

Thinning and Burning in Oak Forests: A Tale of Two Sites

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Two laws of Oak Silviculture

1. Competitive sources of oak reproduction must be **present**.
2. Sources of oak reproduction must receive one or more **timely and adequate releases** to reach the overstory.

Loftis 2004

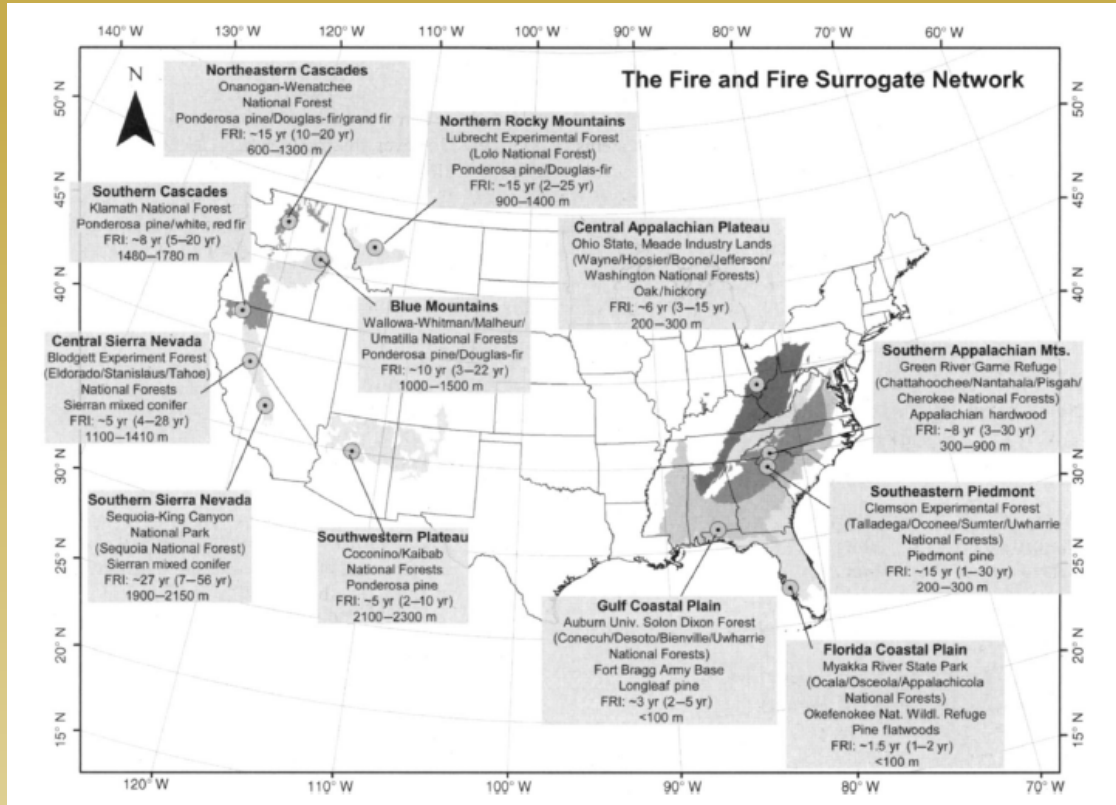


Oak fire adaptations

- Trees
 - Thick bark
 - Wound compartmentalization
- Seedlings
 - Root-centered growth
 - Location of dormant buds
 - Re-sprouting capacity



Fire and Fire Surrogate Study



Study Sites, Central Appalachian Plateau

- REMA (Vinton Furnace Experimental Forest)
- Zaleski State Forest
- Tar Hollow State Forest



200 years of forest change, trees >5" diameter

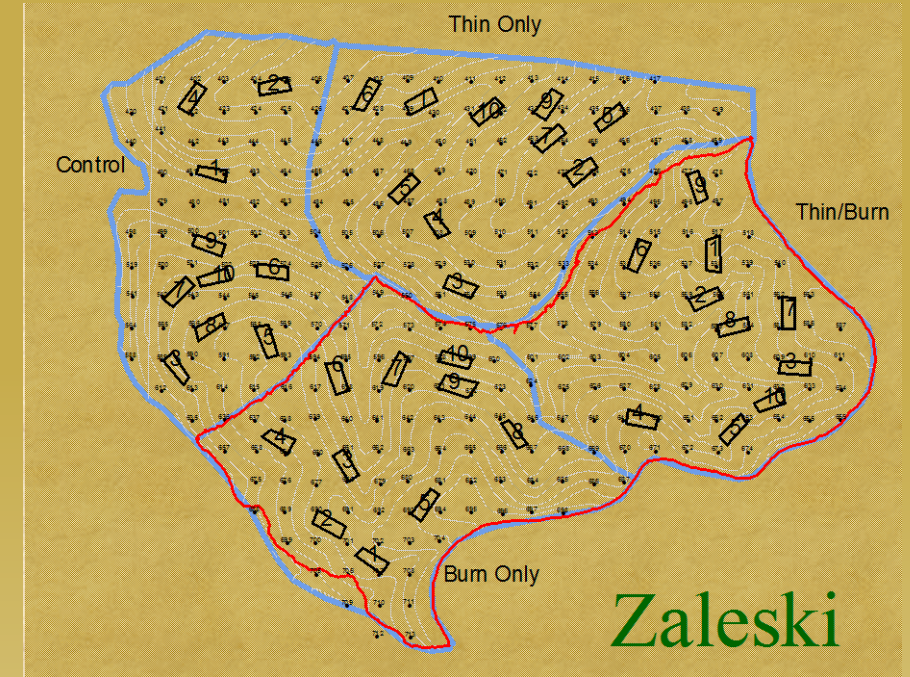
Species/ Group	Witness trees (%) Ca. 1800	FIA trees (%) Ca. 2010
White oak	34.1	6.8
Hickories	13.9	7.0
Red oak group	12.9	7.9
American beech	10.3	4.0
Sugar maple	4.6	9.4
Red maple	3.4	12.6
Yellow-poplar	2.9	11.6
Cherry, Aspen, Elm, Ash, Buckeye	4.6	21.5



5 counties, southern Ohio, Dyer and Hutchinson, in prep.

