Bird and invertebrate response to woody biomass harvest: Preliminary findings and future directions

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A Collaborative Effort

North Carolina State University

Forest Guild

University of Georgia

PlumCreek

Weyerhaeuser

GP Georgia-Pacific

USDA NIFA United States Department of Agriculture National Institute of Food and Agriculture

Department of the Interior SE Climate Science Center

ncasi National Council for Air and Stream Improvement

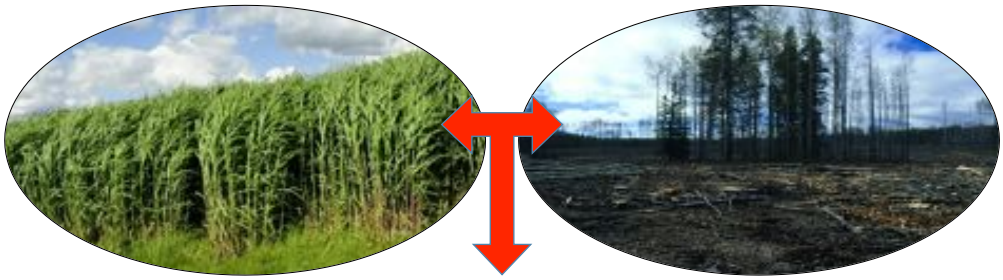
Biofuels Center of North Carolina

Global Energy CRISIS

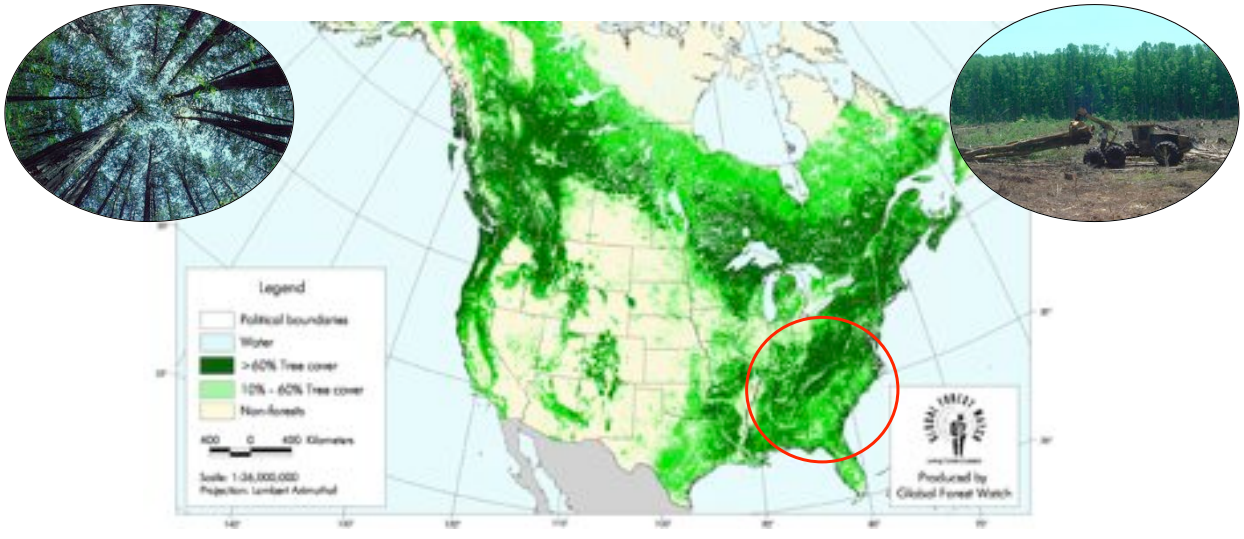
Renewable Energy Revolution

Fifty Shades of Green

Biomass may be converted to energy…



Heavily Forested Areas → Logging = Harvest Residues (Woody Biomass)



Harvest residues are down wood.

Down wood provides habitat for birds…

…and invertebrates.

QUESTION:

Will removing down wood through woody biomass harvest compromise bird and invertebrate habitat?

Biomass Harvesting Guidelines* (BHGs)...just in case

Forest Guild

Designed to:

Protect

Maintain

Enhance

Biodiversity ⟷ Site productivity

Wildlife habitat

*Based on limited empirical data

Project Objectives - Birds

Retained harvest residue volume

Retained harvest residue distribution

Wintering and breeding birds

Inform development of sustainable BHGs

Project Objectives - Invertebrates

Retained harvest residue presence

Retained harvest residue characteristics

Invertebrates

Inform development of sustainable BHGs

Setting the Scene

NC
(4 clearcuts)

Weyerhaeuser

Sheared

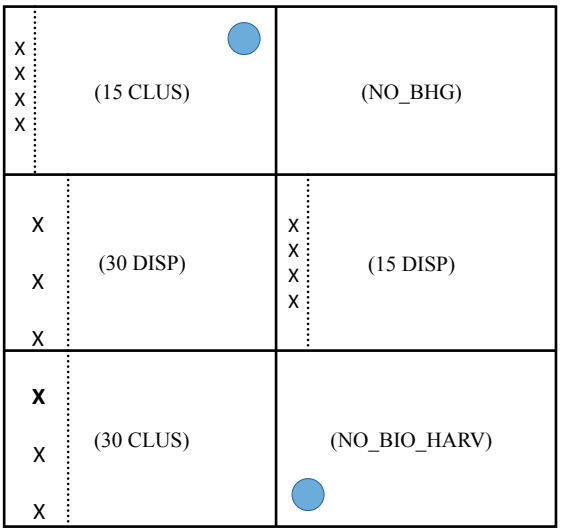
- Intensively managed pine plantations
- Mechanical and chemical site prep
- Replanted

GA
(4 clearcuts)

PlumCreek Georgia-Pacific

Windrowed

Treatments



= logging deck

= retention zone

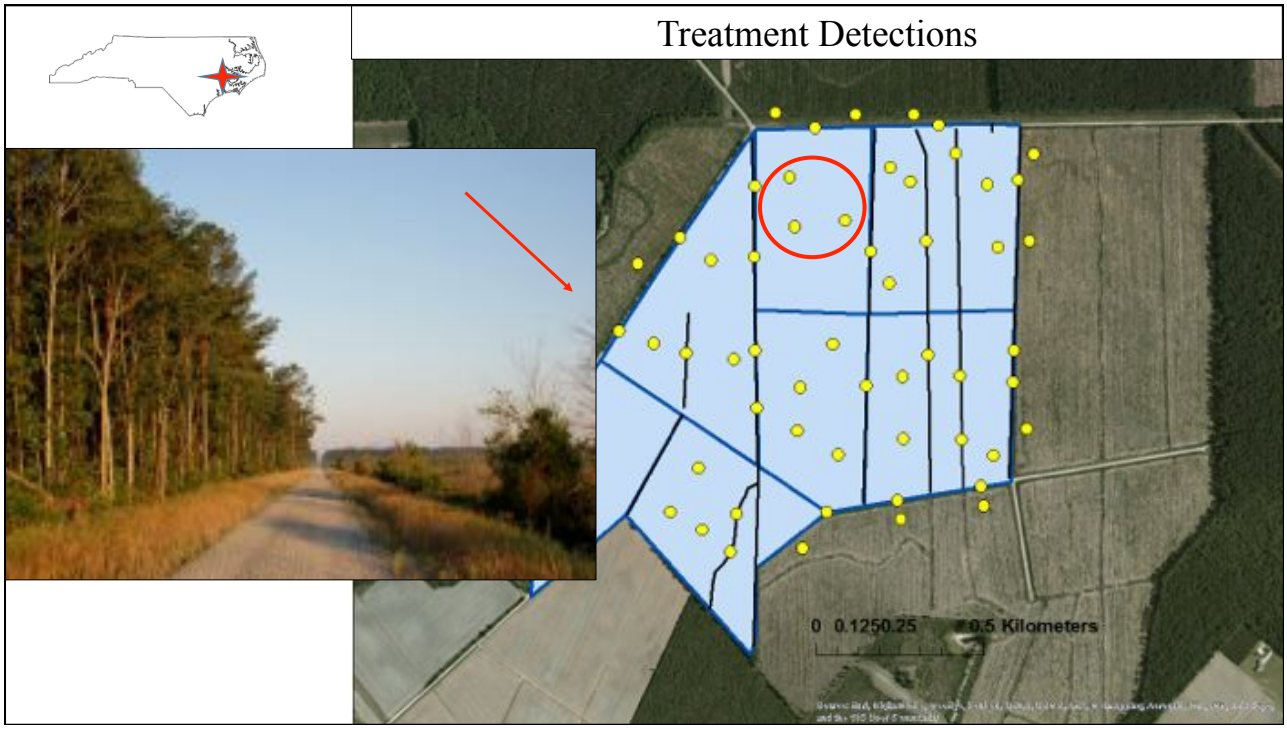
x Treatments ranged from 6 – 14 ha.

