

Street Trees as a Source of Timber in Washington, DC

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Introduction

- Urban timber
- Reclamation
- Cost savings
- Potential business
- Desire for sustainable practices
- Need for research

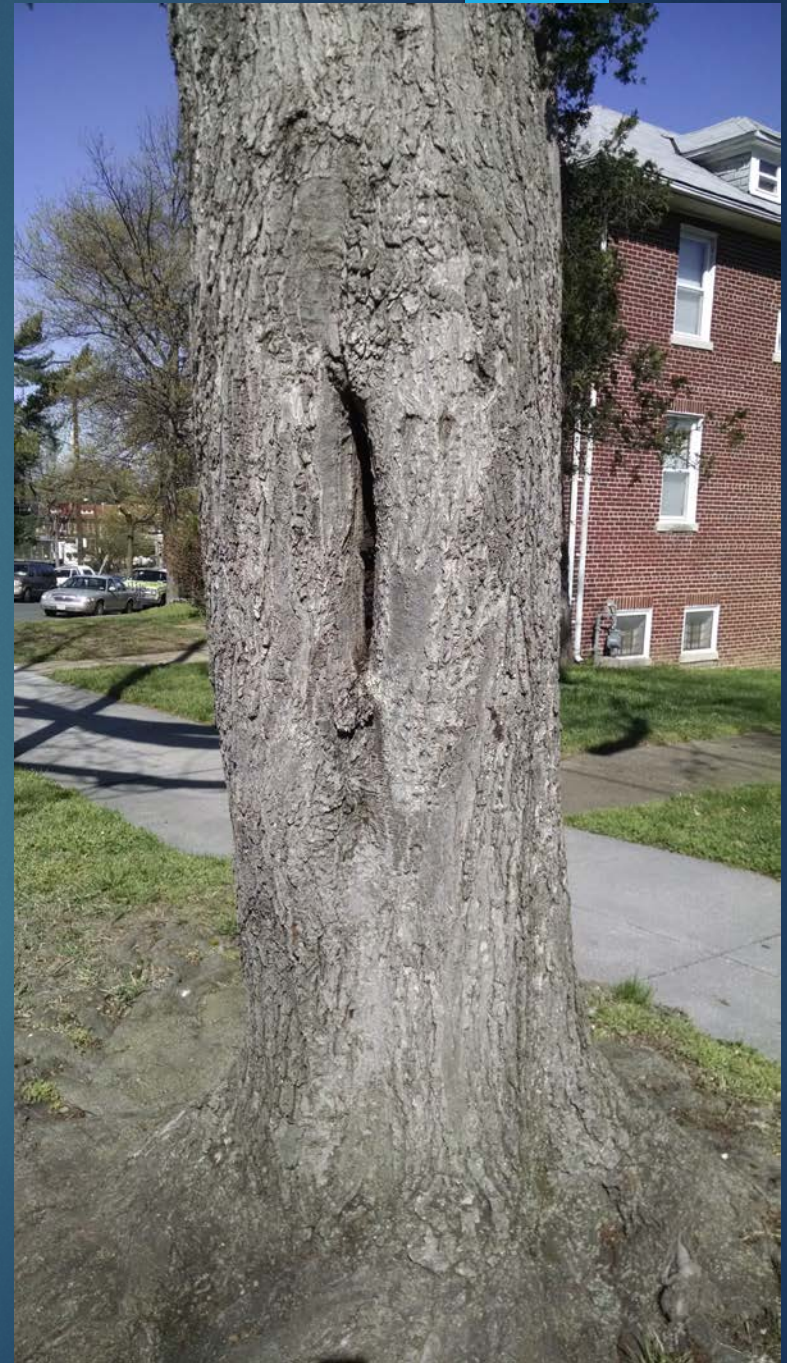


Research Scope

- Washington DC
- Assessment of street tree timber stock
- Six most abundant species
- Randomized observational study

Research Questions

- What is the quantity of urban timber?
- What is the quality of urban timber?
- What is the feasibility of urban timber?
- What is the presence of metal in trees?



