White-tailed Deer Harvest Success and its Impact on Forest Understory Vegetation: Evaluating Deer Management Program Efficacy in Southeastern New York

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Forest Ecosystem Monitoring Cooperative Conference

17 December 2021

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TEATOWN

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Introduction

- It is well-documented that overabundant white-tailed deer populations decrease vegetation structural diversity and richness.
- Lethal management is the most effective management tool for reducing deer densities.
- This study aims to better understand the effectiveness of white-tailed deer management programs in improving forest understory conditions.

UMN Extension

Study Goals

- Understand if different lethal management strategies of white-tailed deer (recreational hunting, highly managed volunteer programs, or culling):
  - are more successful at decreasing overall deer density over time,
  - and if those densities correlate with improved forest vegetation conditions.

Management Strategies & Hypotheses

Recreational/Firearm

1

Coordinated/Archery

2

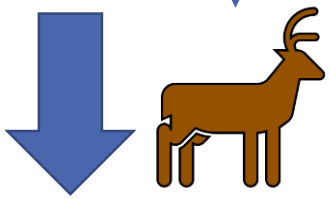
Culling

3

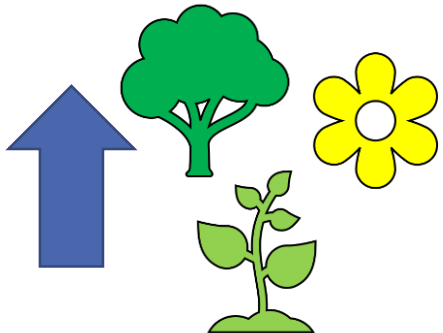
None

4

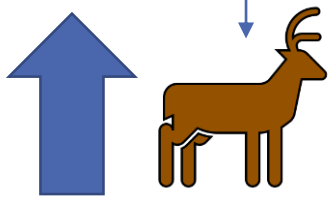
Hypothesis #2a



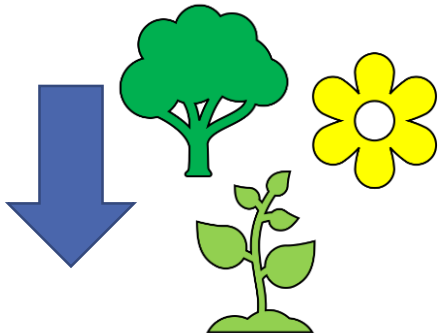
Hypothesis #2b



Hypothesis #1a



Hypothesis #1b



1 Milwaukee Journal Sentinel
2 Wide Open Spaces
3 The Hunting News
4 Buck Manager | Deer Management & Hunting

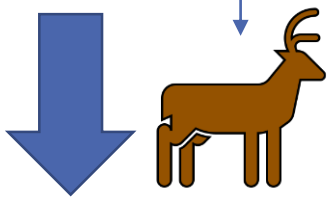
Management Strategies & Hypotheses (cont.)