Methods –Birds

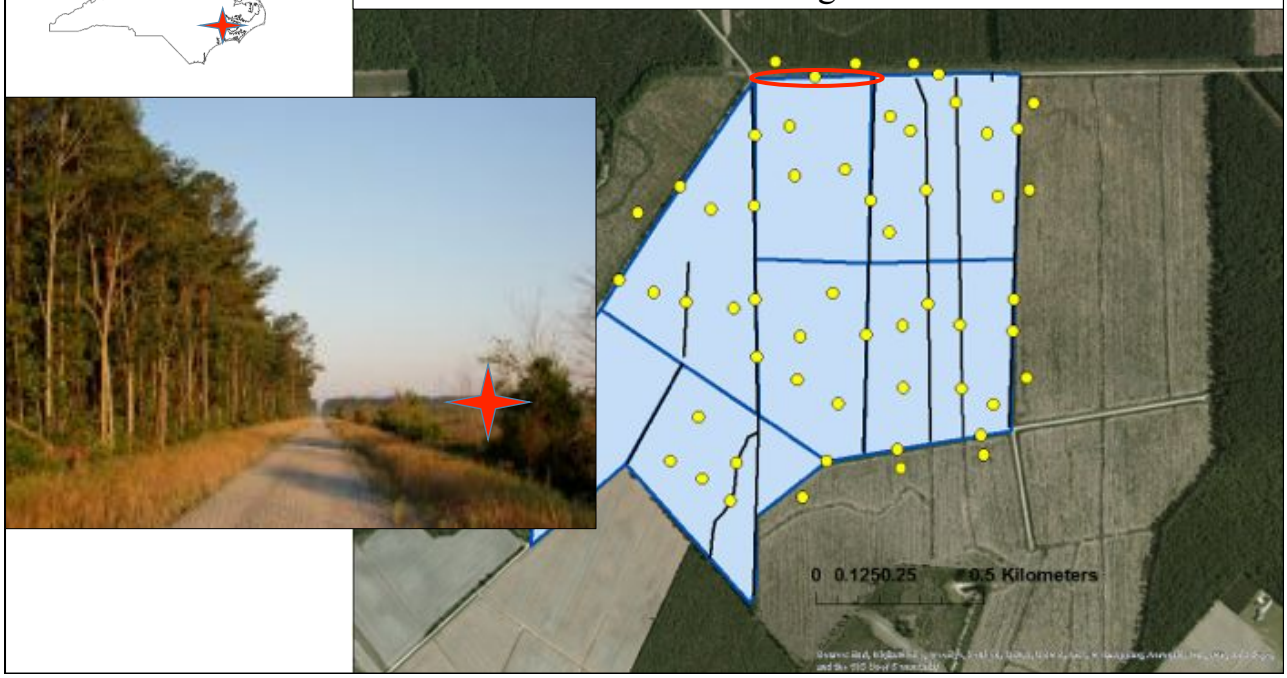
- We **counted birds** in clearcuts and adjacent edge and recorded their behavior and locations during winter (NC only) and the breeding season (NC & GA) of 2012 and 2013.
- We **measured horizontal and vertical vegetative cover** (grasses, forbs, woody vines, and woody vegetation)

= 8 January – 28 February
2012-2014

= 15 April – 15 July
2012-2014



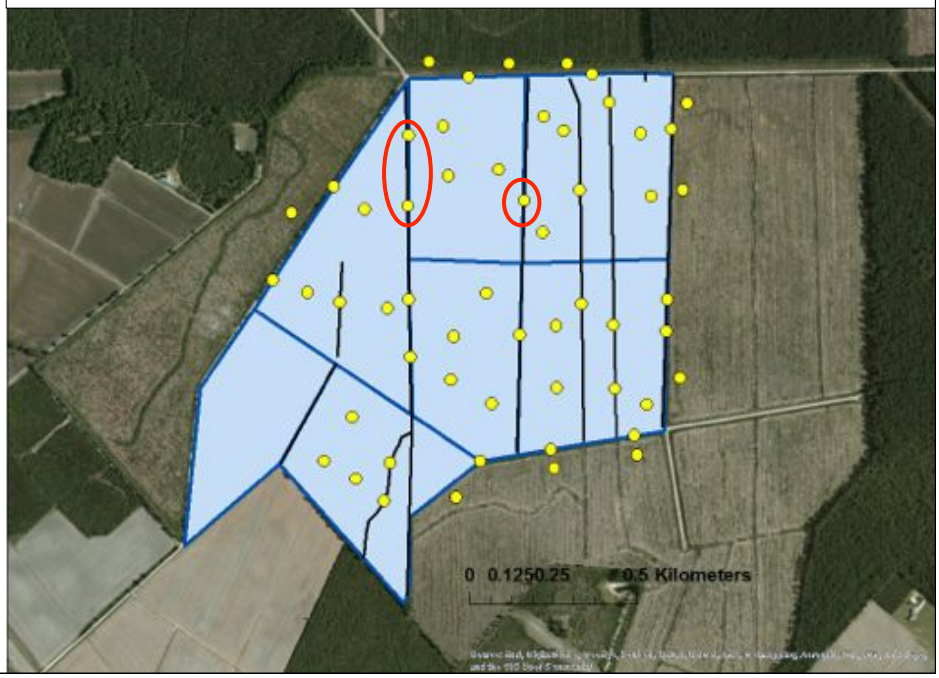
Treatment Edge Detections



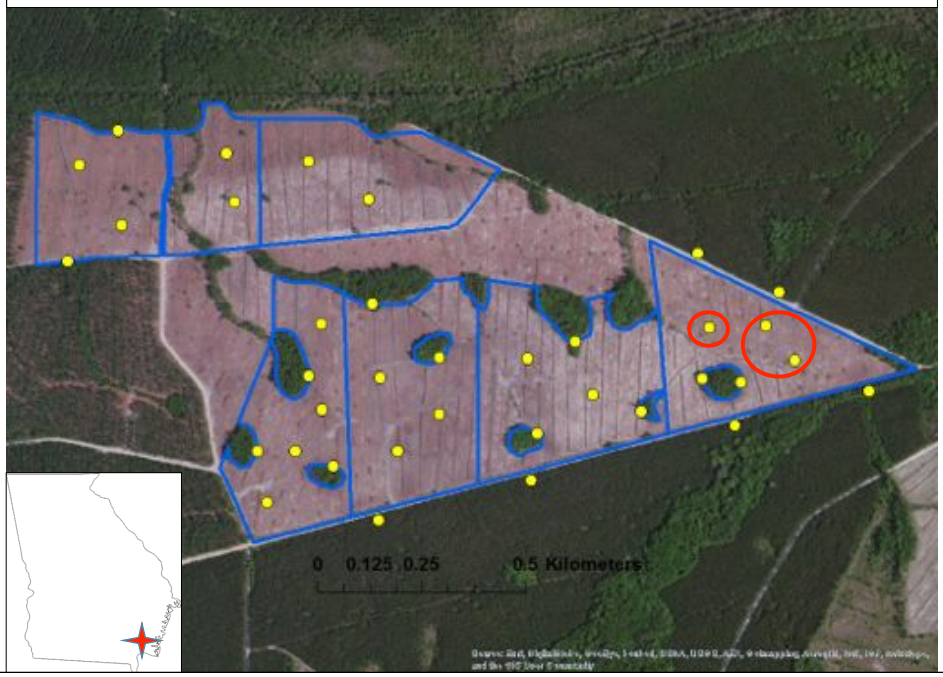
Adjacent Forest Edge Detections

Treatments ditches maintained a shrub-scrub vegetation layer.

