

Can shrub removal or fire restore amphibian habitat in fire-suppressed pine flatwoods wetlands?



Thomas A. Gorman

Department of Fish and Wildlife Conservation, Virginia Tech

Carola A. Haas

Department of Fish and Wildlife Conservation, Virginia Tech

John G. Himes

Florida Fish and Wildlife Conservation Commission

Objective

Evaluate if mechanical treatments can serve as a surrogate for fire and create vegetative conditions that are similar to high-quality amphibian breeding sites.



Primary Metrics of Success:

1. Vegetation response
2. Amphibian response
3. Hydrological response

Ecosystem

- Fire maintained longleaf pine - wiregrass savanna with a historic fire frequency:
 - Uplands: 1-3 years
 - Depression wetlands: 3+ years
- Effects of fire suppression in uplands well-documented; less known about wetlands.
- Lightning-ignitions would have been common during growing-season.
- Shift to dormant-season burns reduces the likelihood of fire creating suitable habitat conditions.



Reticulated Flatwoods Salamander

(*Ambystoma bishopi*)

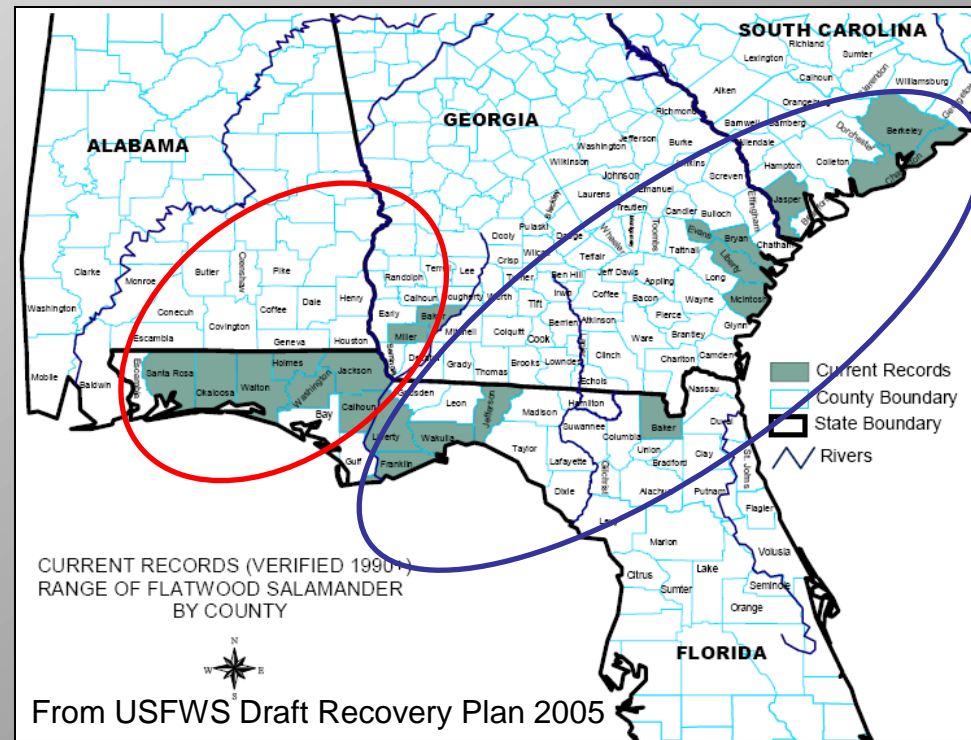
Ecology

- Adults and sub-adults are fossorial.
- Terrestrial courtship.
- Deposit eggs terrestrially and eggs hatch upon inundation.
- Larval period is 11-18 weeks.
- Fall/Winter breeder in ephemeral wetlands.



Reticulated Flatwoods Salamander Status

- Up-listed to endangered under ESA in 2009.
 - Habitat alteration was primary threat considered.
- 14 of 20 extant populations are a single breeding wetland.
 - 5 populations have 2-3 wetlands.
 - 1 population has >3 wetlands.



Ornate Chorus Frog

(*Pseudacris ornata*)

- Use burrows or logs and debris in the adjacent uplands during nonbreeding season.
- Females deposit clusters of 10 to 100 eggs.
- Tadpole development is 8-12 weeks.
- Fall/Winter breeder in ephemeral wetlands.



Role of fire in wetlands



Fire reduces hardwood trees and shrubs in uplands and in the pond basin.

