

**ASSESSING AMPHIBIAN
MARKING TECHNIQUES IN
RECENT TOAD METAMORPHS:
RELIABILITY, EFFECTS ON SURVIVORSHIP
AND PHYSIOLOGY, AND CONSERVATION
IMPLICATIONS**

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SCB - Beijing, CHINA 15 July 2009**

Introduction

- Amphibian Extinction Crisis is a rapidly escalating problem
~32% of 6,546 species threatened or extinct

Global Amphibian Assessment - 2008 update

- Captive breeding and reintroduction & translocation programs have key implications for conservation of species
18 of 58 species reintroductions successful

Griffiths and Pavajeau, 2008; Cons. Biol.

Research questions

- How can we track the progress of reintroduced or translocated individuals?
- Which marking technique(s) are most reliable?
- Which marking technique(s) have the least effect on:
 - 1) Growth and survival
 - 2) Predator avoidance

Fowler's Toad

(Anaxyrus fowleri)

- Widespread species in U.S.
- Collected 65 recent metamorphs from an urban lake in Memphis, TN
- Mean mass = 1.50 ± 0.61 g
- Reared in individual housing for 6 months in EPAC lab at Rhodes College



Marking Techniques

- Toe Clips (TC)

- Visual Implant Elastomers (VIE)

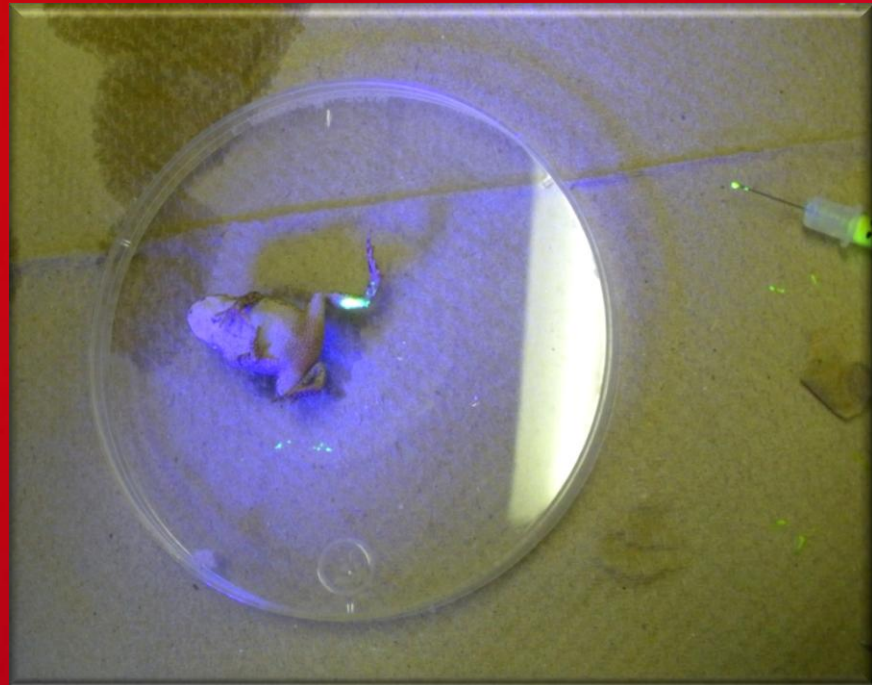
- Passive Integrated Transponders (PIT)

- Alpha-Numeric Fluorescent Tags (Alpha-Num)



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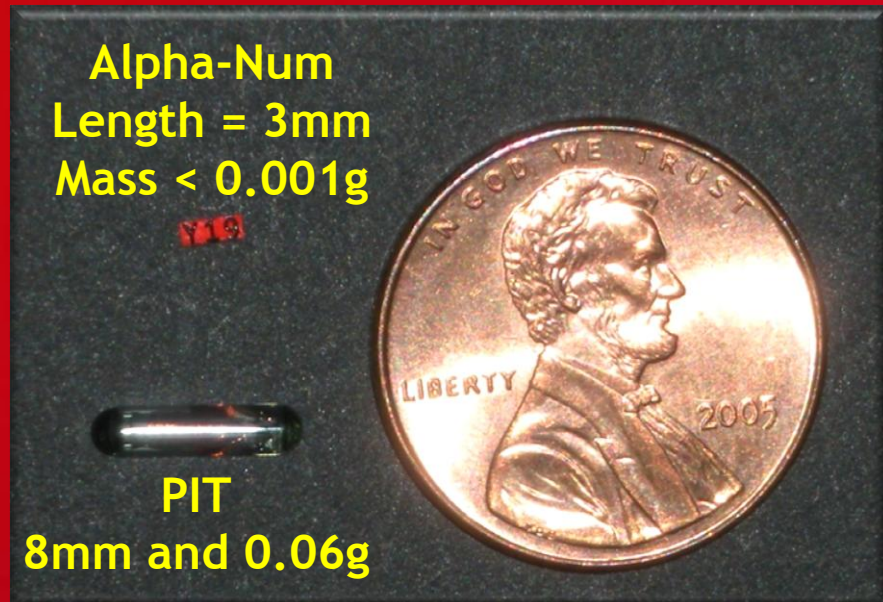
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Methods

- Monthly:

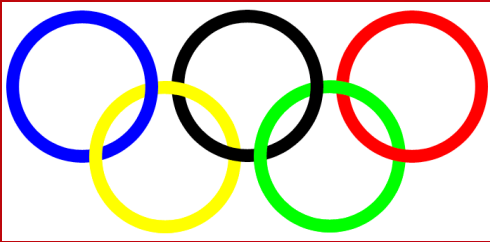
Toad survival, mark loss, & body mass & length

- Month 0, 1, 3, & 6:

Locomotor performance = swimming and jumping

Locomotor performance

- Swimming trials
- Jumping trials

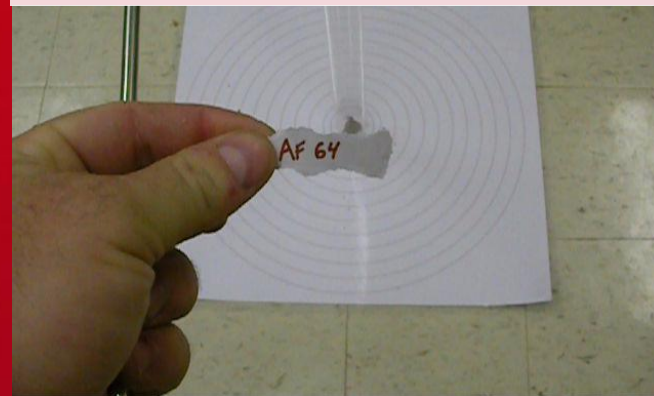


- Analyzed videos using Adobe Photoshop CS4

Swimming speed



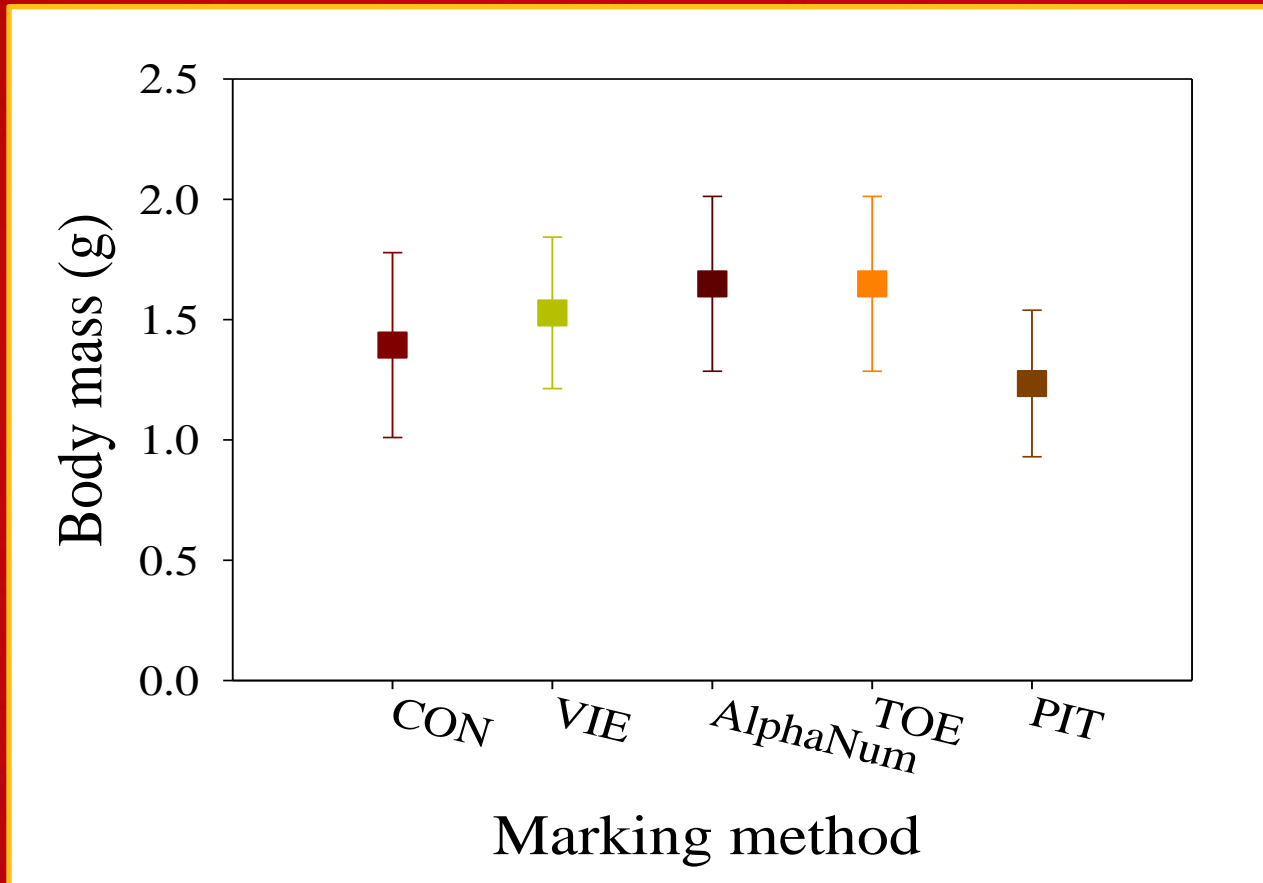
Jumping speed



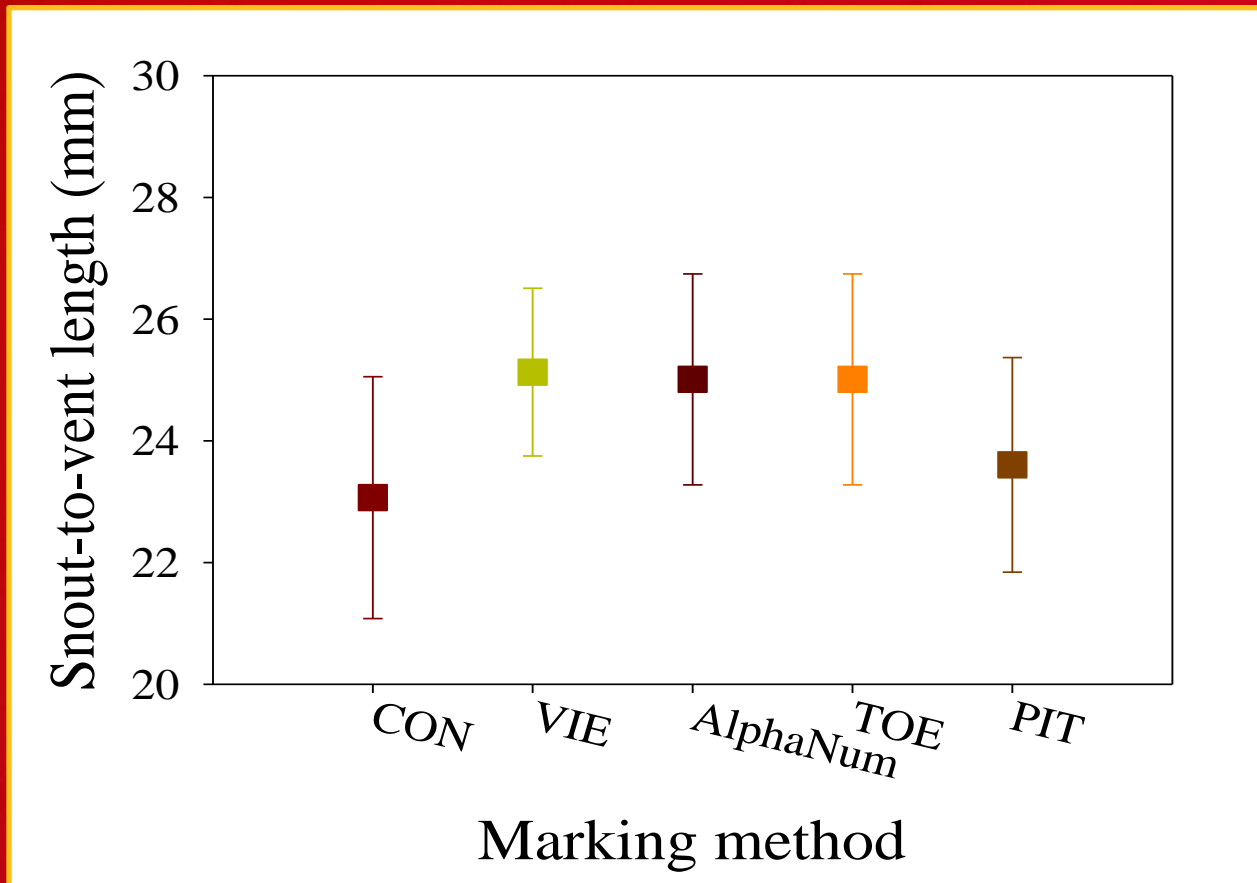
Data analysis

- Toad growth
 - *Compared total mass and length gain among treatment groups using ANOVA*
- Toad, mark, and total animal loss
 - *Compared proportion of toads and marks lost among treatment groups via ANOVA*
 - *Combined toad and mark loss to determine total animal loss in the study - compared via ANOVA*
- Locomotor performance
 - *Swim and jump speeds compared among treatments via RmANOVA*

