Cuban treefrog adults observed crossing loop road during nighttime surveys.

A recent invasion: Not observed by Pablo Delis (USF graduate student) as late as 2001.

New Research Focus

Without knowing the distribution, abundance, and effects of Cuban treefrogs, there is no way to effectively monitor the health and recovery of wetlands using frogs as sentinels at Morris Bridge Wellfield (or any other location where Cuban treefrogs occur).

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Research Questions

1. What is the distribution and abundance of Cuban treefrogs at Morris Bridge Wellfield?

2. What are the effects of Cuban treefrogs on native frogs and toads?

3. Can Cuban treefrog populations be reduced via removals using PVC refugia?

4. Will Cuban treefrog population reduction benefit native frogs and toads?

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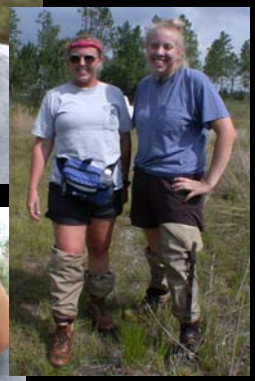
Cuban Treefrog Project Monitoring Team



UT
Todd Campbell
Bee Buckingham
Nathalie Briend

BRA
Kym Campbell
Jackie Guzy
Zach Adcock

UF-IFAS
Steve Johnson
Melissa Friedman
Esther Langhan
Erin Brown


360 pipes = 36 wetlands x 10 pipes per wetland

Sampling Design

- 36 Wetlands, 22 Monitored by BRA, 1 Monitored by SWFWMD (Includes 16 Sites Studied in 2004)
- 5 Borrow Pits
- 12 Marshes
- 12 Isolated Cypress Systems (Includes 4 MFL Wetlands)
- 7 Riverine Systems (Forested)