Evapotranspiration is reduced, so hydroperiod of pond increases.

Larvae have time to metamorphose.

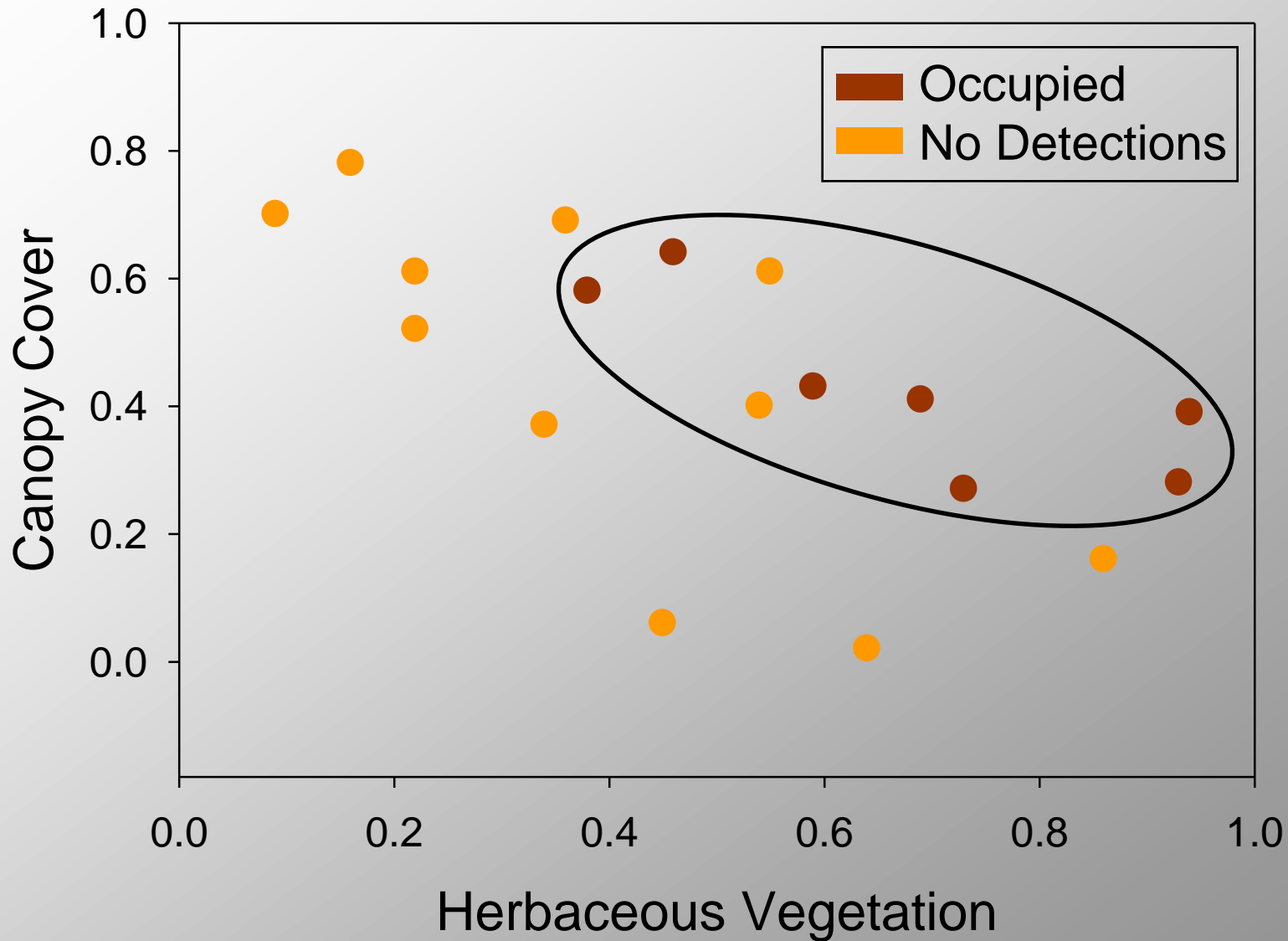
Reduced canopy cover increases solar insolation, increasing growth of herbaceous vegetation.

Increased water temperatures speed larval growth.

Increased food for prey and increased cover increases larval survival.