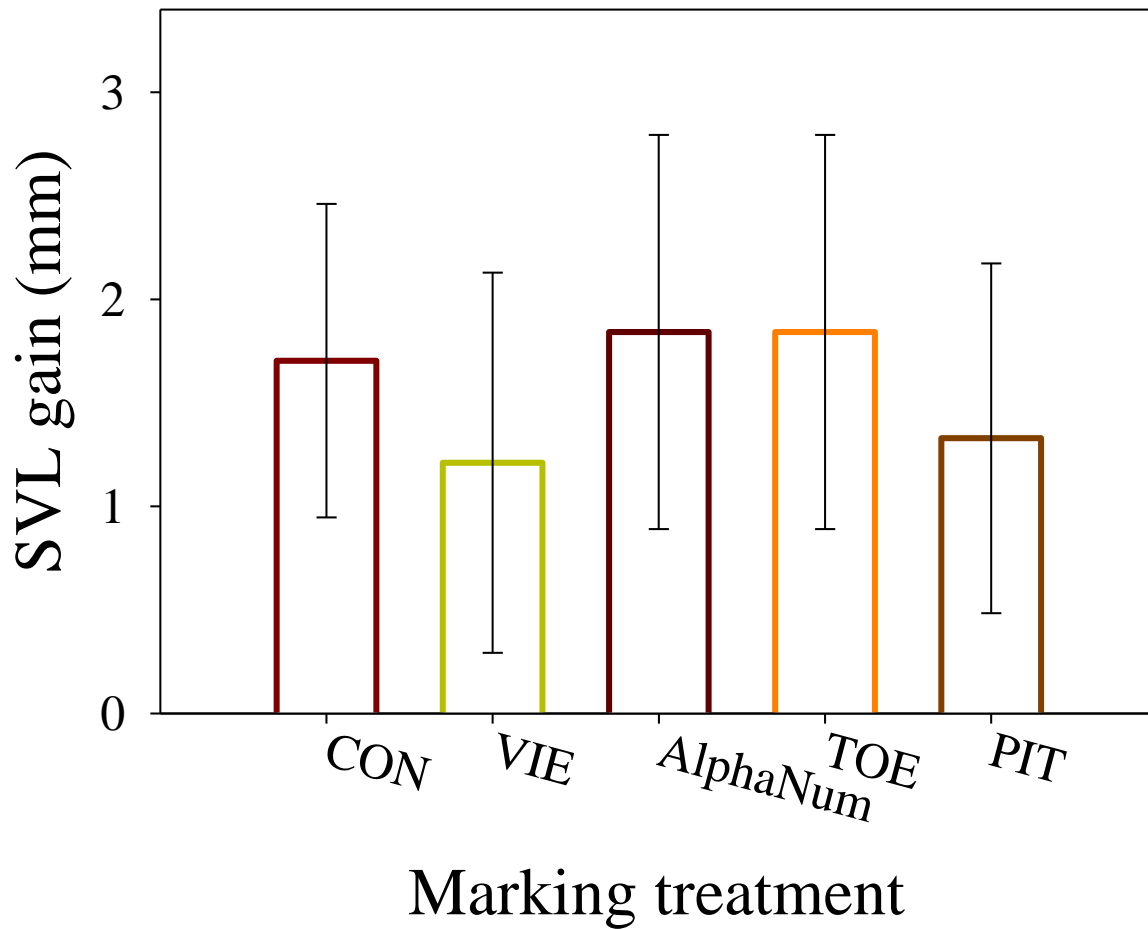
No initial size differences



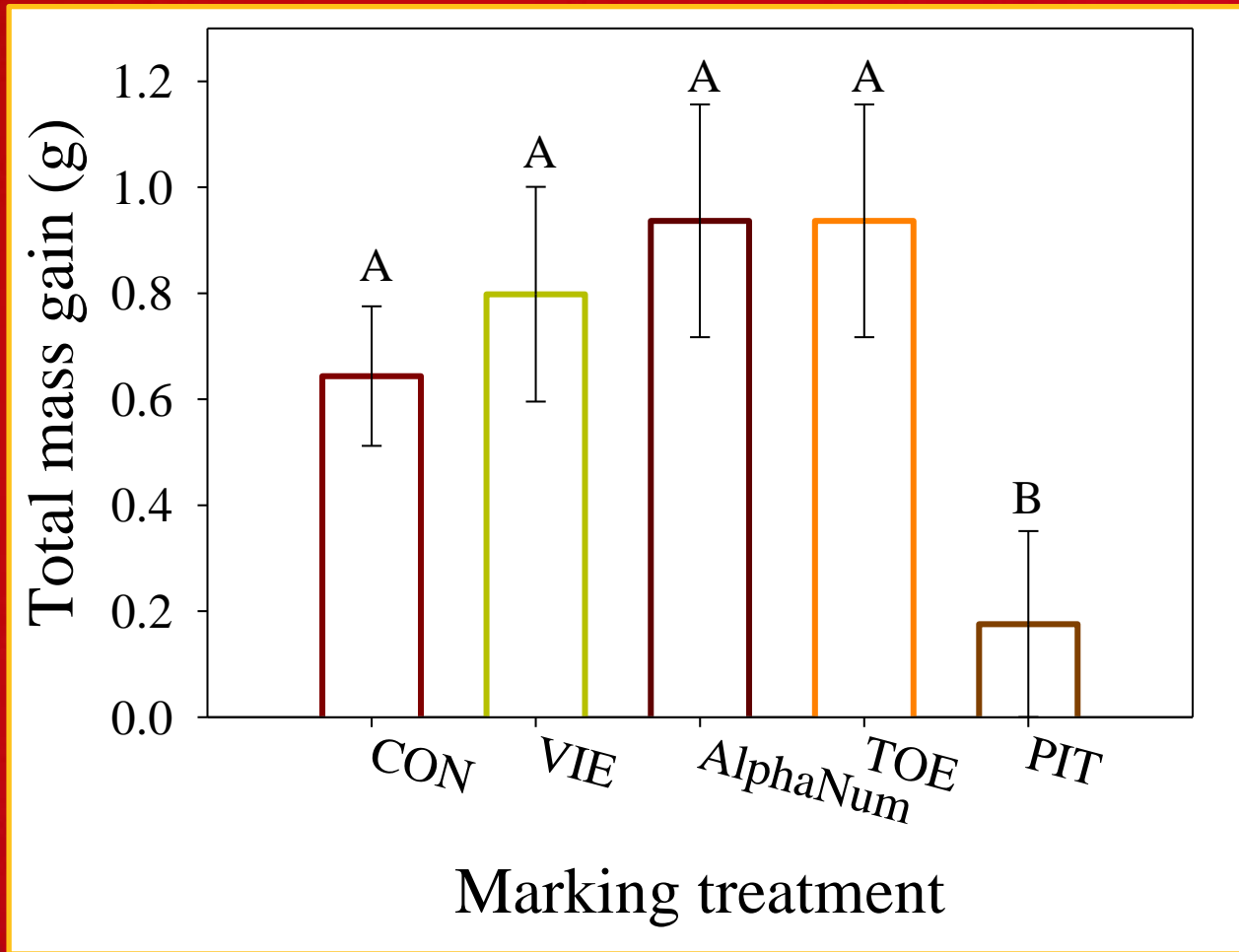