Coordinated/Archery

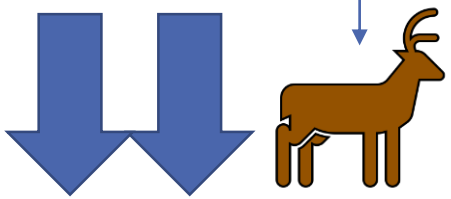
Recreational/Firearm

Culling

None

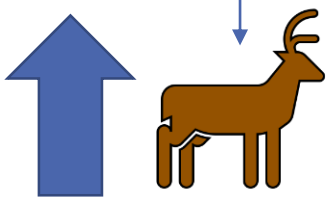


Moderate Efficiency

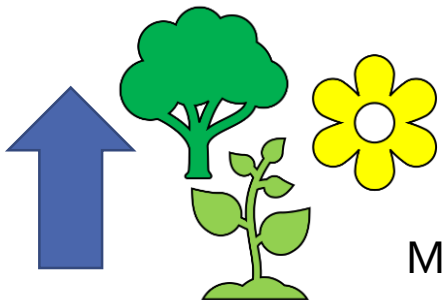


Hypothesis #3

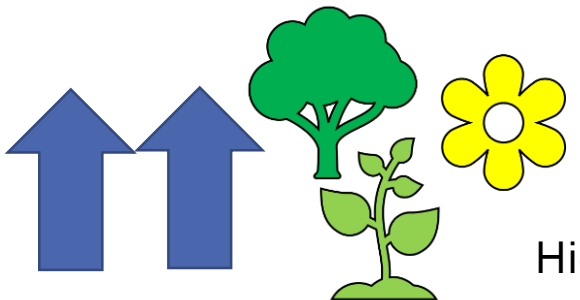
High Efficiency



No Efficiency

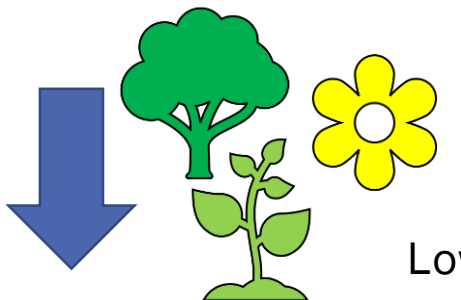


Moderate



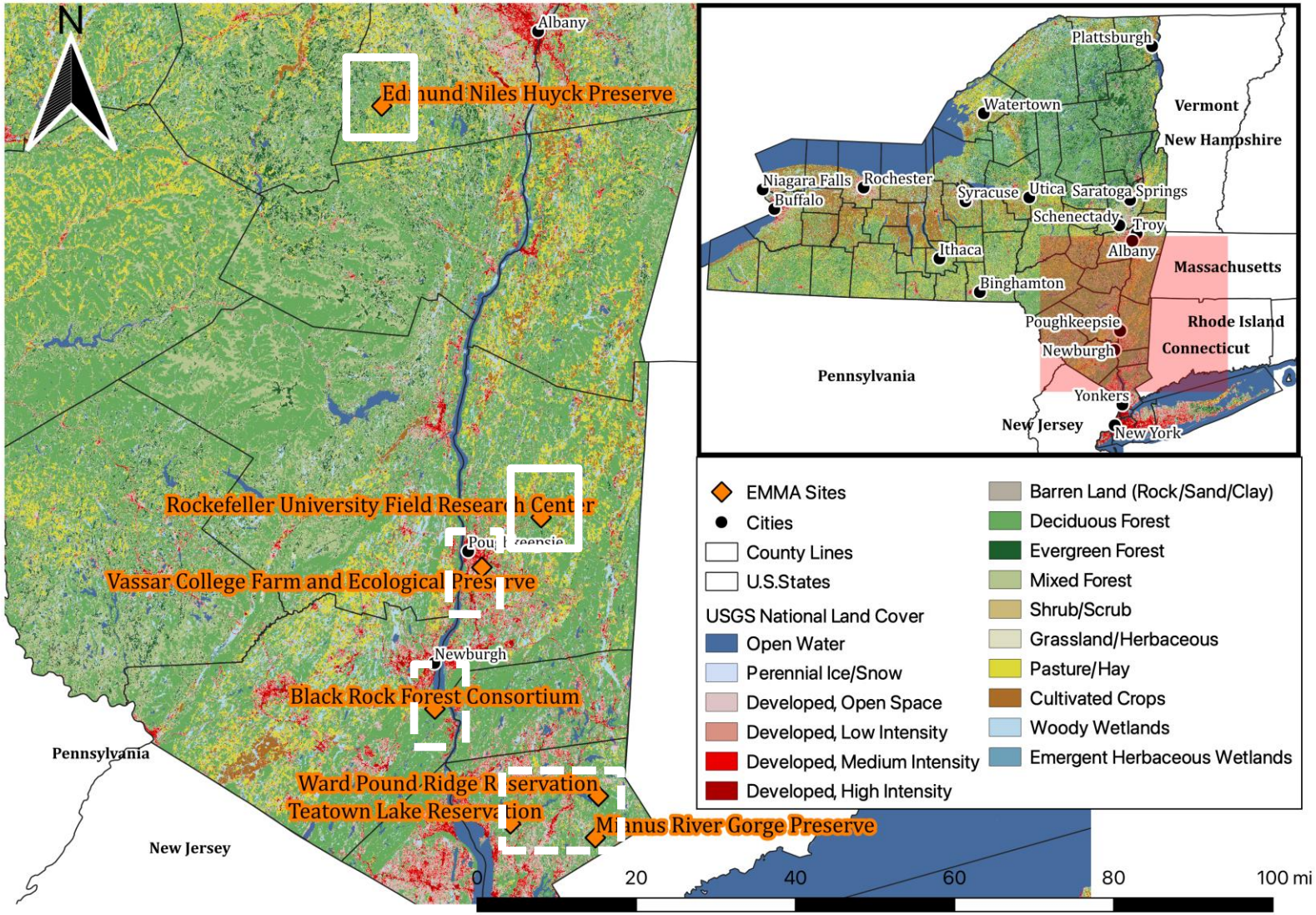
Hypothesis #4

High



Low

Study Sites



EMMA
Environmental Monitoring and Management Alliance

Methods

- I will assess three criteria to determine differences between program efficacy:
  - (1) compare harvest efficiency, or the number of deer taken per hour effort.
  - (2) compare relative changes in deer density between years to determine which programs have most affected the local deer population.
  - (3) compare vegetation characteristics, including woody seedling density, seedling height and presence/absence of key understory plant taxa.

The Question: Do deer density and vegetation conditions correlate?

Methods: Data Compilation

Site			
Black Rock (Firearm)			
Huyck (None)			
Mianus (Archery)			
Rockefeller (None)			
Teatown (Archery)			
Vassar (Firearm Cull)			
Ward Pound Ridge (Archery)			

Methods: Vegetation Data Compilation & Collection

- To fill in the gaps of the provided vegetation data I had to collect supplemental data in the Summer 2020 & 2021:
  - Herbaceous Deer Preferred Plants (Deer Indicator Plants):
    - species identification,
    - measurement of plant height (cm),
    - number of individuals,
  - Seedlings (tree seedlings <3.8 cm DBH):
    - species identification,
    - measurement of plant height (cm),
    - status (Live or Dead),
    - number of individuals

