

Aspen and Oak Community Response to Restoration

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Aspen Life History

- **Shade intolerant**
- **Clonal:** relies on vegetative reproduction between episodic seeding event
- **Disturbance dependent:** releases apical dominance/
creates establishment sites for seeds



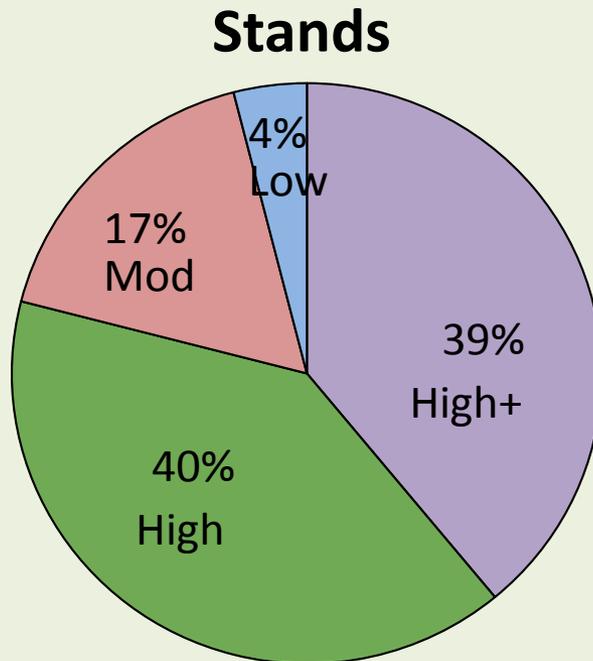
Ecological Importance

- **Landscape heterogeneity**
- **Biodiversity:** Abundance and diversity of plants, birds, and invertebrates are greater in aspen stands than surrounding conifers
- **Provide:** higher forage quality as well as important habitat structure for birds and mammals
- **Water yields:** aspen communities have less intercept and a lower duration of transpiration compared to conifer communities



Baseline monitoring

Risk Rating Summary, Live Stands Only (2000-2011, N=700 stands; 3,805 acres)



Risk Factors	%
Conifer encroachment	96
Excessive browse	54

Treatments

Mechanical Thinning

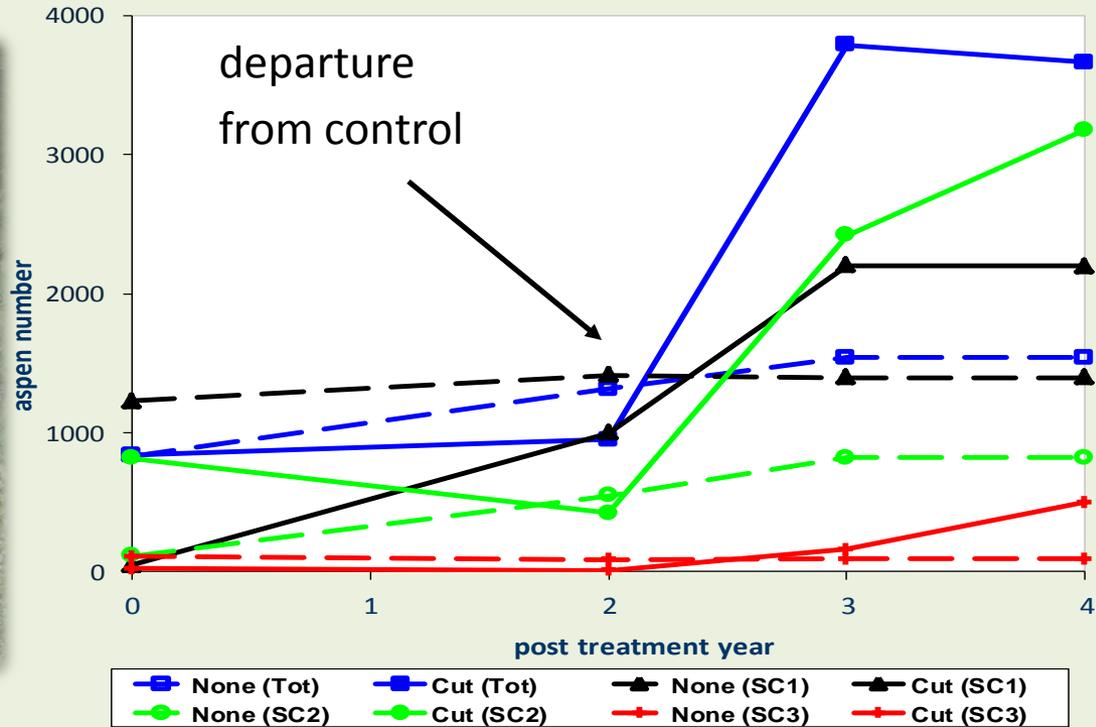
- Aspen regeneration
- Soil moisture
- Stream attributes