No initial size differences



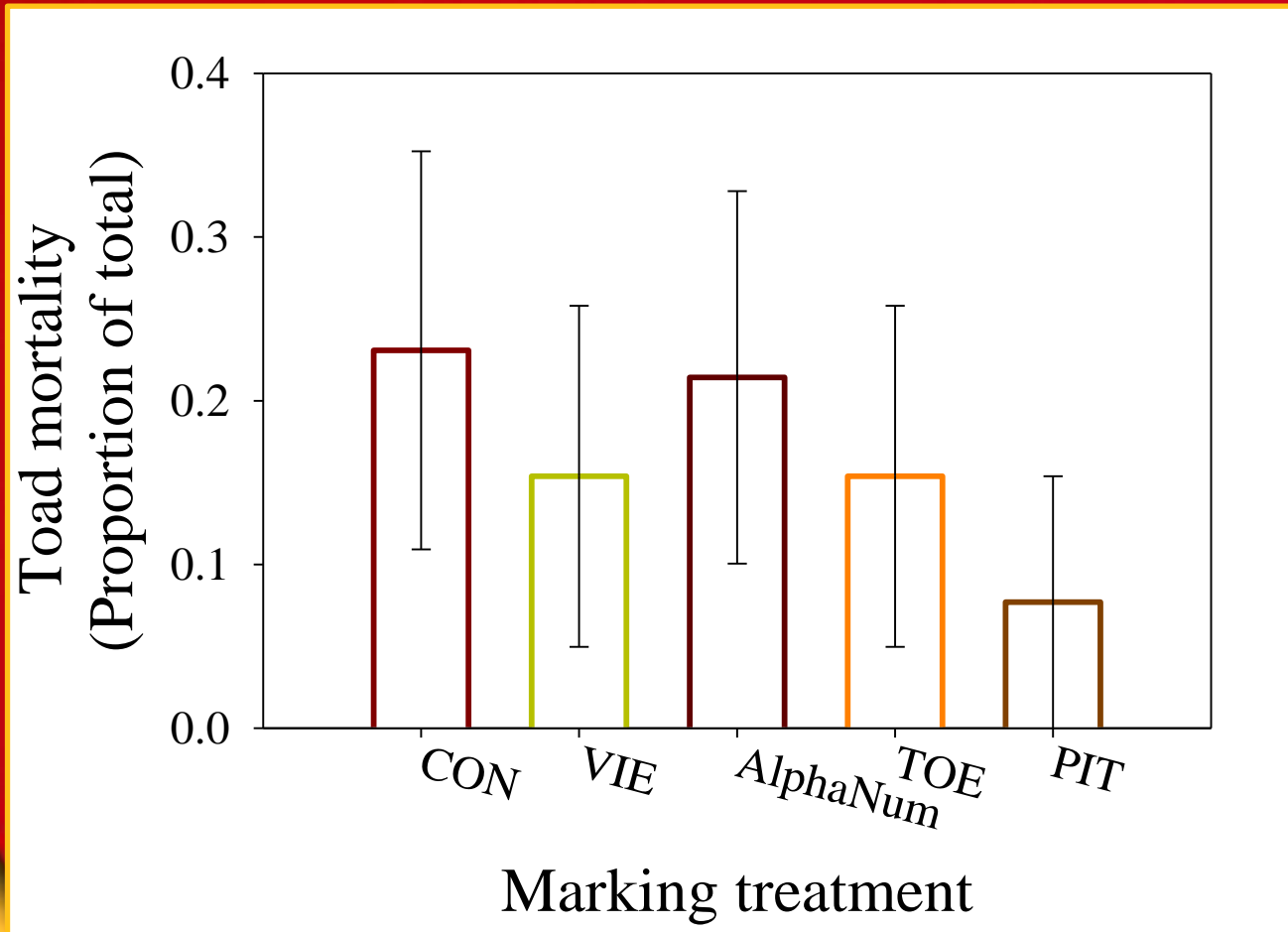
No effect on SVL gain