Treatments

- Control: No treatment
- Thin: Cut 1/3 of basal area
- Burn: Rx fire
- T+B: Cut 1/3 of basal area + Rx fire



Treatment Timeline





Focus on Zaleski and Tar Hollow

	Zaleski	Tar Hollow
Site Quality	Poor-Average More acid soils	Average-Good Less acid soils
Land-use history	Charcoal Production	Agricultural NNIS- Ailanthus, wineberry
Overstory	White oak-chestnut oak- red oaks	Chestnut oak (white oak, red oaks)
Sapling	Red maple	Sugar maple Red maple

Forest Composition, pre-treatment (2000)

Canopy >10" DBH

SITE	Oak-hickory	Maples	Y-Poplar
Zaleski	93%	4%	2%
Tar Hollow	78%	10%	8%

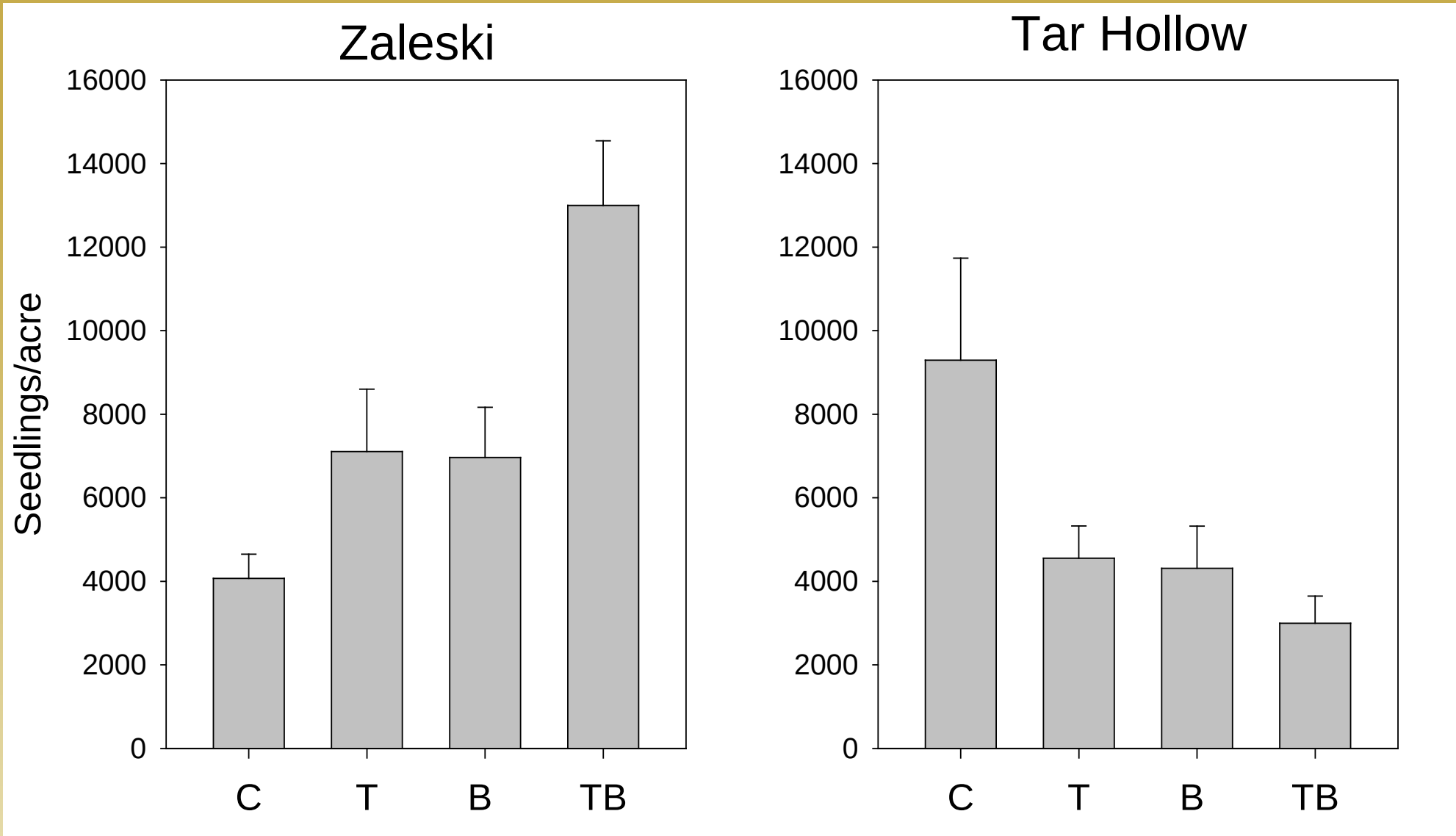
Midstory 4-10" DBH

SITE	Oak-hickory	Maples/Tolerant
Zaleski	45%	52%
Tar Hollow	37%	56%

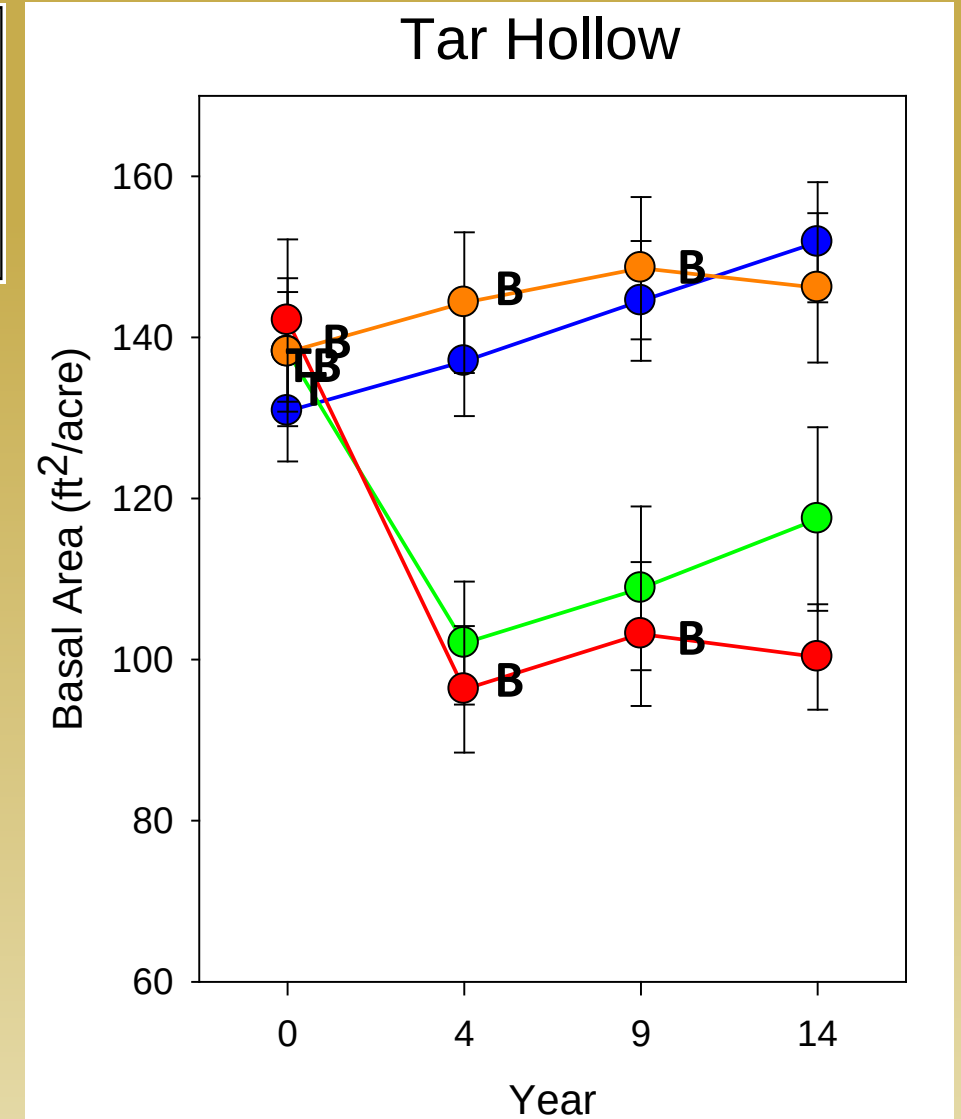
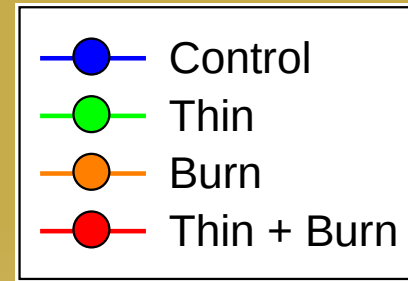
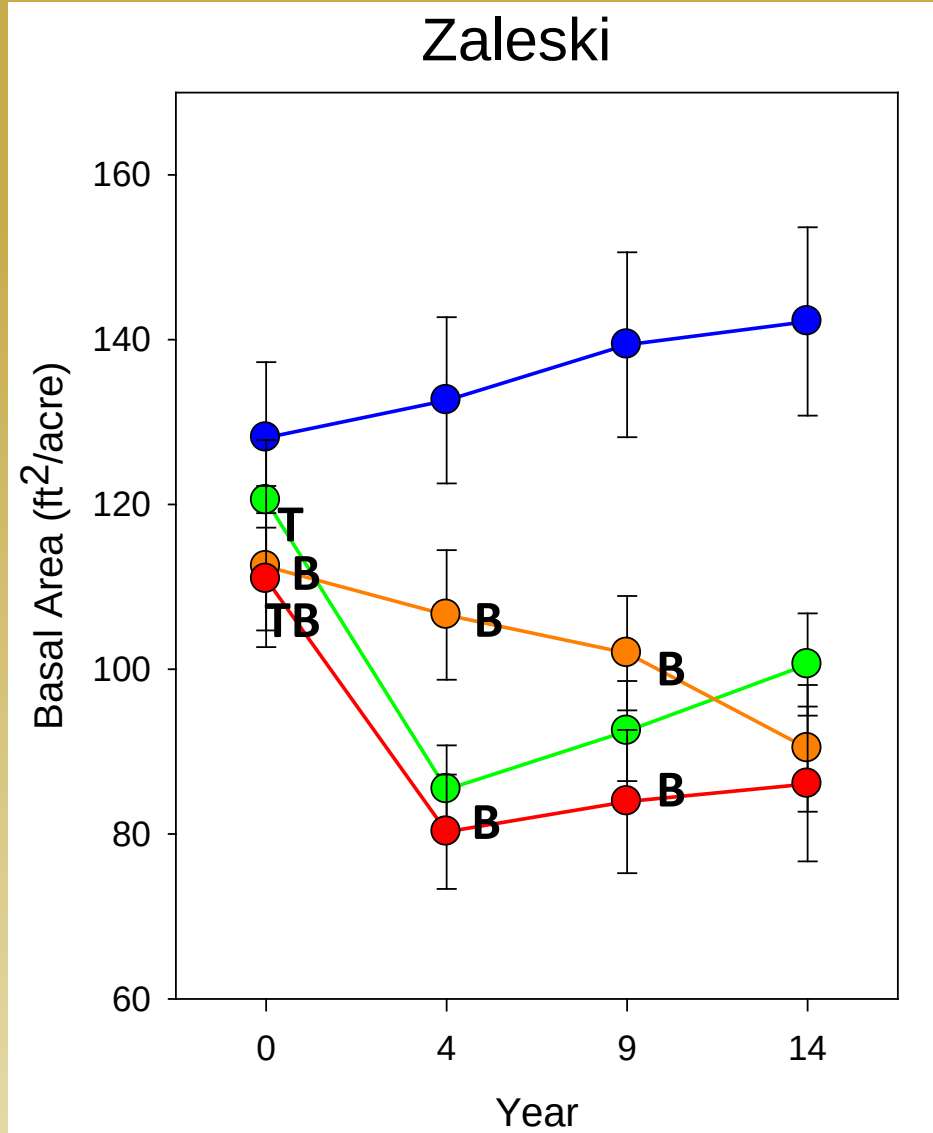
Saplings 1-4" DBH pre-treatment (2000)