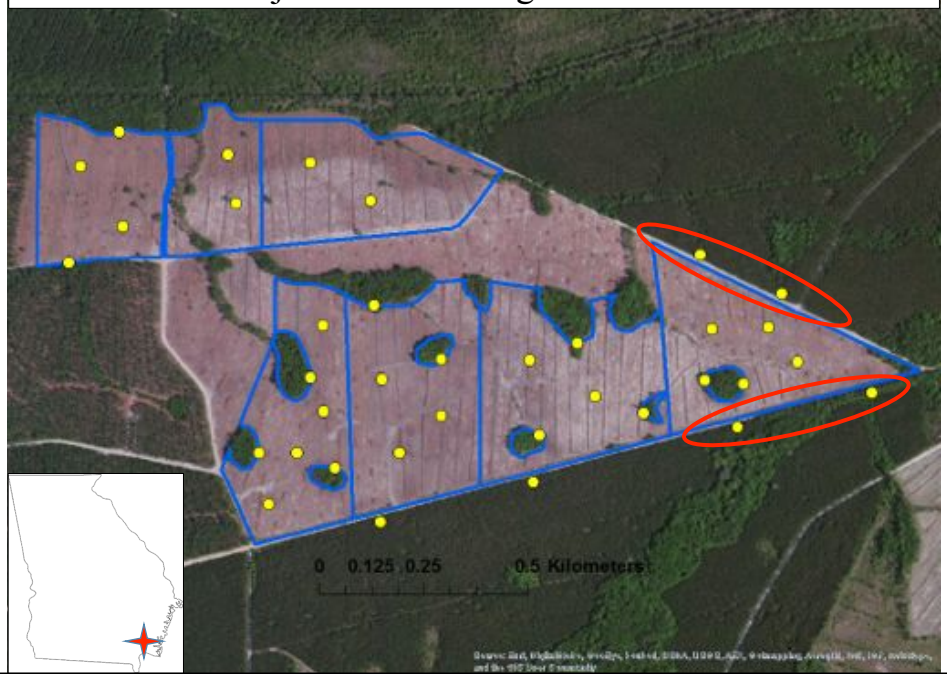
Interior Treatment Ditch Detections



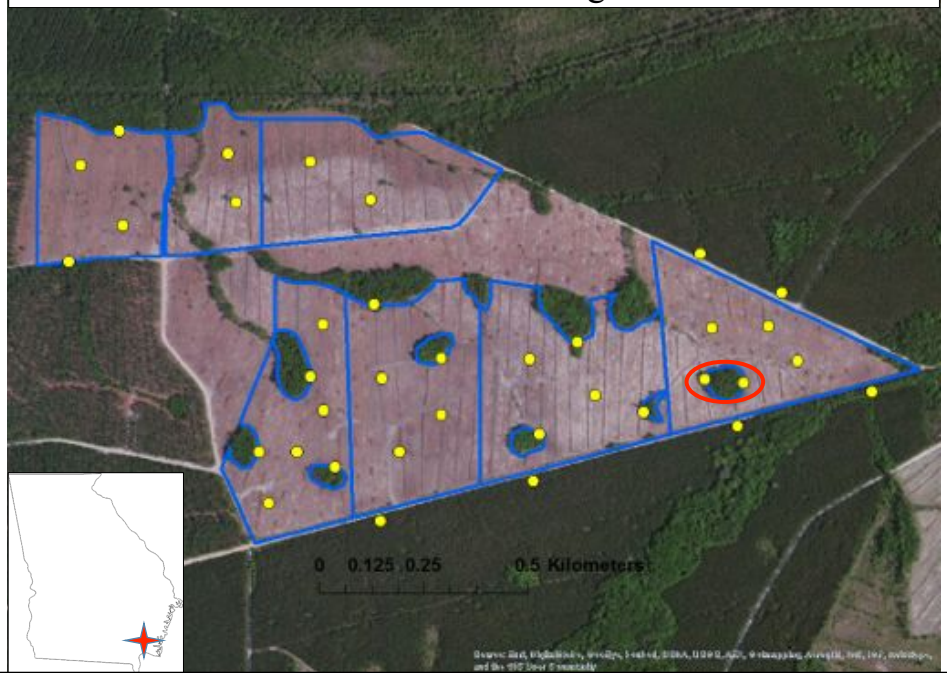
Treatment Detections



Adjacent Forest Edge Detections

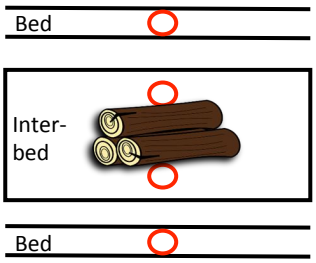


Wetland Retention Forest Edge Detections



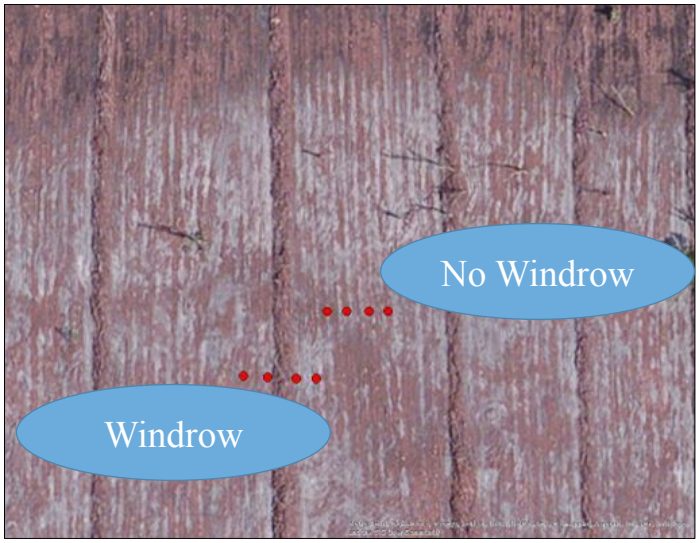
Methods – NC Invertebrates

Pitfall Tapping
3 treatments =
1)Hardwood pile
2)Pine pile
3) No pile



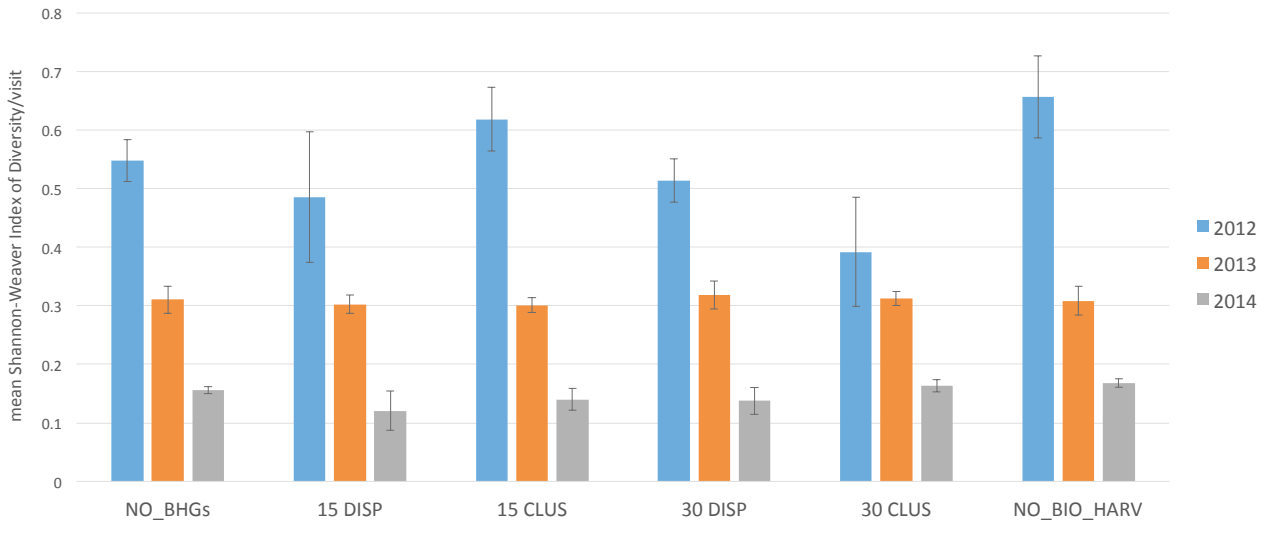
Methods – GA Invertebrates

Pitfall Trapping
2 treatments =
1)Windrow
2)No windrow
(i.e., no large-diameter harvest residue)



Preliminary Results – Winter Birds

Mean Shannon-Weaver Index of Diversity for winter birds/visit in treatments*



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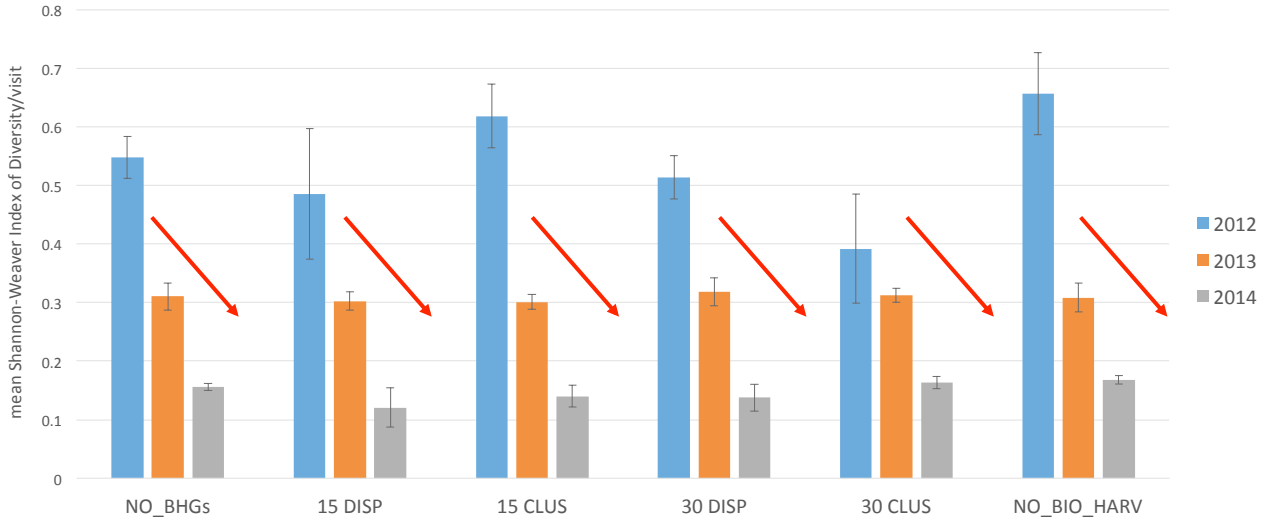

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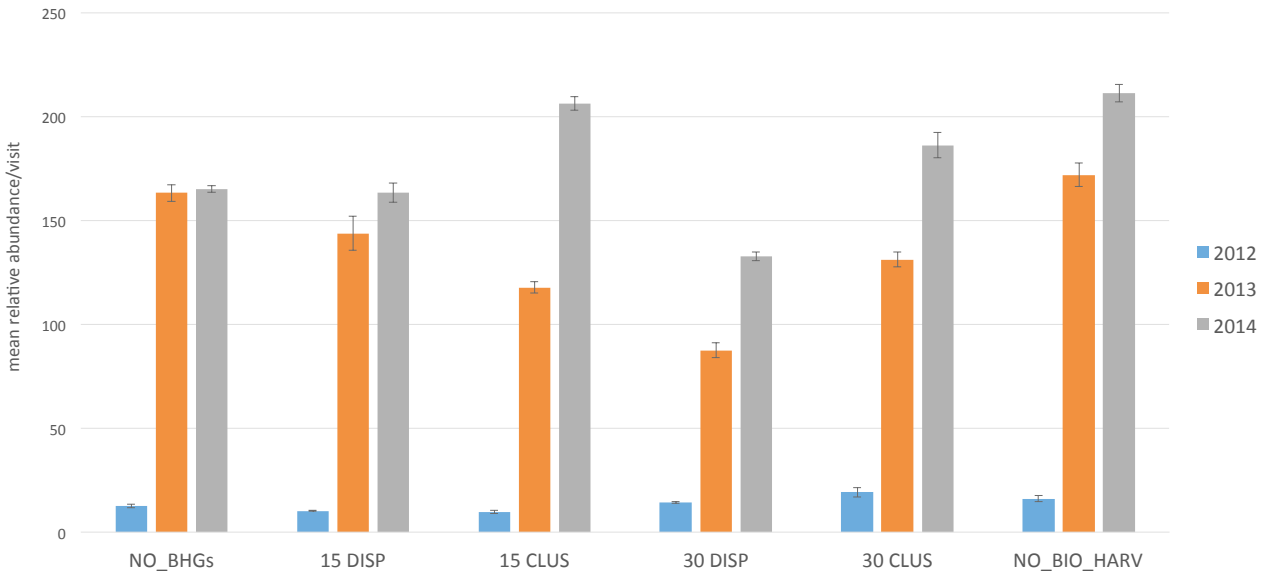
Mean relative abundance of winter birds/visit in treatments *