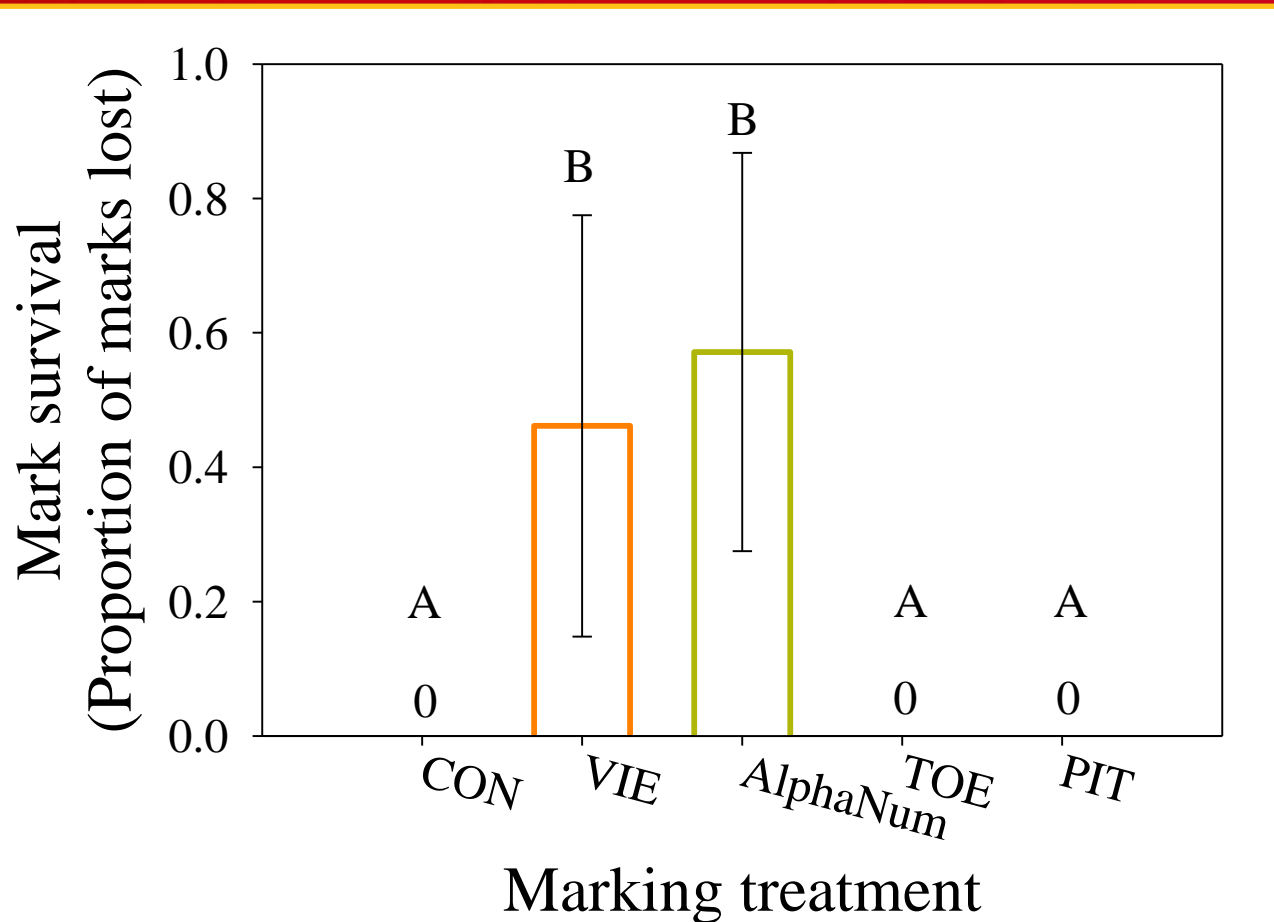
PIT gained < mass



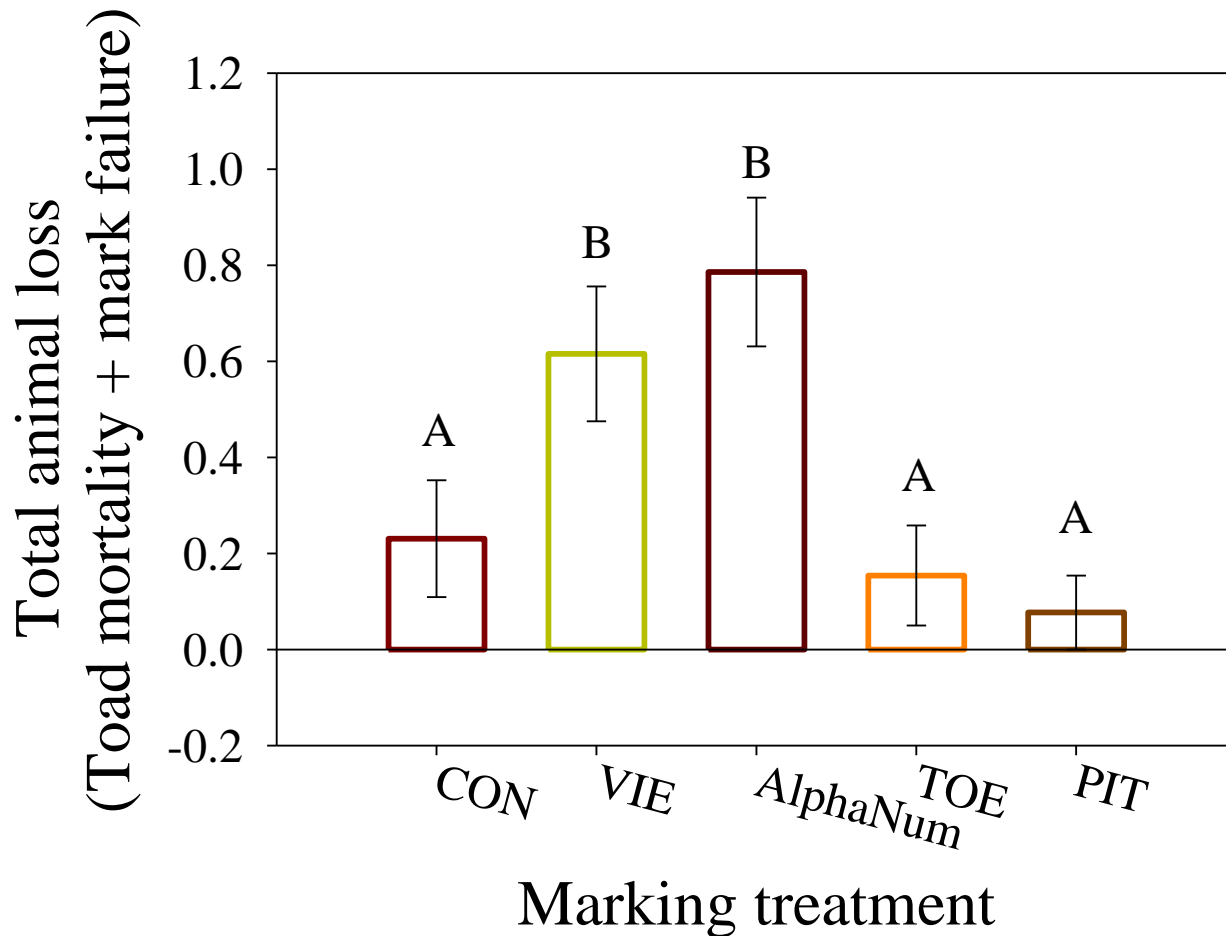