Species	Zaleski	Tar Hollow
Red maple	50%	24%
Sugar maple	3%	34%
Other tolerant	42%	30%
Other	2%	12%
Oak-hickory	4%	1%

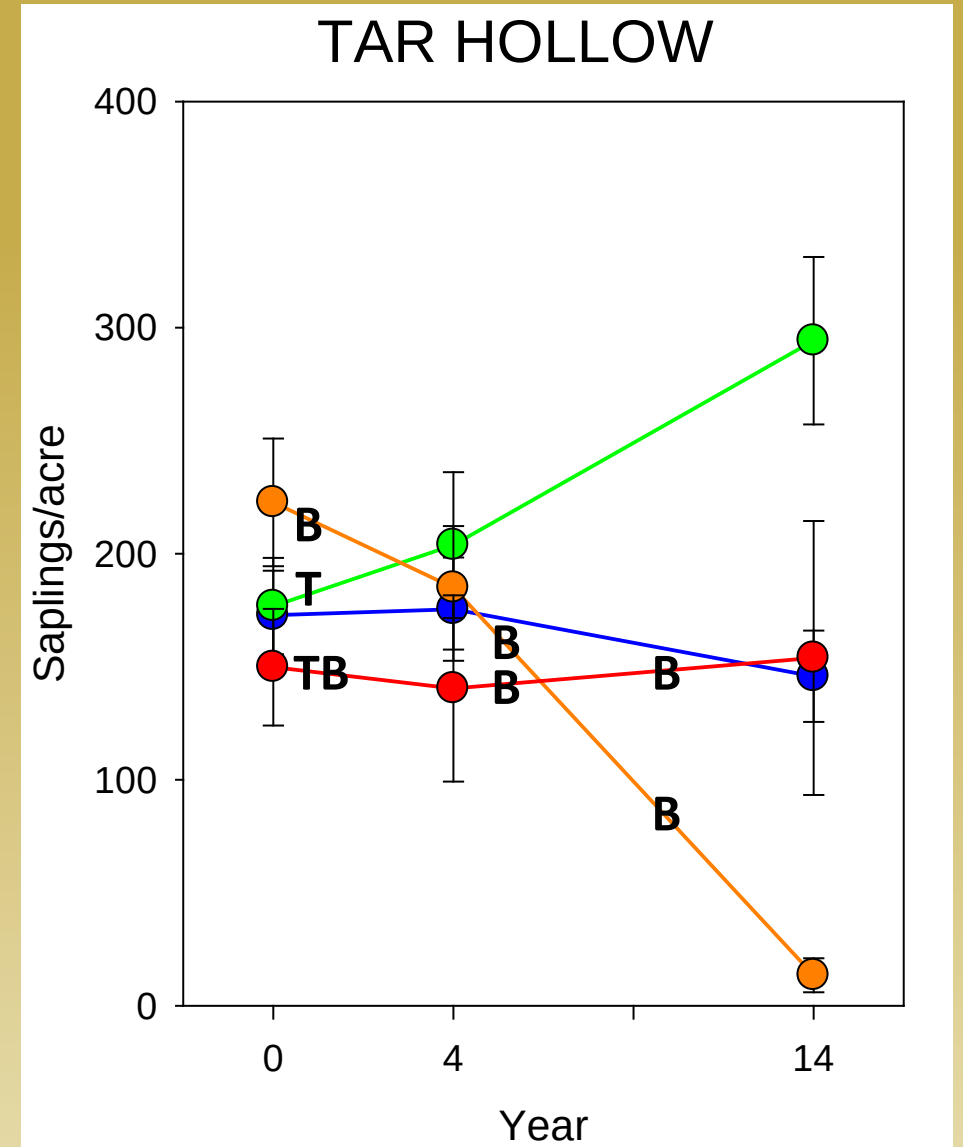
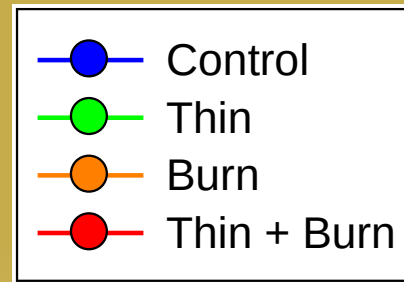
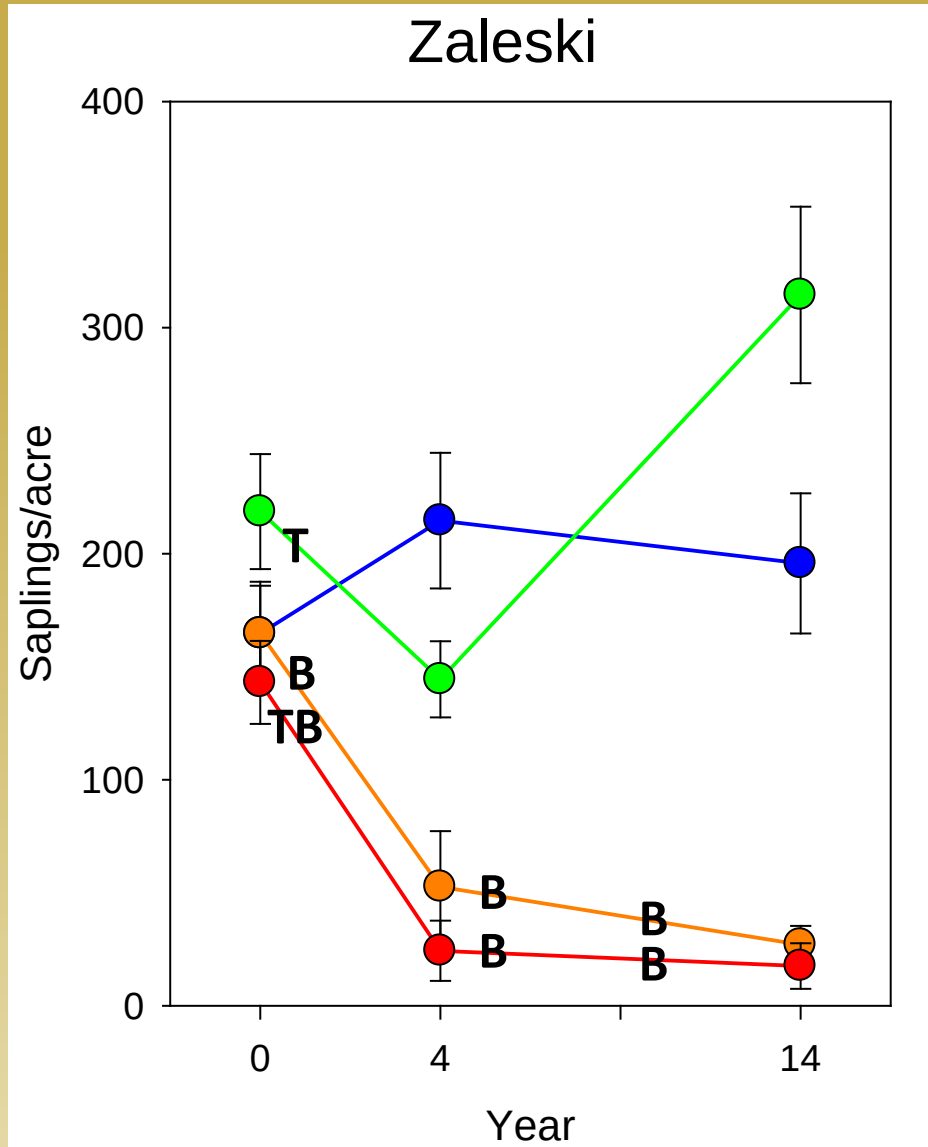
Oak-hickory seedlings, pre-treatment (2000)