Sampling Scheme

Legend

- Condemned Trees
- ◆ Non-condemned Trees

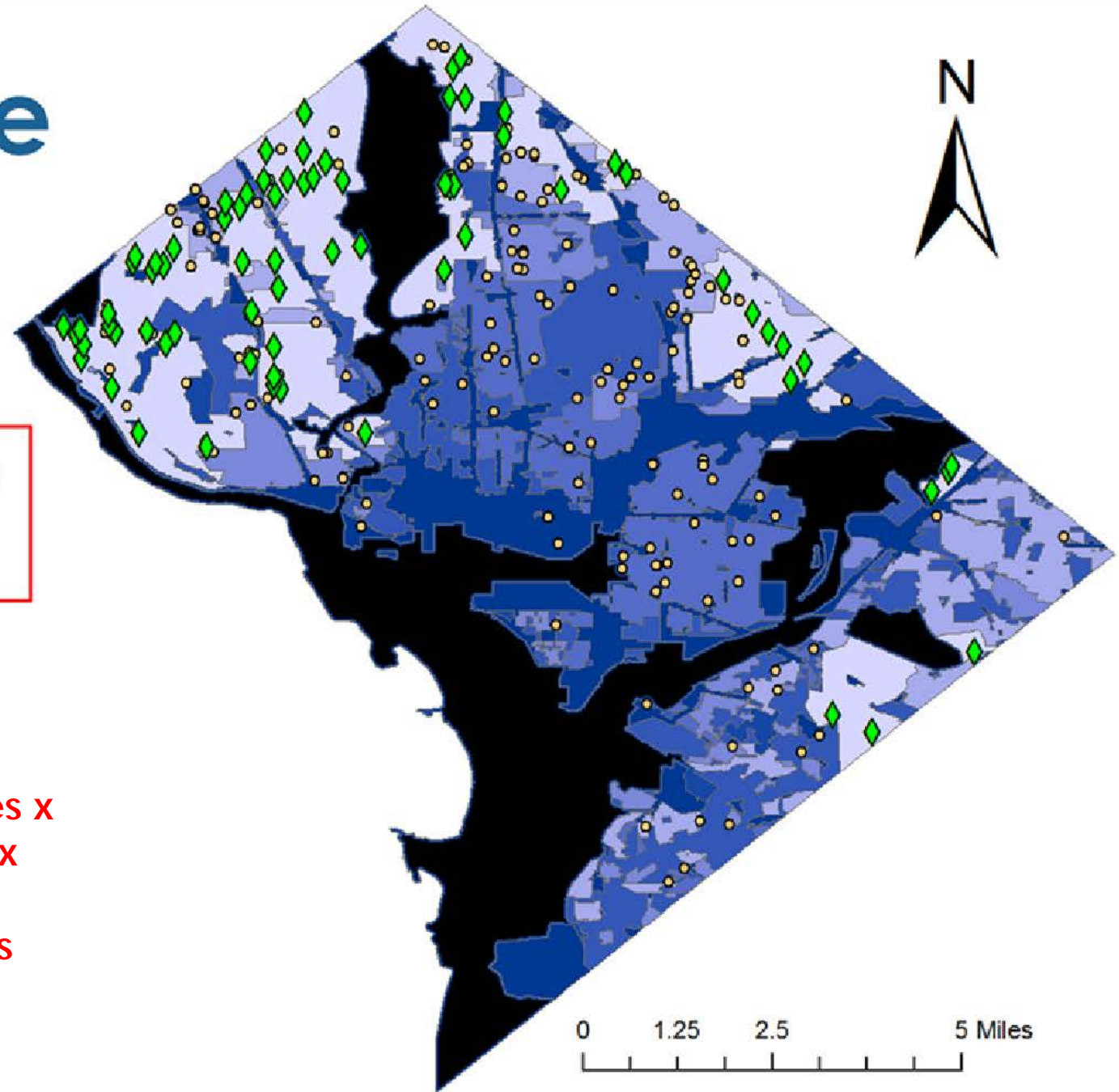
n=149

n=72

Zoning

- R-1
- R-2
- R-3
- R-4
- R-5
- Non-residential
- Unzoned

Goal:
6 species x
6 zones x
5 reps =
180 trees



0 1.25 2.5 5 Miles

Land-use Zones



R-1



R-4



Non-residential

Grading Methods

- Trunk Diameter (at 4.5' AGL)
- Log Length (feet)
- Clear wood (feet; percent)
- External defects
 - Knots (count)
 - Scars (count)
 - Decay (percent)