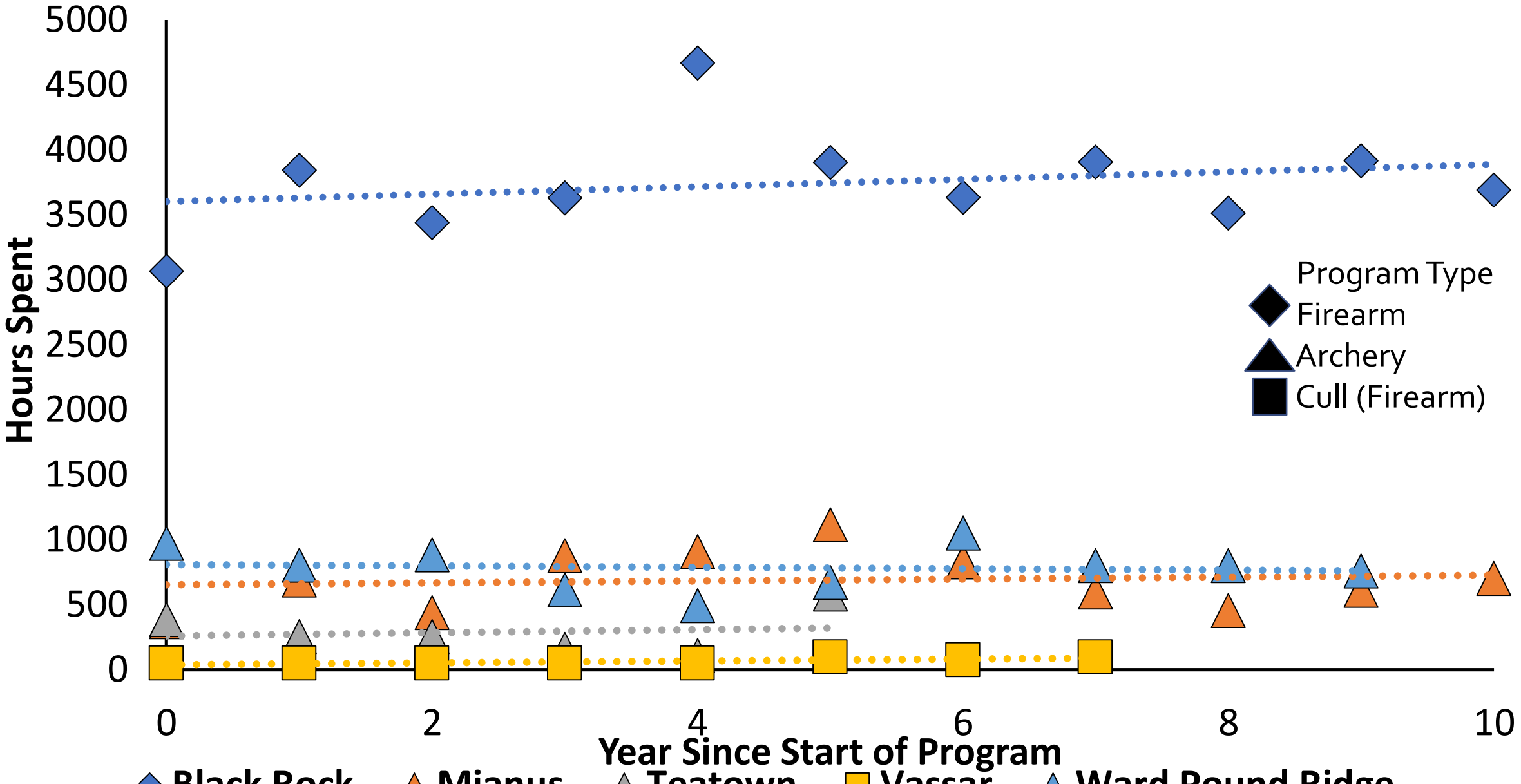
Methods: Deer Data Compilation & Collection

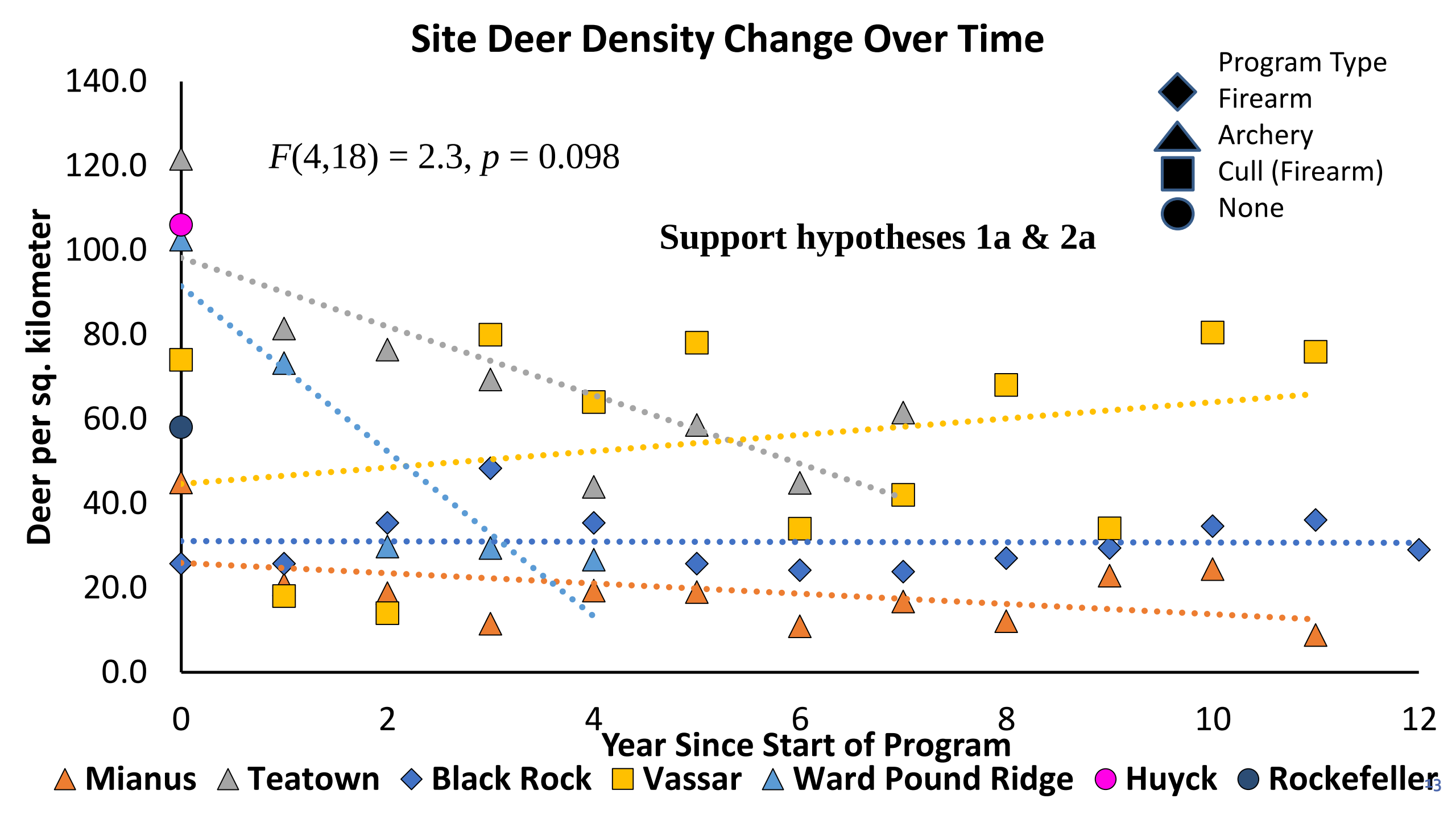
- Also, I needed annual deer density estimates and harvest rates.