Tree Basal Area, 2000-2014



Sapling Density, 2000-2014



Control plots



Thin only



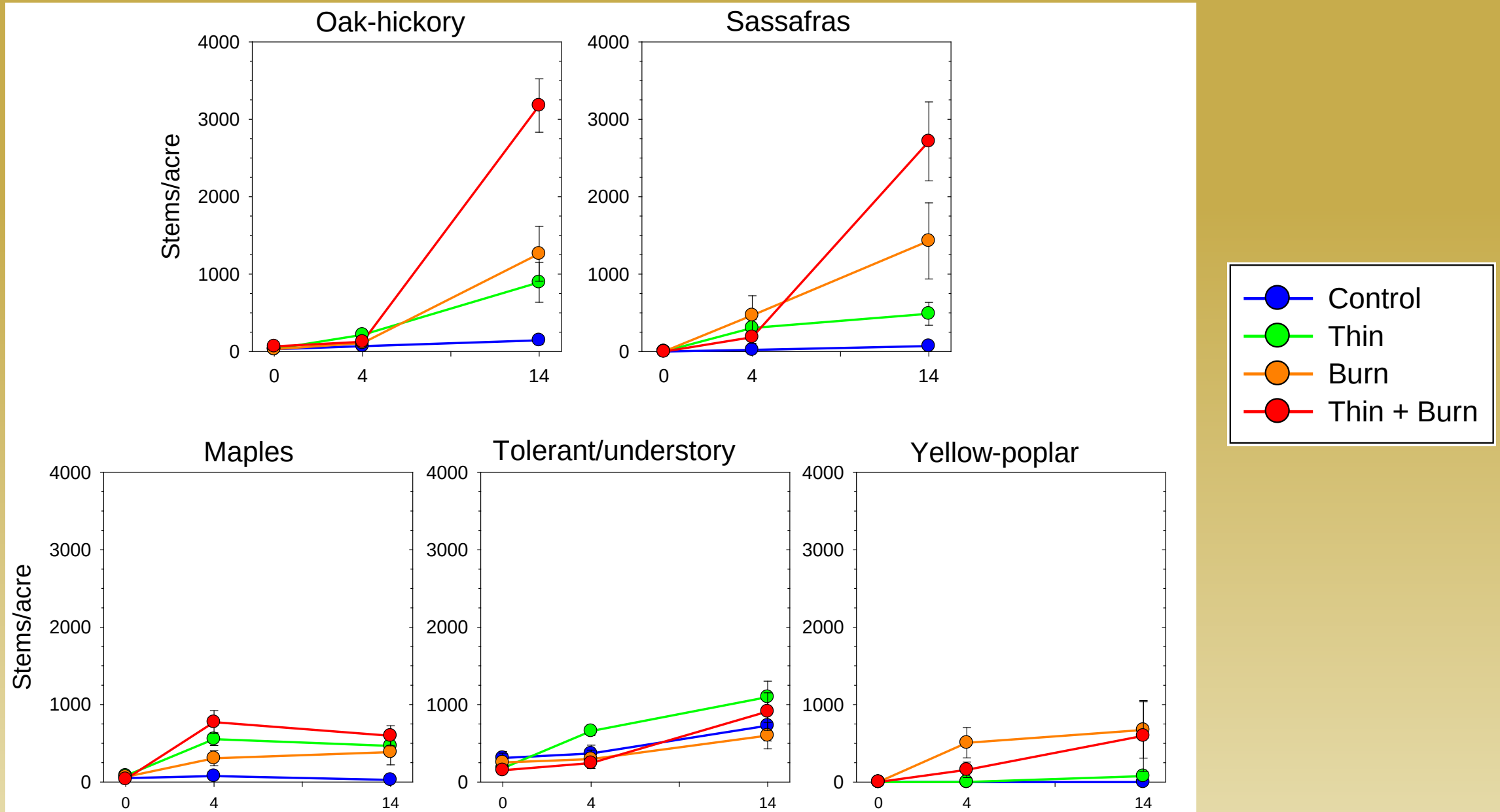
Burn only plots



Thin + Burn Plots



Large regeneration (>2' tall), Zaleski

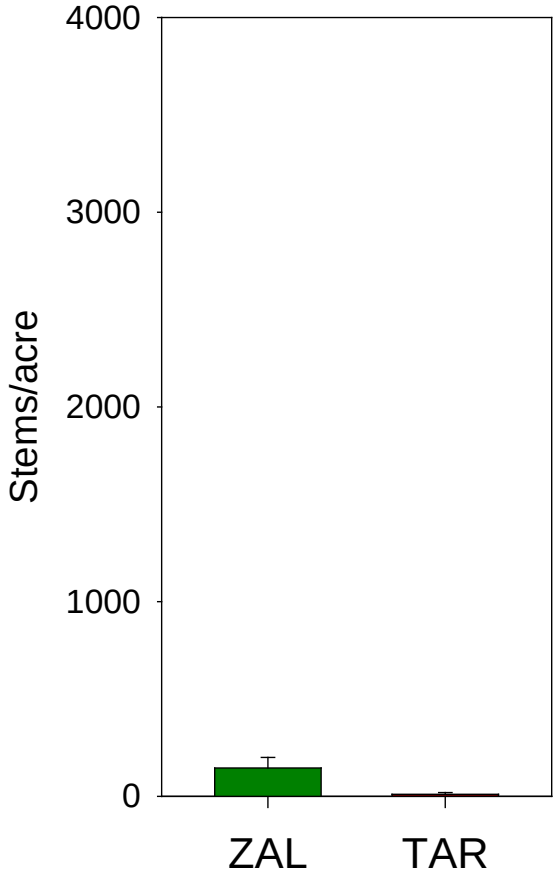


Treatment Comparison, Zaleski, Year 14

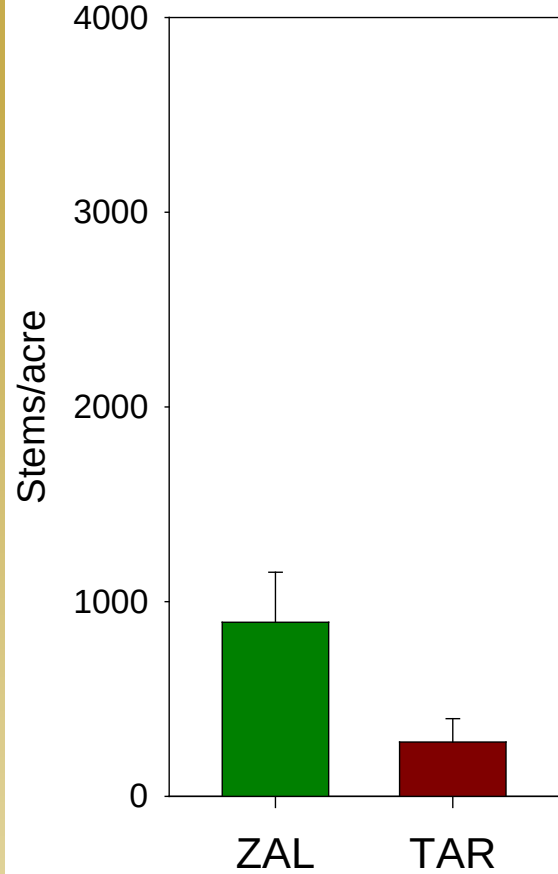
Attribute	Thin	Burn	Thin+burn
Large Oak-hickory regen /acre	894	1263	3177
Basal area (ft ² /ac)	101	90	86
Trees/acre	131	65	75
Large saplings/ acre	314	27	18

