A WEEDY ISSUE:

Shifts in community composition following common buckthorn removal

Alex Roth, Sascha Lodge, Lee Frelich and Peter Reich

Department of Forest Resources
University of Minnesota
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OUTLINE

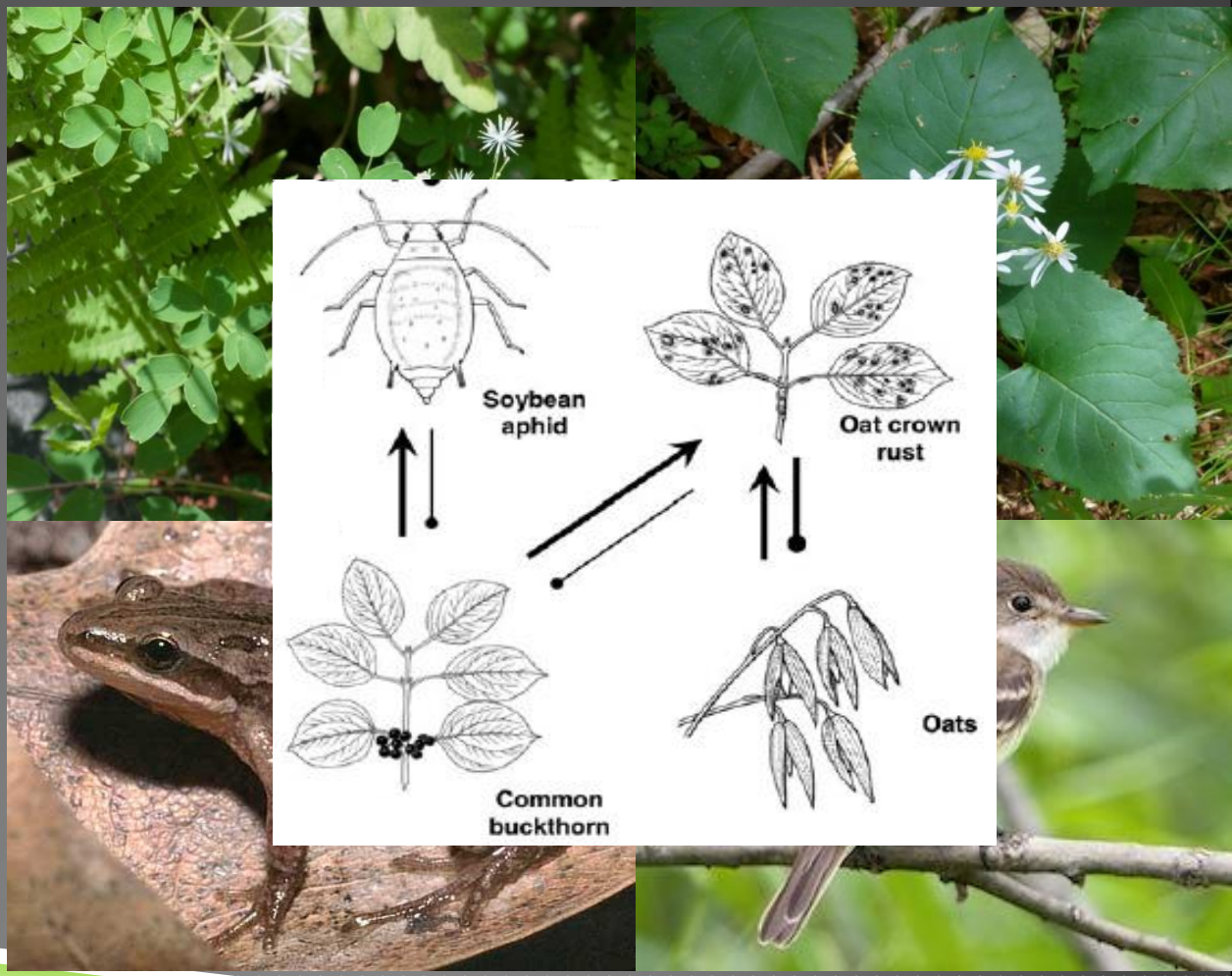
- Introduction to invasive species
  - Buckthorn
- Experimental rationale
- Removal experiment
  - Methods
  - Results
- Conclusions and management implications
  - Application
  - Considerations

COMMON BUCKTHORN

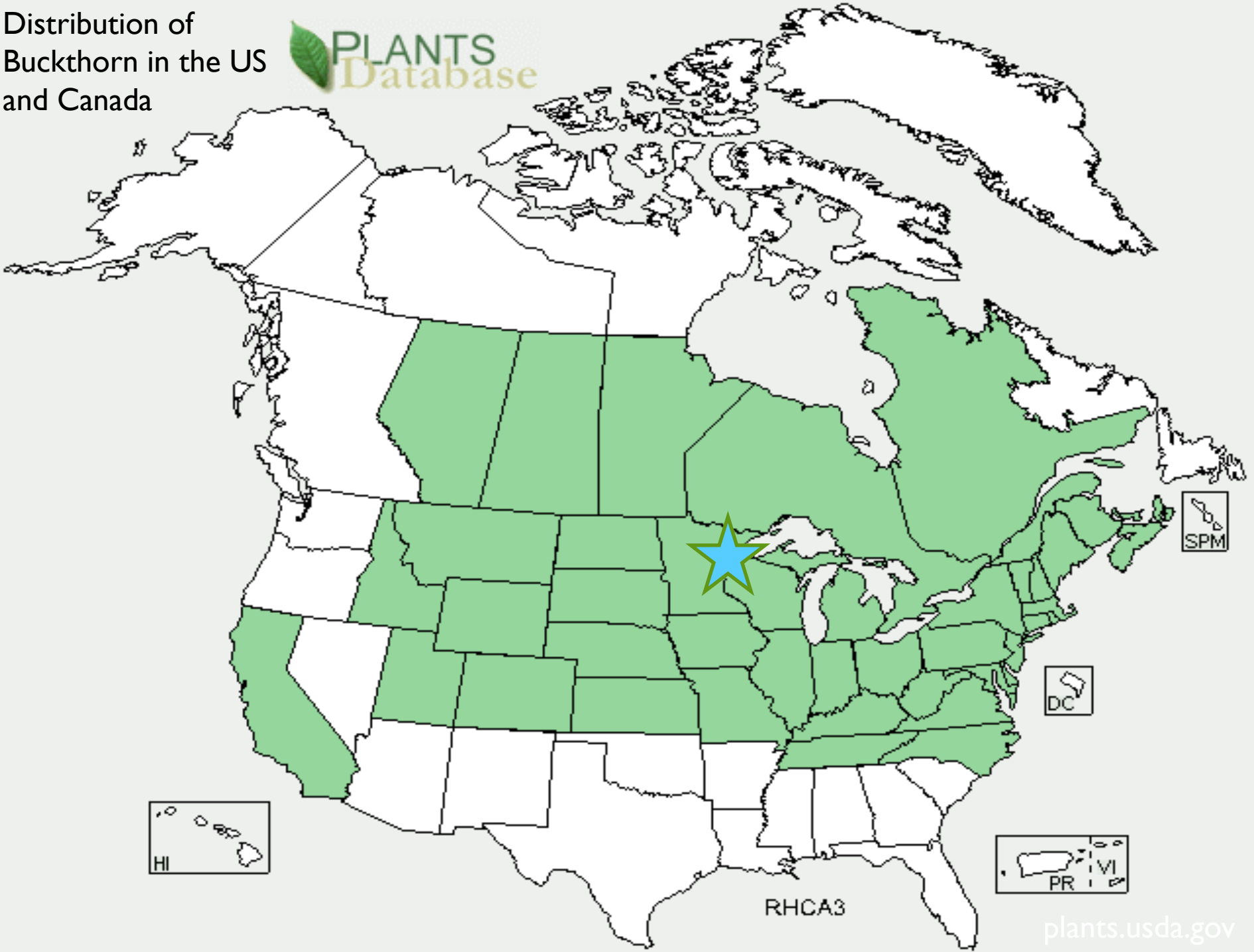
- *Rhamnus cathartica* L.
- From hedgerows to forests and beyond…

