Aspen Restoration Treatments and Community Response

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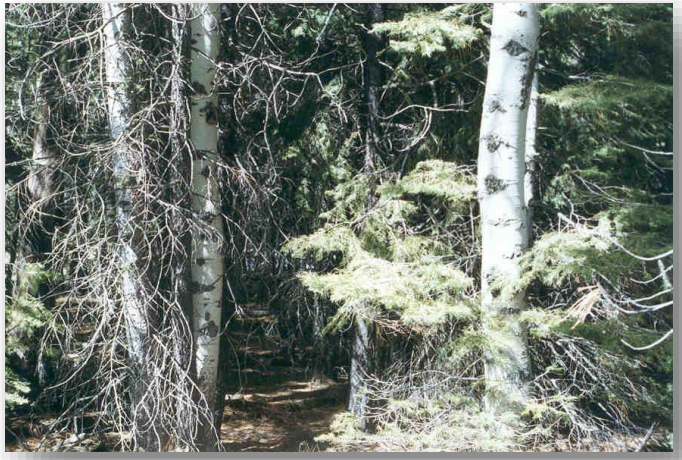
Aspen Life History

- Shade intolerant: requires high level of light
- Reproduction:
  - Vegetative- suckers from roots. Primary reproductive method between seeding events
  - Seed – frequently produce an abundance of seeds; adapted for long distance wind dispersal; more common than once thought
- Disturbance dependent: releases apical dominance/ creates establishment sites for seeds/ and removes competitors
- Genetic Diversity: high genetic diversity within and among stands/ provides the mechanism for adaptation

Risk Factors Affecting Aspen

- Successional processes – conifer encroachment
- Wildlife/Livestock damage

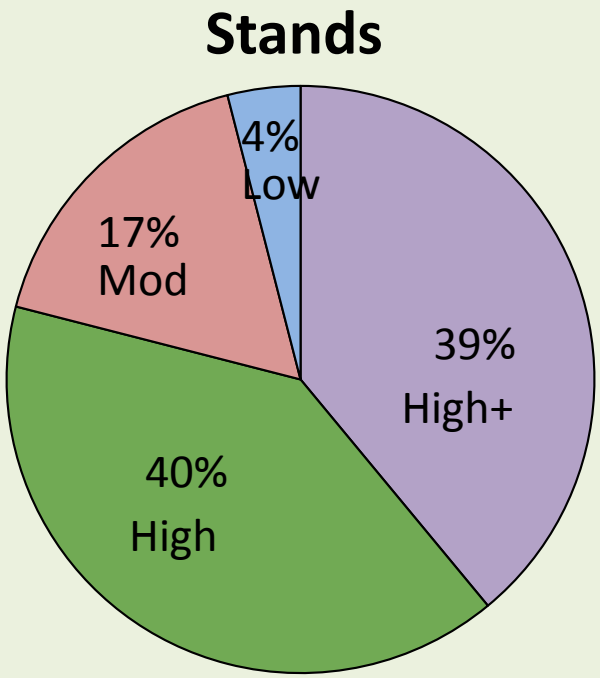
- Climate Change
  - Drought
  - Extreme Weather
  - Pest and Disease