Large oak-hickory regen, year 14

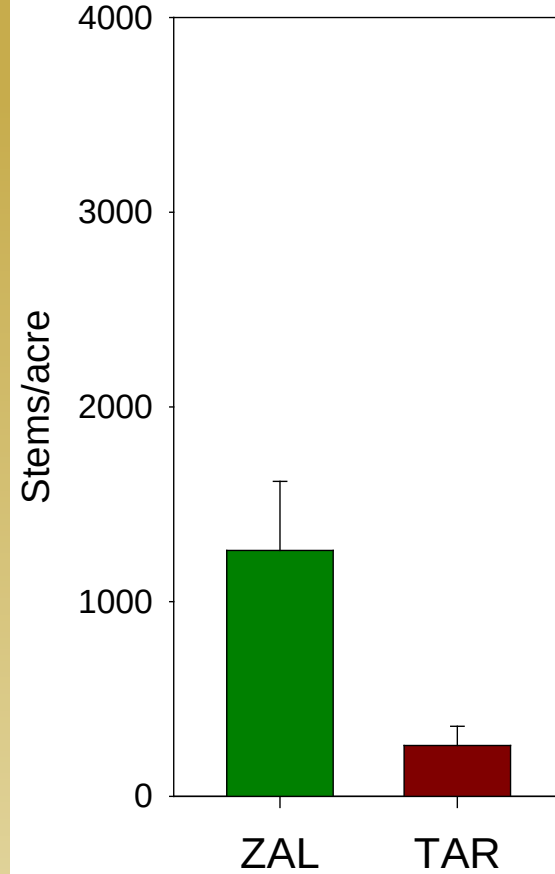
Control



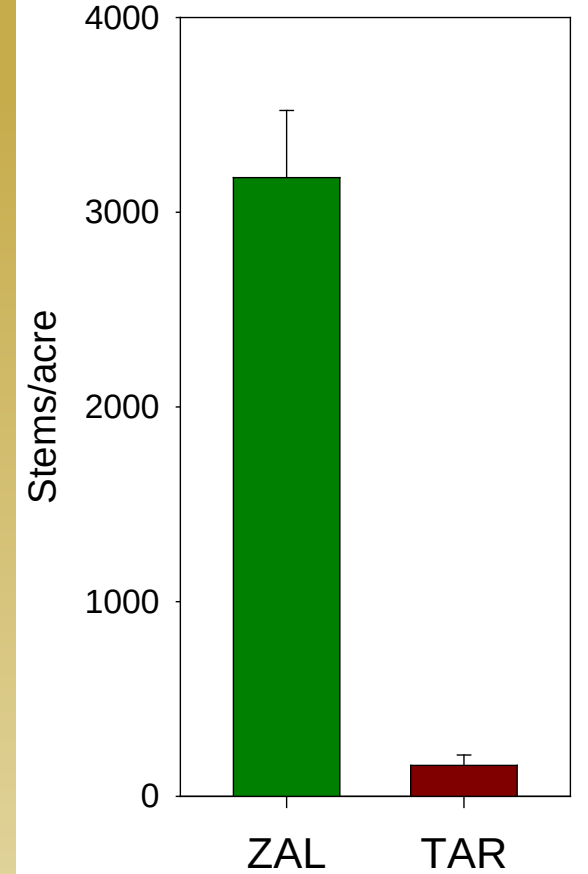
Thin