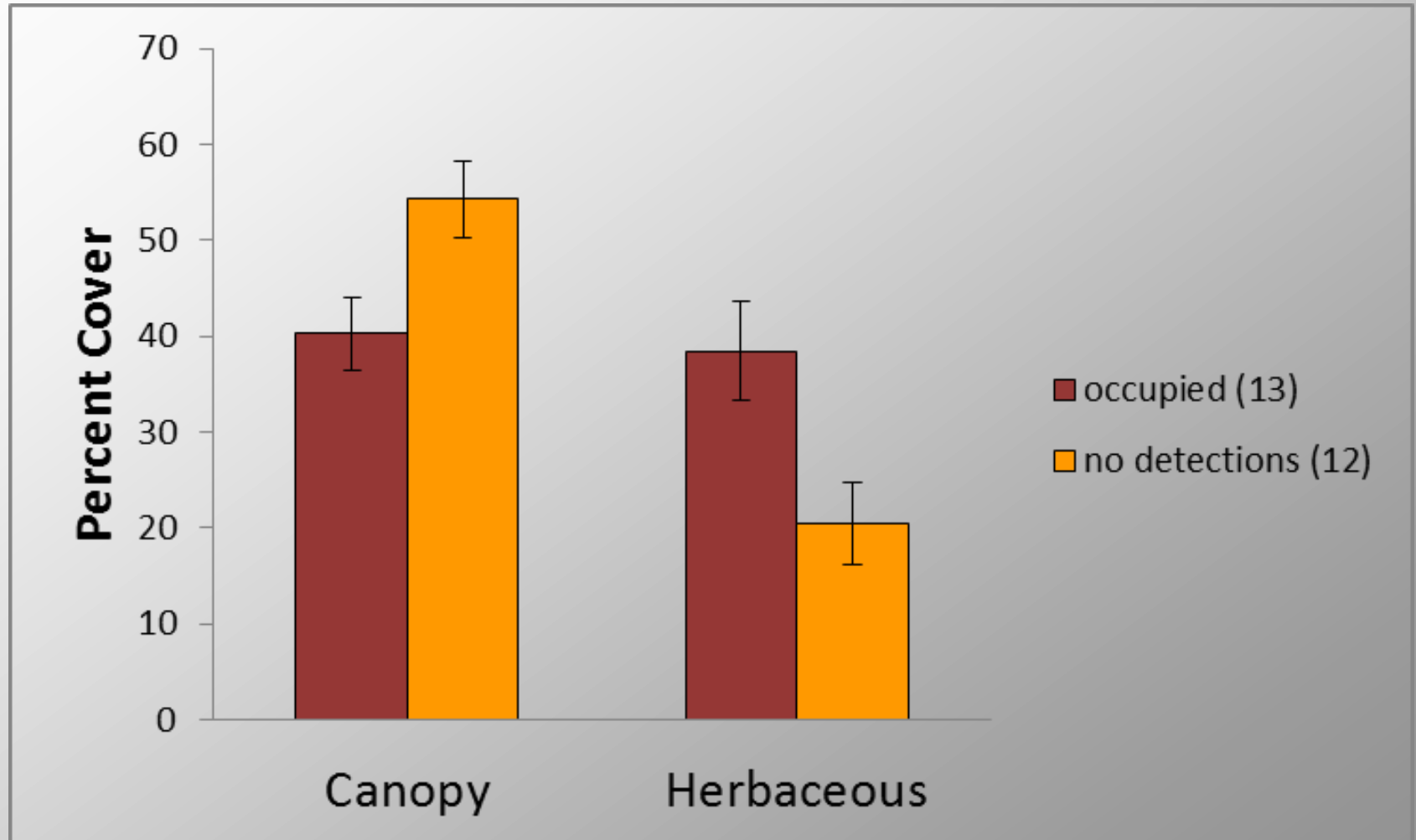
Reticulated Flatwoods Salamander



Reticulated flatwoods salamander

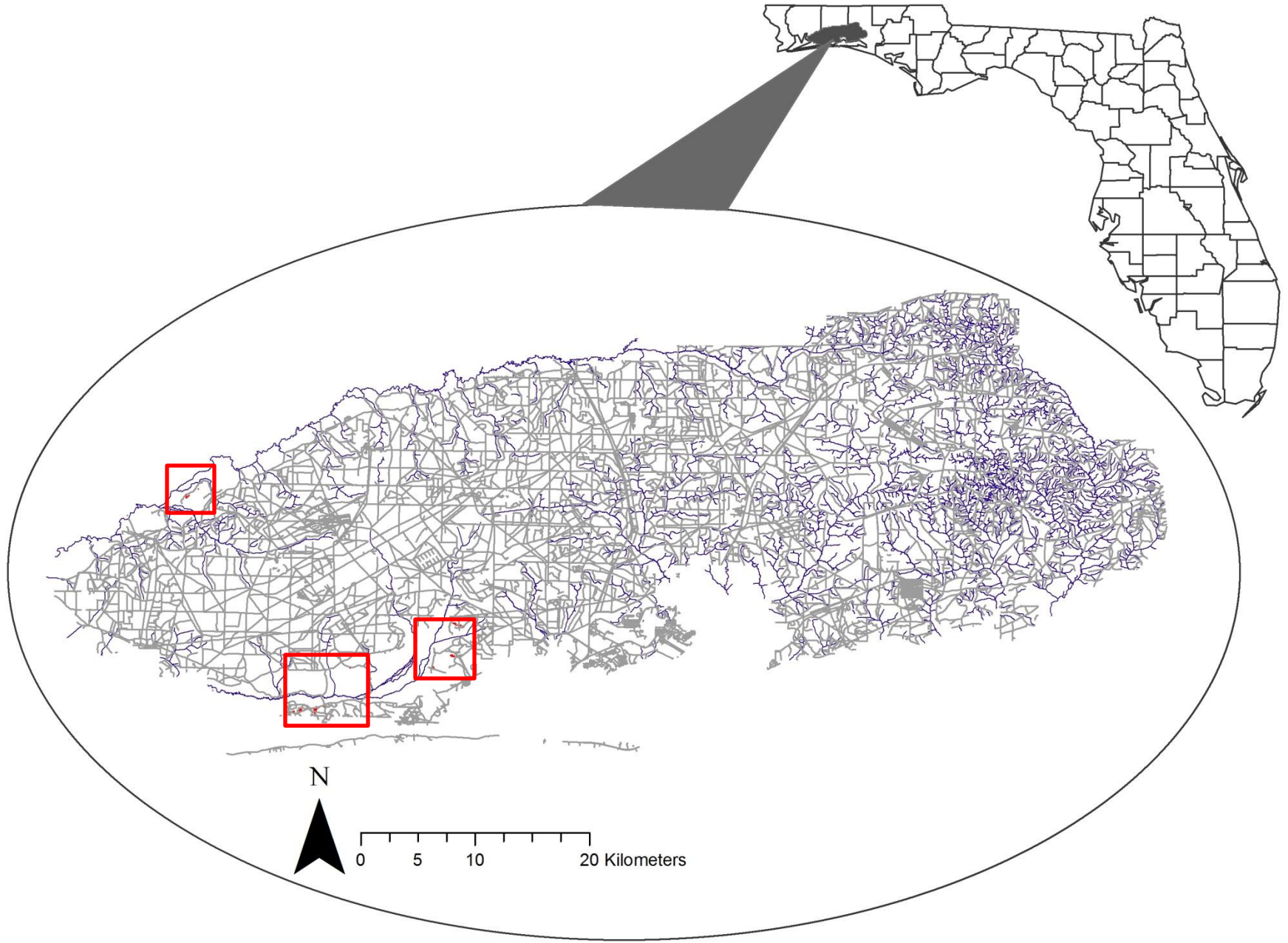


Ornate Chorus Frog



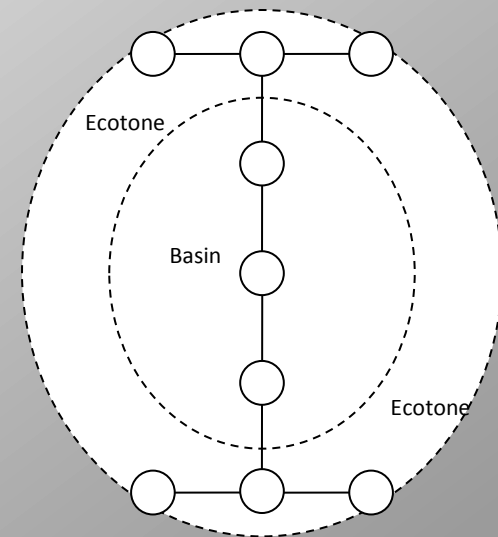
Experimental Design

- Initiated a field experiment to examine if mechanical and herbicide treatments could serve as a surrogate to fire in wetlands embedded within the longleaf pine ecosystem.
- **25 sites**
 - **21** had an overgrown midstory.
 - **8** were treated mechanically and with herbicide.
 - **2** were treated mechanically and with herbicide and fire.
 - **4** were treated with fire only.
 - **7** served as reference sites.
 - **4** additional sites with a less dense midstory and known to be recently occupied by flatwoods salamanders served as an example of high-quality sites.