No effect on toad survival



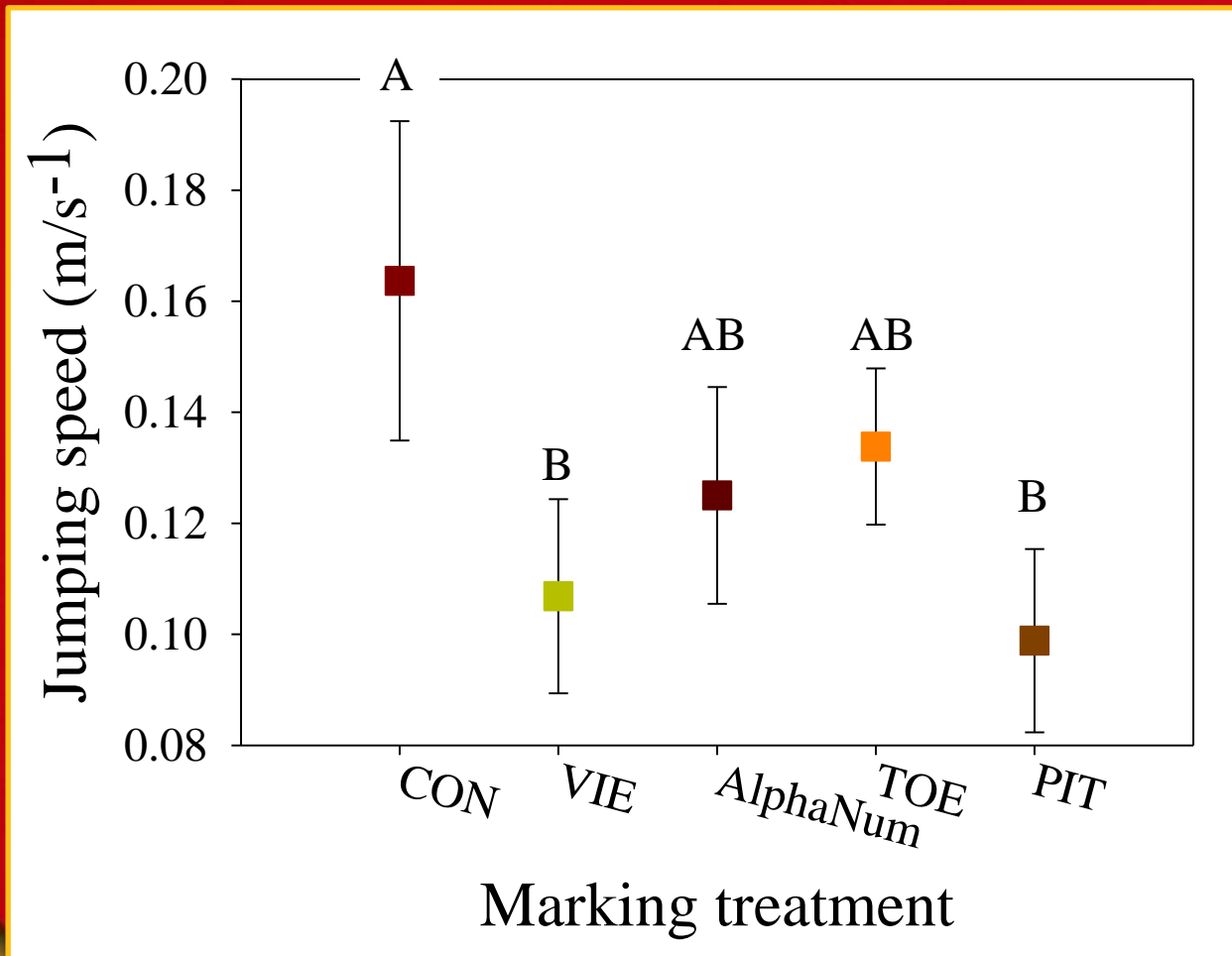
VIE & AlphaNum marks were only lost marks