- Two unmanaged sites did not have deer density estimates (Rockefeller and Huyck):
  - Ran camera trap surveys in the Fall 2020 at both sites and used Jacobson's branch antlered survey method to estimate deer densities.

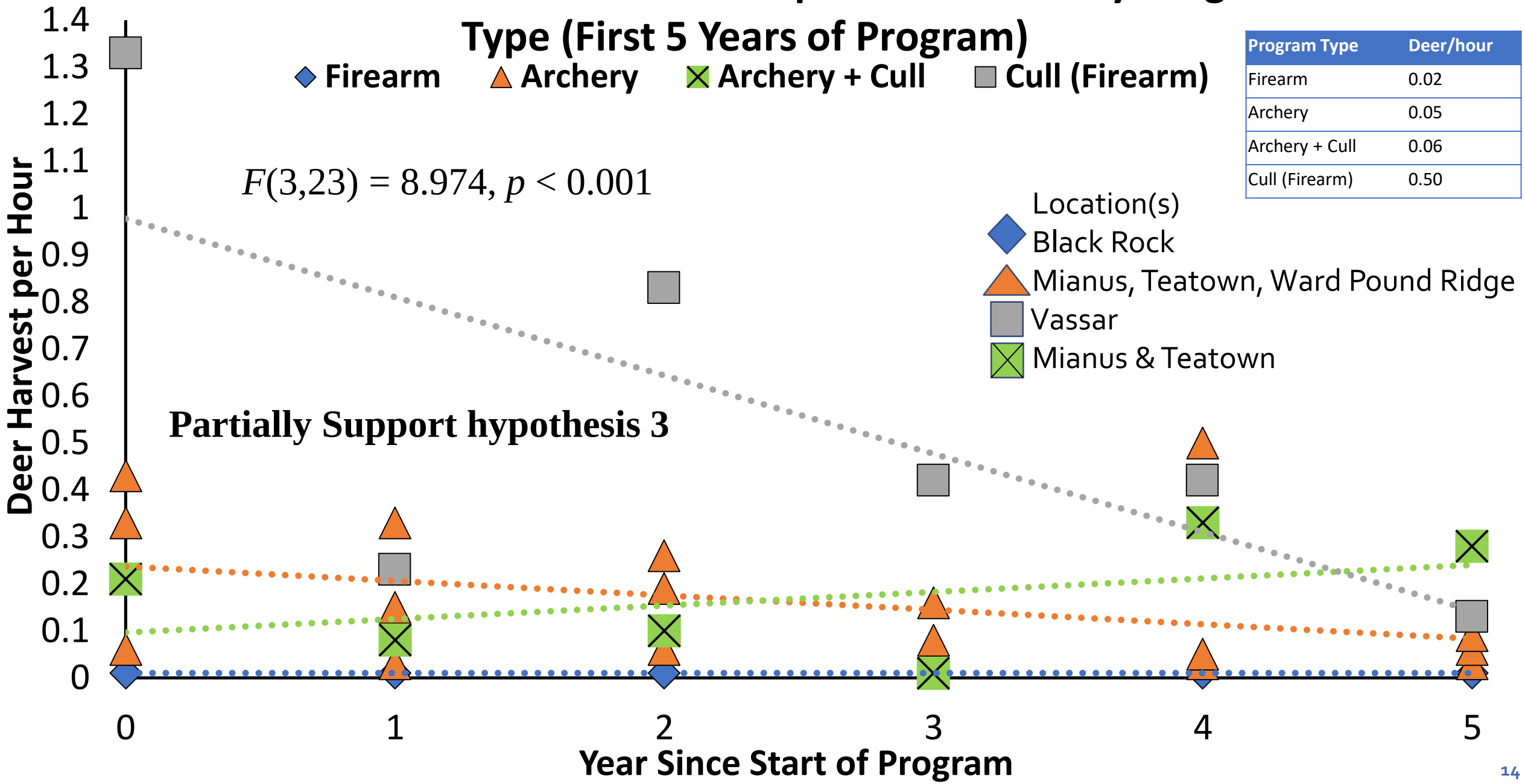
Results: Harvest Metrics

Annual Rates of Total Hunting Hours by Site




Site Deer Density Change Over Time
$F(4,18) = 2.3, p = 0.098$