Baseline monitoring

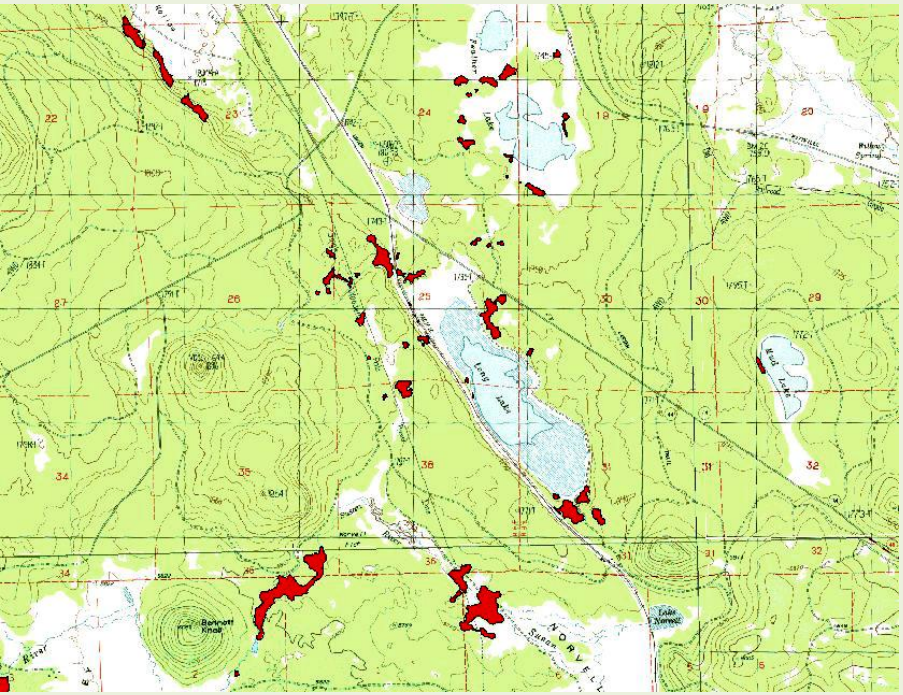
Risk Rating Summary, Live Stands Only

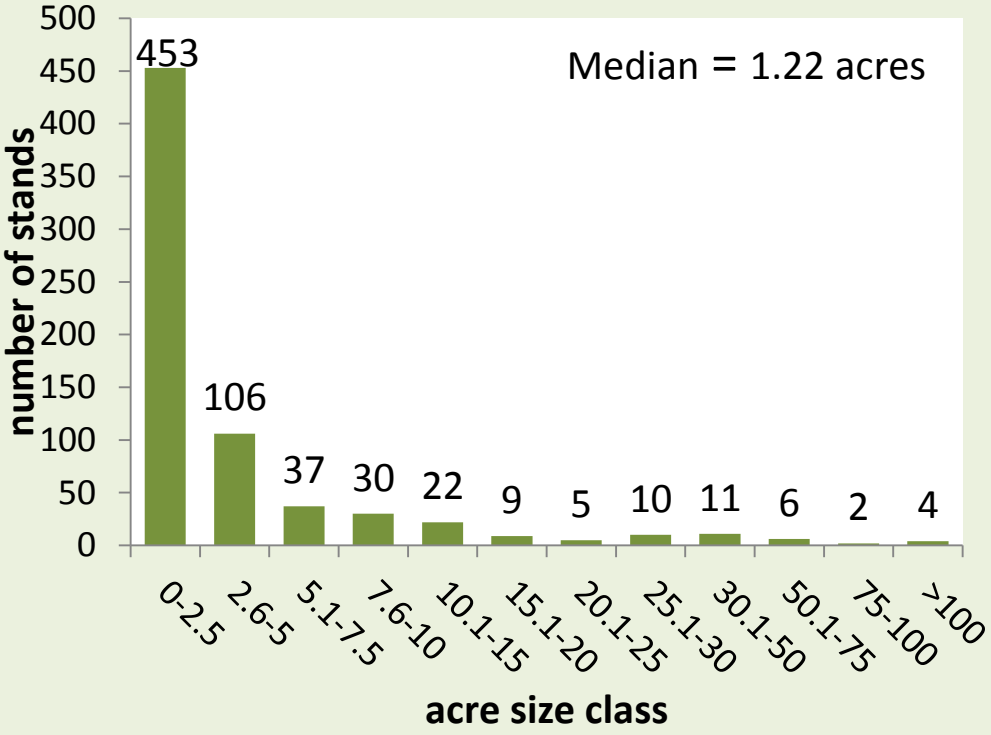
(2000-2011, N=700 stands; 3,805 acres)



Risk Factors	%
Conifer encroachment	96
Excessive browse	54

Aspen Stand Size Distribution