Fencing

- Aspen regeneration
- Grazing strategies

Results

Effect of conifer removal on aspen density



Results



Results



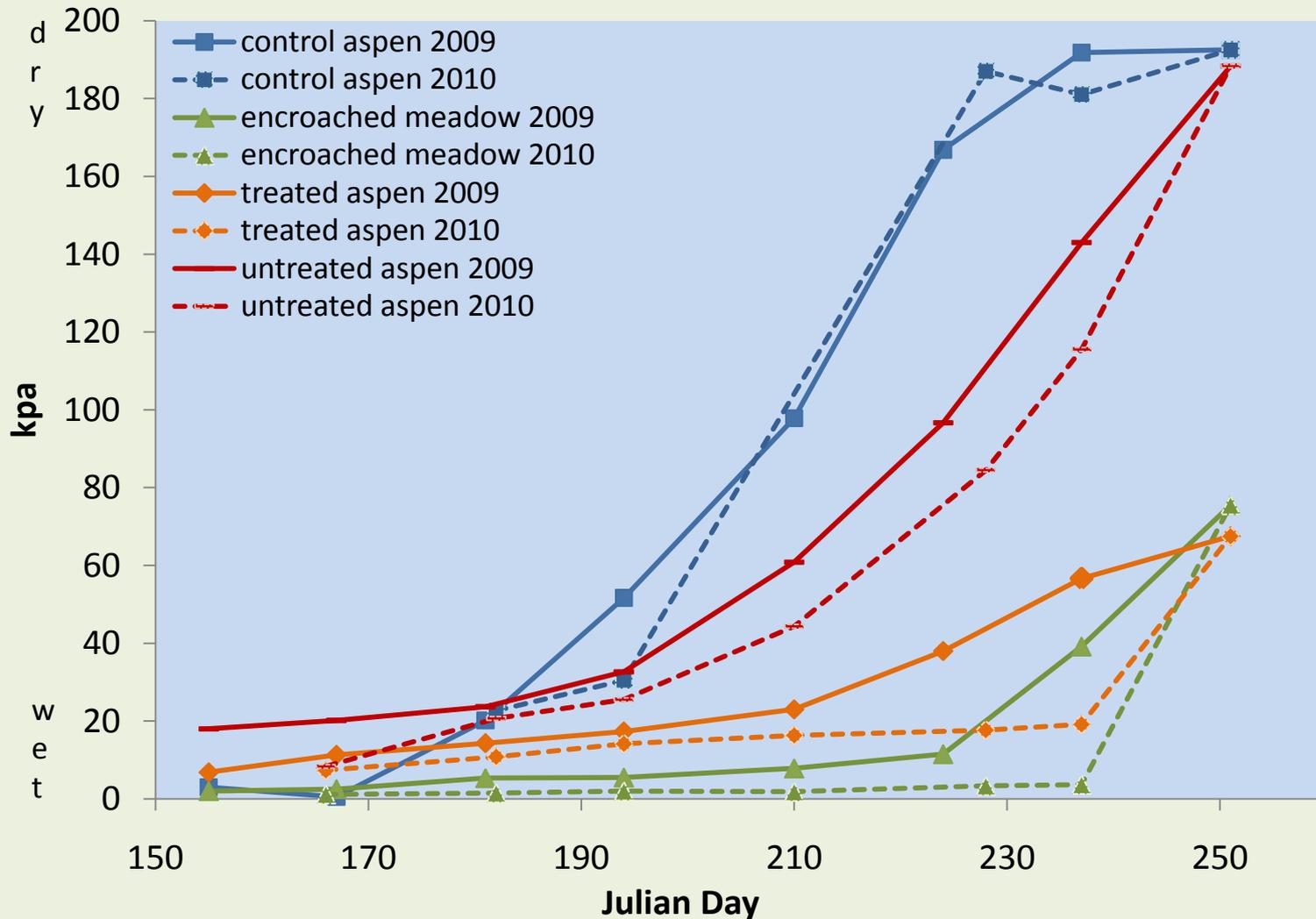
Results —No adverse impact to in-stream or riparian habitat detected

Collaborative Project (UCD)