Support hypotheses 1a & 2a
Program Type
Firearm
Archery
Cull (Firearm)
None
Deer per sq. kilometer
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
0
2
4
6
8
10
12
Year Since Start of Program
Mianus
Teatown
Black Rock
Vassar
Ward Pound Ridge
Huyck
Rockefeller

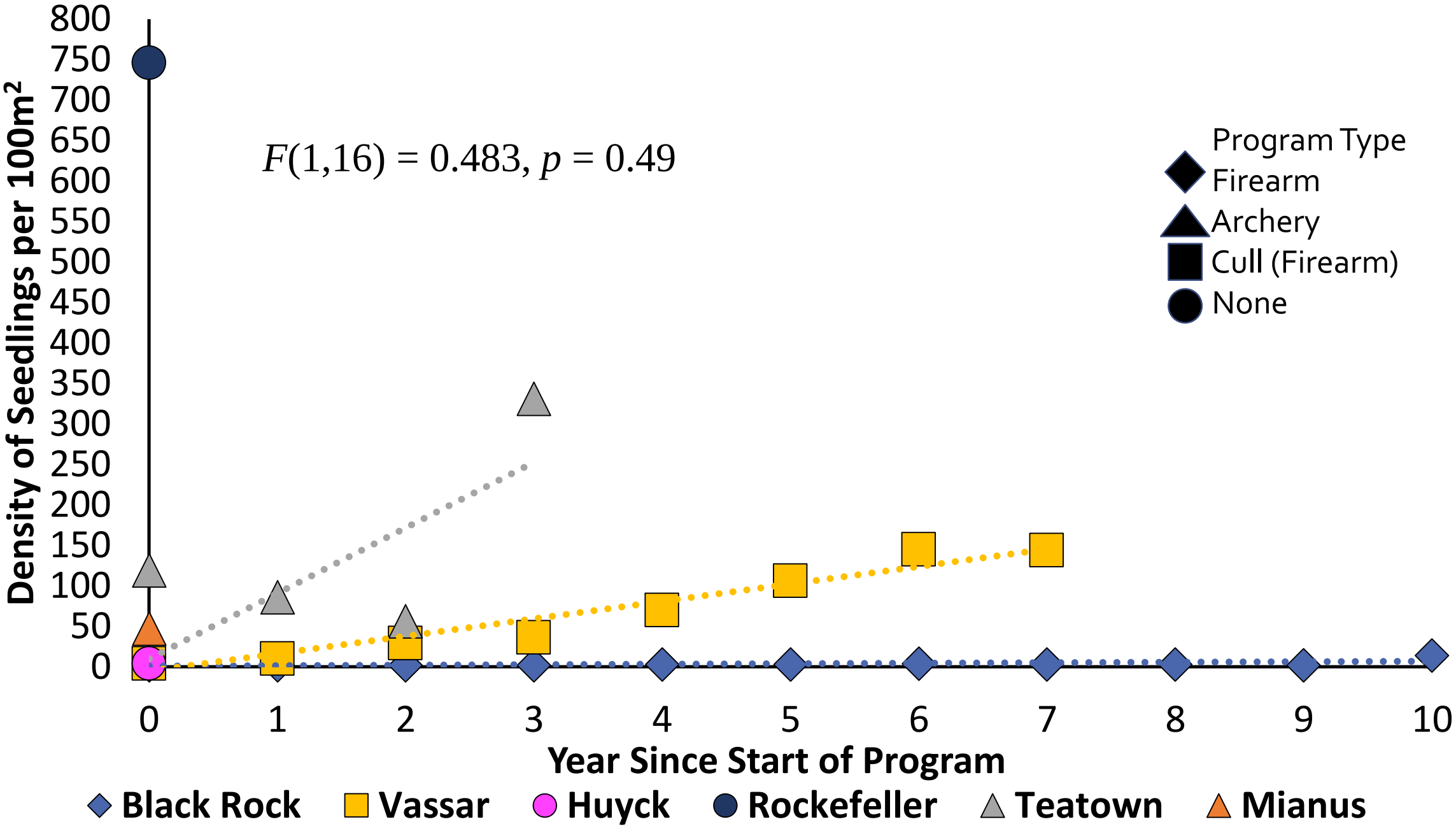
Annual Rates of Deer Harvested per Hour Effort by Program Type (First 5 Years of Program)