Restoration Treatments

Mechanical Thinning

- Remove conifers
- Increase light
- Improve aspen regeneration

Fencing or Alternative Grazing Strategies

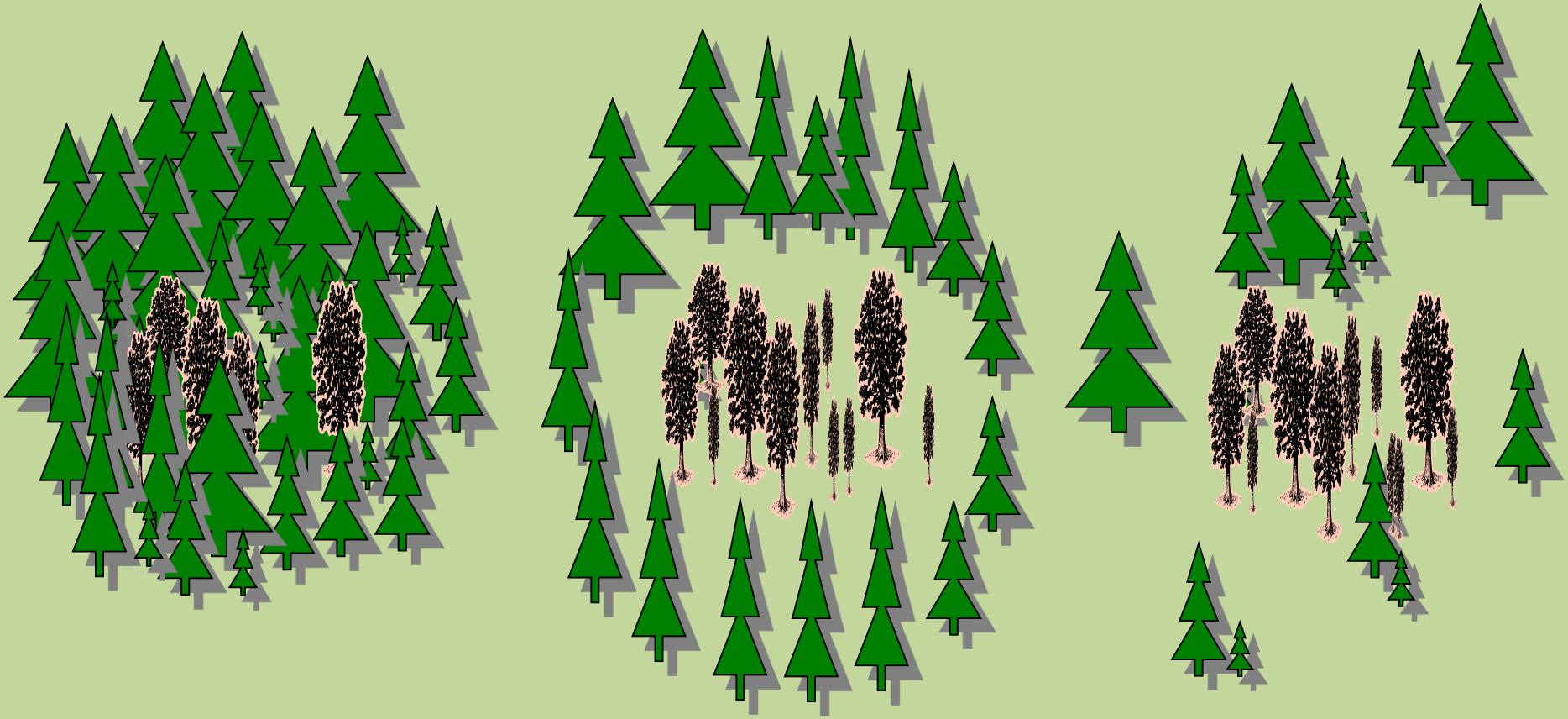
- Protect aspen regeneration
- Improve aspen community condition