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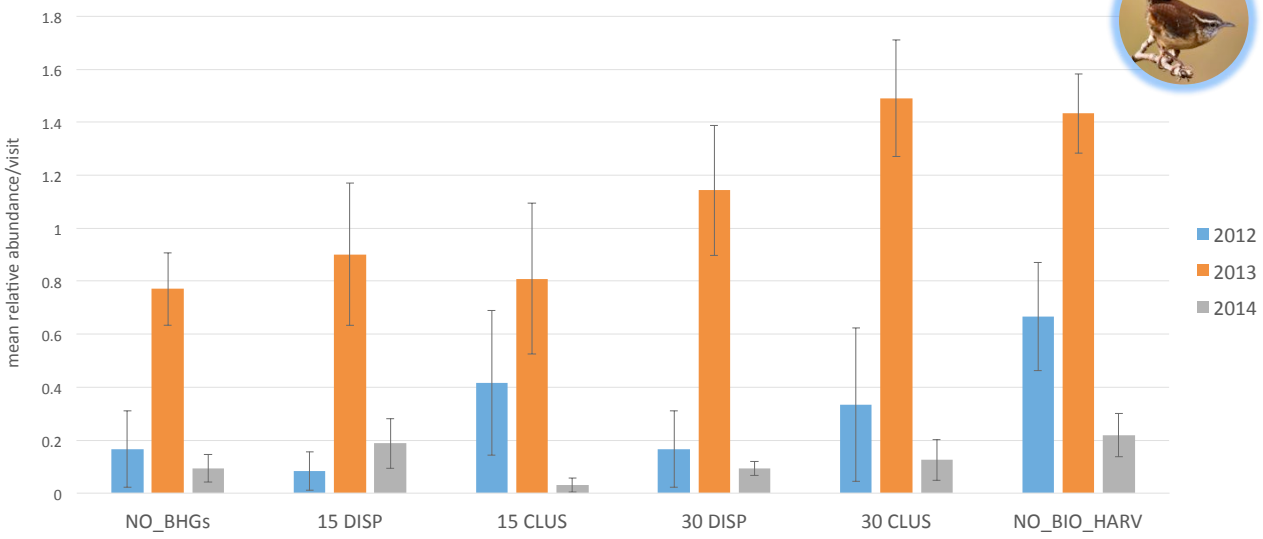
Mean relative abundance of Carolina Wrens/visit in treatments *



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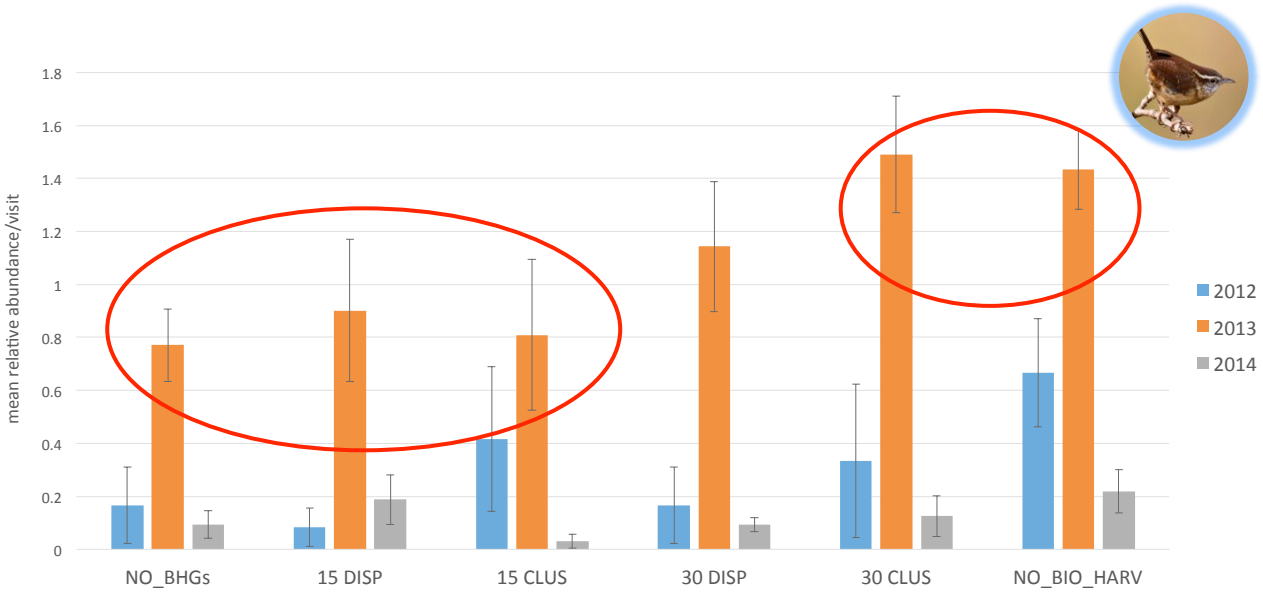

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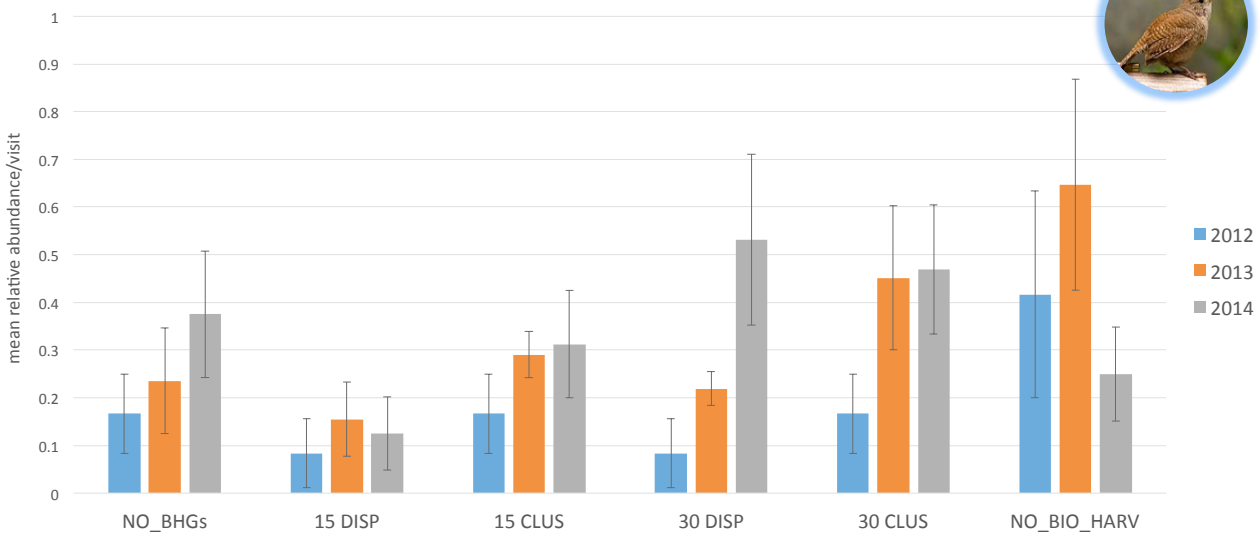
Mean relative abundance of House Wrens/visit in treatments*



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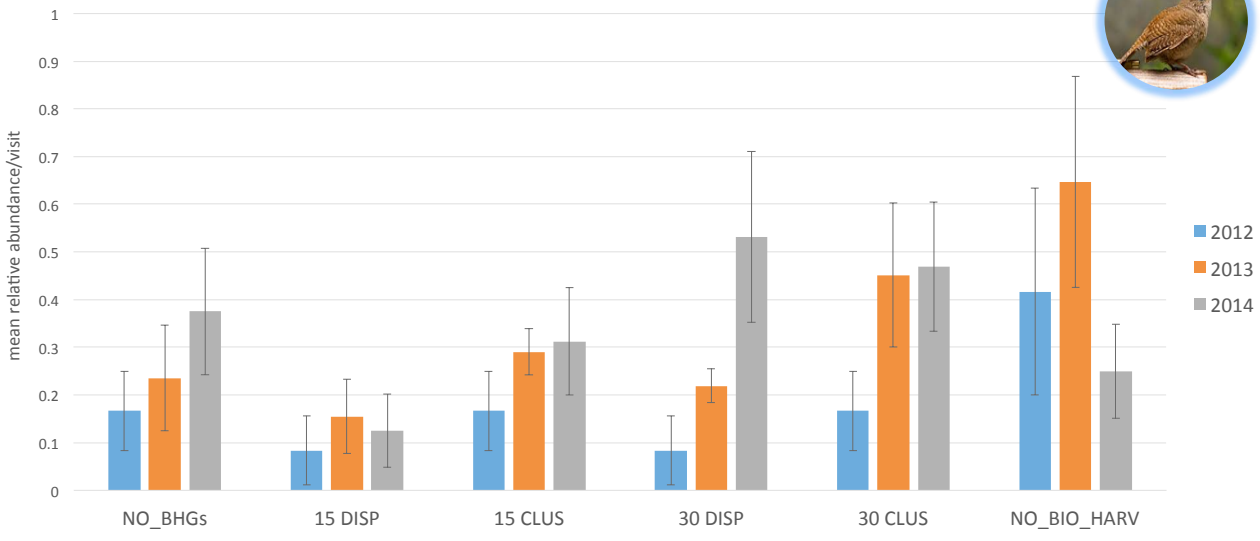