COMMON BUCKTHORN

- Klionsky et al. 2011
- Sacerdote and King 2014
- Schneider and Miller 2014
- Heimpel et al. 2010



Distribution of Buckthorn in the US and Canada



CAN WE GO BACK?

- How do we restore these areas?

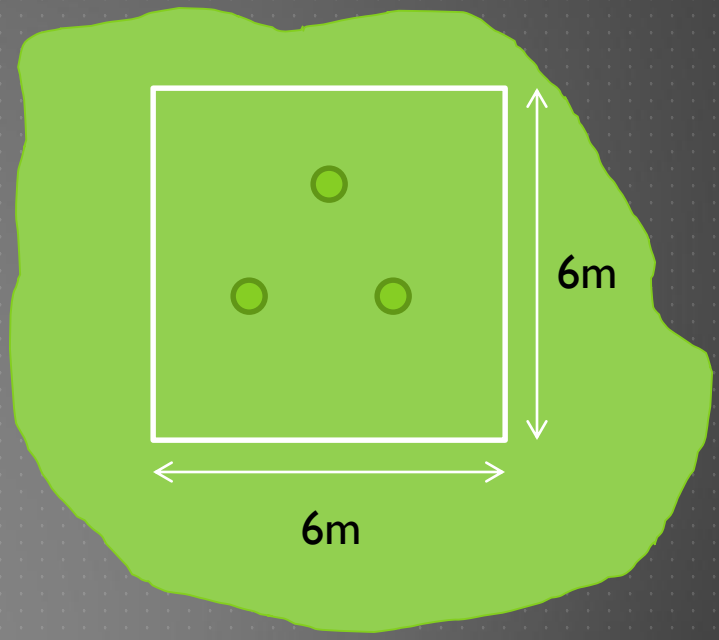
A SCIENTIFIC APPROACH TO REMOVAL

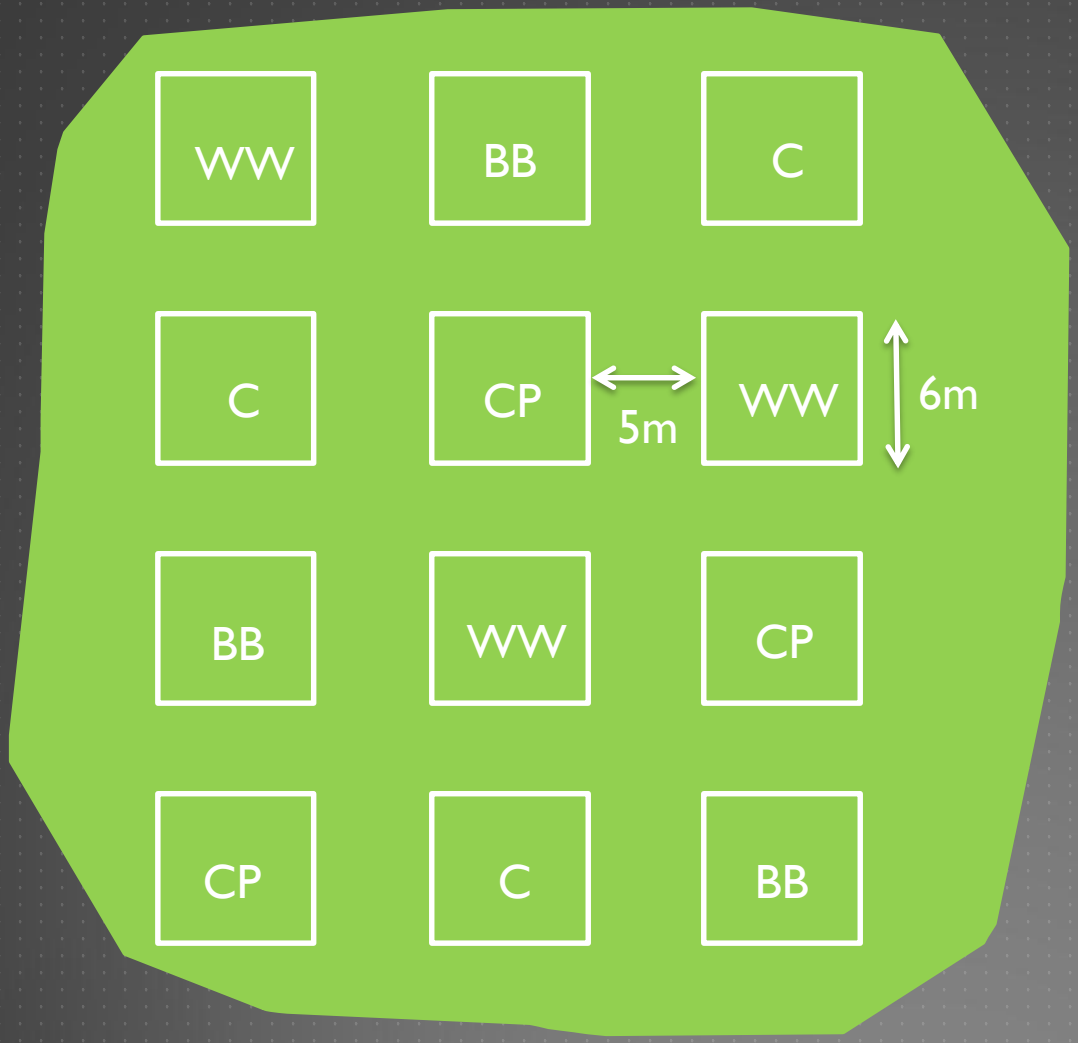
	Light	Litter
Weed Wrenching	↑	↓
Cut and Paint	↑	**No Change**
Basal Bark Application	~↑	**No Change**

REMOVAL EXPERIMENT

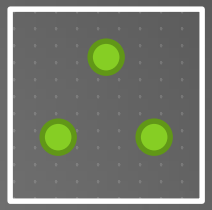
- **4 Sites**
- **12 Plots per site**
- **3 Survey points per plot**
- **2011, 2012 (2), 2013 (2)**