Mechanical Treatment Description

Objective: Create proper growth environments for aspen to maximize light and stimulate aspen regeneration

- Design a project for a single entry to reduce cumulative effects
- Remove all conifers <30 in dbh within aspen and adjacent to stand
  - In large stands address tradeoff to maintain conifer component and meet aspen objectives
- Recommend using harvest practices that do not produce a lot of slash
- Do not pile burn in aspen footprint
- Do not use prescribed fire as initial treatment in stands with high fuel loads

Stand versus Landscape Treatments



No Treatment

Stand

Landscape

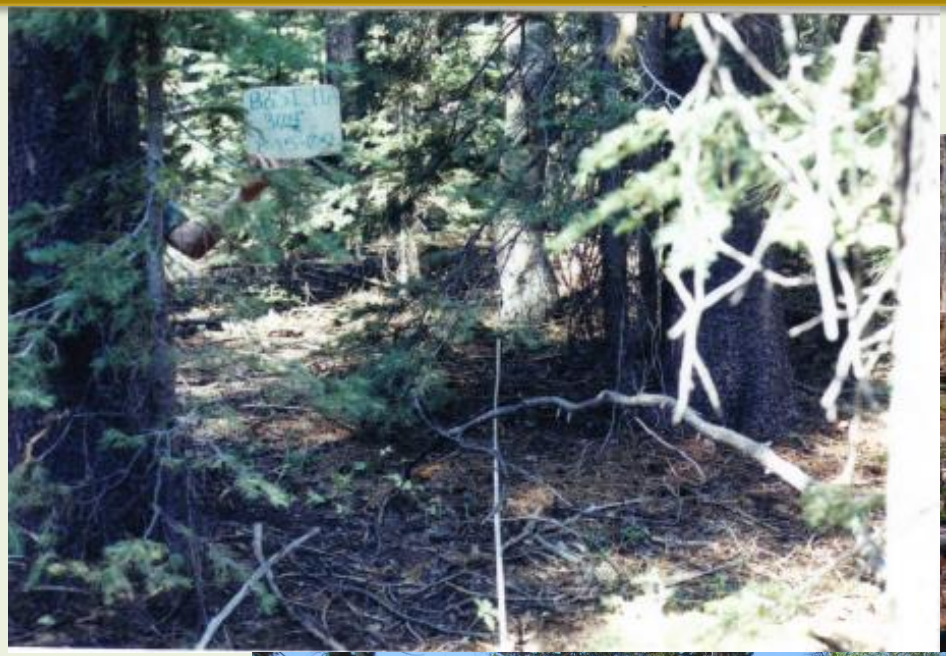
Results

2002-pre

2002- post

2005- 3 years post

Results



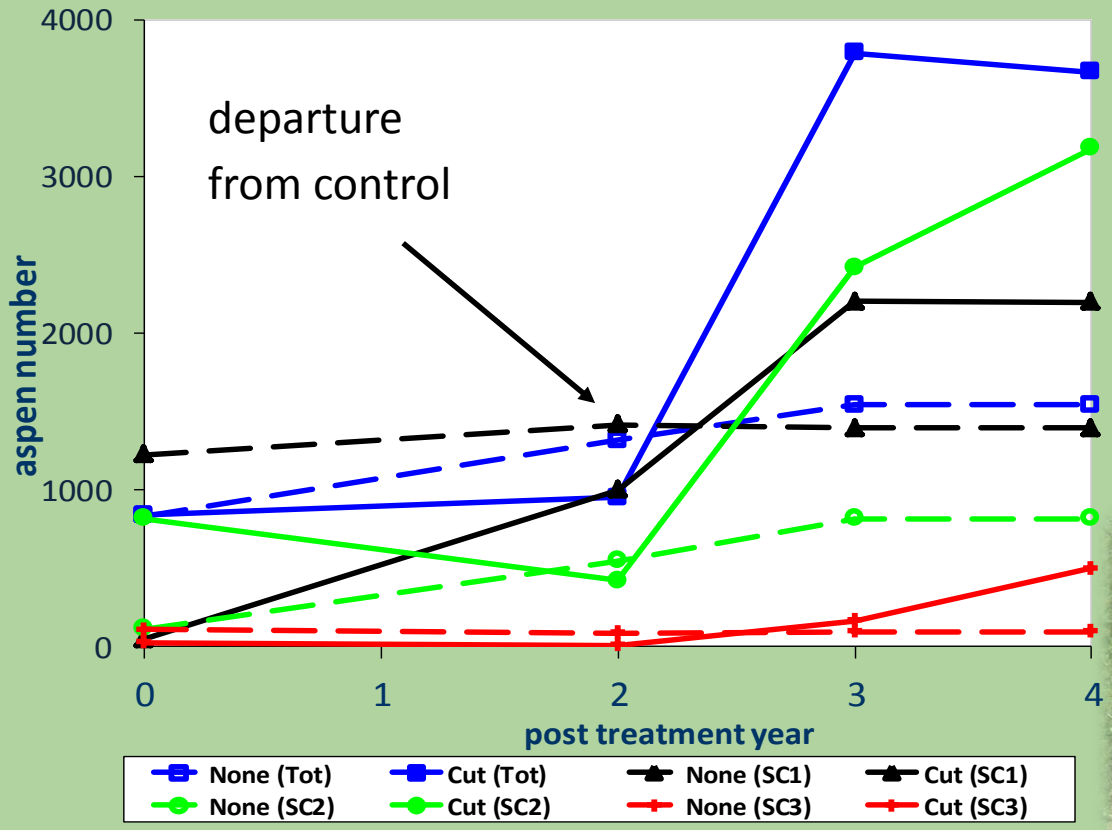
2002-pre

2004- 1st year post

2012- 9 years post

Results

Effect of conifer removal on aspen density



Understory Response

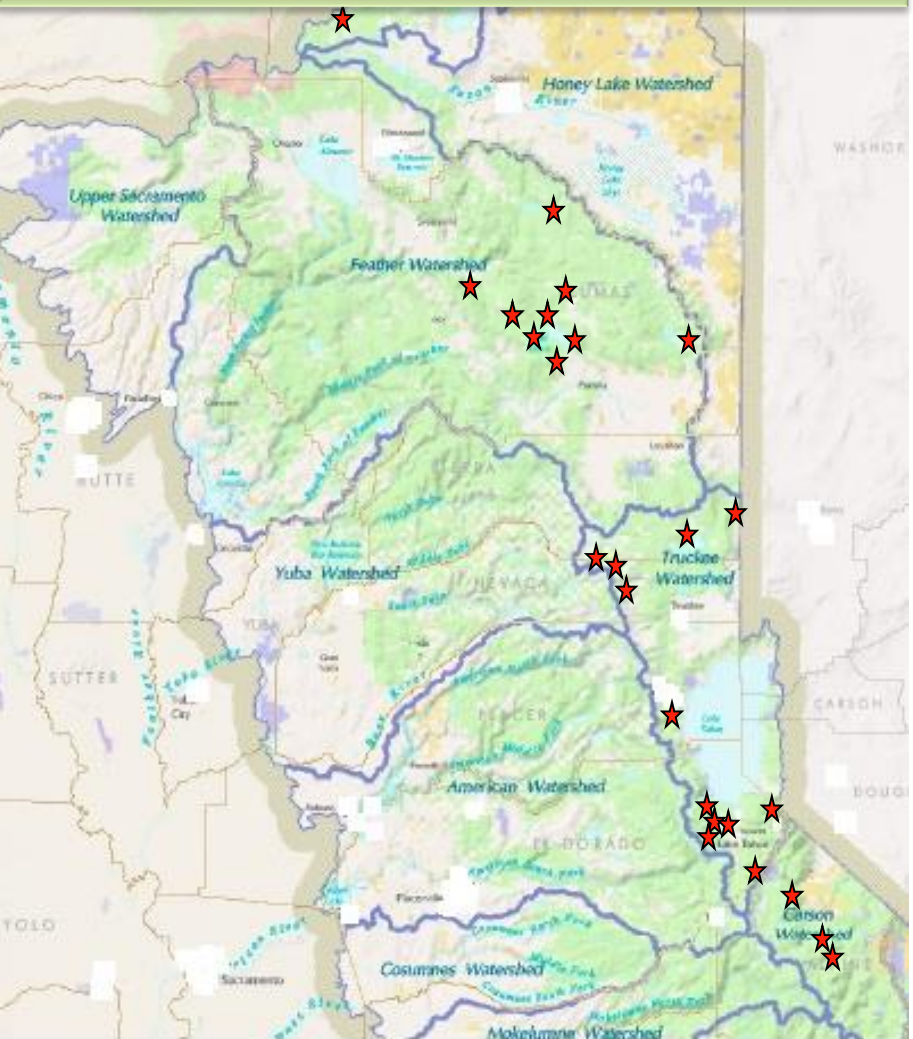
2007 pre-treatment

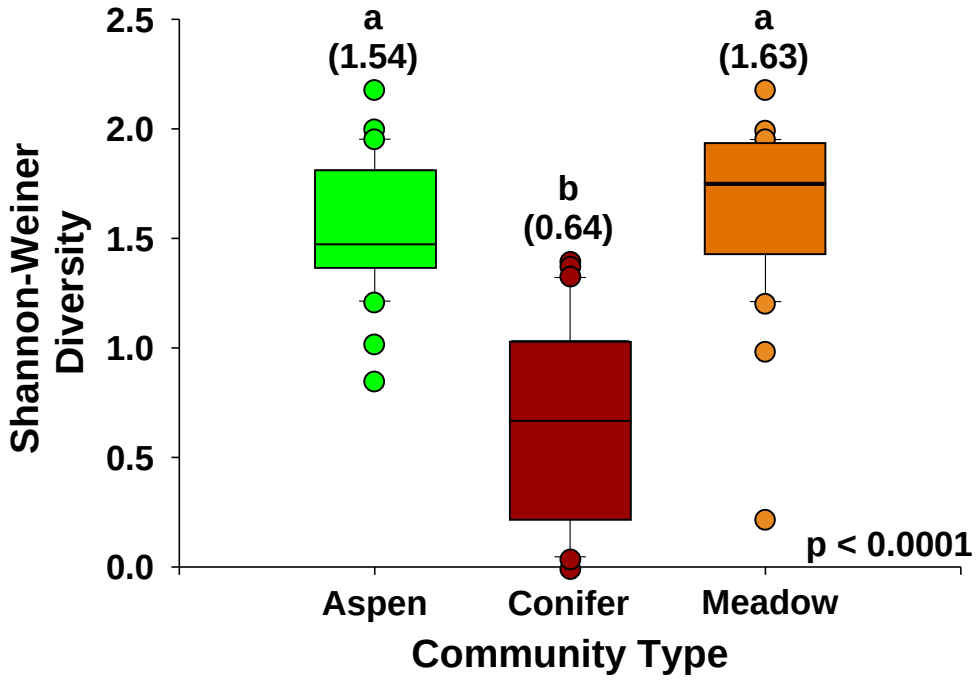
2014 3rd year post-treatment

2007 pre-treatment

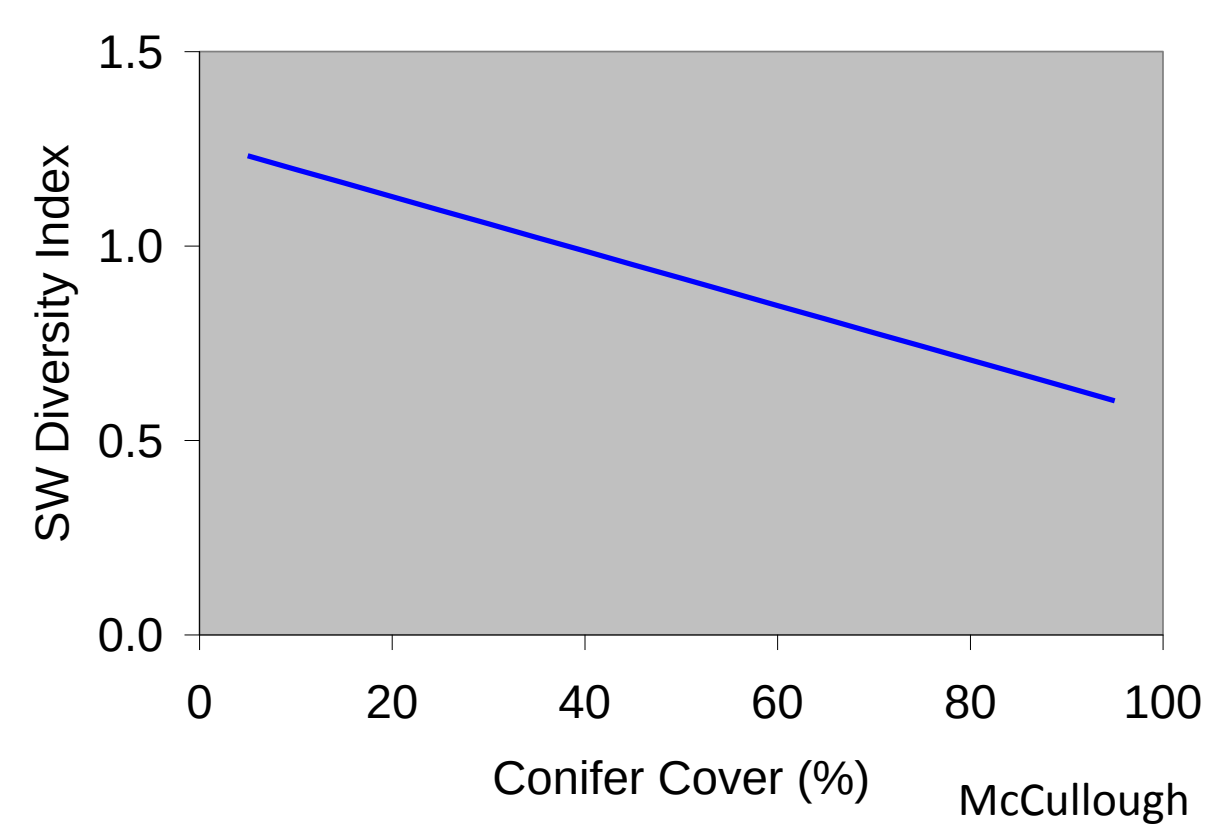
2014 3rd year post-treatment

Kuhn et al. 2007 – associated aspen-meadow-conifer forest sites. Aspen with <20% conifer cover.