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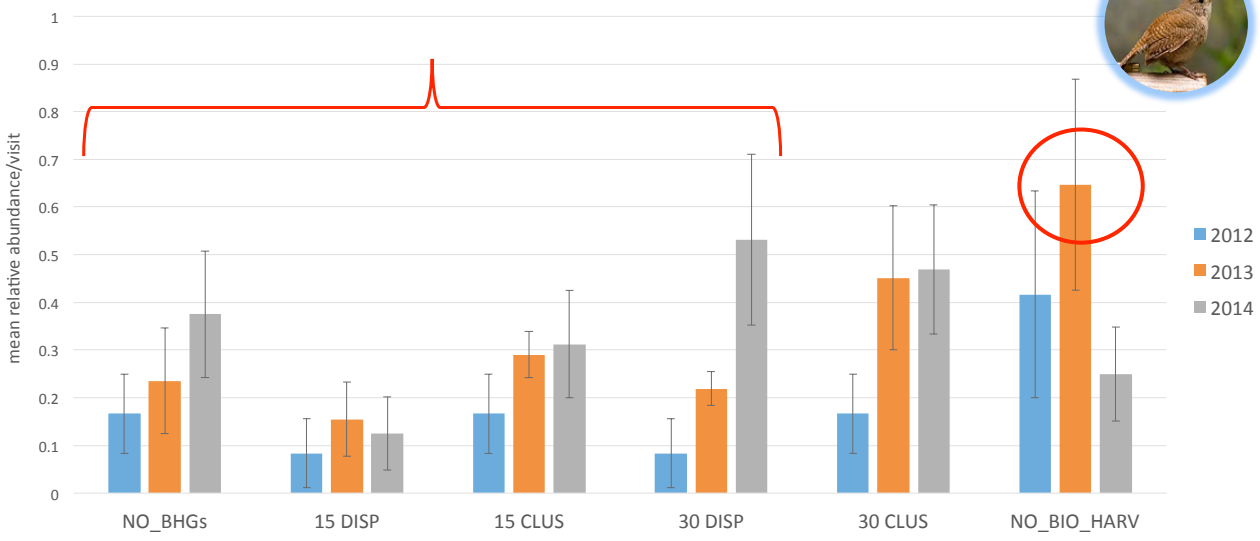

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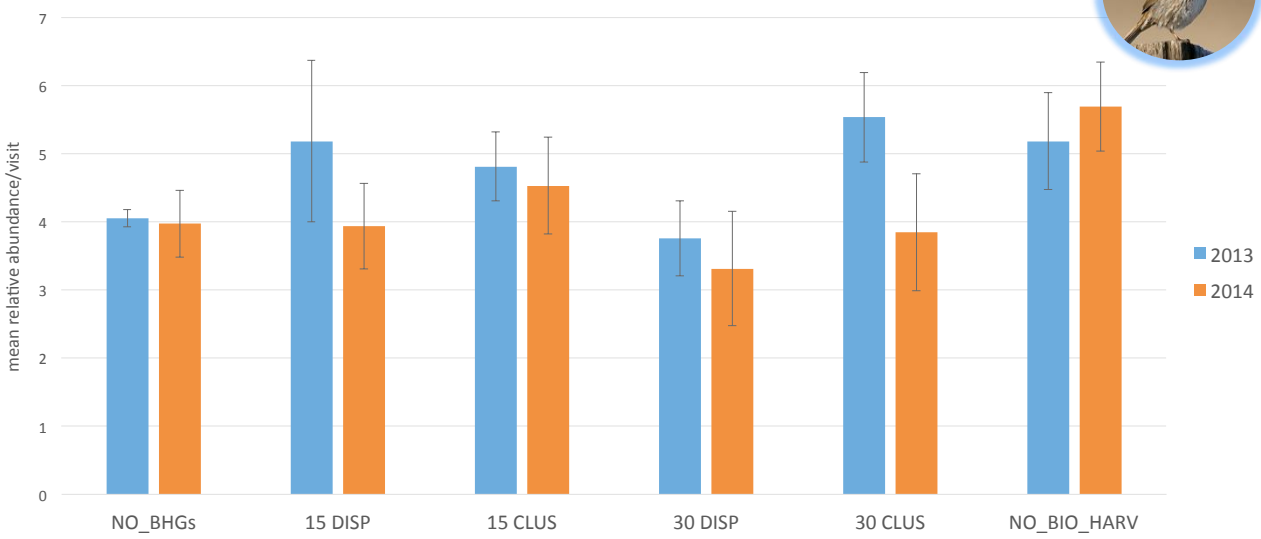
Mean relative abundance of Song Sparrows/visit in treatments*



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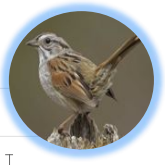
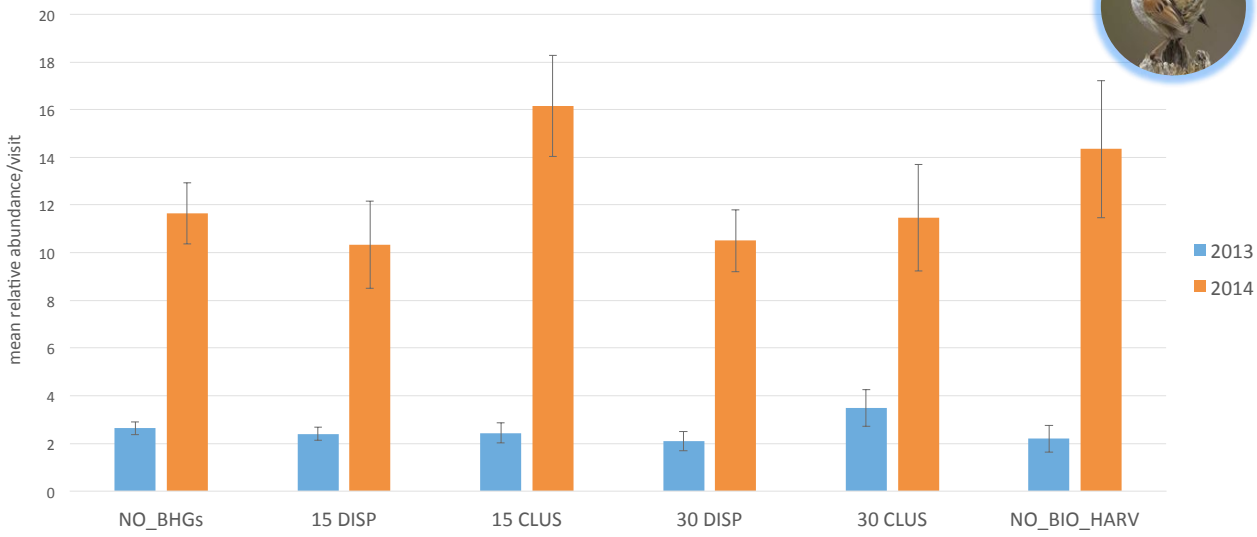
Mean relative abundance of Swamp Sparrows/visit in treatments*





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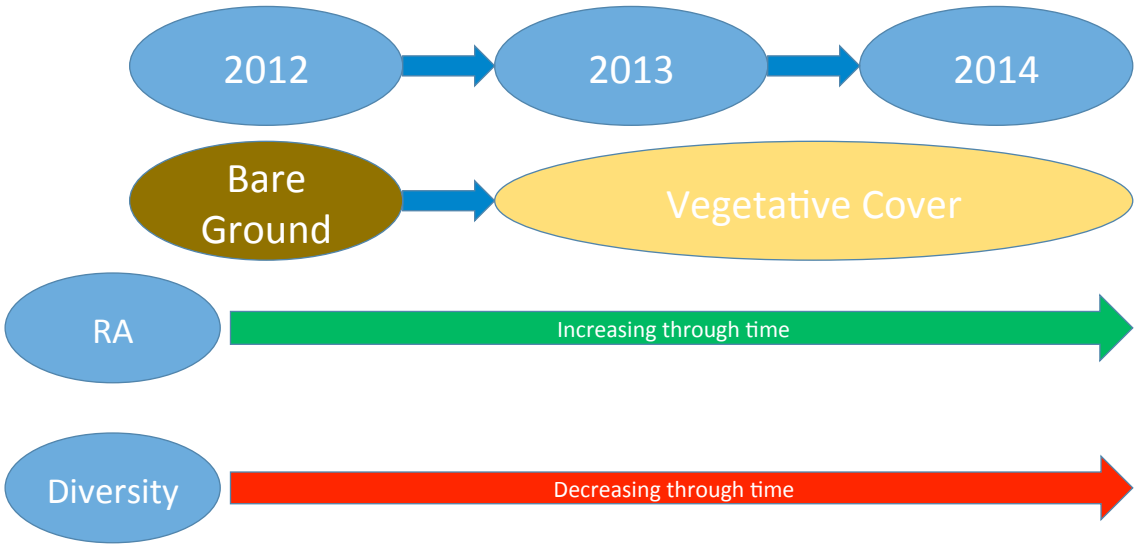
Winter Bird Response - A Successional Timeline...