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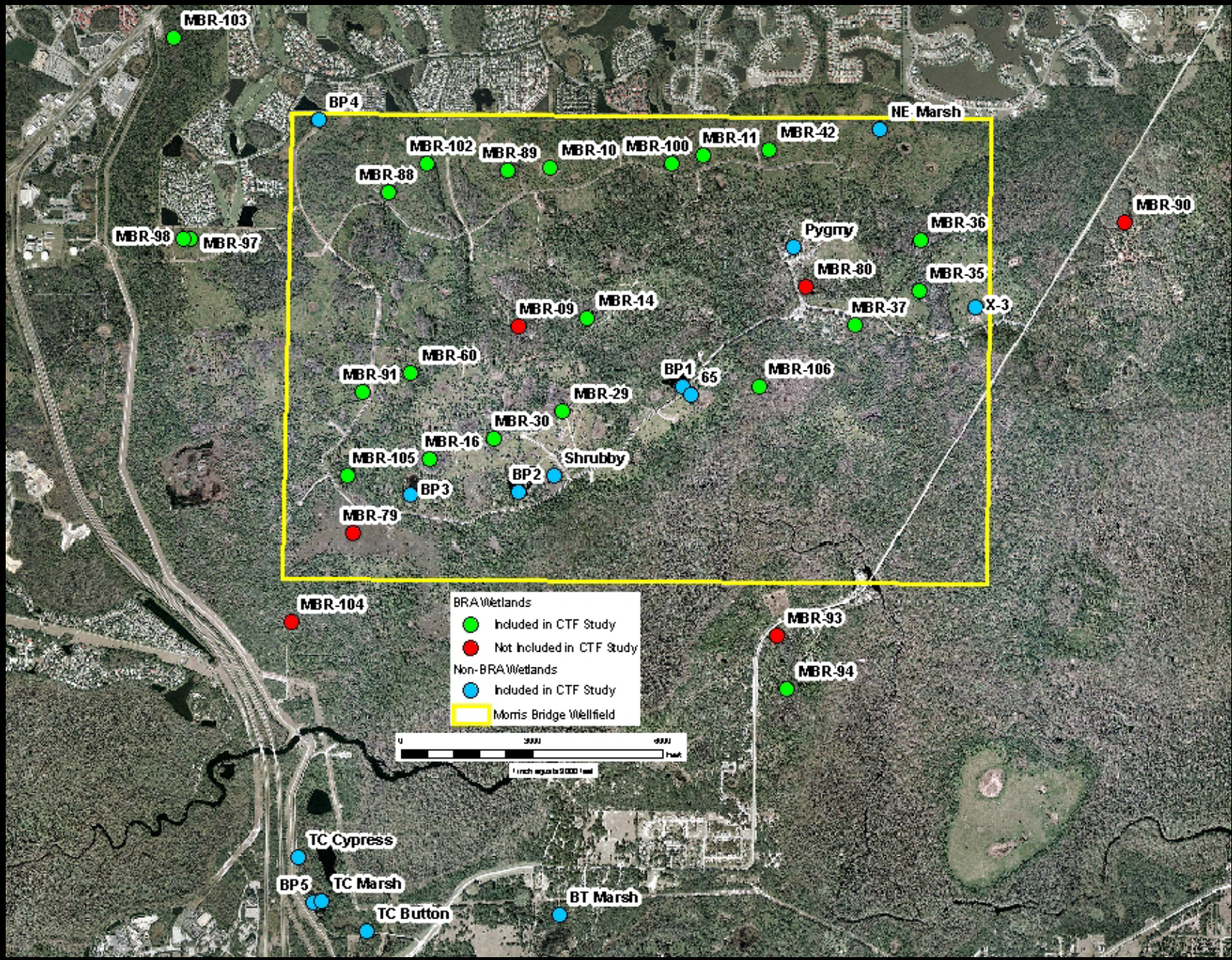
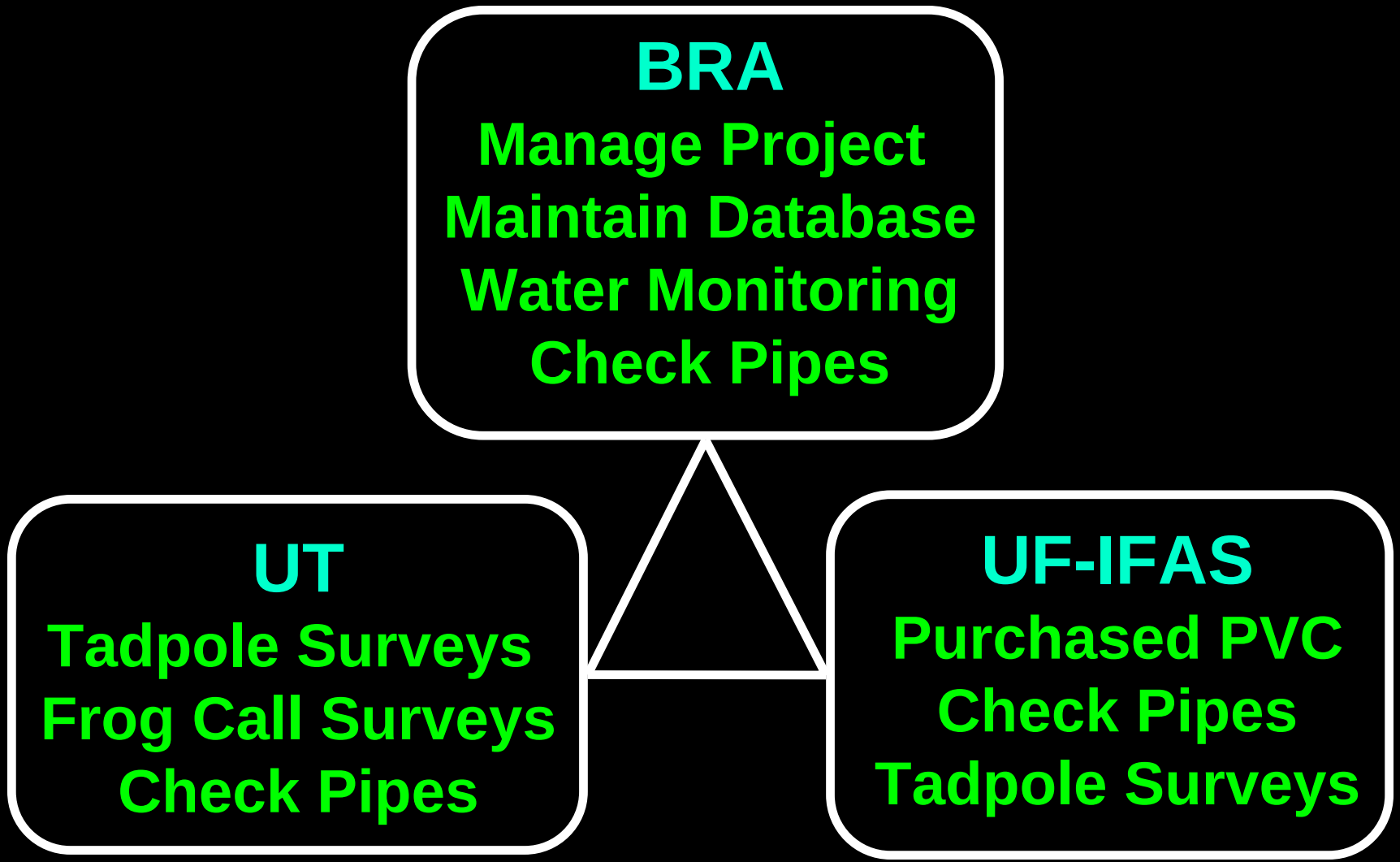

MBR-103
BP4
NE Marsh
MBR-102
MBR-89
MBR-10
MBR-100
MBR-11
MBR-42
MBR-88
MBR-90
MBR-98
MBR-97
Pygmy
MBR-36
MBR-80
MBR-35
MBR-09
MBR-14
MBR-37
X-3
MBR-60
MBR-91
BP1
65
MBR-106
MBR-29
MBR-30
MBR-16
MBR-105
Shrubby
BP2
BP3
MBR-79
MBR-104
MBR-93
MBR-94
BRA Wetlands
Included in CTF Study
Not Included in CTF Study
Non-BRA Wetlands
Included in CTF Study
Morris Bridge Wellfield
TC Cypress
BP5
TC Marsh
BT Marsh
TC Button

Methods

Cuban Treefrog Project Tasks



Results From Late June Through Early December 2005:

We Captured:

- 2,227 Cuban Treefrogs
- 379 Squirrel Treefrogs
- 221 Pinewoods Treefrogs
- 186 Green Treefrogs
- 1 Barking Treefrog

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Results From Late June Through Early December 2005:

- Cuban Treefrogs Were Found in Pipes at All 36 Study Sites

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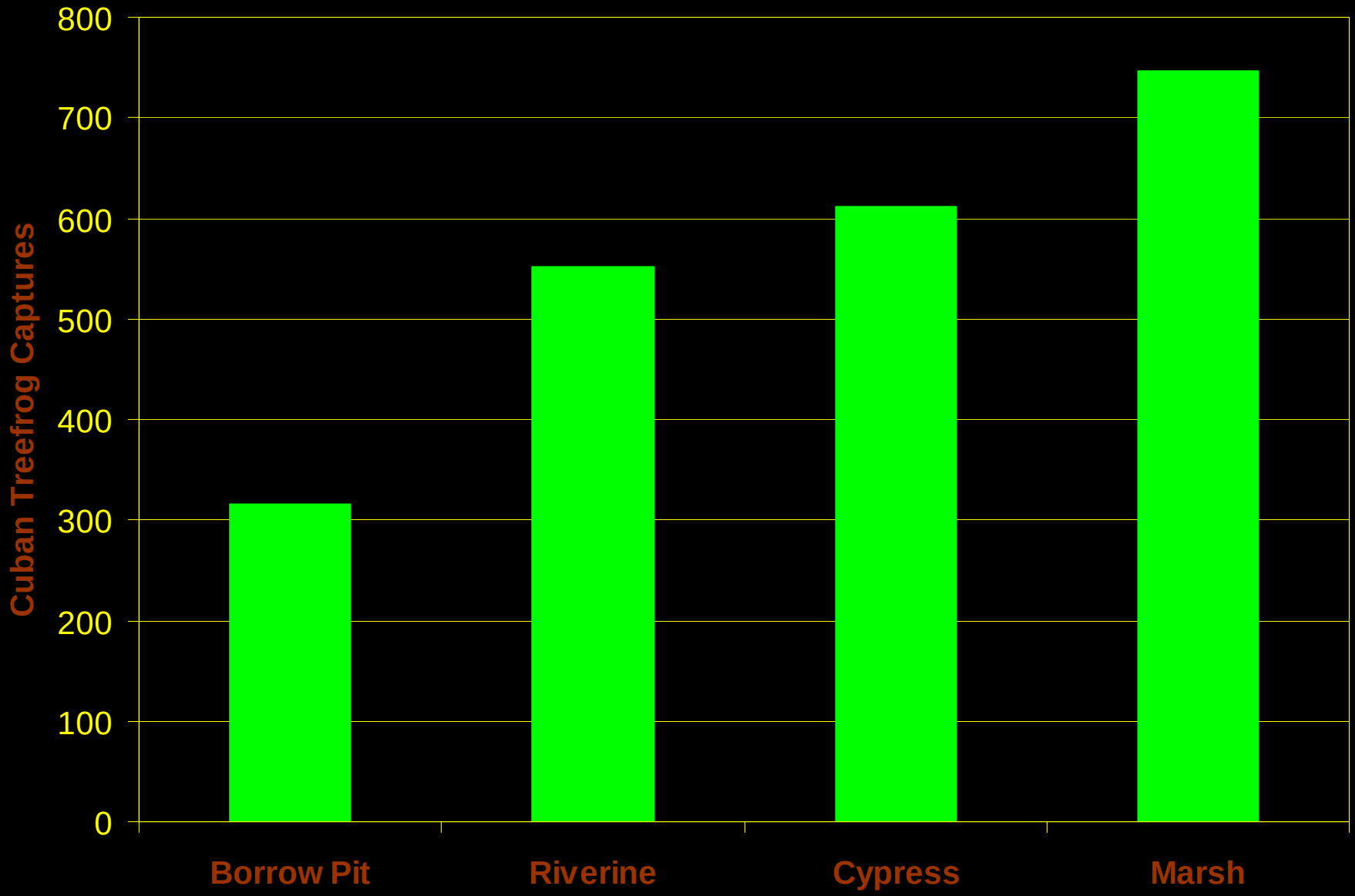
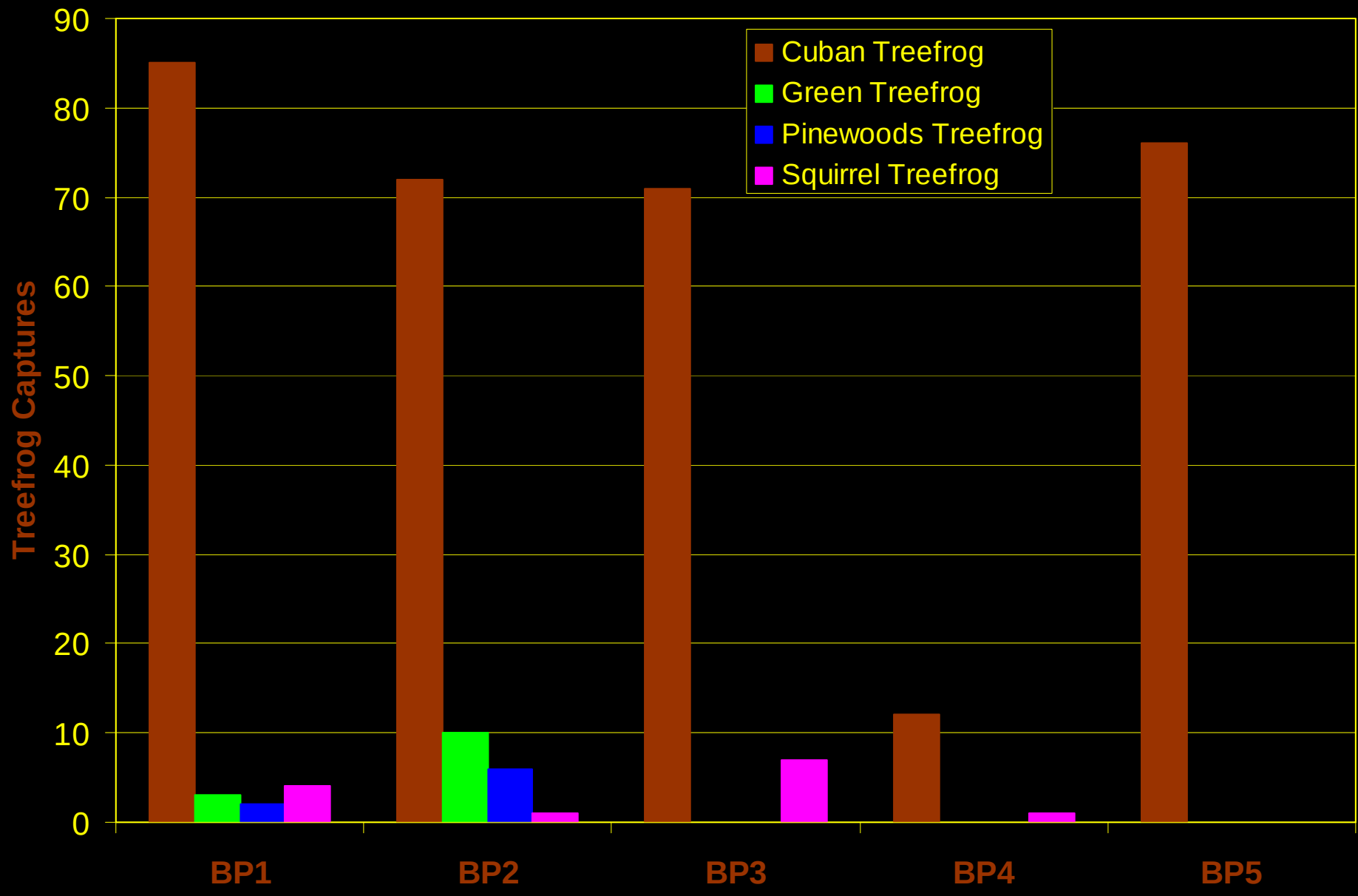
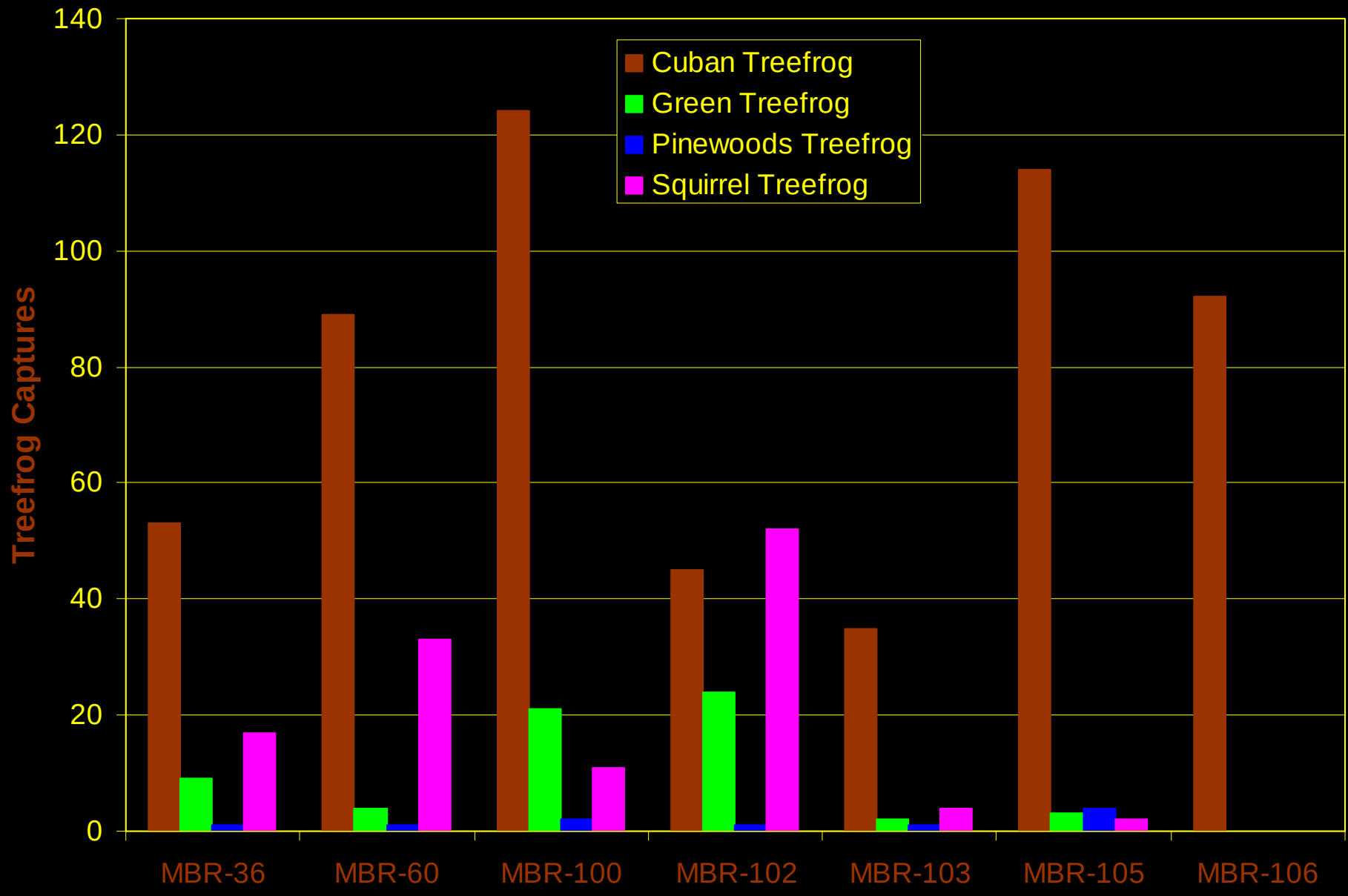
Cuban Treefrog Captures by Wetland Type