- **720 Survey Points**



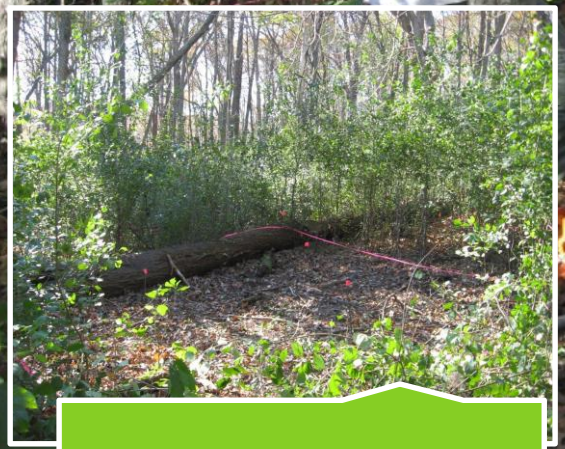


C = Control
BB = Basal Bark
CP = Cut and Paint
WW = Weed Wrench



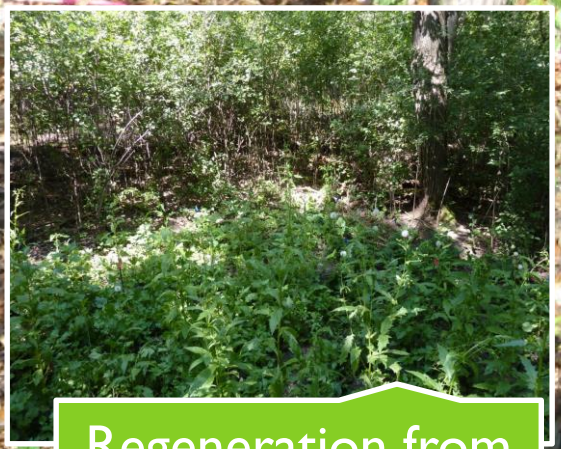
= 6m x 6m

RESULTS

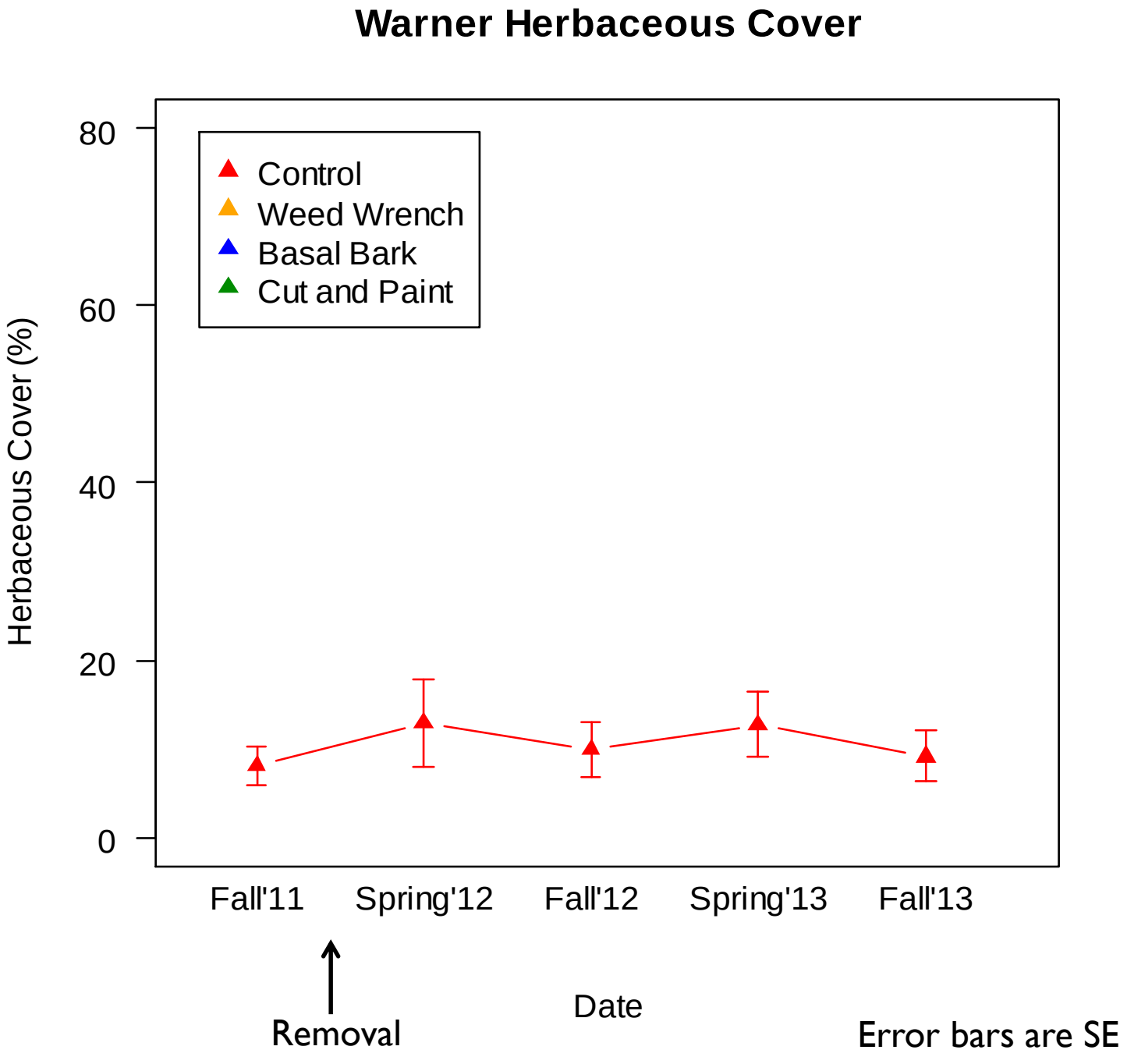


99% Effective

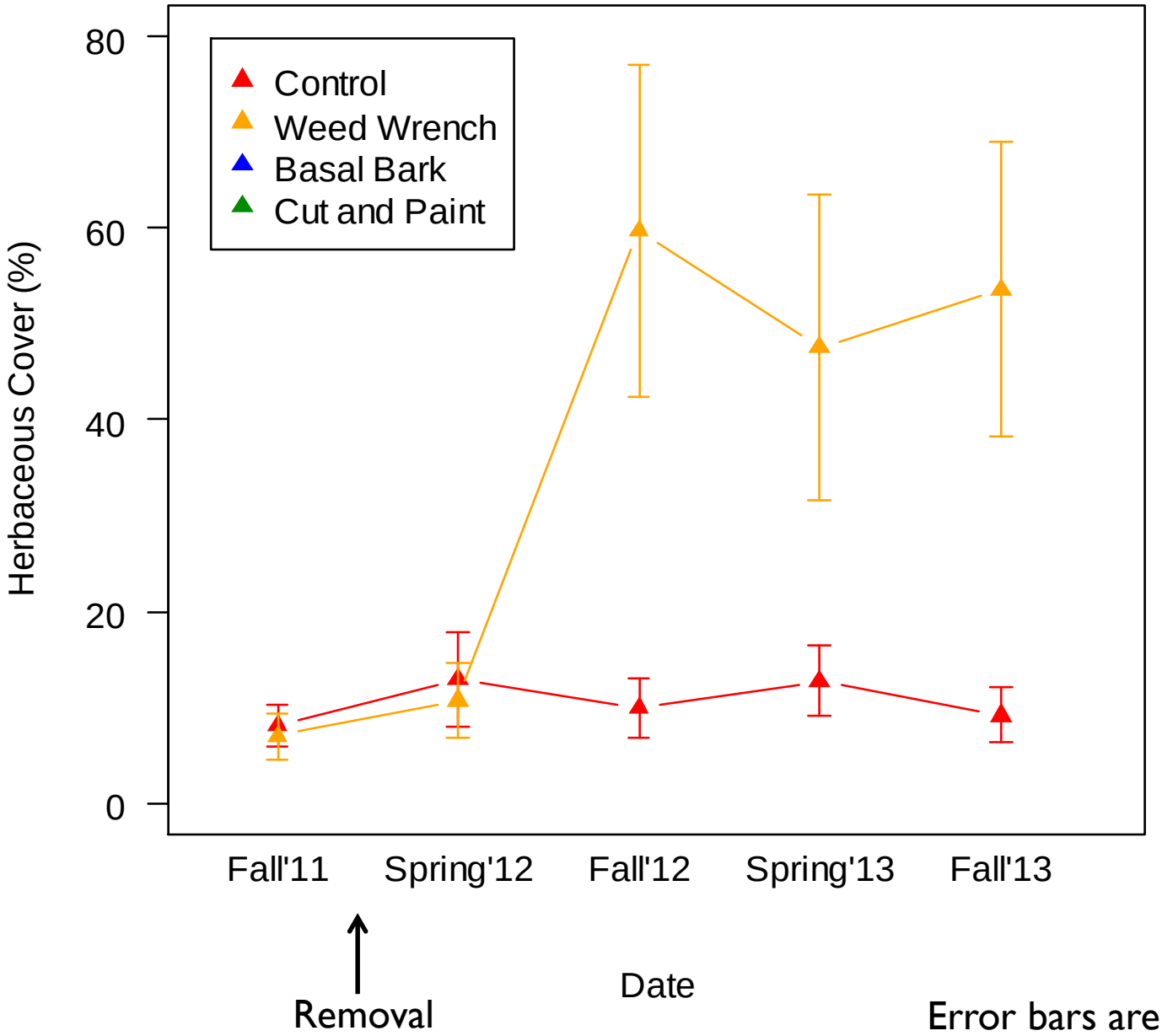