Log Grades



Cull



Grade 3



Grade 2



Grade 1

Volume measurements

- Board feet
- International log rule
- What are the dimensions?
- Board Feet International = $0.049 \times \text{Length} \times \text{Diam}^2 + 0.006 \times \text{Length}^2 \times \text{Diam} - 0.185 \times \text{Length} \times \text{Diam} + 0.0002 \times \text{Length}^3 - 0.012 \times \text{Length}^2 + 0.042 \times \text{Length}$



Recovery Feasibility Protocol

- Tree characteristics
- Removal logistics
- Infrastructure barriers
- 11 criteria (possible score 1 to 4)
- Total feasibility score: 11 (high feasibility) to 44 (low feasibility)



Metal Count Measurements

- Visual Inspection
- Two feet above and below DBH
- Staples count
- Nails count

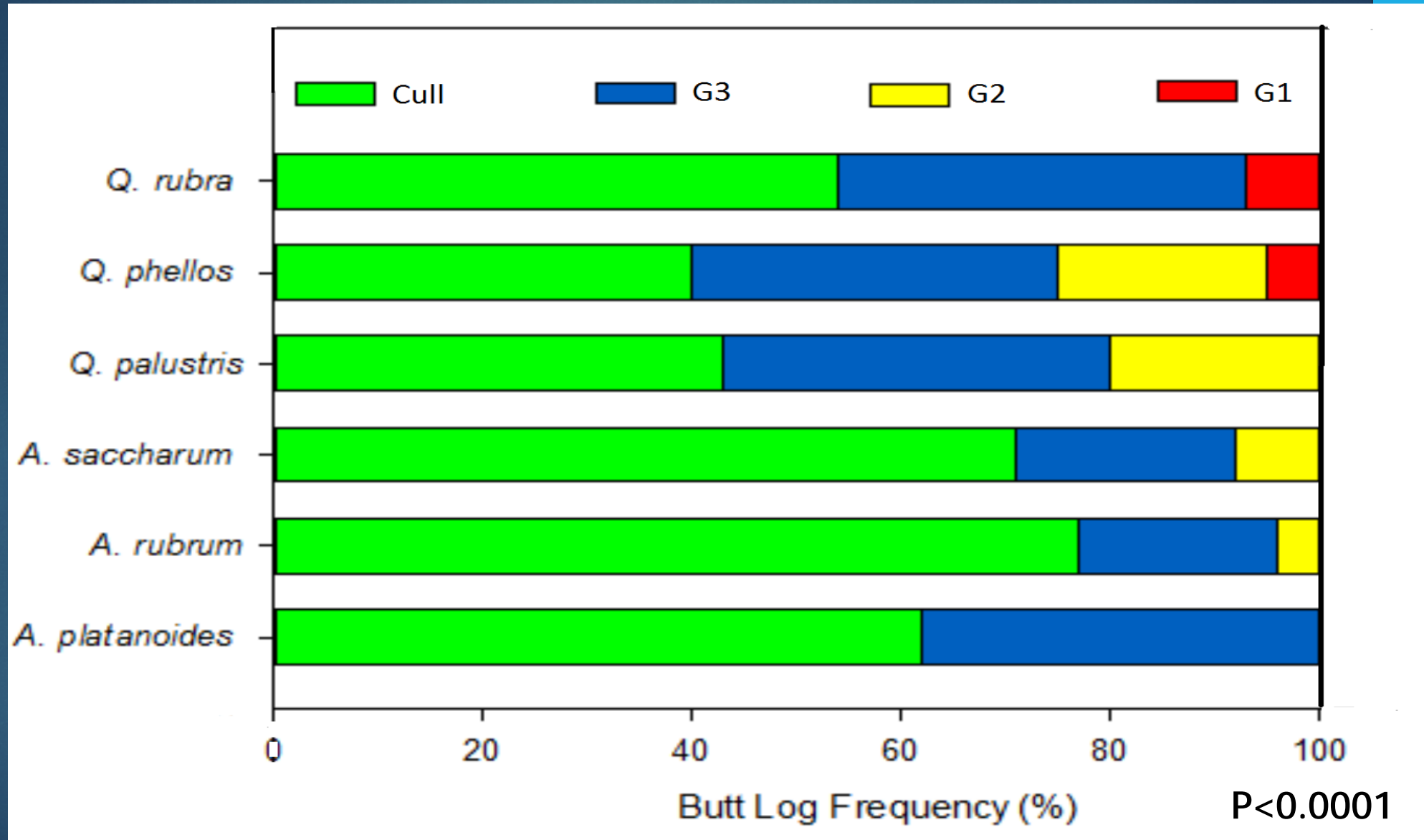


Log Prevalence

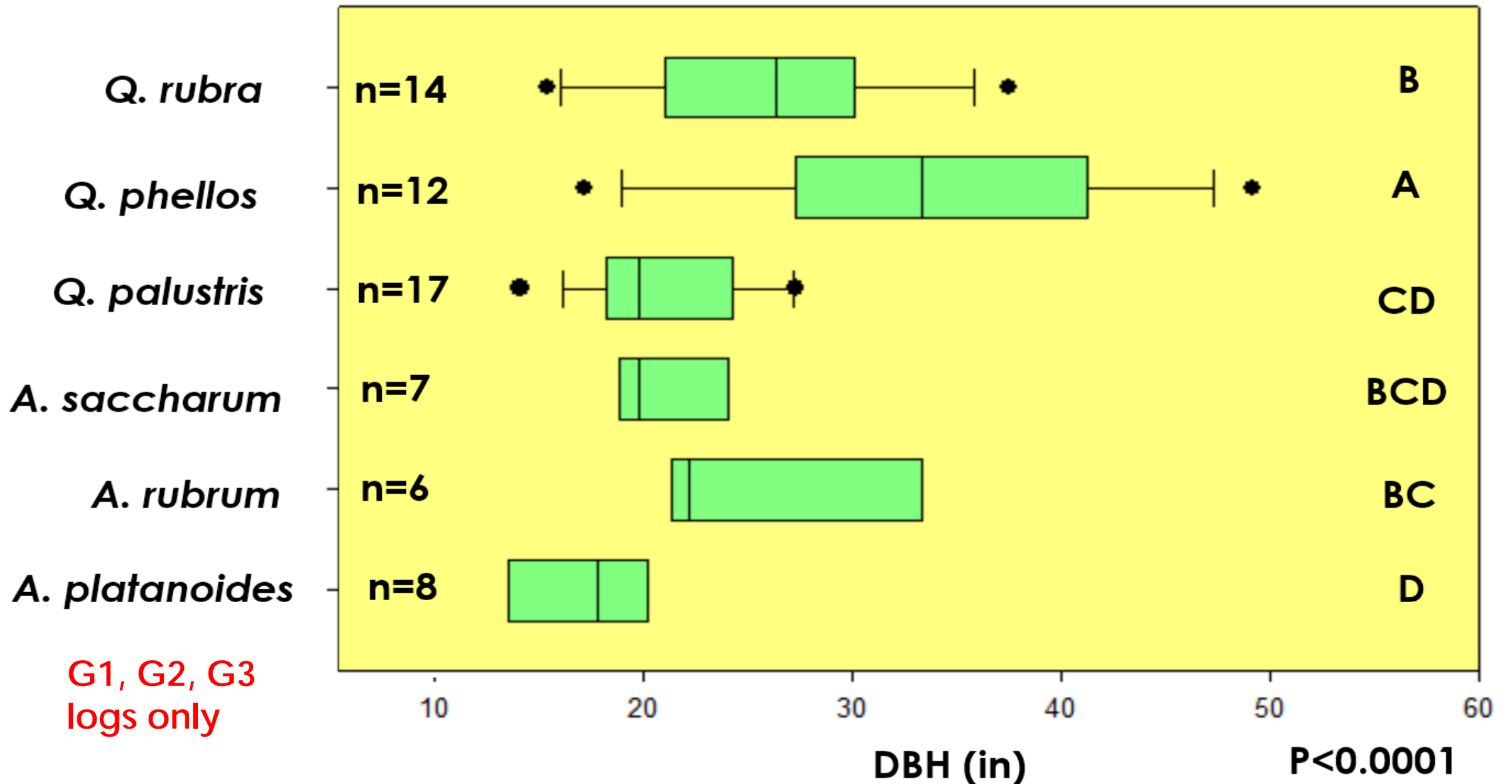


Species $P=0.045$	Sample trees (#)	Trees with logs (#)	Prevalence of logs (%)
<i>Acer platanoides</i>	21	8	38
<i>Acer rubrum</i>	26	6	23
<i>Acer saccharum</i>	24	7	29
<i>Quercus palustris</i>	30	17	57
<i>Quercus phellos</i>	20	12	60
<i>Quercus rubra</i>	28	13	46
Total	149	63	42