Methods

- We collected pre- and post-treatment data on vegetation and amphibians in 2009-10 (pre) and 2011-12 (post).
 - Vegetation surveys are completed once/year at the beginning of the breeding season.
 - We conducted dipnetting and call surveys at each site twice/month from December – April.
- Midstory mechanical/herbicide treatments were conducted in summer/fall 2010 prior to the fall/winter breeding season.



PRE



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POST



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PRE



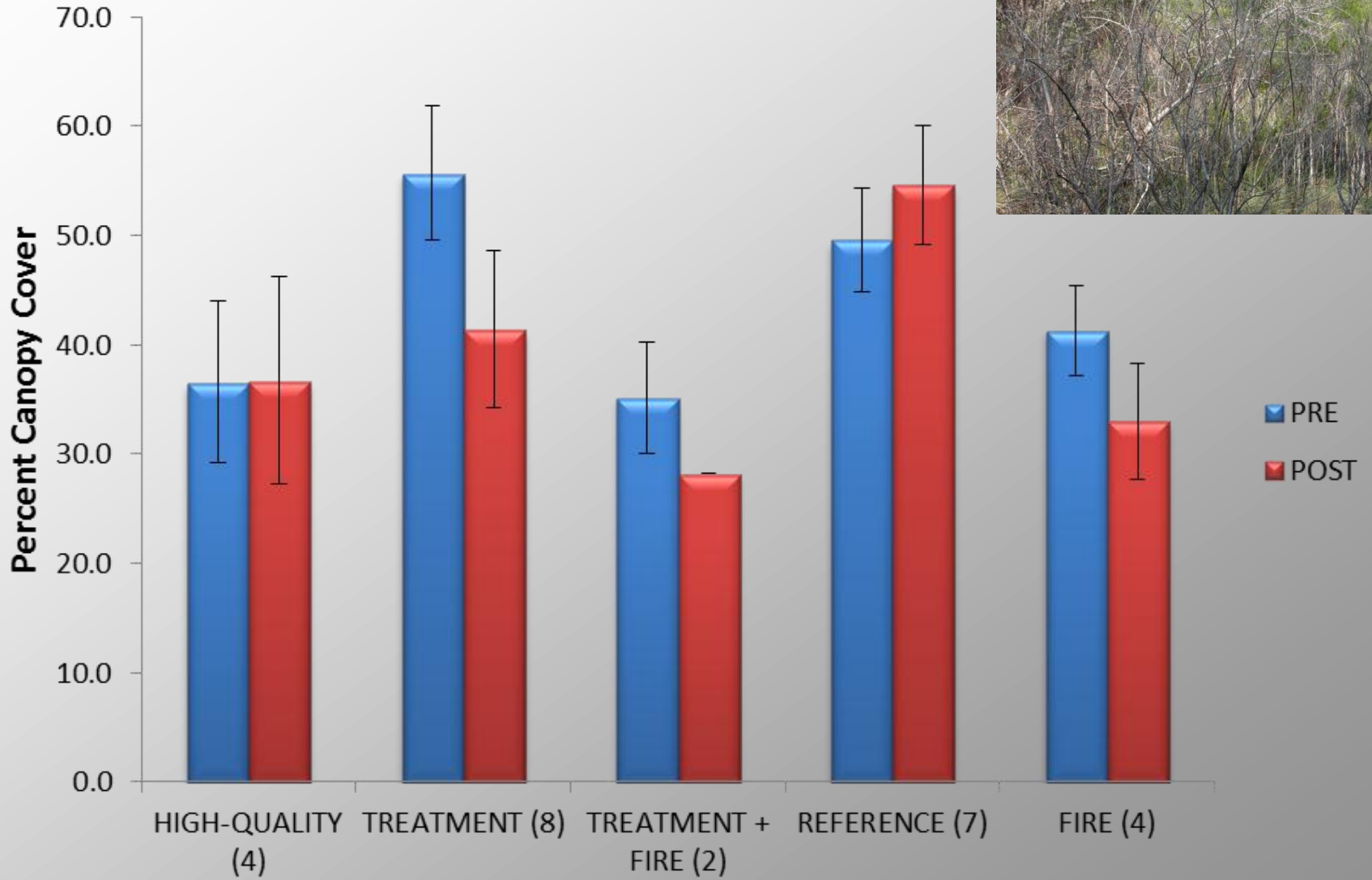
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POST