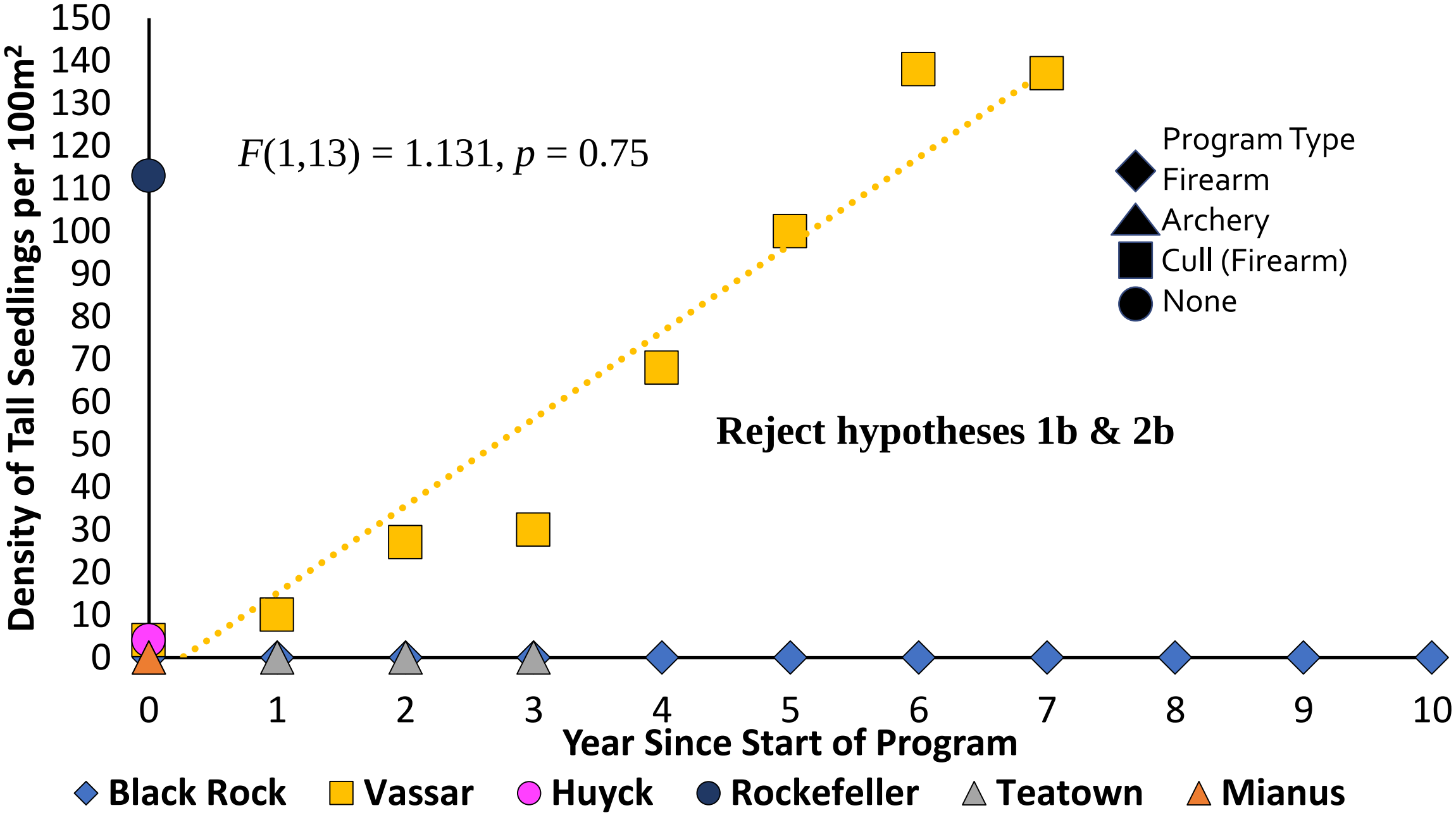
Program Type	Deer/hour
Firearm	0.02
Archery	0.05
Archery + Cull	0.06
Cull (Firearm)	0.50