Burn



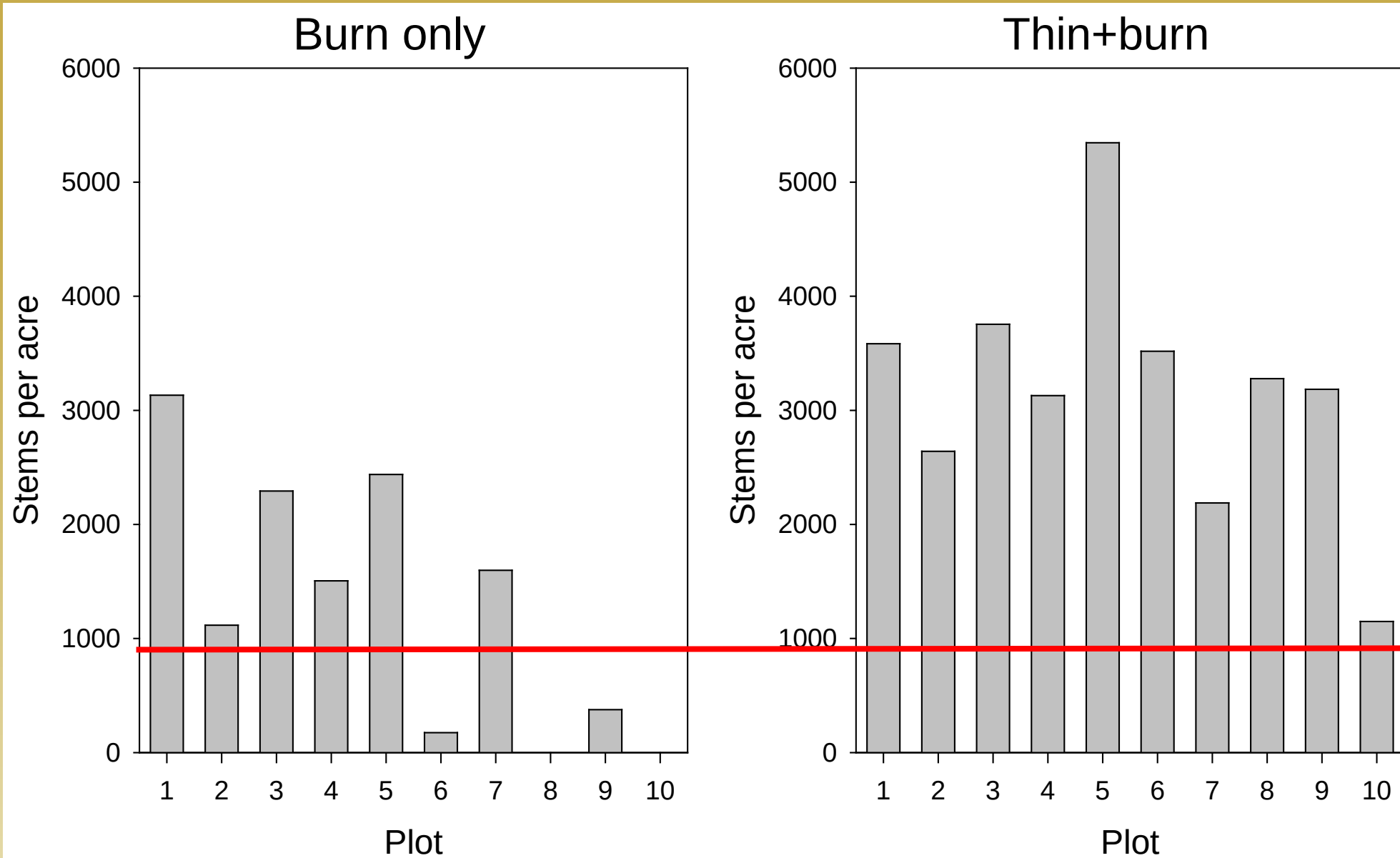
Thin+burn

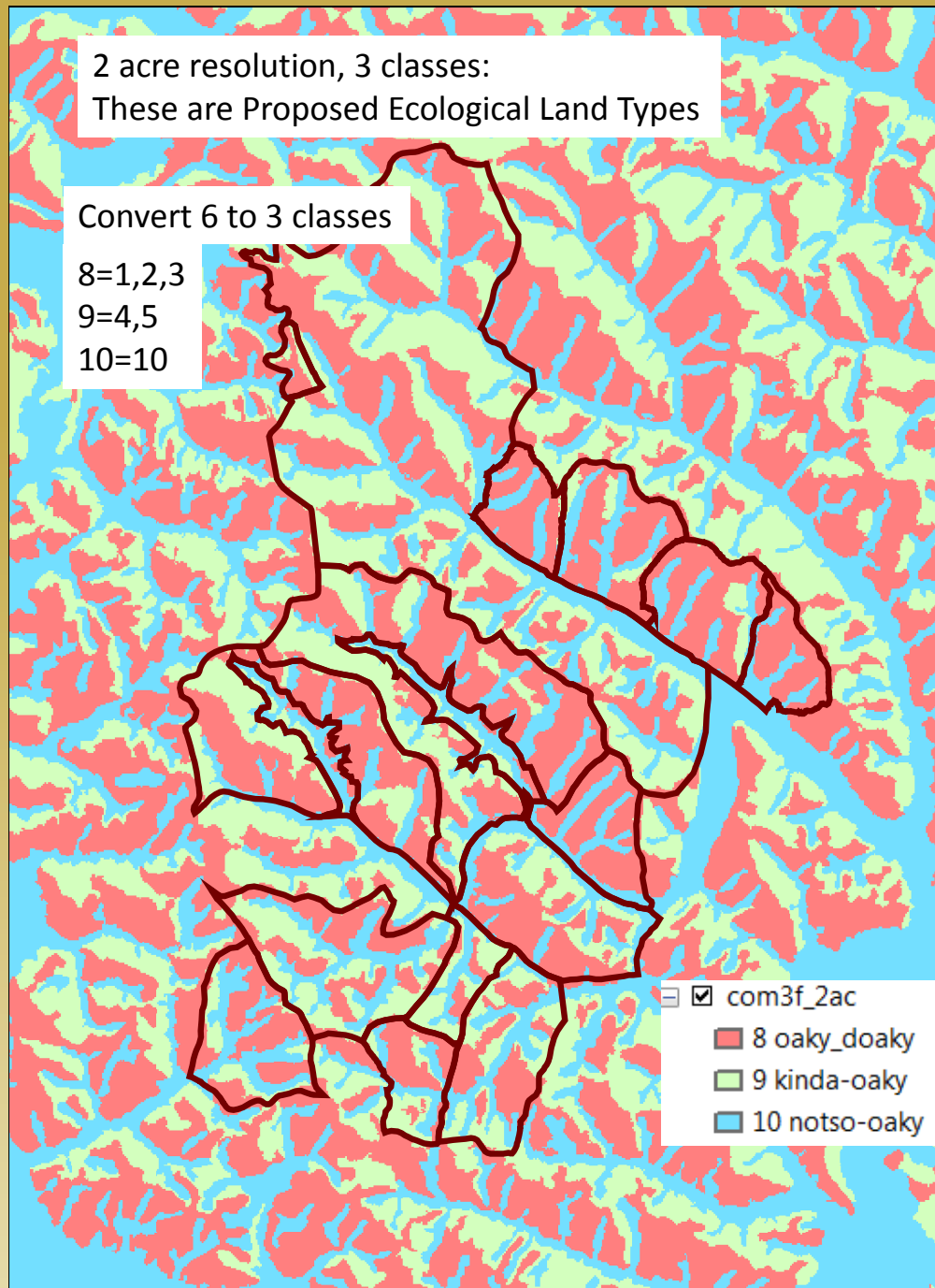


Tar Hollow Thin+Burn