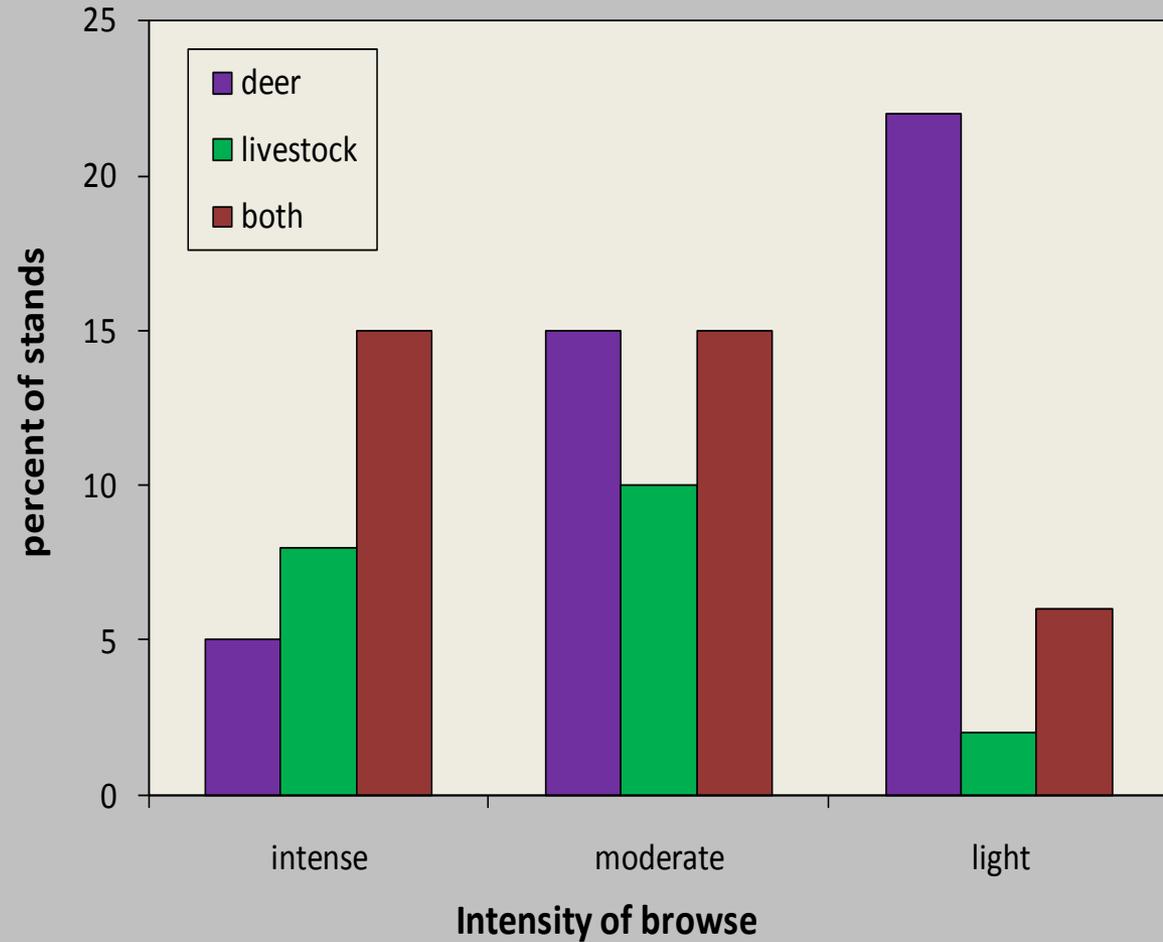
- >60% of samples <0.05 ppm for $\text{NO}_3\text{-N}$, $\text{NH}_4\text{-N}$, $\text{PO}_4\text{-P}$.
- Mean TSS < 15 ppm.
- No significant change in stream temperature
- Macroinvertebrates – no detection of species tolerant of poor water quality
- No soil compaction