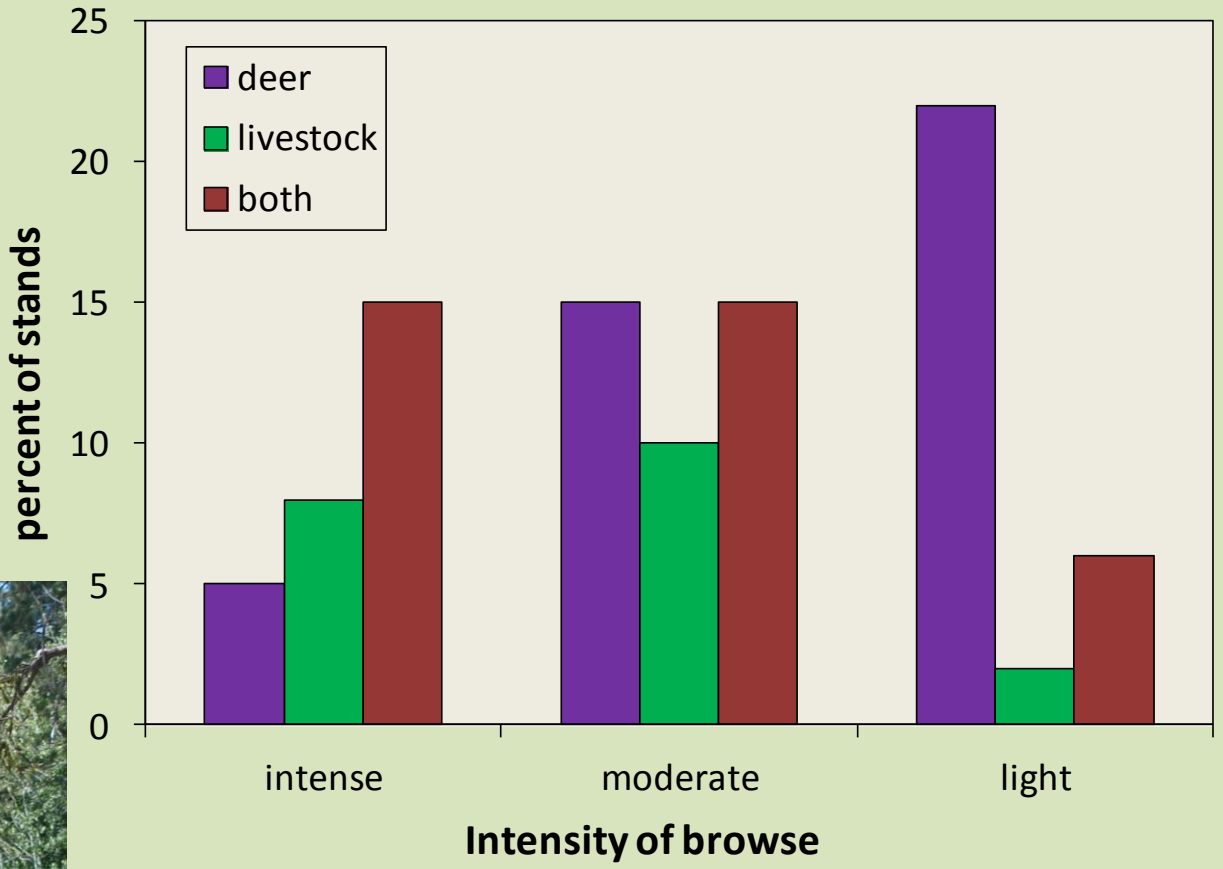
Conifer Canopy effect on Understory Diversity



Climate Change

- Aspen reproduction and genetic diversity allow it to adjust to changing climate conditions.
- Maintain as many existing stems to provide habitat, produce seed and provide photosynthetic input if browsing is a concern
    - Wildlife damage is the most critical inciting factor of aspen dieback in western N. America
- Functioning aspen communities have higher moisture availability so they will be able to endure droughts
- Important to restore NOW!