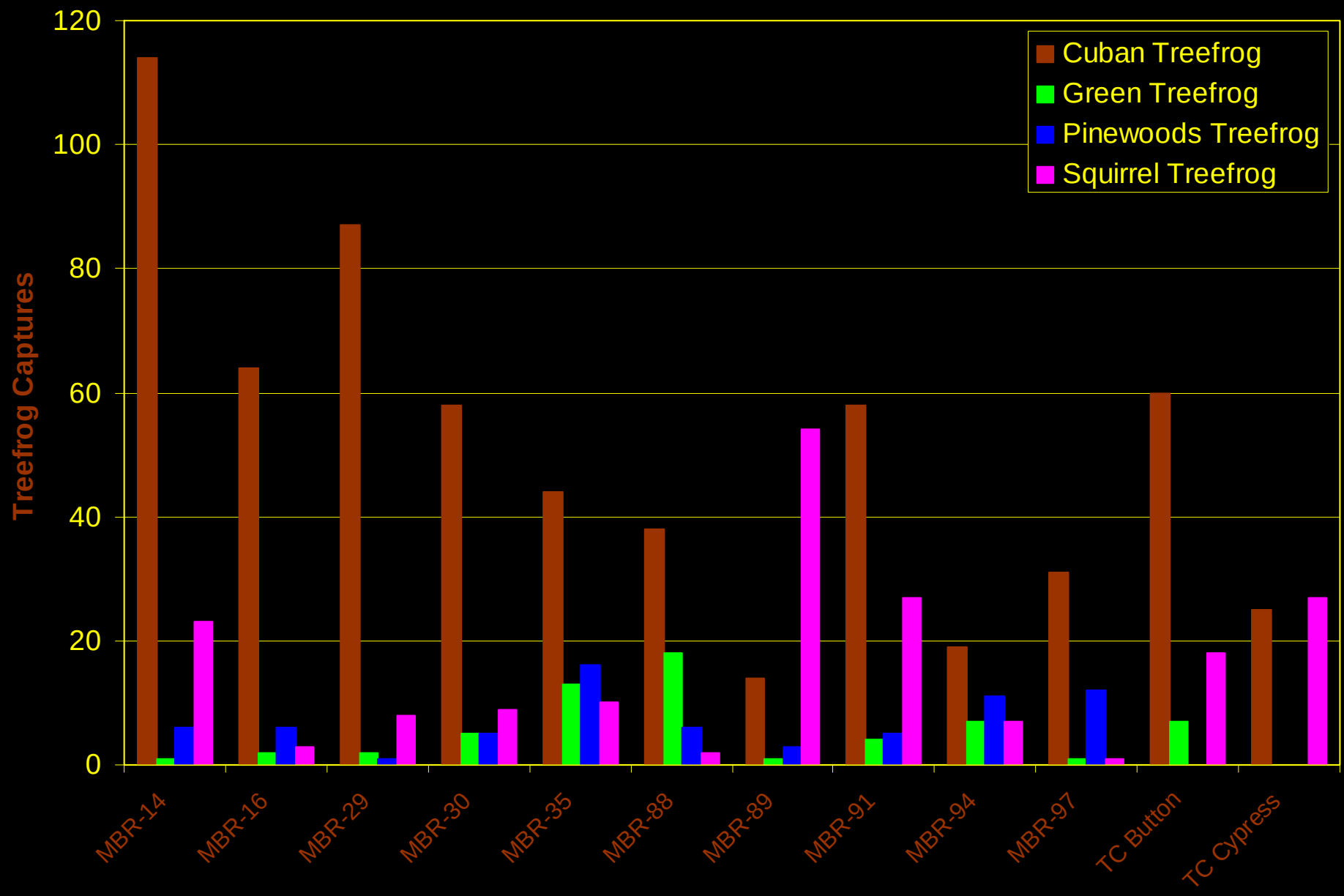
Treefrog Captures in Borrow Pits



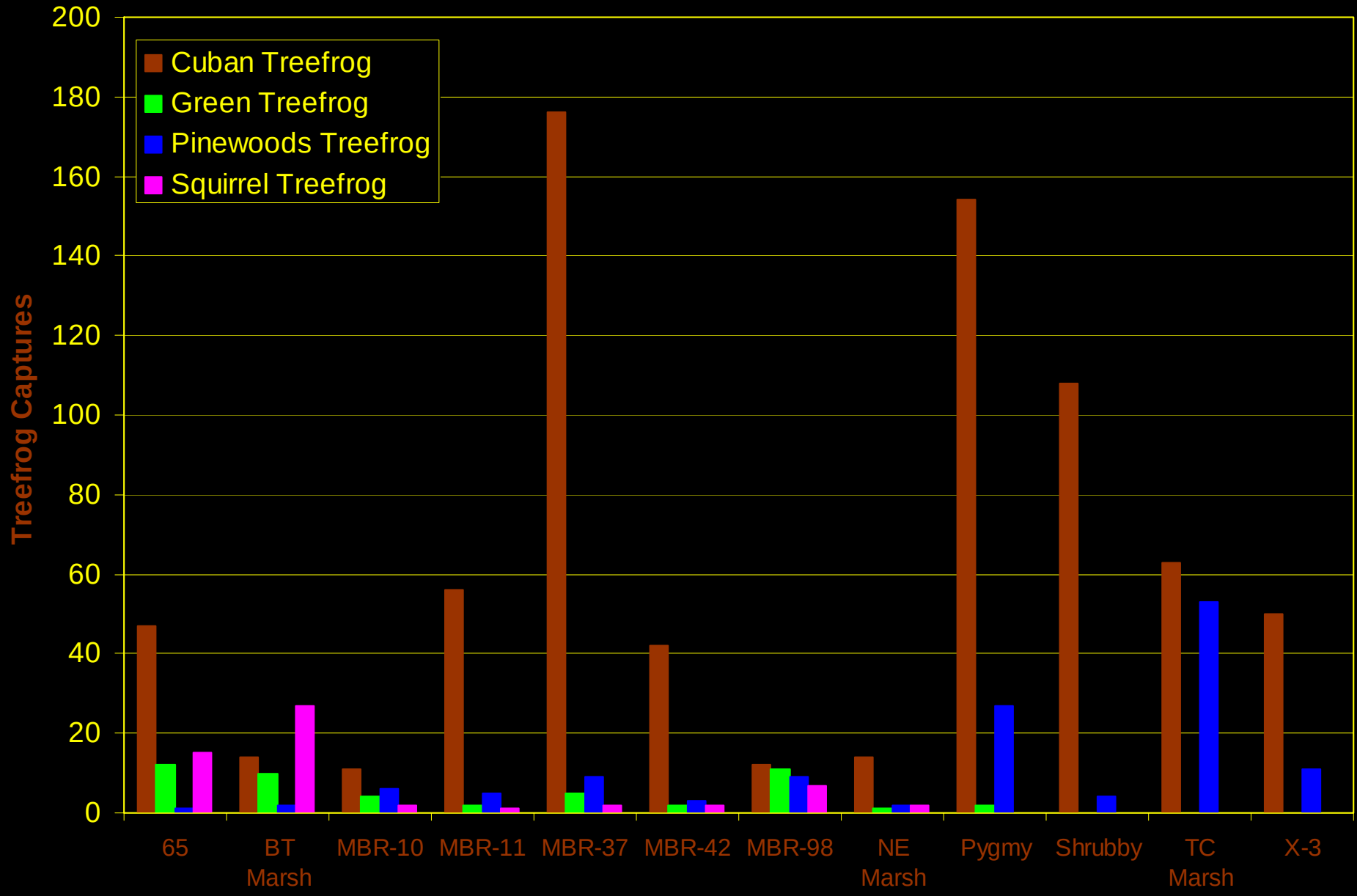
Treefrog Captures in Riverine Wetlands



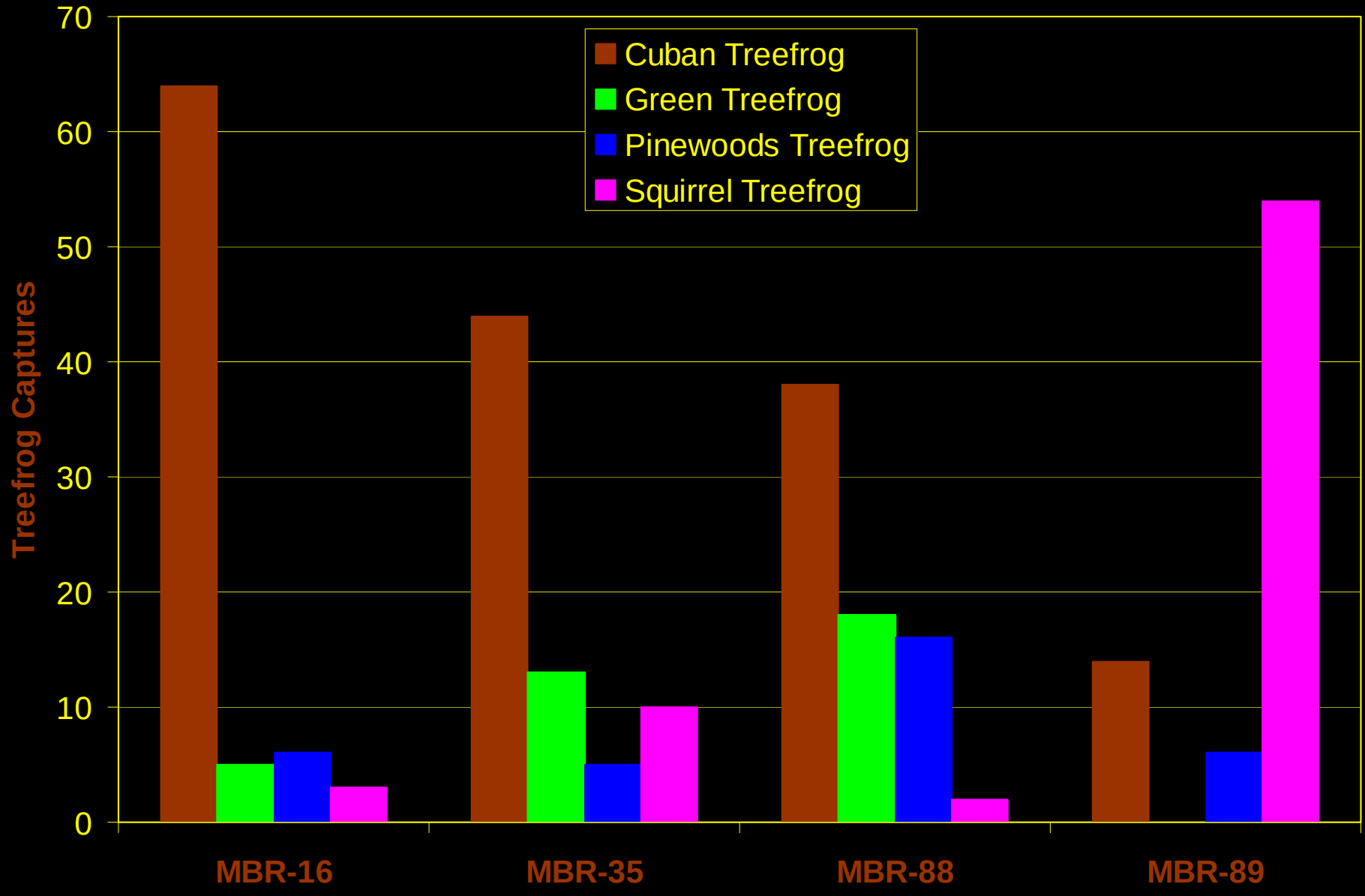
Treefrog Captures in Cypress Systems



Treefrog Captures in Marshes



Treefrog Captures in MFL Wetlands



Research Questions

1. What is the distribution and abundance of Cuban treefrogs at Morris Bridge Wellfield?

Cuban treefrogs occur in all wetland study sites, are abundant at many sites, and likely occur throughout the wellfield. The invasion was recent.

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Research Questions

2. What are the effects of Cuban treefrogs on native frogs and toads?

Impacts of Cuban treefrogs on native frogs and toads at Morris Bridge Wellfield are not yet known, but the negative effects on native frogs and toads in general are well known.

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Research Questions

3. Can Cuban treefrog populations be reduced via removals using PVC refugia?

We plan to start removing Cuban treefrogs from selected sites after 1 year of background data (July 2006). We also hope to add more pipes at each wetland.

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Research Questions

4. Will the Cuban treefrog population reduction benefit native frogs and toads?

Until we start to remove Cuban treefrogs, this question cannot be examined. We must mark and measure native species to estimate population sizes in each wetland.

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Summary

To date, we have collected a large amount of information on a shoe-string budget (thanks to Tampa Bay Water, University of Tampa, and University of Florida)

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Work Plan for 2006

- Continue to check pipes every two weeks
- Continue sampling tadpoles
- Continue frog call surveys
- Compare 2005 tadpole and frog call data with 2004 data

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Work Plan for 2006

- Link Cuban treefrog, water level, and vegetation databases
- Analyze the relationships between Cuban treefrogs, hydroperiods, water levels, and vegetation changes
- Analyze relationships between land-use and Cuban treefrog presence and abundance