Removed 1,200+ buckthorn stems



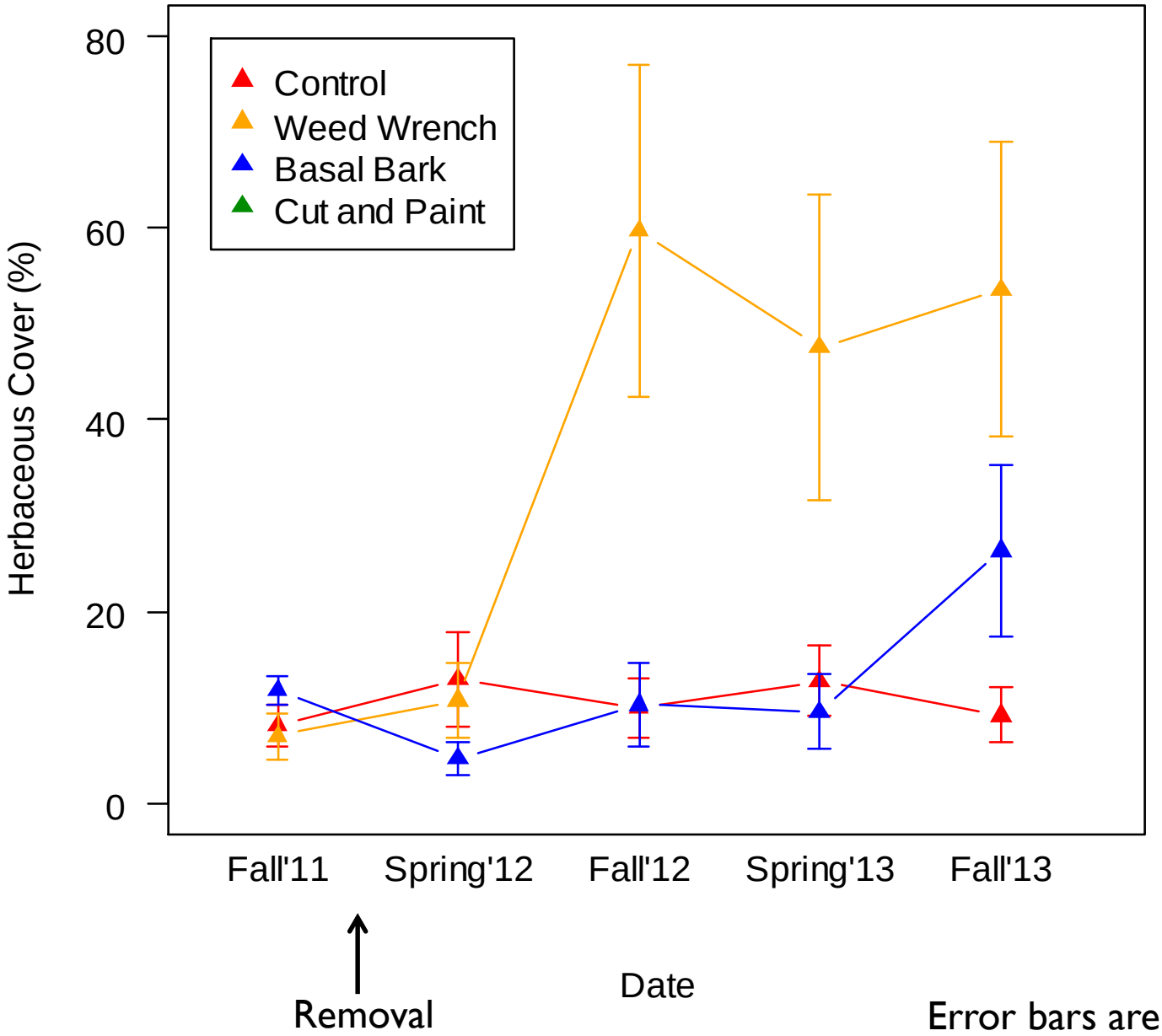
Regeneration from the seedbank


Warner Herbaceous Cover
Herbaceous Cover (%)
80
60
40
20
0
Control
Weed Wrench
Basal Bark
Cut and Paint
Fall'11
Spring'12
Fall'12
Spring'13
Fall'13
Removal
Date
Error bars are SE