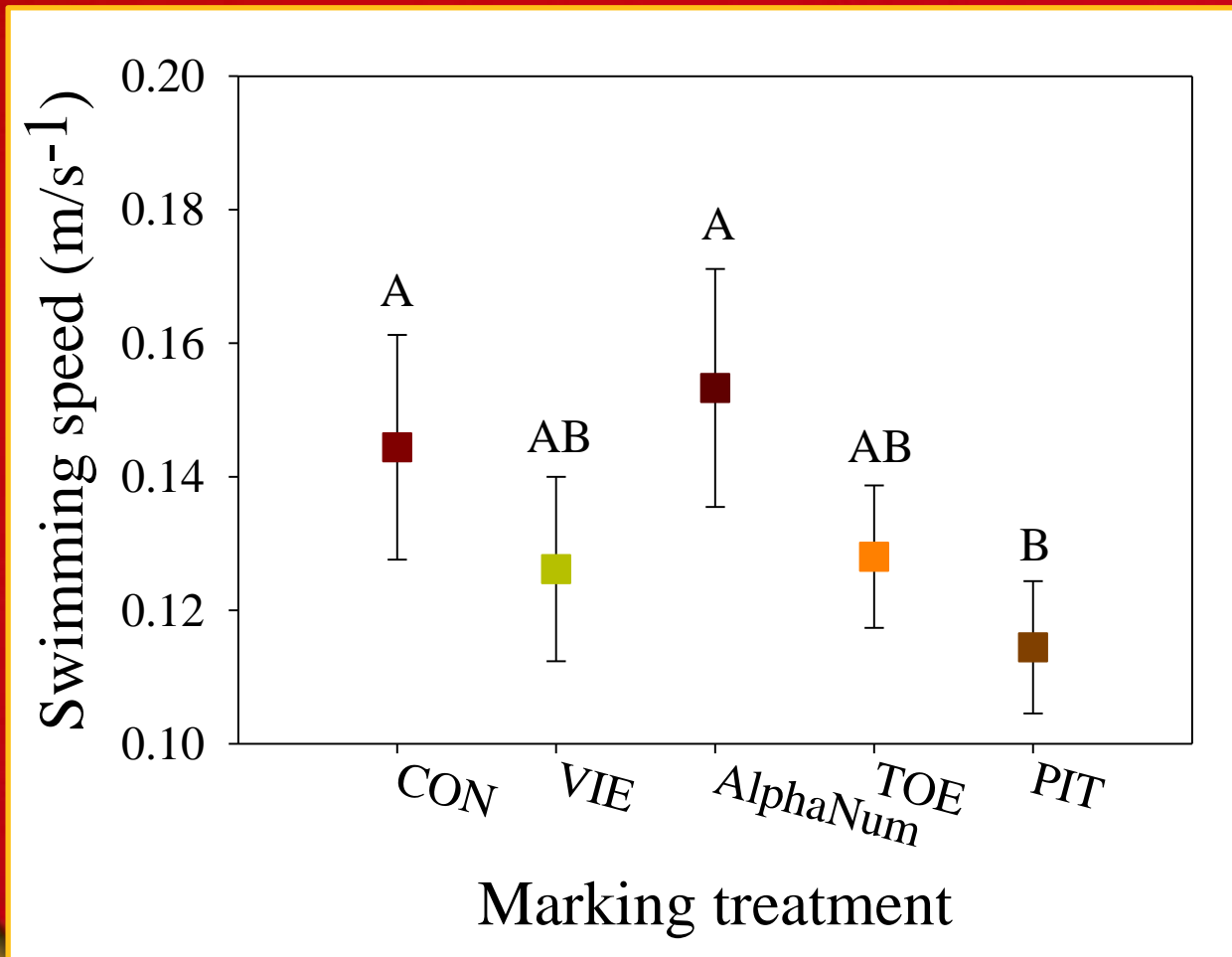
Total animal loss >60% in VIE & AlphaNum



Effects on locomotion



Effects on locomotion



Summary

No effects on survival or SVL gain

PIT 100% reliable

but < mass gain & decreased locomotion

VIE & Alpha-Num > 60% total animal loss
minimal effects on locomotion

TOE 100% reliable

minimal effects on locomotion

TOE CLIPS



Consider
species &
(I³S) tool

Conservation Implications

- ~2,000 amphibian species in crisis
- Translocations & captive breeding and reintroduction programs may help
- Toe-clipping provides a simple, rapid, & reliable method of monitoring individuals

Acknowledgments



Environmental Physiology and Conservation (EPAC) Lab

Cybil Covic

Julia Goss

Allison Graham

Allison Conn

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Rhodes IACUC # 099

Memphis Zoo IACUC # 2008-06