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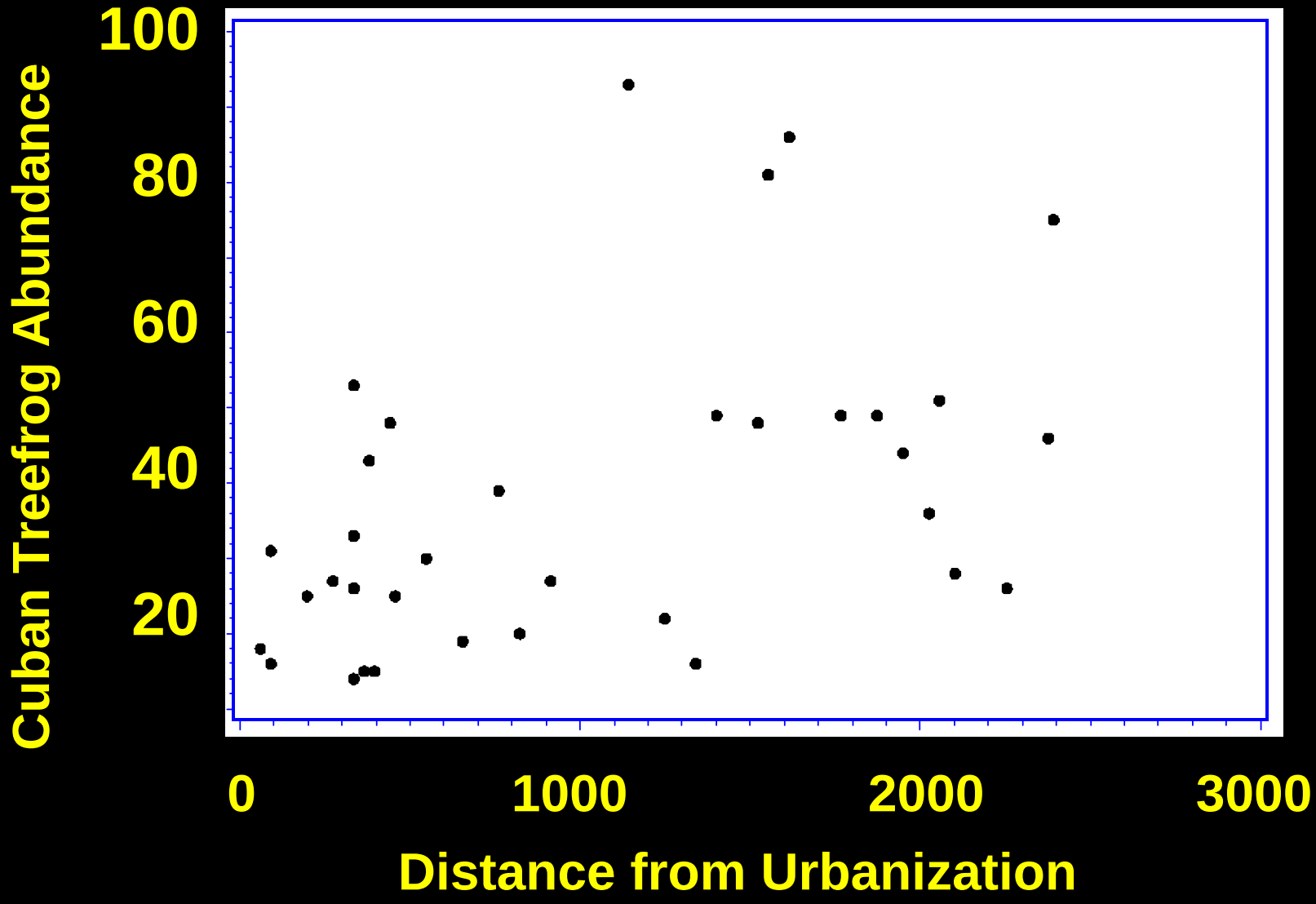
Distance From Urbanization vs Cuban Treefrog Abundance



Future Long-Term Plans

- Funding for more personnel
- Install more pipes at 36 study sites
- Install pipes at more wetlands

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Proposed Sampling Design

Type	Current	Proposed	Removals
Marsh	12	12	6
Cypress	12	12	6
Borrow Pit	5	12	6
Riverine	7	12	6
		48	24

20 Pipes Each x 48 = 960 Pipes

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Future Long-Term Plans

- Assess the efficacy of Cuban treefrog removals using pipes
- Assess the response of native treefrogs (must mark and measure all individuals)
- Analyze the gut contents of the Cuban treefrogs that are removed

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Future Long-Term Plans

- Install devices to monitor water levels in wetlands not monitored by BRA or SWFWMD
- Install drift fences for sampling metamorphs
- Conduct field and laboratory studies to learn more about the behavior and life history of Cuban treefrogs

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Future Long-Term Plans

- Evaluate the effects of other introduced species on native flora and fauna (channeled apple snails, feral hogs, fish, etc.)
- Cane toads are coming!

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Summary

- Without knowing the impacts of introduced species, it is not possible to manage native species
- There is no way to effectively monitor the health and recovery of wetlands using frogs as sentinels at Morris Bridge Wellfield without knowing the distribution, abundance, and effects of Cuban treefrogs

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Ultimate Goal

Determine the combined, synergistic effects of groundwater pumpage, wetland vegetation changes, surrounding suburban encroachment, and introduced species on native frogs and toads at Morris Bridge Wellfield

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Acknowledgments

- Southwest Florida Water Management District
- Flatwoods Park Personnel
- Tampa Bay Water
- University of Tampa
- Biological Research Associates
- University of Florida

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