Large oak-hickory/ moisture gradient

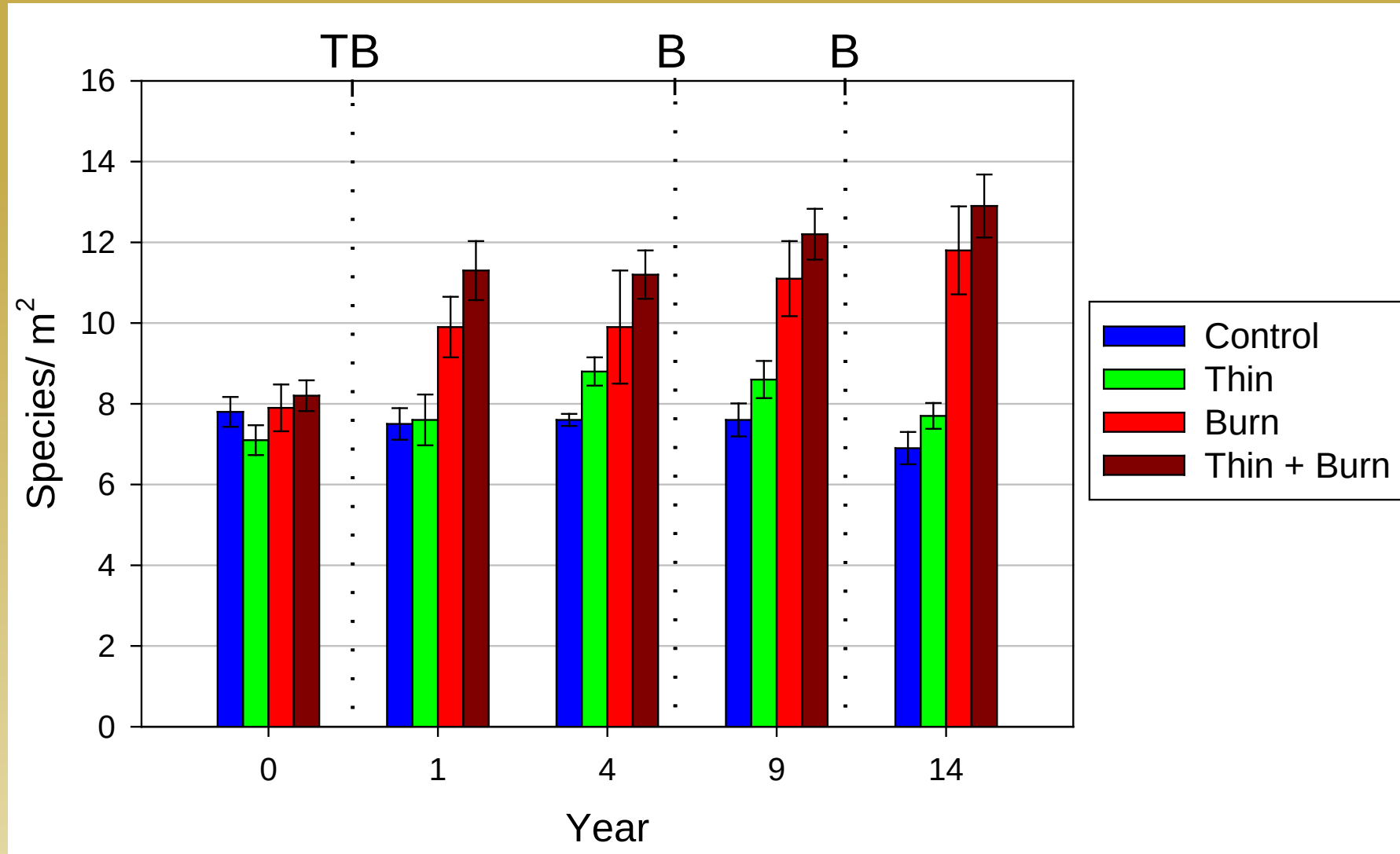




Herbaceous layer diversity



Species Richness



Shelterwood Study