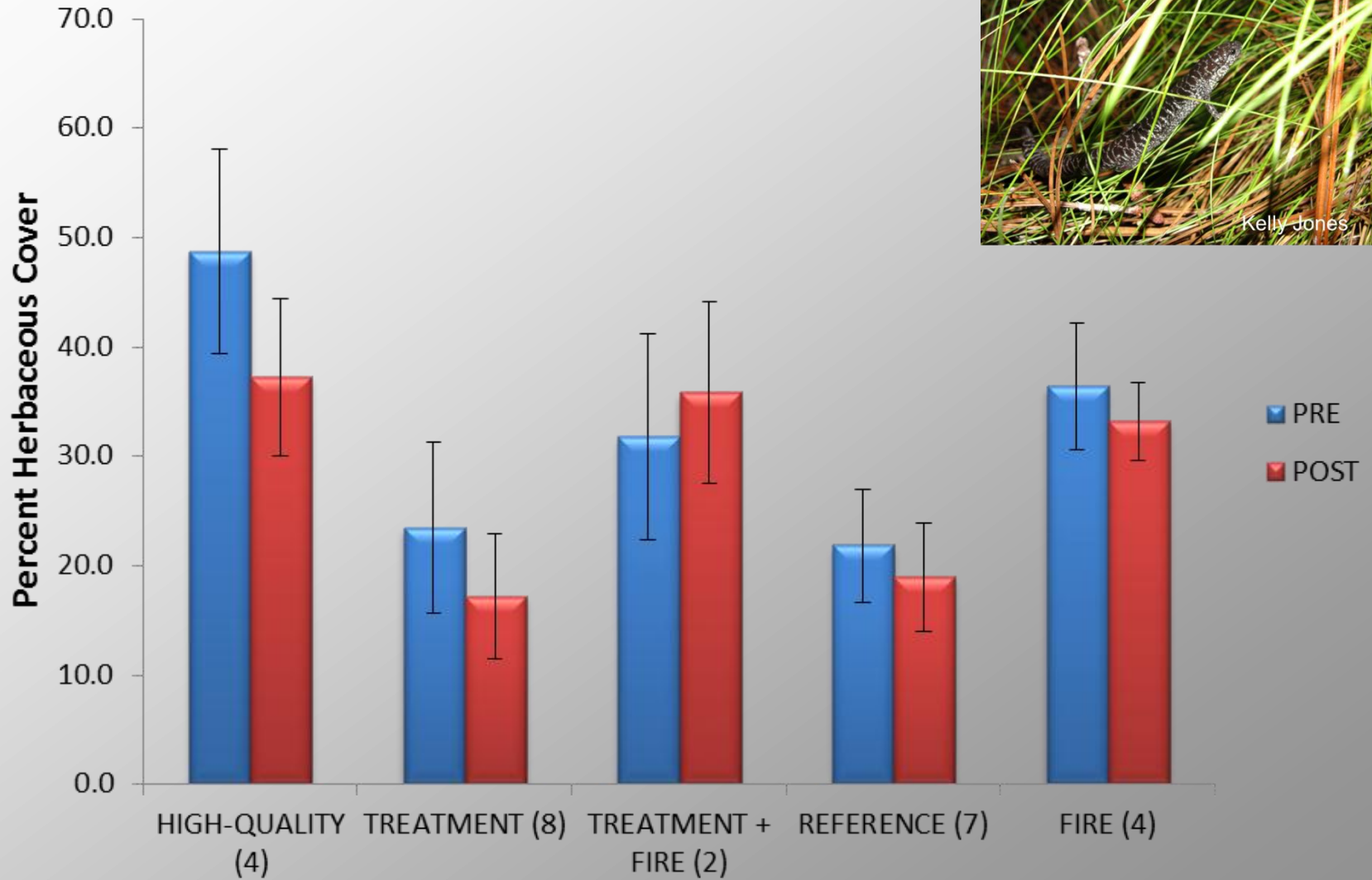


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