Browsing – species and intensity

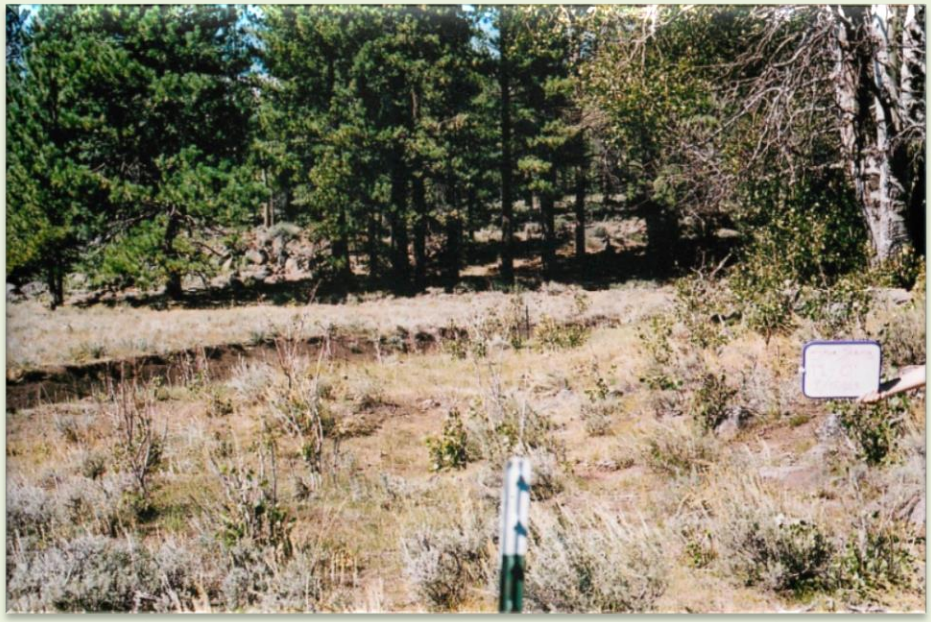


Types of Fencing

Wildlife

Livestock

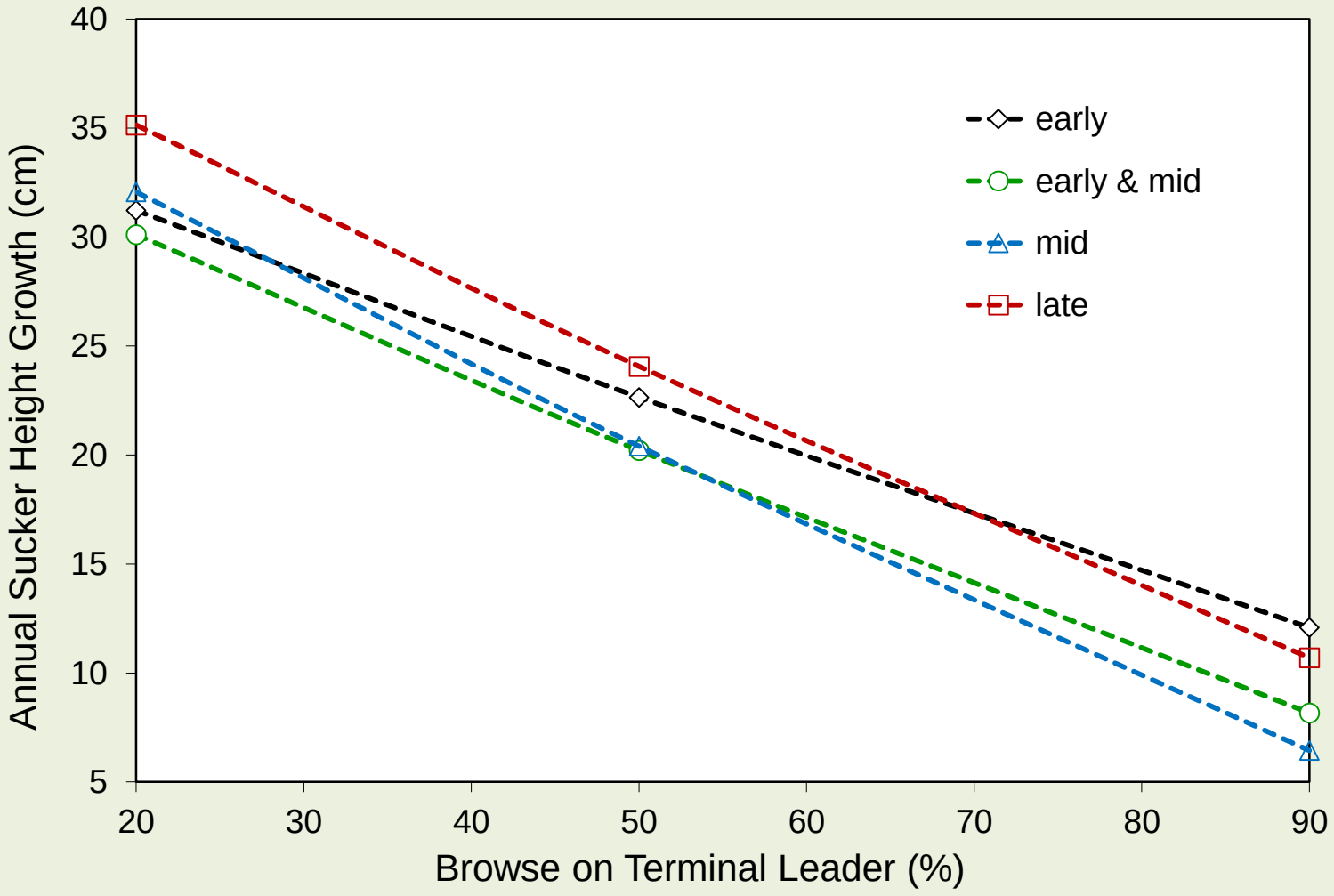
Aspen Response to Fencing



Prior to fencing