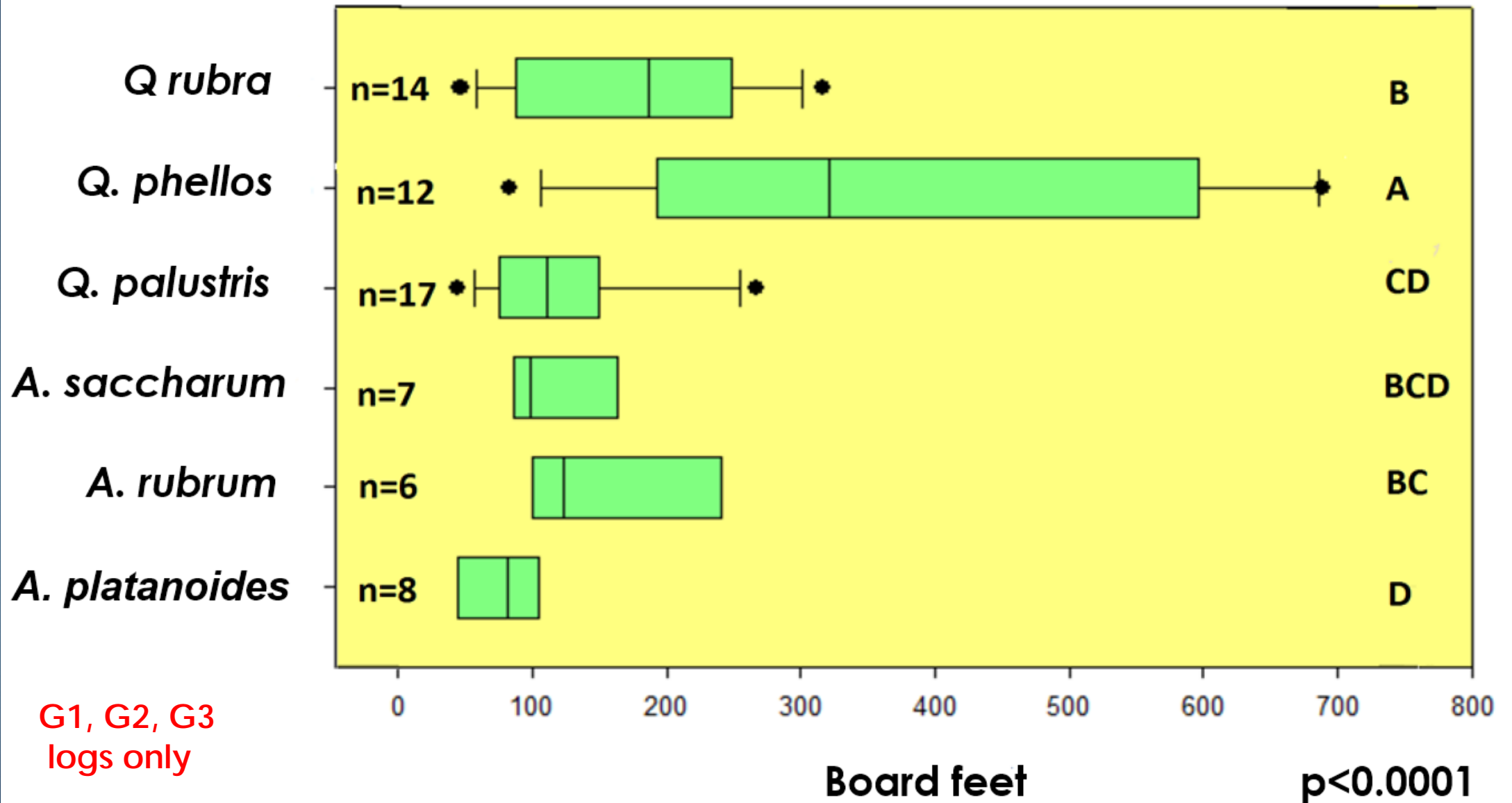
Log Distribution by Species



DBH Distribution of Trees with Logs



Log Volume by Species



Total Log Volume in DC

- Results presented so far are per-tree basis
- Need “whole forest” estimates
- Final aspect of our study
- How much total log volume is generated annually by routine removals?