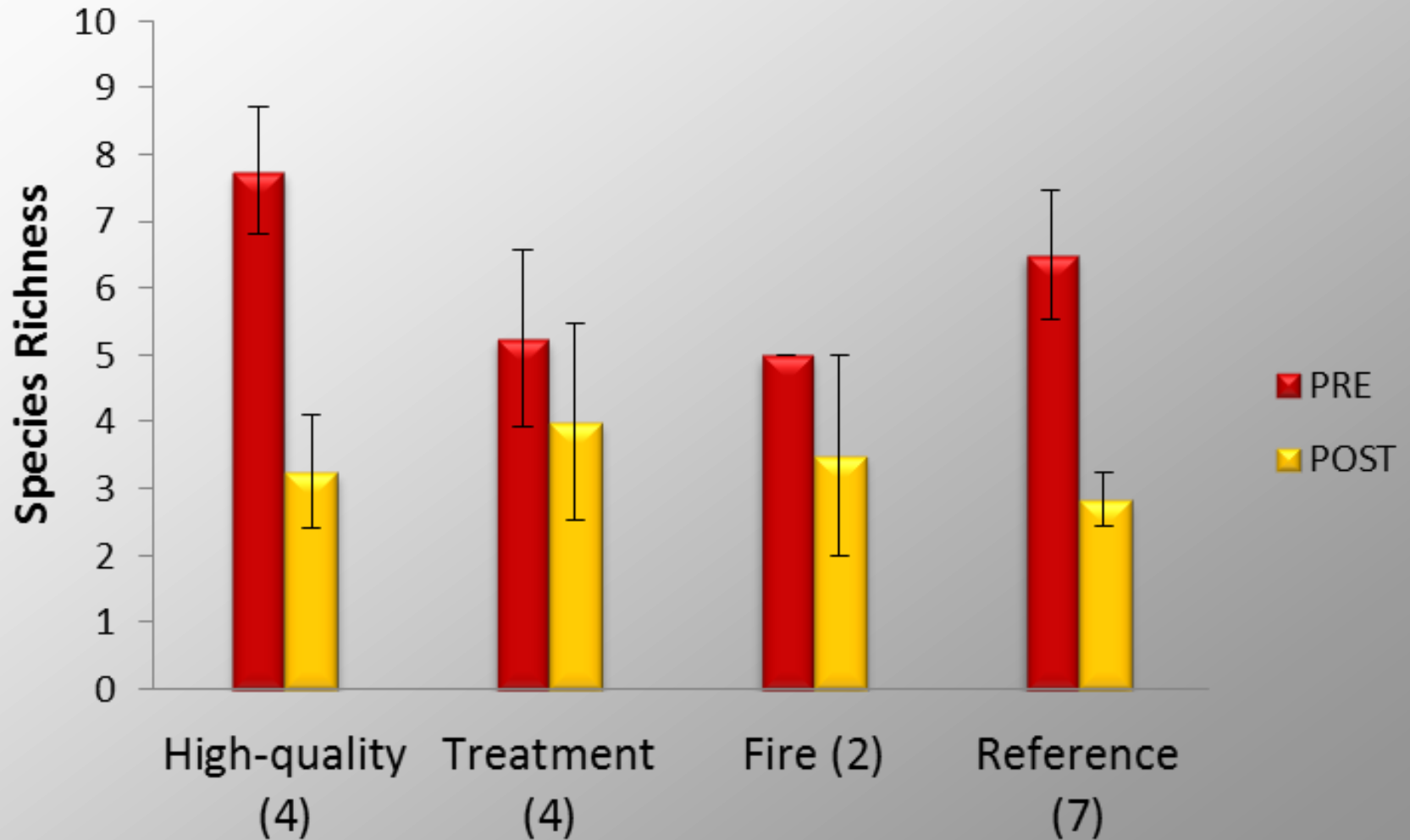
Canopy Cover