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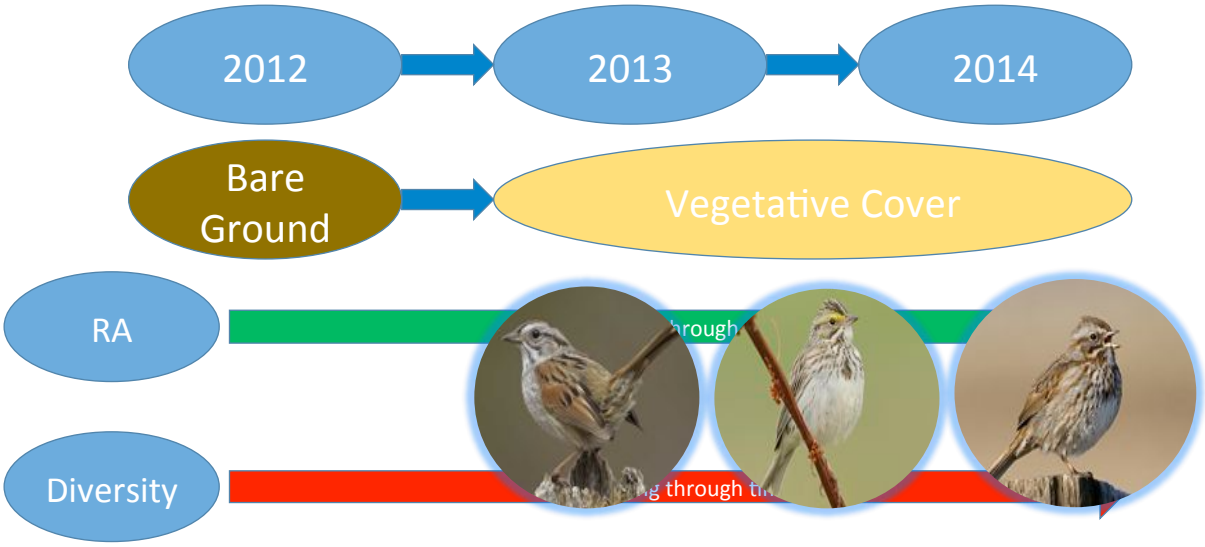

Preliminary Results – Breeding Birds (NC)

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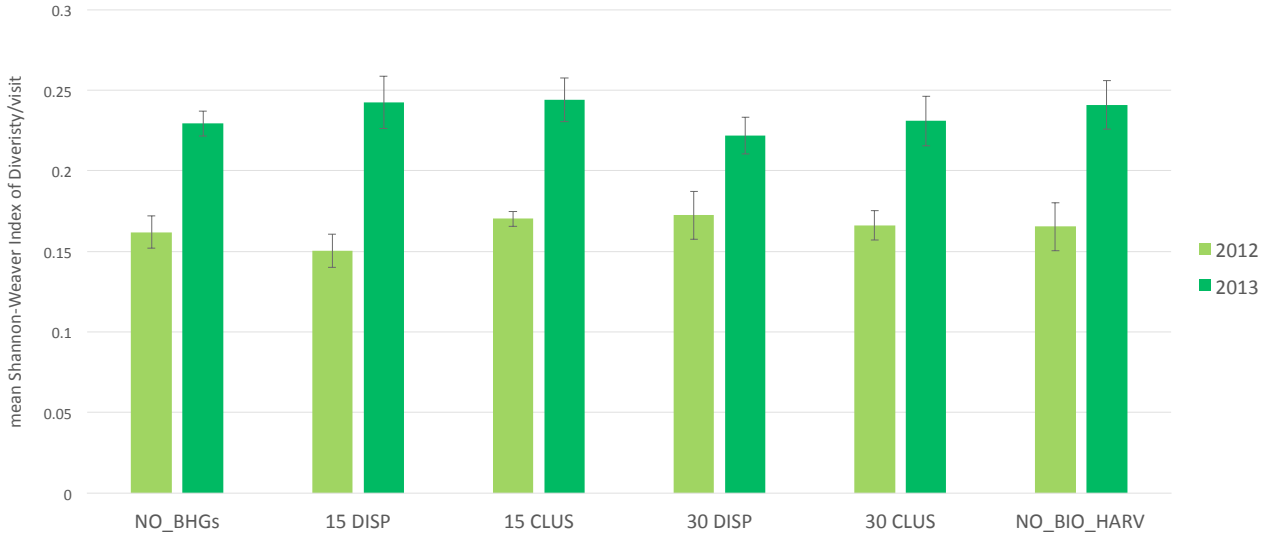

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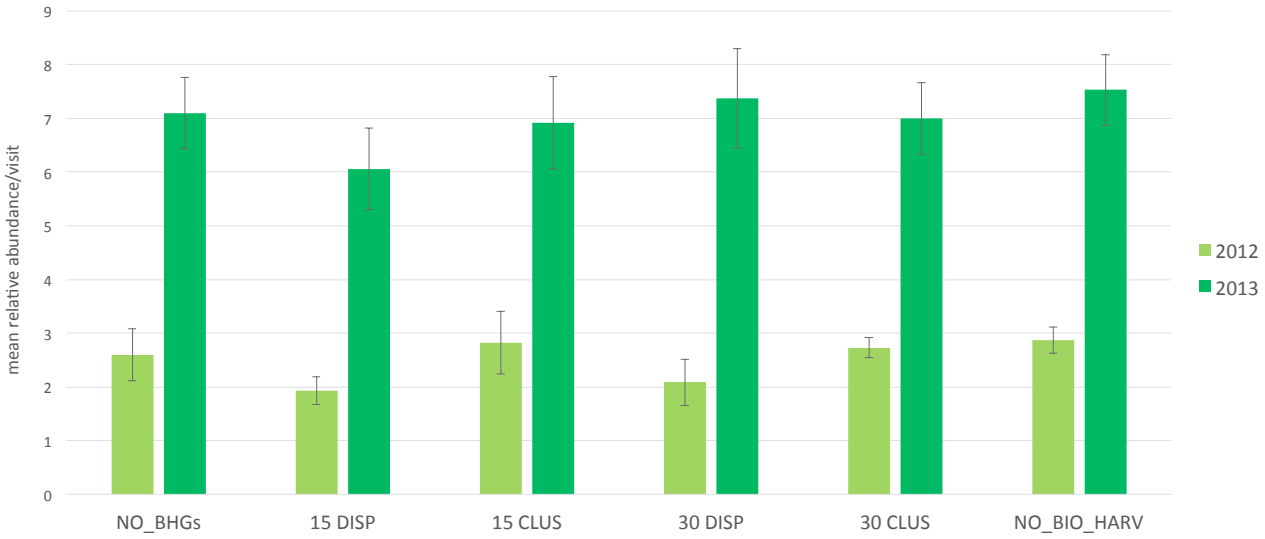

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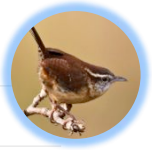
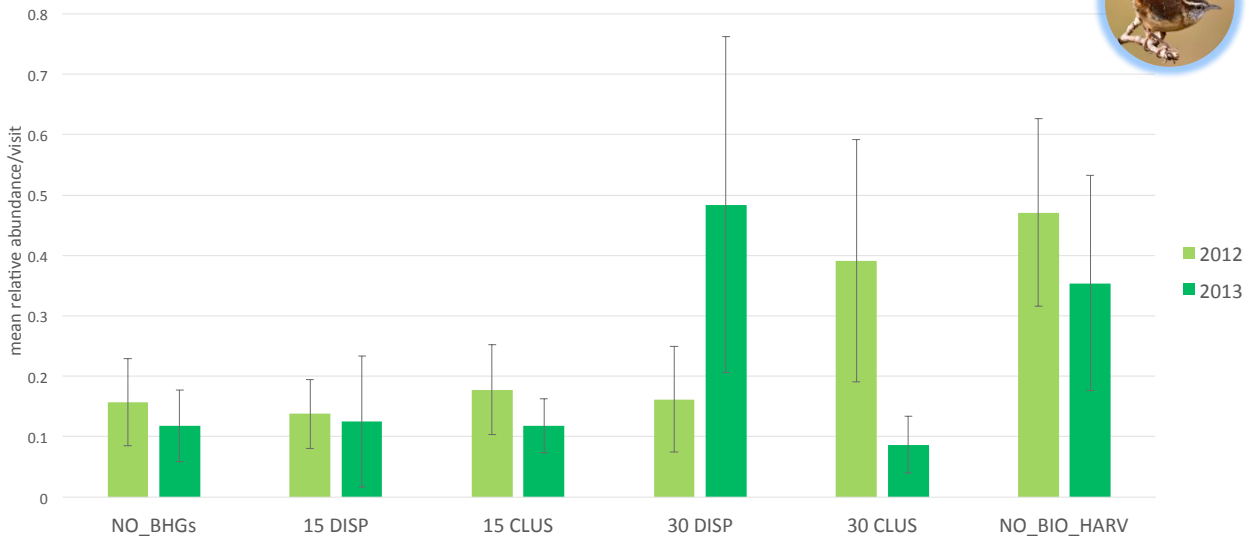
Mean relative abundance of Carolina Wrens/visit in treatments*





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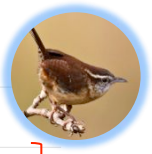