Soil Moisture Availability



Herbivory – species and intensity



Types of Fencing

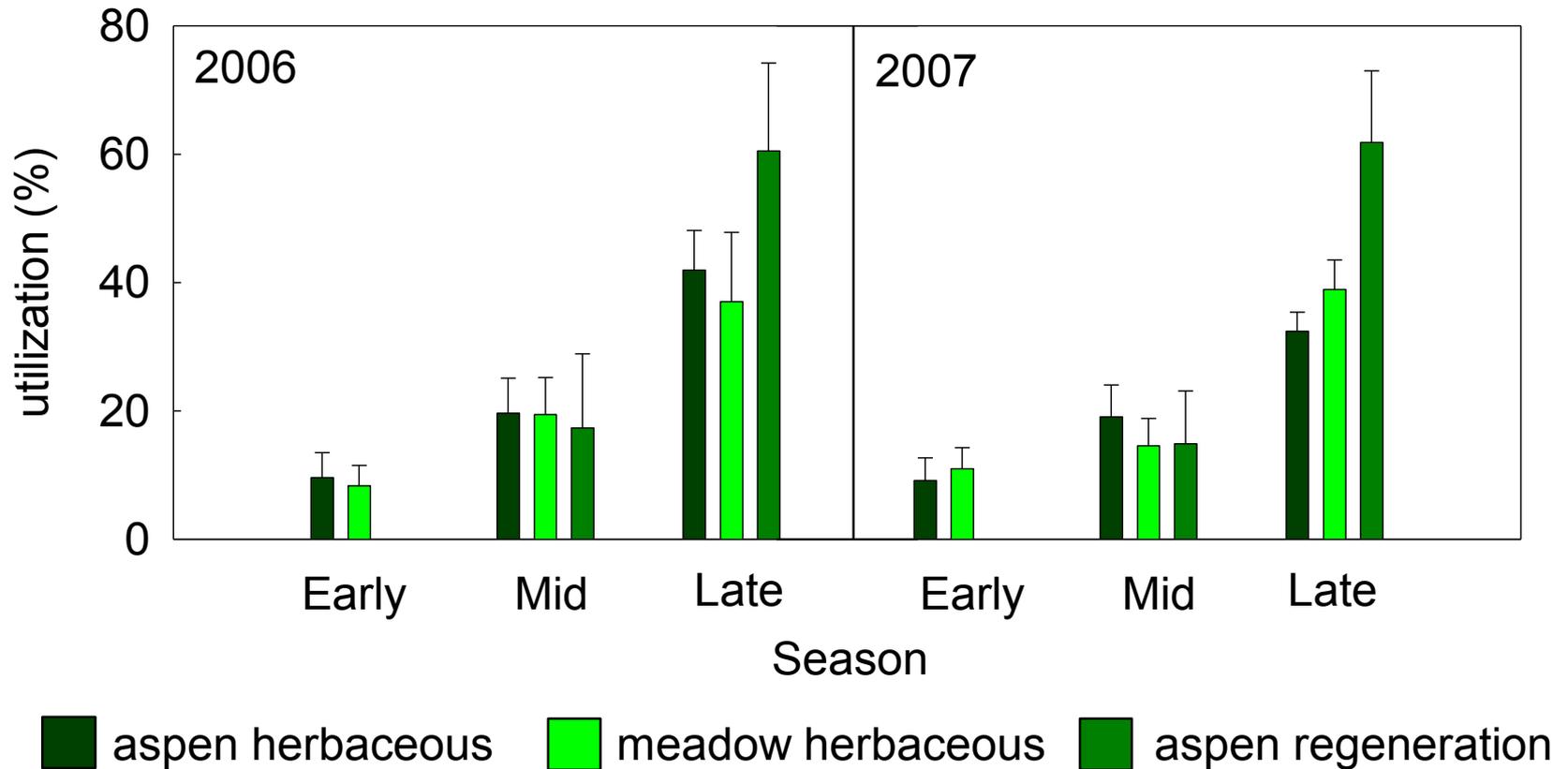
Wildlife



Livestock



Seasonal utilization by forage type



Conclusion

Lessons learned through monitoring



- Mechanically removing conifers has been a successful treatment to enhance aspen regeneration
- Aspen can be treated in riparian areas using responsible logging practices without adverse effects to stream attributes
- Management opportunities exist as an alternative for fencing in aspen stands with excessive cattle browsing

Oak Restoration

- Shade intolerant
- Reproduces – vegetative (stump sprouting) and seeding
- Disturbance dependent



Ecological Importance

- Landscape heterogeneity
- **Structural Diversity:** cavities, snags, and dead branches
- **Provide:** acorns and oak mistletoe for a variety of wildlife species (deer, gray squirrels, turkey, and birds)