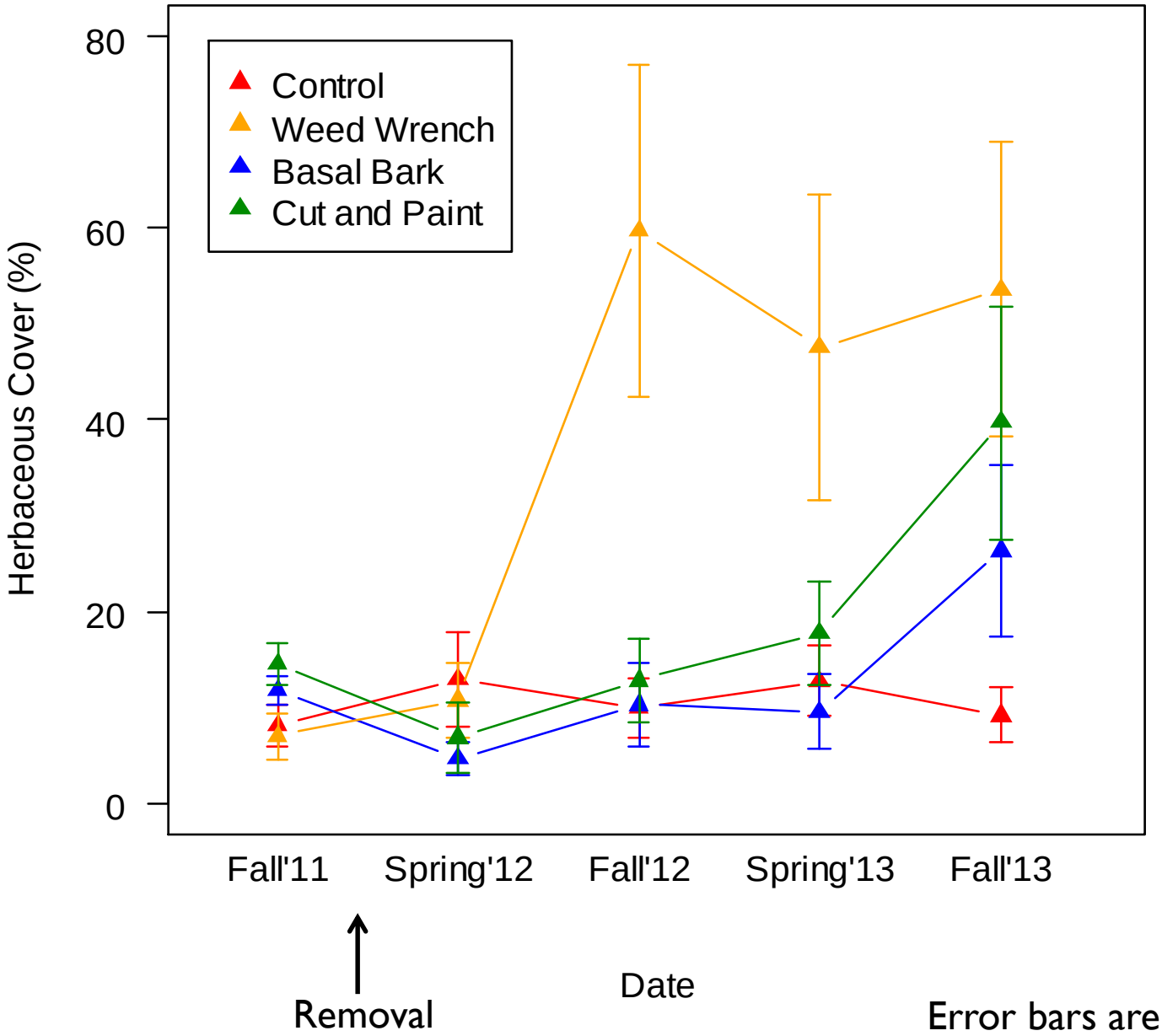
Warner Herbaceous Cover



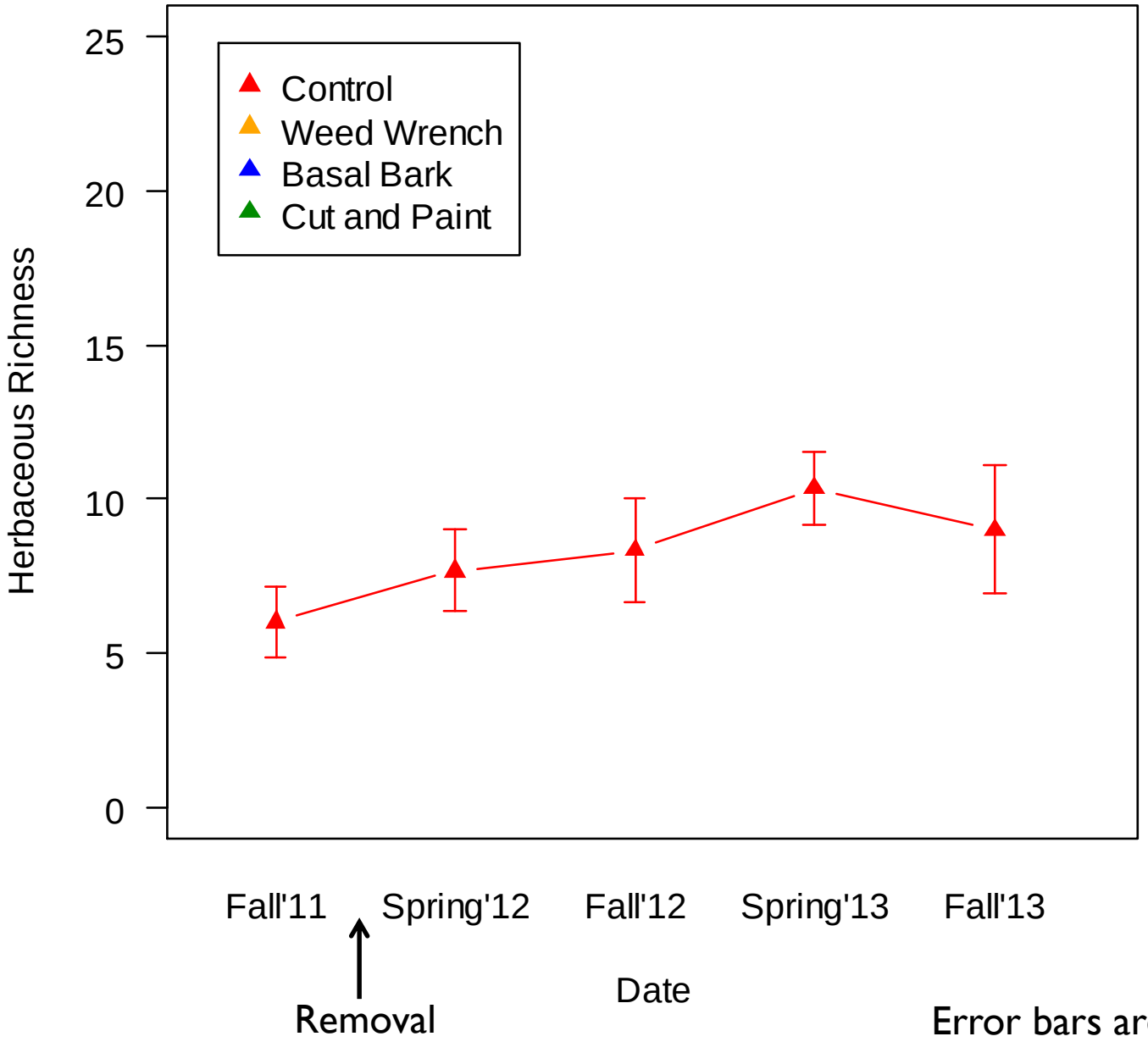
Warner Herbaceous Cover