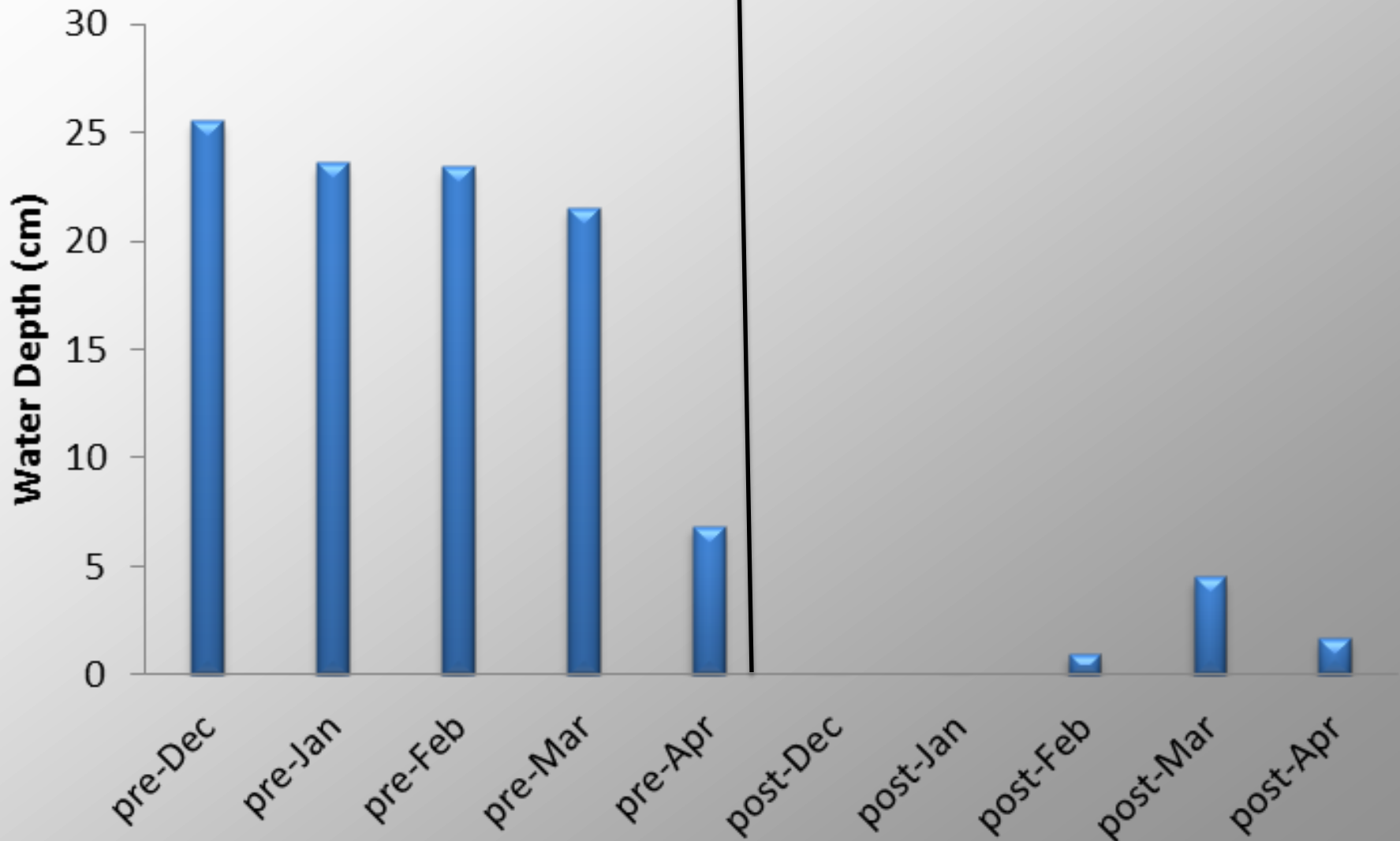
Herbaceous Cover



Anuran Species Richness



Water-levels – High-quality sites



Discussion

- Although we restored the woody midstory to desired conditions, there was not an immediate response of amphibians or herbaceous plants.
- Sufficient water-levels in 2009-2010 and drought in 2011-2012 influenced amphibian use at many wetland sites.
- If amphibians and herbaceous cover increase in burned ponds, but not in mechanically-treated ponds, we will need to address other effects of fire (such as water chemistry) and consider other methods for establishing native grasses in mechanically-treated sites.

Future Directions

- Fire occurred at an additional 6 sites this past winter.
 - Increased sample size of *treatment + fire* and *fire only* treatments.
- Sub-surface hydrology data are being collected to understand the treatments impact on evapotranspiration.



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Kelly Jones

Tonya Mammone

Lori Blanc

Steve Goodman

Steve Ritchie

Jay Parker

Annamarie Saenger

Brandon Rincon

Sylvia Powell

Jeromi Hefner