Treatments

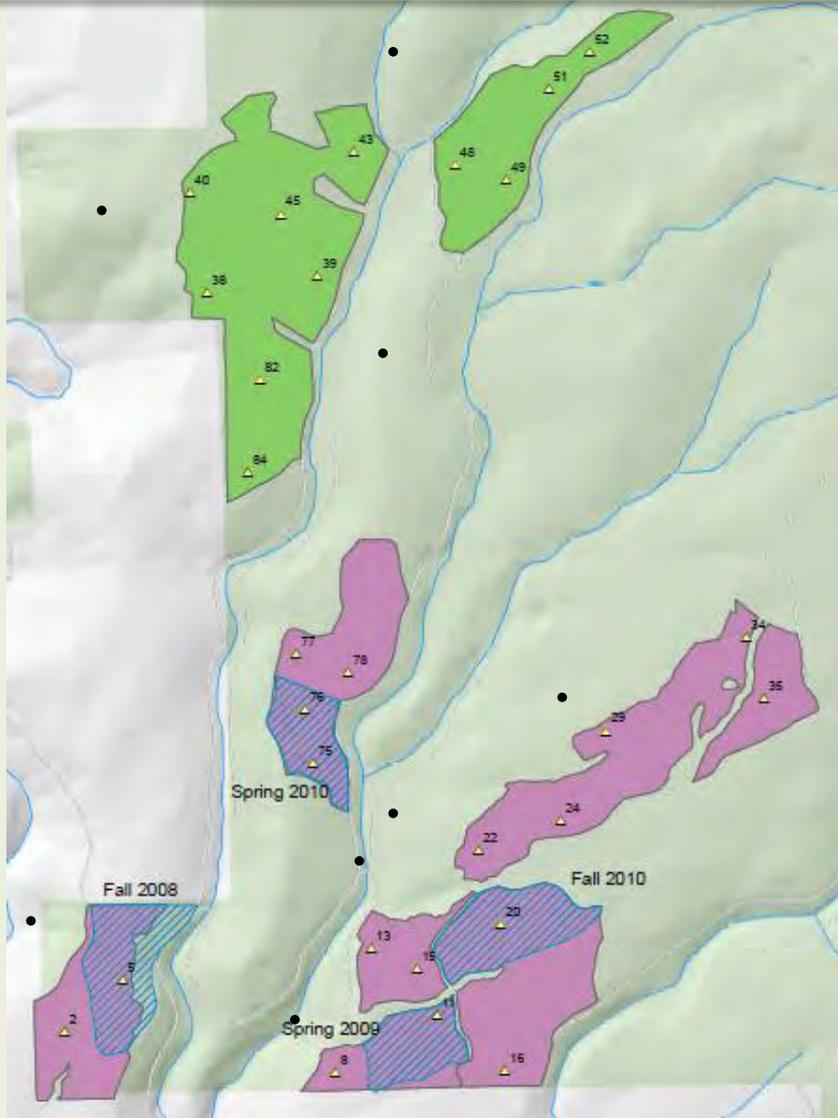
Mechanical Thinning

- Forest structure
- Oak regeneration
- Herbaceous and shrub understory

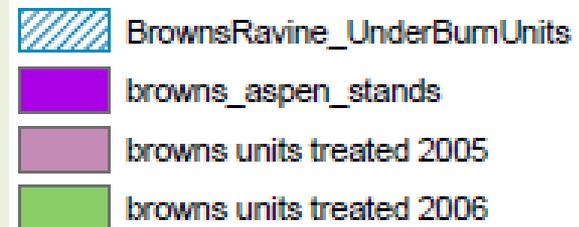
Under-burning

- Herbaceous understory
- Oak regeneration
- Shrub cover

Study Area and Design

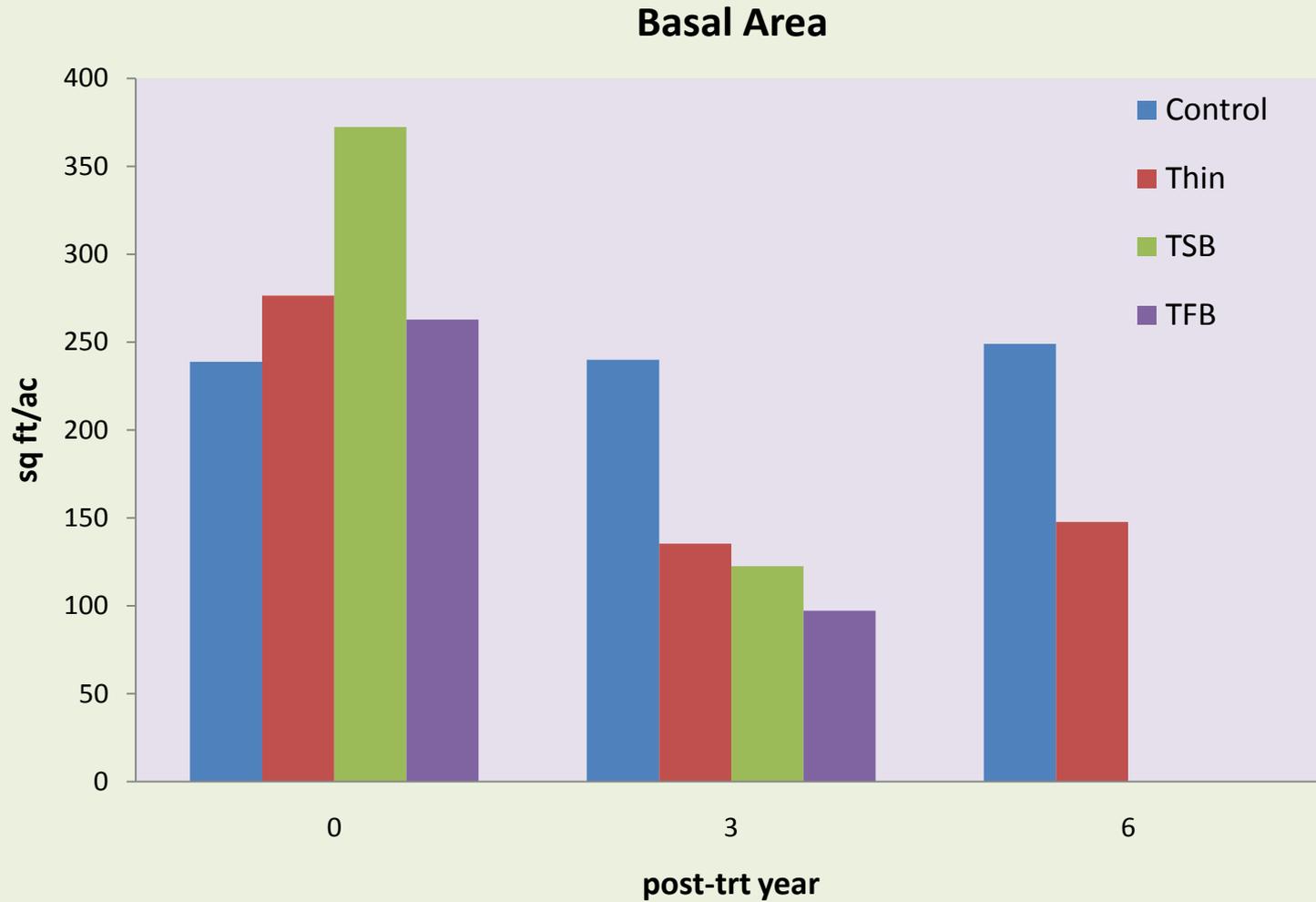


- Four treatments – no-treatment (7), thin (23), thin and spring burn (3), thin and fall burn (2)
- Data collected – prior to treatment, and 3 and 6 years post treatment
- Thin and burn treatments have a small sample size
- Treatments implemented in different years