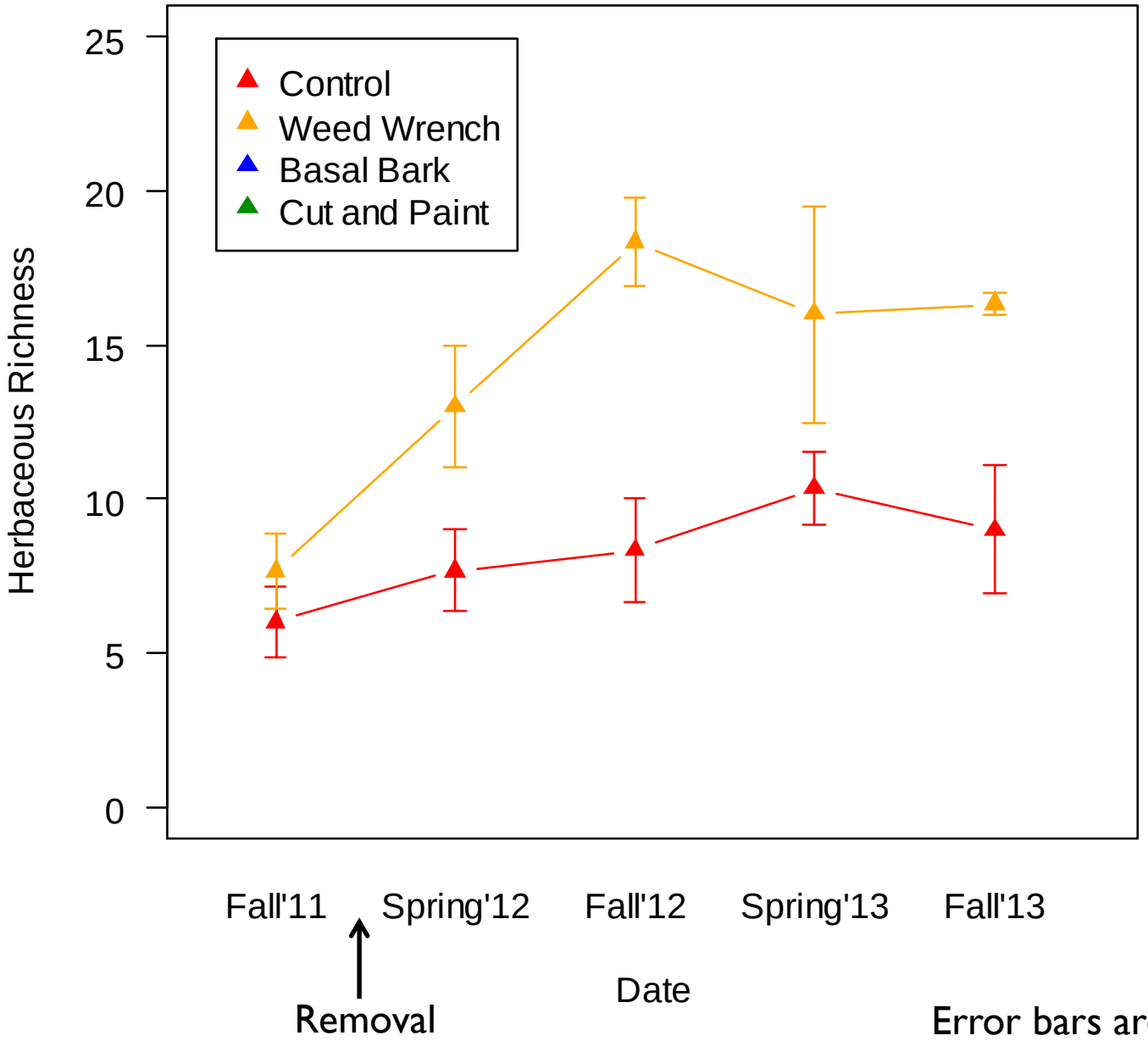
Warner Herbaceous Cover



Warner Herbaceous Richness



Warner Herbaceous Richness