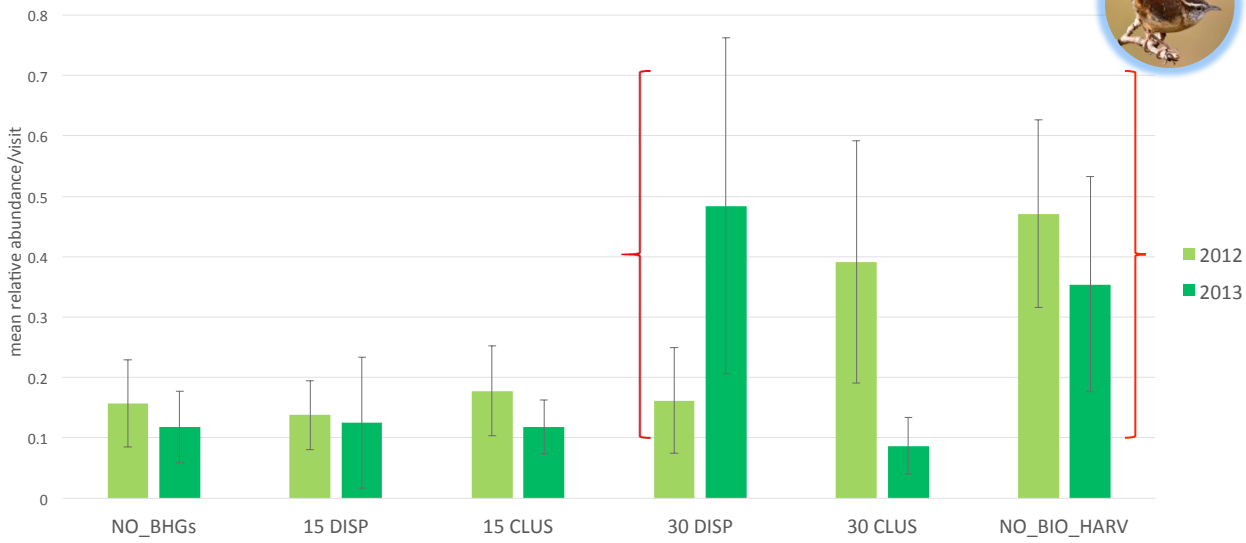

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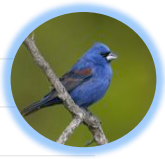
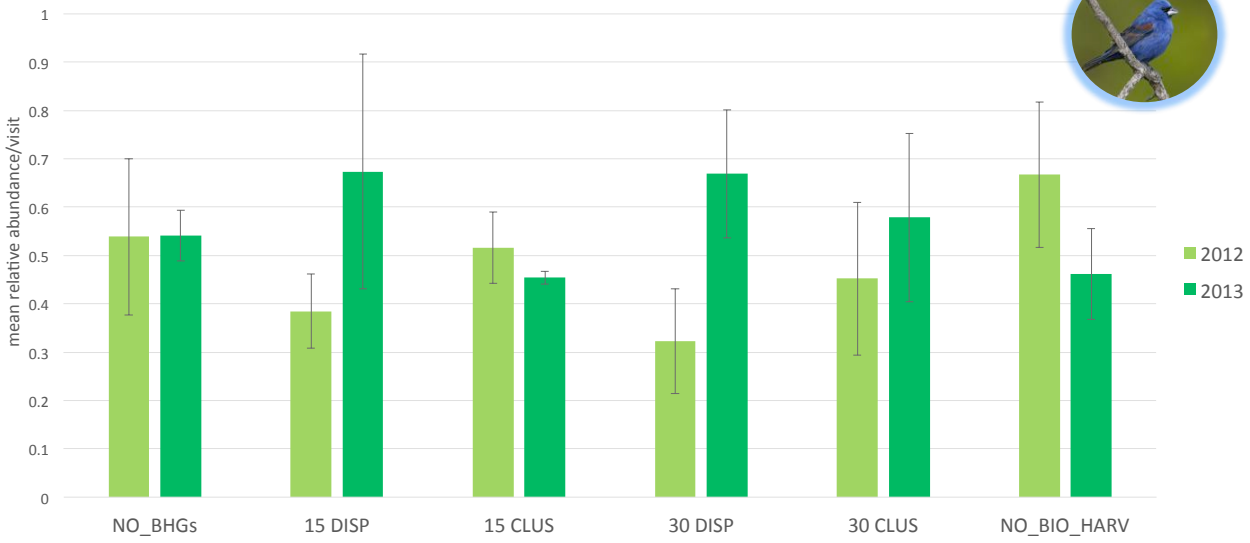
Mean relative abundance of Blue Grosbeaks/visit in treatments*





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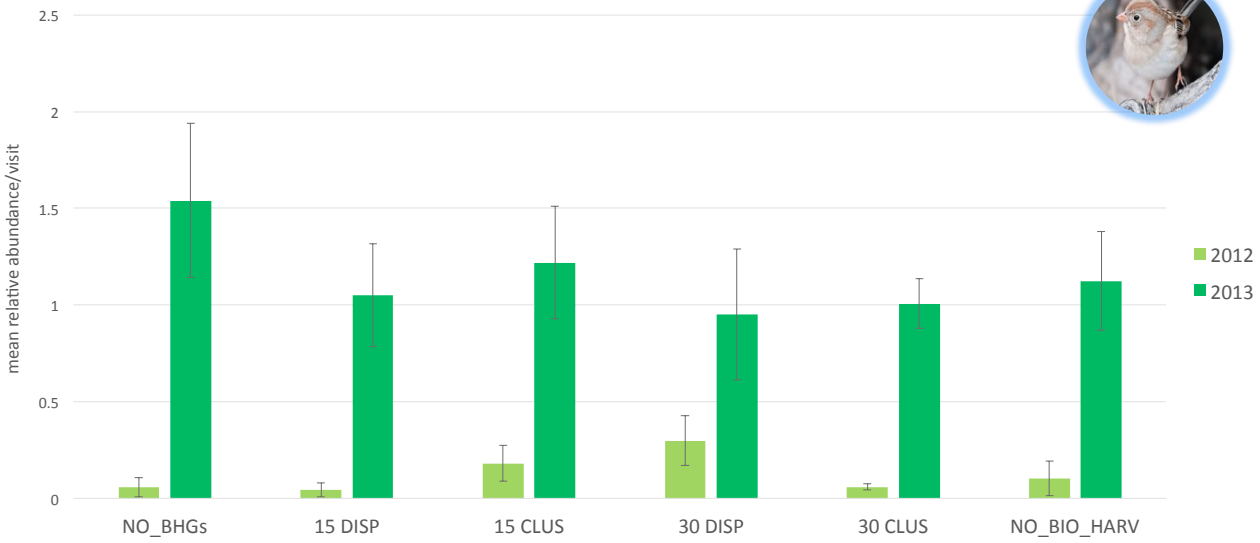
Mean relative abundance of Field Sparrows/visit in treatments*



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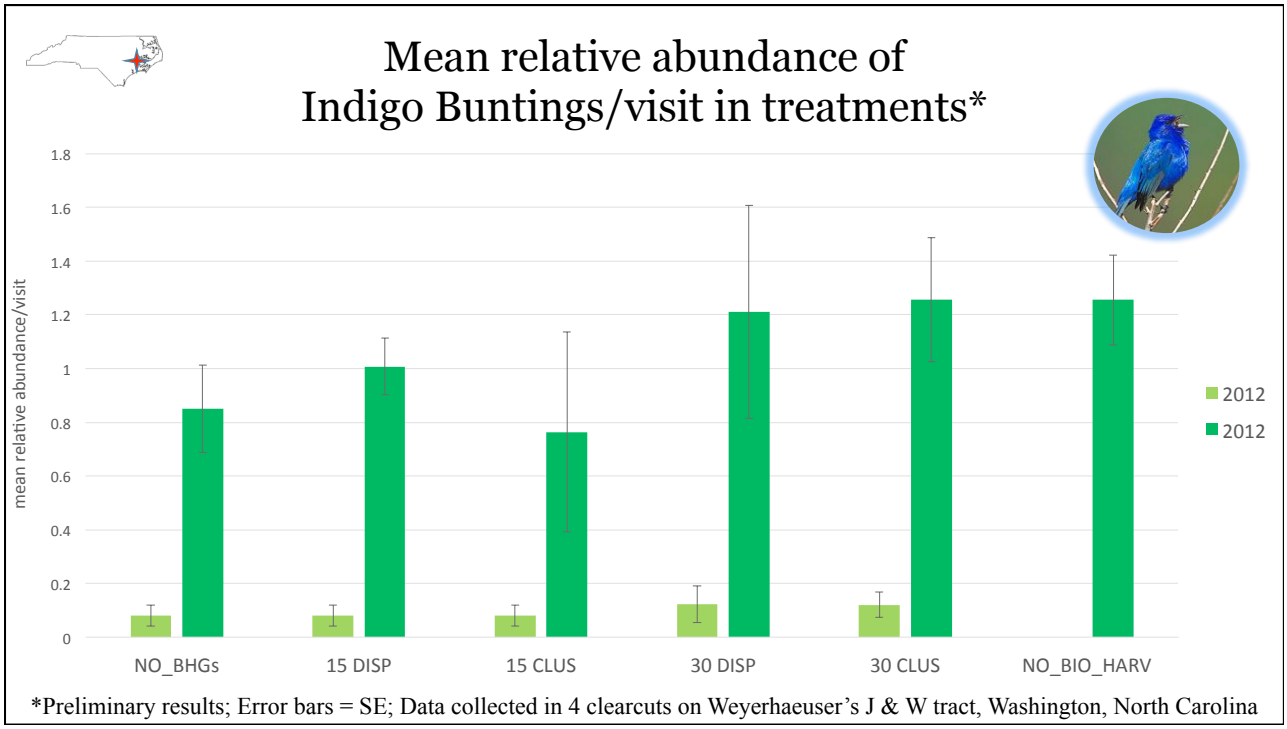

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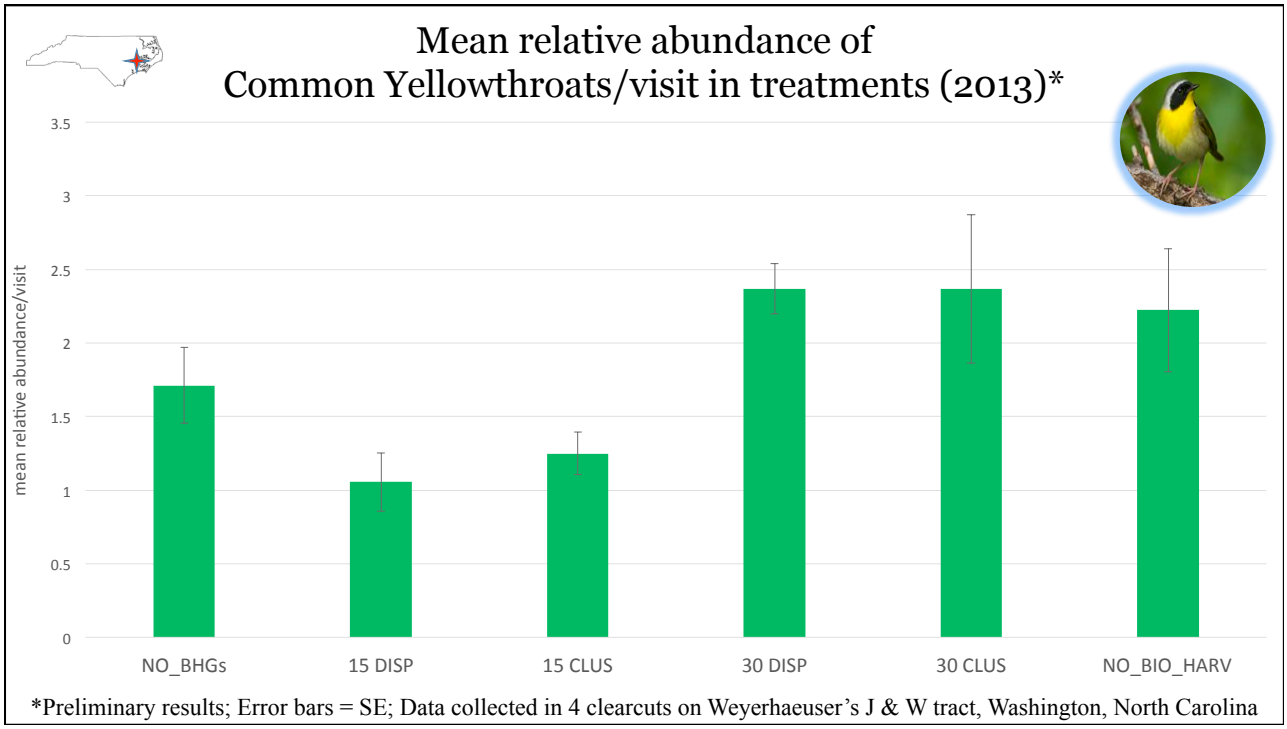