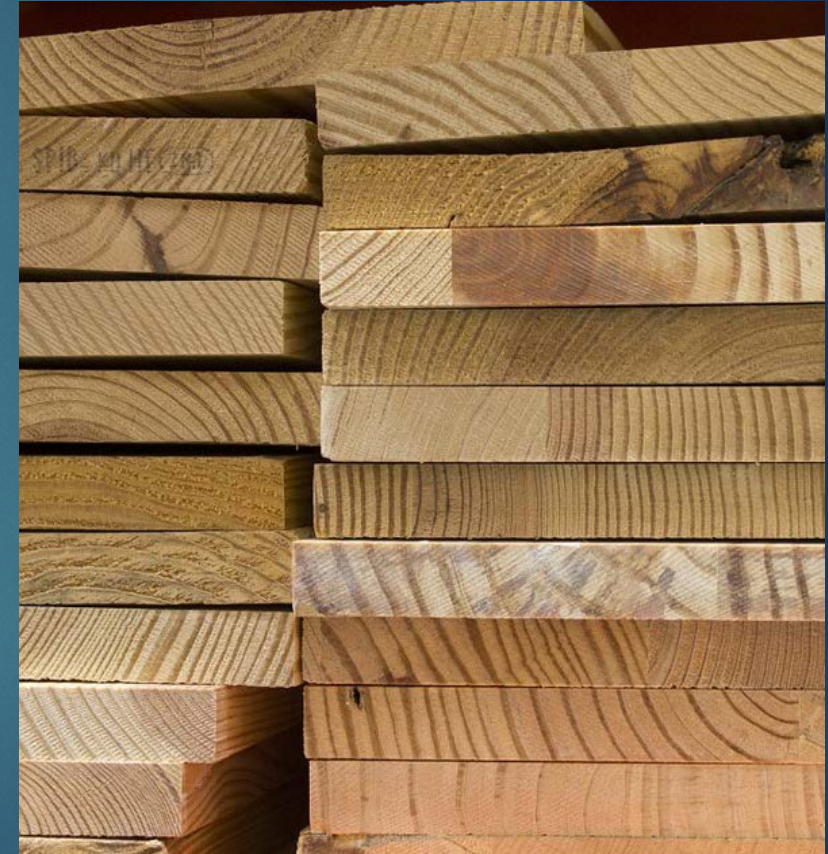


Volume by DBH Class

Log Diameter	N	n	Mean Butt Log Volume (ft. ²)	95% CI of Mean Butt Log Volume (ft. ²)	Standard Deviation of Mean	Total Butt Log Volume (ft. ²)	95% CI of Total Butt Log Volume (ft. ²)
12–18 in.	72	11	51	47 – 55	17	3684	2874 – 4494
19–24 in.	72	25	76	71 – 82	27	5554	4751 – 6357
25–30 in.	40	15	158	150 – 167	52	6317	5166 – 7468
31–36 in.	20	5	222	213 – 231	46	4403	3271 – 5536
37–42 in.	30	4	292	282 – 303	49	8816	6437 – 11195
Over 42 in.	18	3	426	385 – 467	230	7729	0 – 18105