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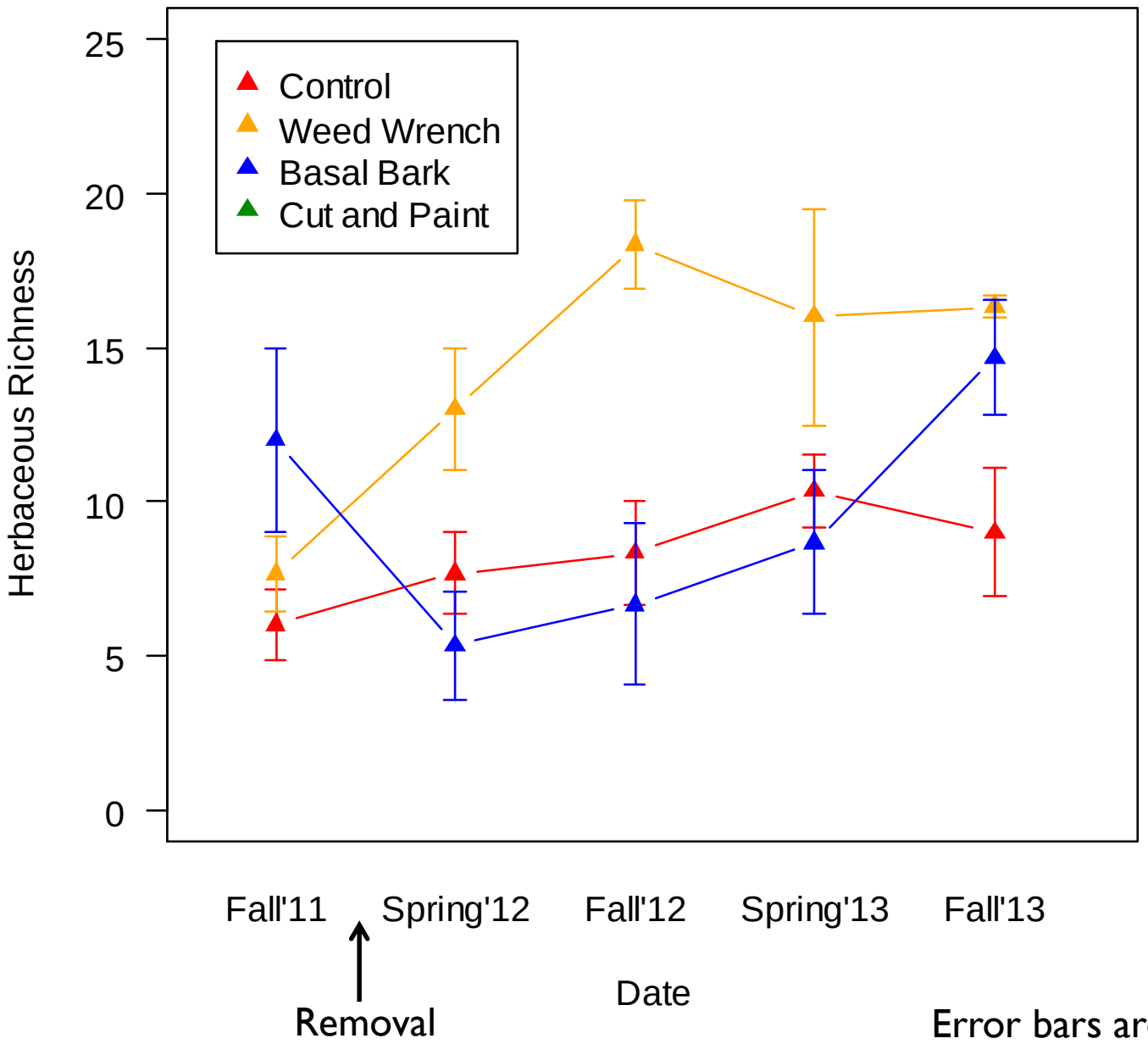
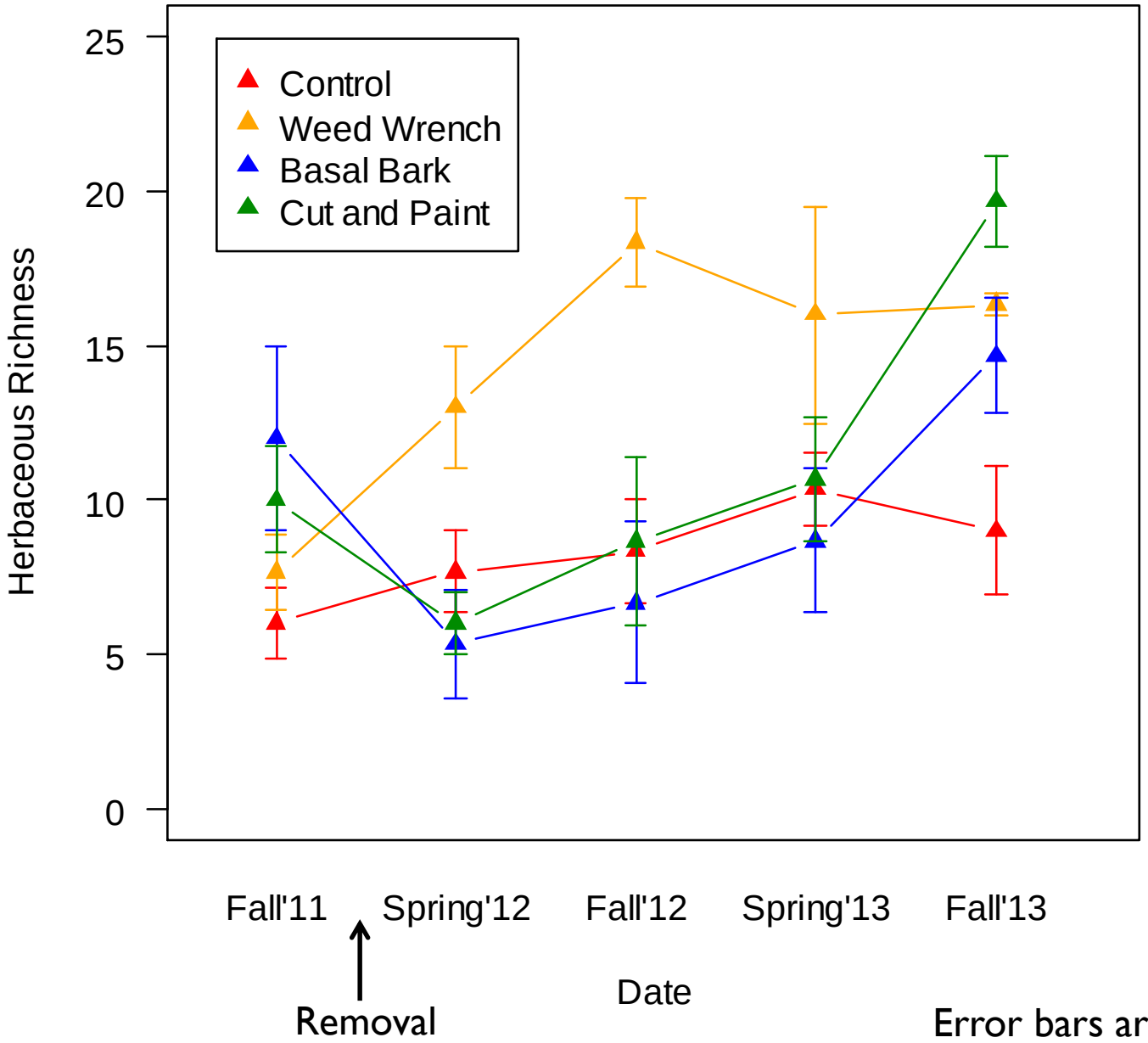