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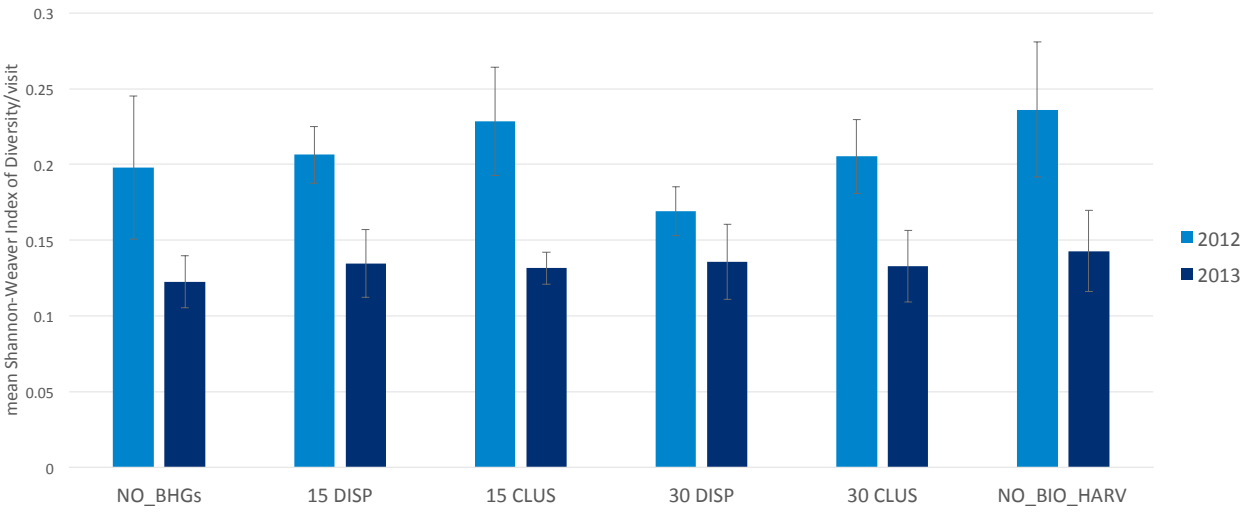

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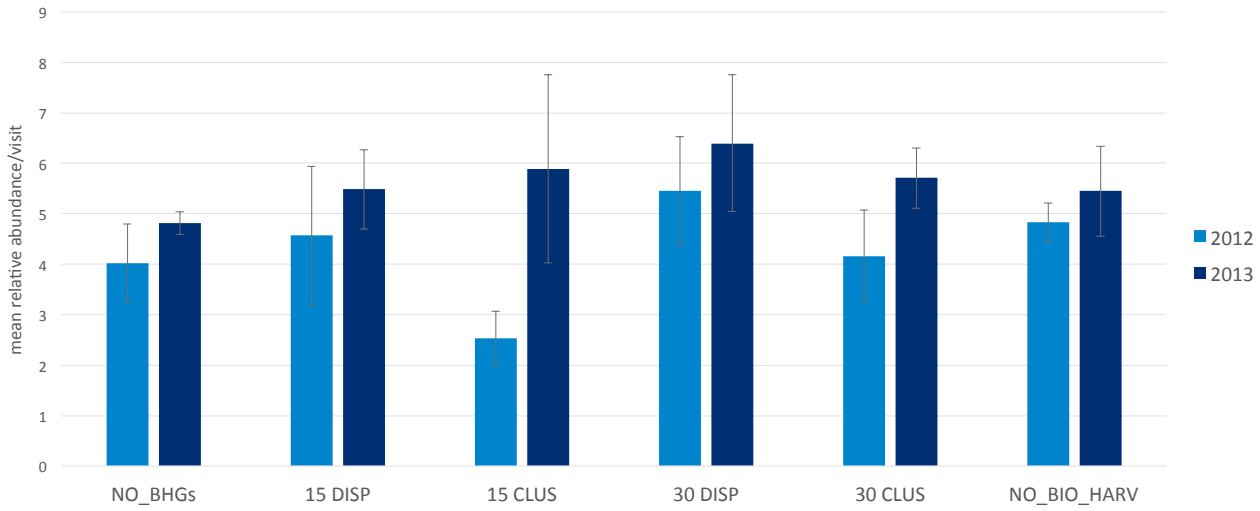
Mean relative abundance of breeding birds/visit in treatments*



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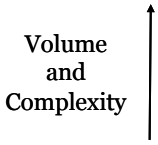
Avian response to woody biomass harvest – A revegetation situation



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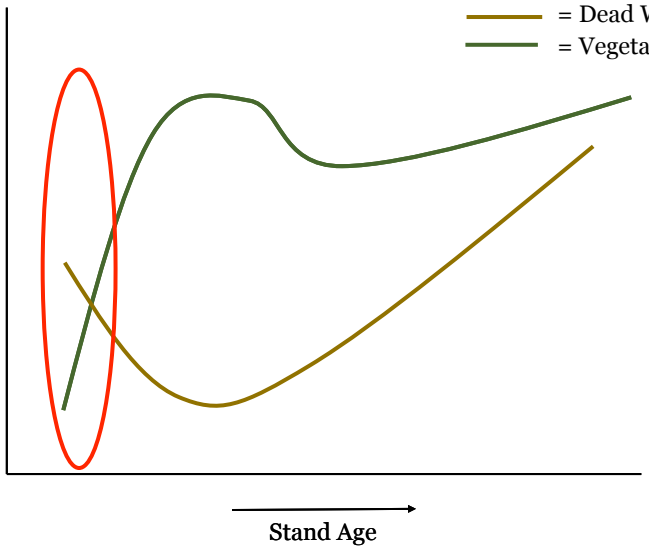


Site Preparation

- Low concentration versus high concentration
- "Dinner in the stomach" effect

Breeding Bird Discussion Summary

- Scale of landscape change
- Adjacency issues
- Site prep matters
- **VEGETATION**

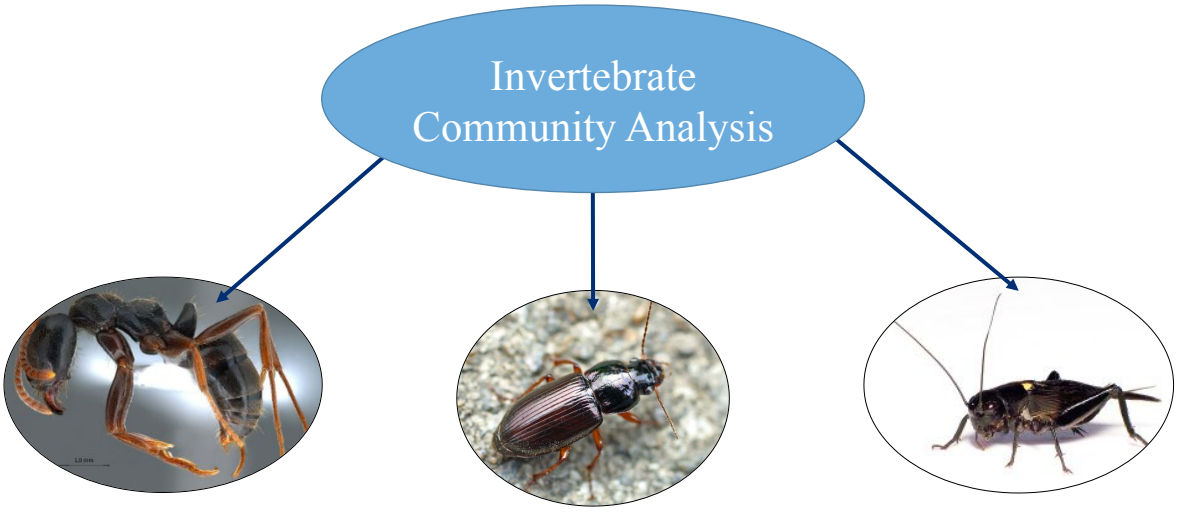
Q: What about the invertebrates??

A: Ask me in 10 years when I am done identifying them!!

Invertebrates as bioindicators...

- Effective indicators (**THINK BOTTOM UP!!!**)
- Appropriate study organisms for small scale treatment effects
- Are important food sources for vertebrates
- Tend to stay put (unlike some other animals I know)
- **Many groups closely linked to down wood**

A multi-pronged approach to testing invertebrate response to woody biomass harvest...



The results presented in this webinar are preliminary.