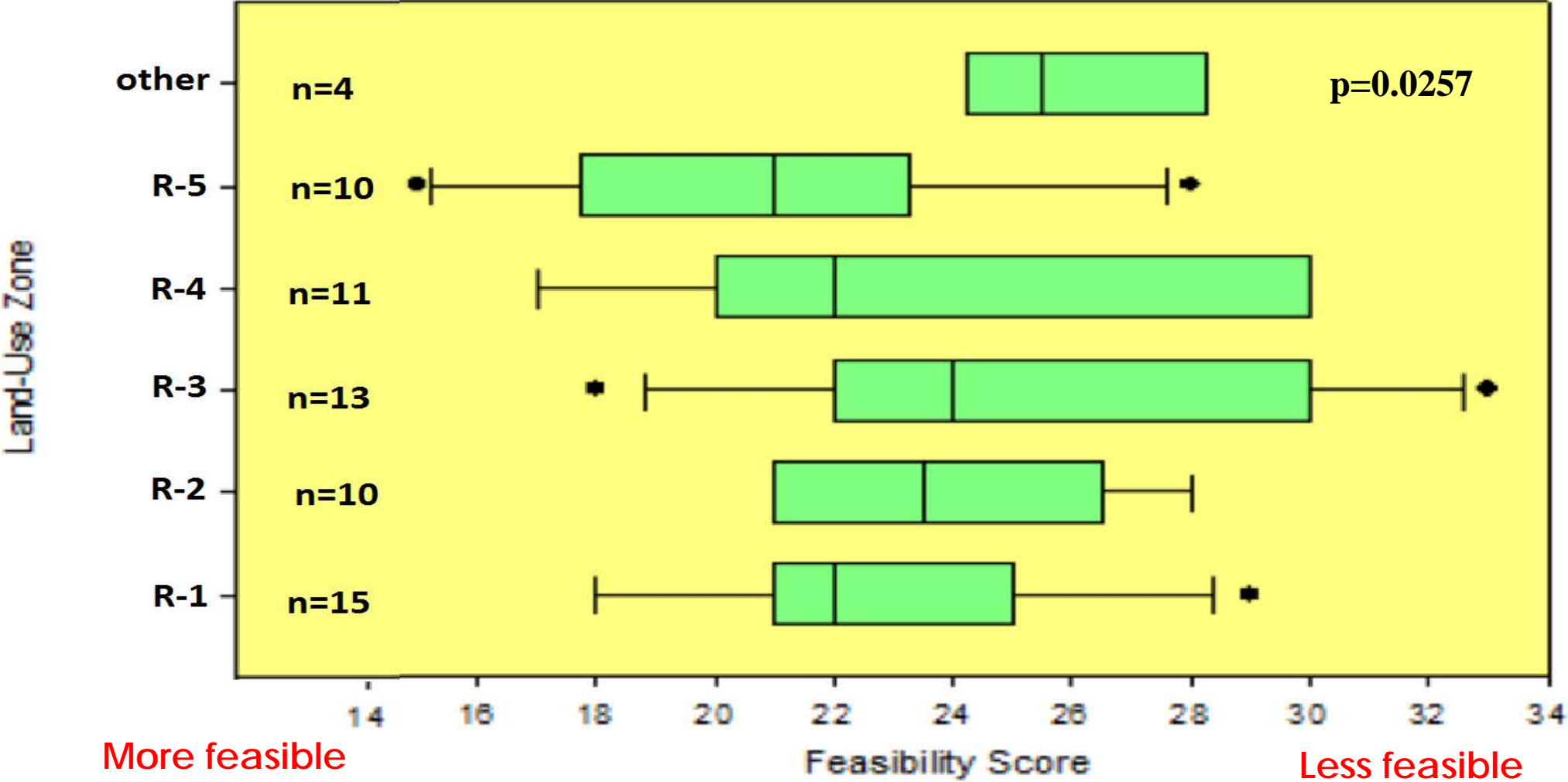
Total Log Volume in DC

- 36,500 Board Feet (condemned trees for the top six species)
- 64,000 Board Feet (all condemned street trees)
- What does this mean?



Feasibility of Removal

Feasibility of Removal



Metal Prevalence

	Total Butt Logs	Logs with Any Metal Object		Logs with Nails	
	(#)	(#)	(%)	(#)	(%)
Removal status			(p=0.0097)		(p=0.0006)
Condemned	63	51	80	24	38
Non-condemned	53	32	59	6	11
Land-use zone			(p=0.3560)		(p=0.5412)
R-1	15	10	67	4	27
R-2	10	10	100	2	20
R-3	13	11	85	7	54
R-4	11	8	73	5	45
R-5	10	8	80	4	40
Non-residential	4	4	100	2	50
Species			(p=0.5029)		(p=0.7353)
<i>Acer platanoides</i>	8	6	75	2	25
<i>Acer rubrum</i>	6	4	67	2	33
<i>Acer saccharum</i>	7	7	100	2	29
<i>Quercus palustris</i>	17	15	88	6	35
<i>Quercus phellos</i>	12	10	83	7	58
<i>Quercus rubra</i>	13	9	69	5	38
Log grade			(p=0.1287)		(p=0.5717)
Grade 1	3	1	33	0	0
Grade 2	13	10	77	5	38
Grade 3	47	40	85	19	40

Conclusion

- Volume of grade logs in condemned street trees is very limited
- High quality timber is scarce in condemned street trees
- Condemned oaks tend to have higher quality wood than maples
- There is a large volume of low quality wood removed annually...what to do with it?