Results

Significant reduction in basal area for all treatments



Oak Response

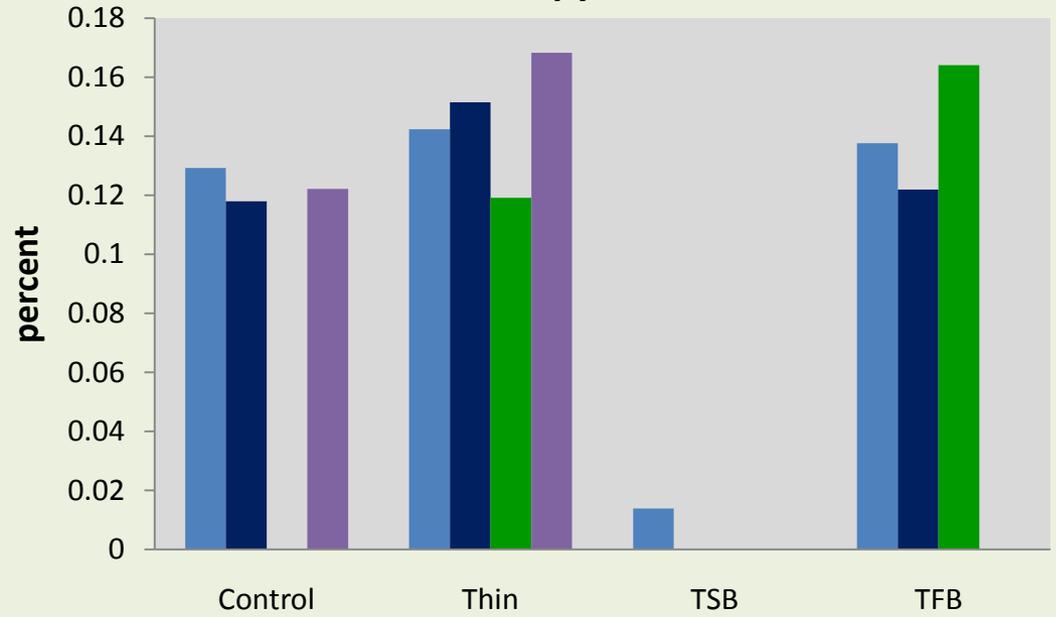
1st year post treatment



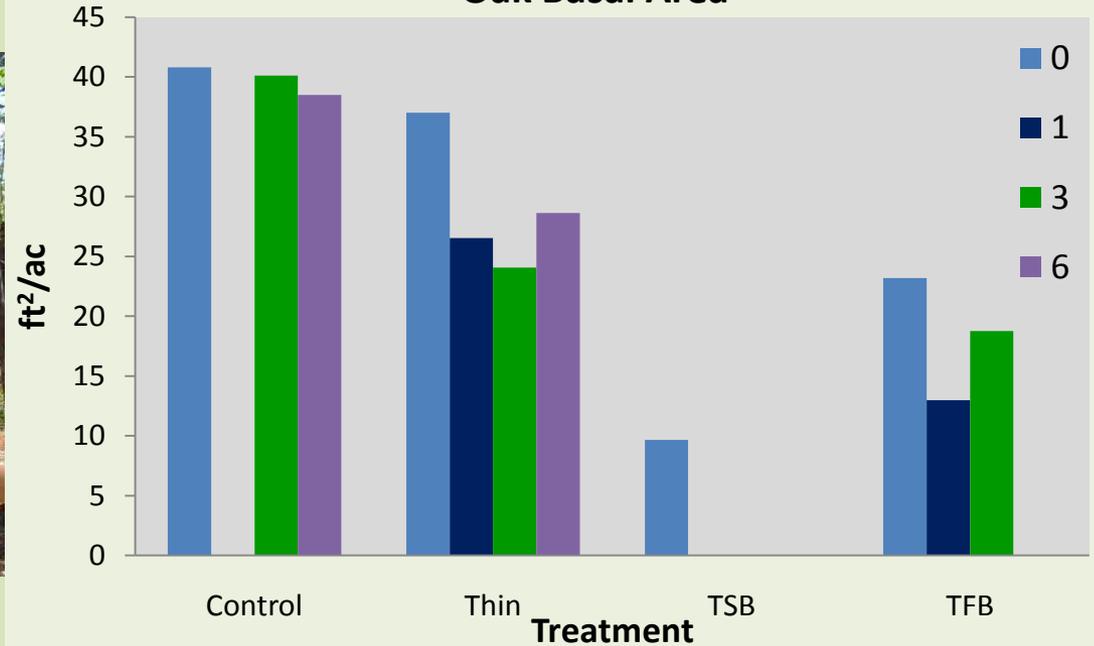
6th year post treatment



Oak Canopy Cover



Oak Basal Area



Results - thin



pre-treatment 2004



1 year post treatment 2006



6 years post treatment 2011

Results – thin and burn

pre treatment 2004



1st year post burn 2009

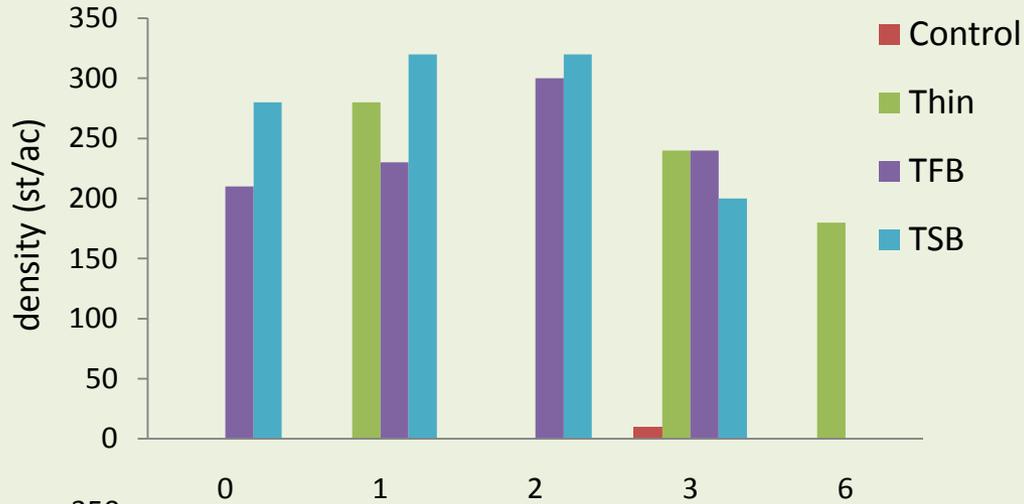