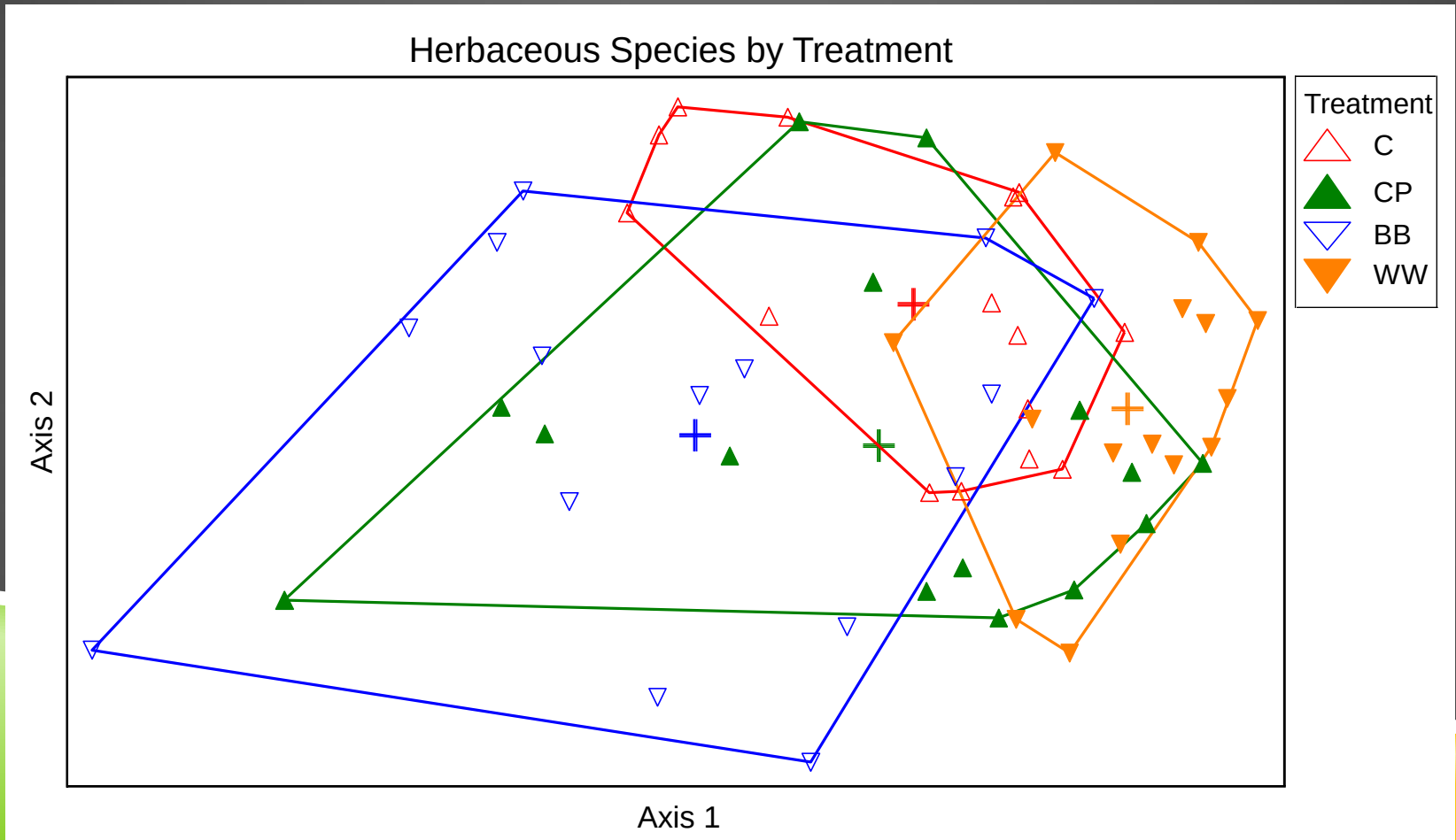
Warner Herbaceous Richness



SPECIES COMPOSITION

NMS Ordination
MRPP Test
A = Within-group heterogeneity (~0.1)
p = Significance level

Groups	T	A	p
C vs. WW	-5.76128047	0.06207473	0.00013444*
C vs. BB	-5.38022796	0.05706132	0.00015706*
C vs. CP	-4.52406488	0.04332541	0.00078941*
WW vs. BB	-9.64347401	0.10598038	0.00000025*
WW vs. CP	-5.28173457	0.05141568	0.00015026*
BB vs. CP	-1.84405684	0.01937343	0.05138038

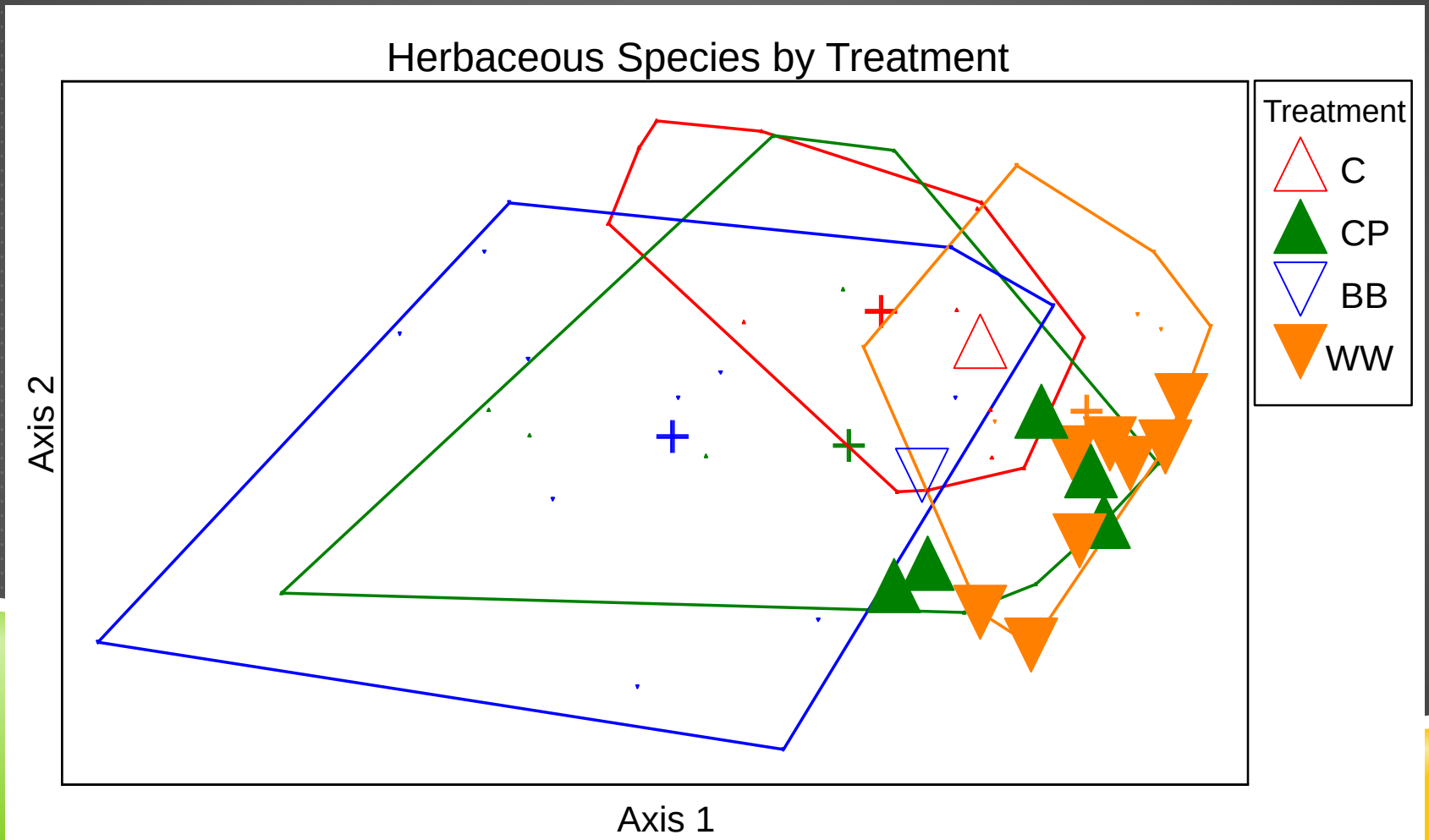


INDICATOR SPECIES

Species	Maxgrp	Indicator Value (IV)	p *
Dandelion	WW	36.9	0.0050
Stickseed	WW	28.4	0.0224
Horseweed	WW	35.6	0.0030
Garlic Mustard	WW	4.29	0.0458
Ricegrass	CP	27.8	0.0104
Jewelweed	Con	26.1	0.0530
Geranium	Con	44.7	0.0008

INDICATOR SPECIES

Species	Maxgrp	Indicator Value (IV)	p *
Stickseed	4	28.4	0.0224



CONCLUSIONS AND IMPLICATIONS

- All treatments increased cover and diversity
  - Weed-wrench saw the most re-vegetation
- Plots with herbicide saw less re-vegetation
  - Herbicide may have temporary suppressive effects
- Species composition depends on the treatment
  - Weed wrench had more early successional and non-native species

CONCLUSIONS AND IMPLICATIONS

- Can cover and diversity suppress buckthorn?
  - Future studies to examine effects on buckthorn
  - Needs to be paired with local propagule management
- Next steps: Woody species, traits, and cover crops
- A scientific approach to management
  - Encourage cover and diversity to resist re-invasion
  - Results provide information suited to specific goals

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QUESTIONS?