Source: Michigan State Shadows

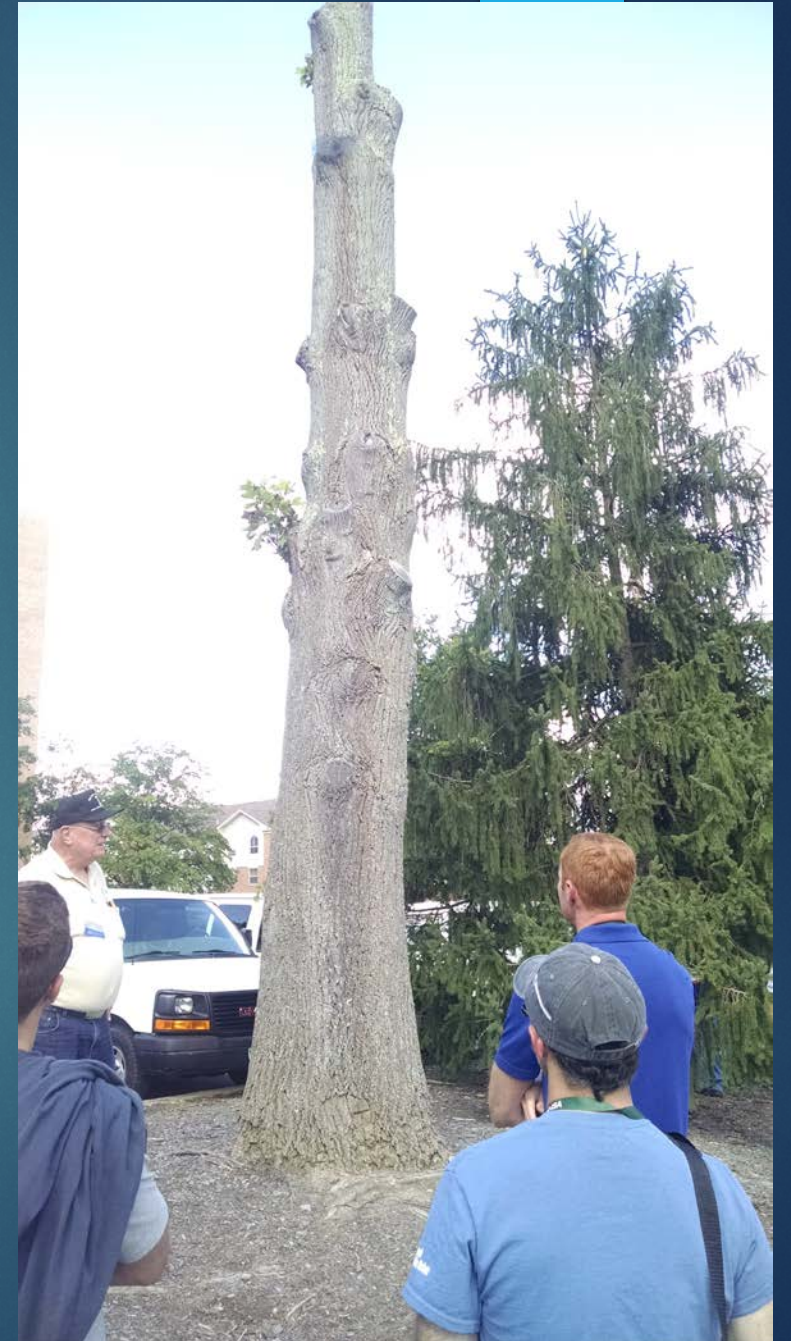
Conclusion

- Feasibility of salvage is highly variable no clear relationship to land use or species
- Metal exists in the majority of condemned street trees
 - No relationship to land-use zone, species, and grade
 - Nails are less frequent than other types of metal



Considerations

- Focused on street trees condemned for removal
- Small sample size
- Applicability of grading techniques
- Sample stratification
- Limited range of species



Future studies

- Forward desirable characteristics
- Comparisons between park and street trees
- Comparisons between insect invested trees and routine removal
- Wood characteristics (durability)



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Thank You



Questions?