3rd year post burn 2011

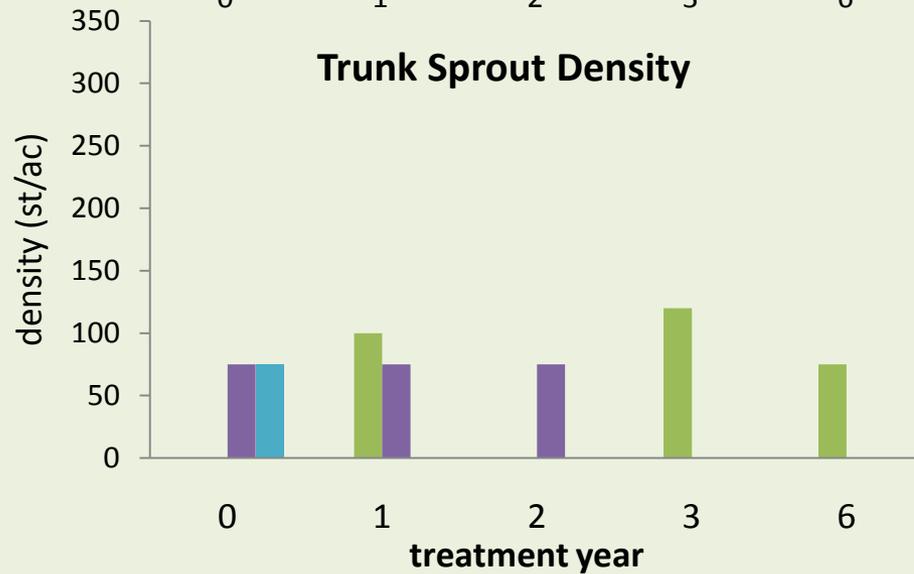
Results

Successful black oak regeneration following treatment

Basal Sprout Density



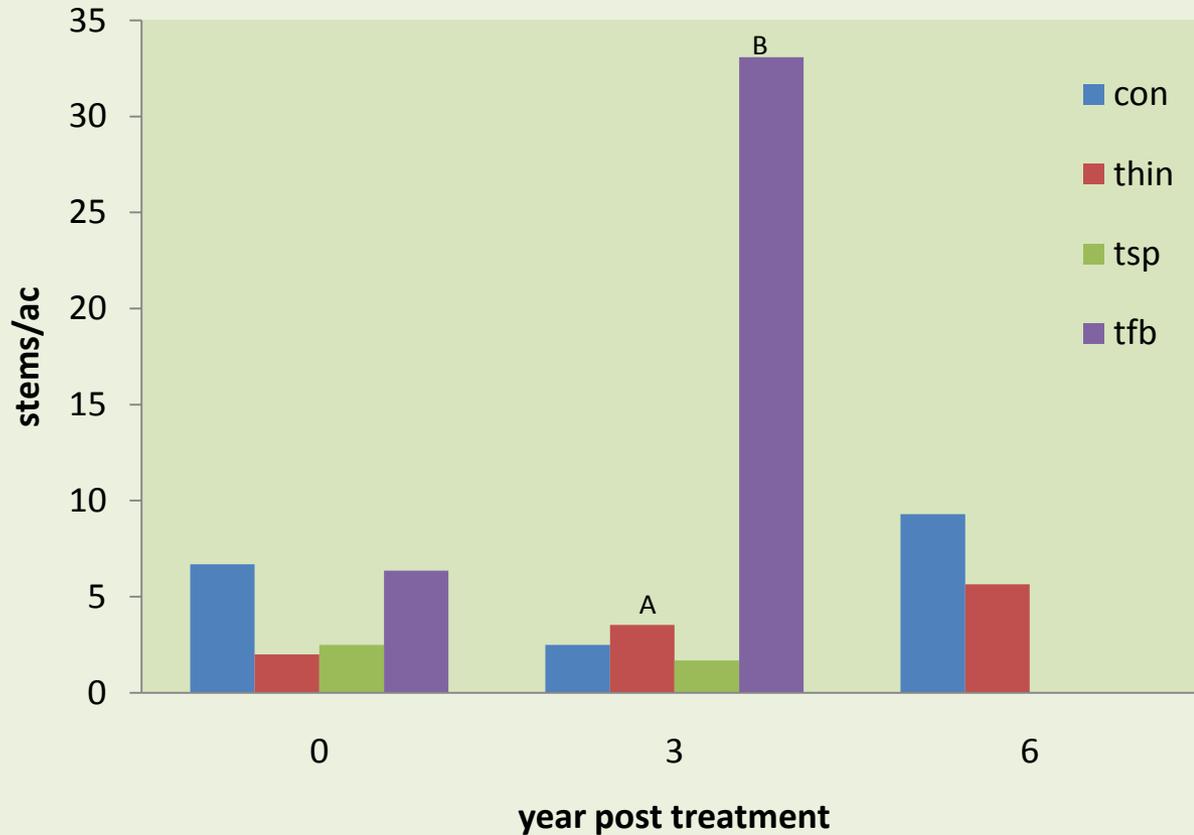
Trunk Sprout Density



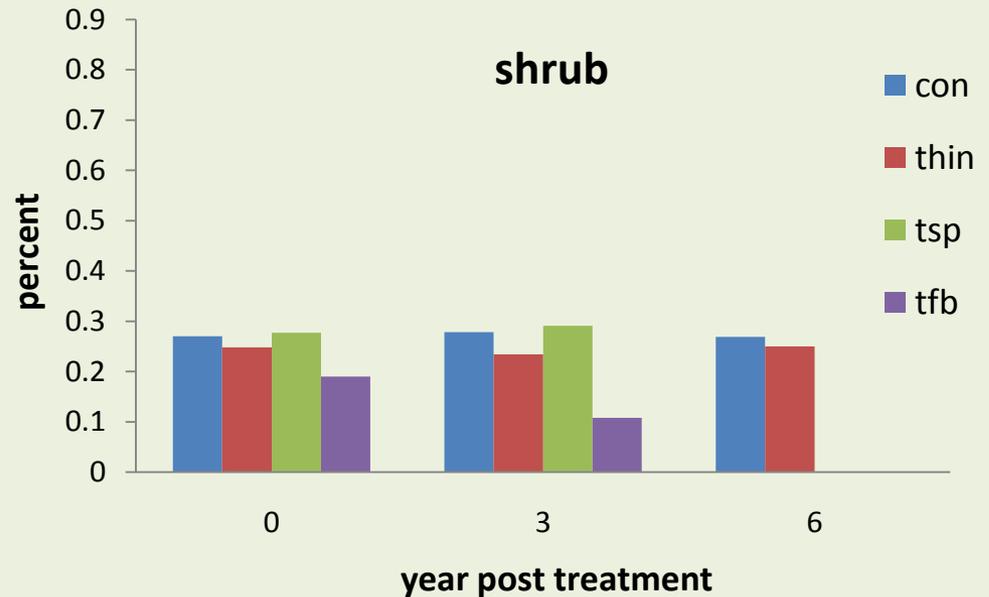
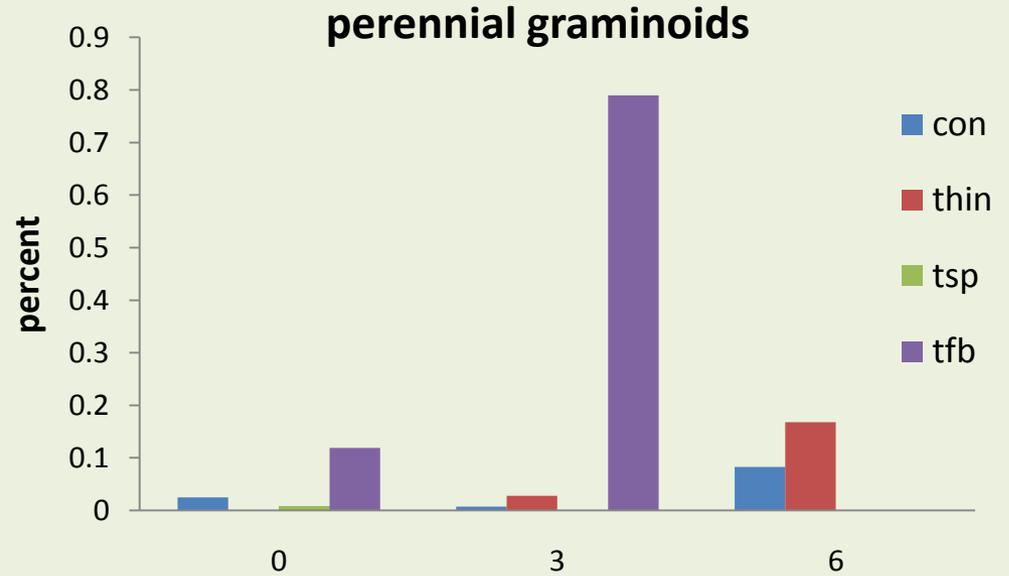
Results

Successful black oak regeneration following thinning and fall burn

oak seedlings



Results - understory



Conclusion

Lessons learned through monitoring

- Oak vigor and regeneration increased following treatments
- Cutting black oak trees can stimulate stump sprouting – but we do not recommend cutting oak in young stand especially if treatments includes burning
- Perennial grasses significantly increased in following thinning and burning.
- Conifer removal using thinning and burning is required to promote, enhance, and sustain the ecological value of these hardwood communities.