Results: Vegetation Metrics

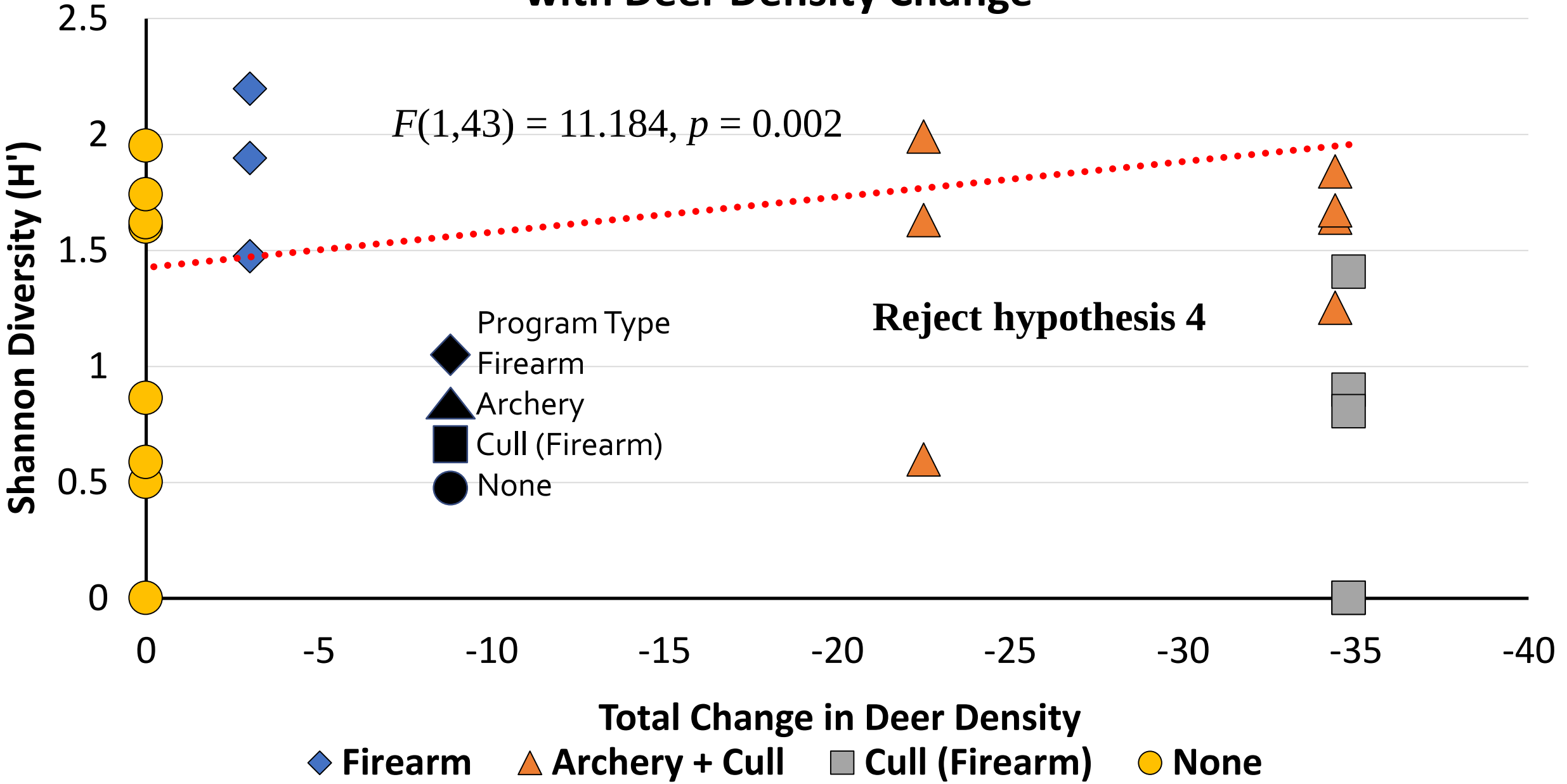
Site Seedling Densities



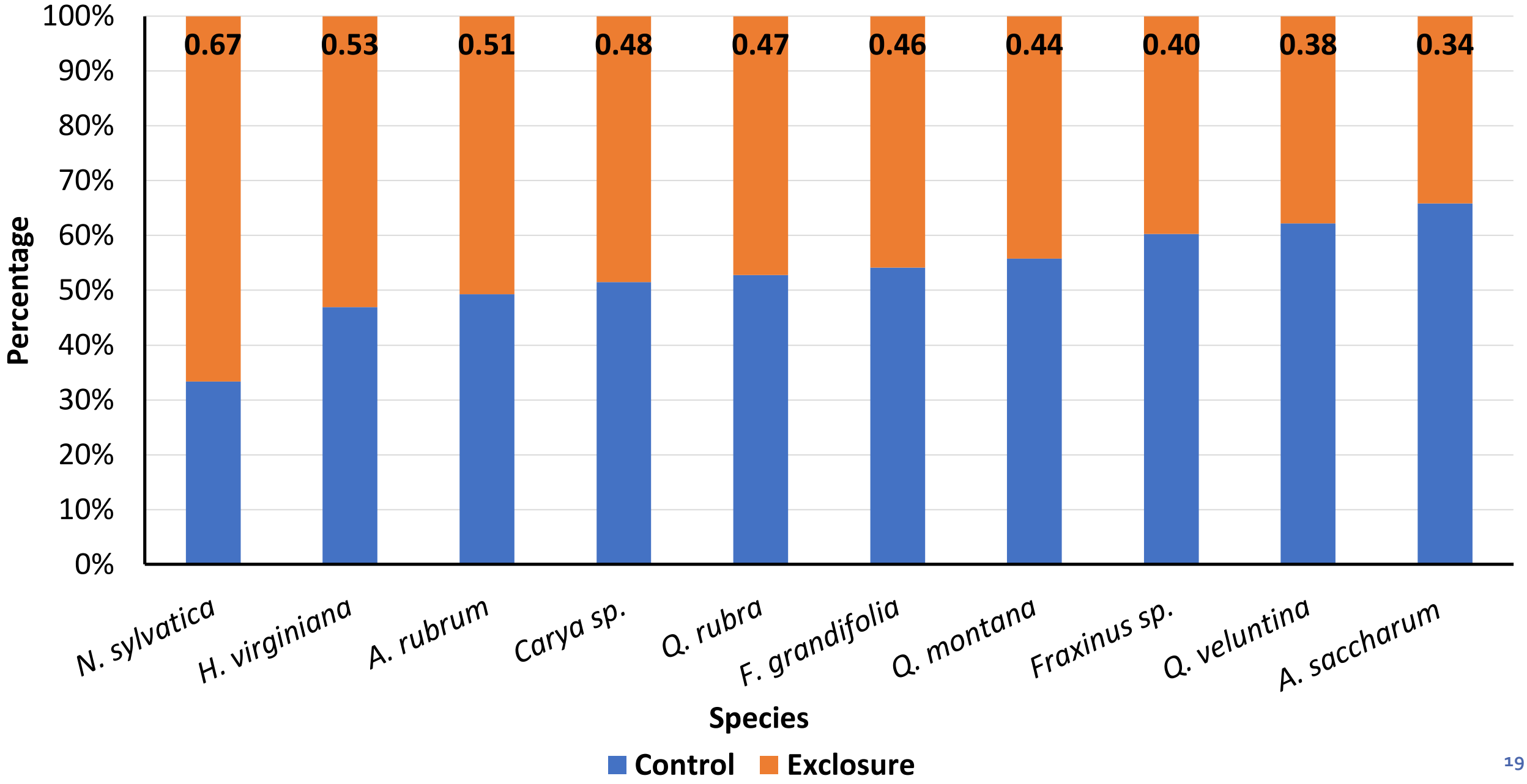
Site Tall Seedling (>40cm) Densities



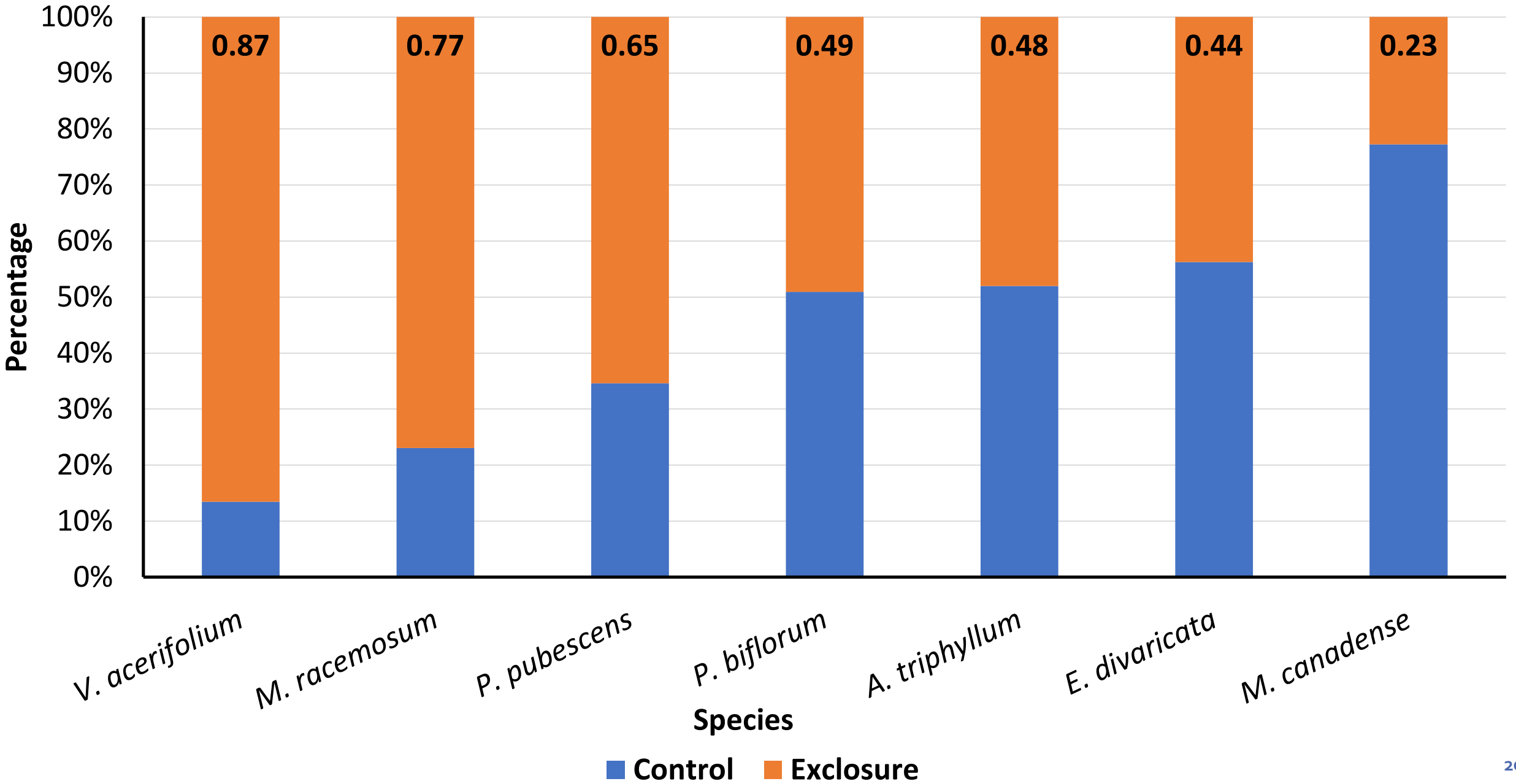
Program Type Understory Diversity Scores in Correspondence with Deer Density Change



Percentage of Tree Seedling Species within Control & Exclosure Plots



Percentage of Deer Indicator Plant Species within Control & Exclosure Plots



Conclusions

- Culling is the most efficient method for reducing deer densities.
- However, sites better explained variability in vegetation conditions and deer density than program type.
- Other unmeasured sites factors like browsing history, soil conditions, and land use history may account for these differences across sites.
- Additionally, inconsistent methods in measuring deer density limited comparisons by program type.

Other Considerations

- Poaching maybe occurring.
- Site's that manage deer do see decrease and stabilization of population over time.
- Seedlings may not be as sensitive to changes in deer density compared to herbaceous plants.

Take Home Message

Management and assessment of program success should occur at the site level, unless standardized metrics/protocols are implemented at the regional level

Thank you, any questions?