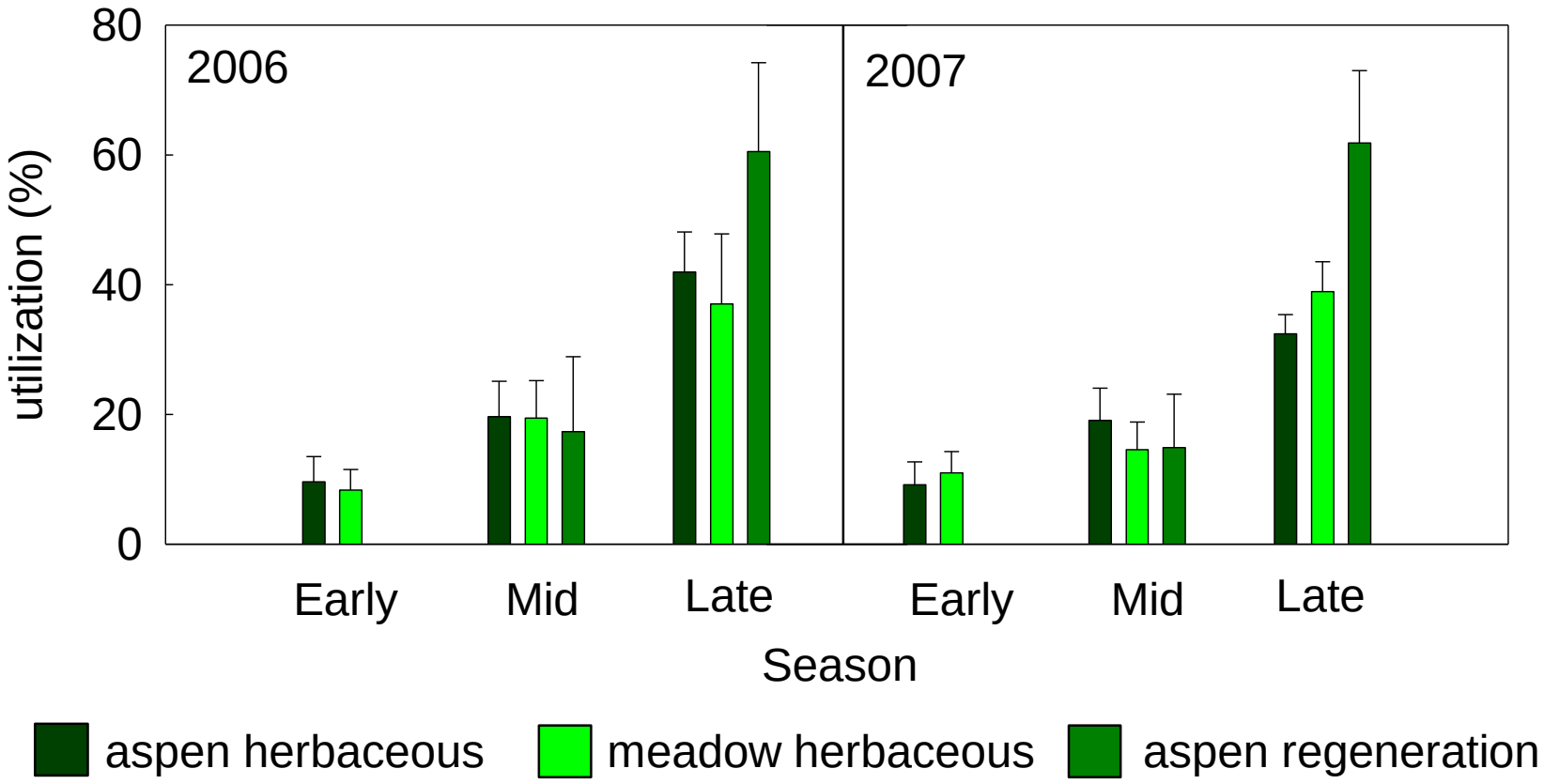
6 years after fencing

TL x Season: Intensity of browse is negatively correlated with growth and the magnitude of decrease in dependent on season

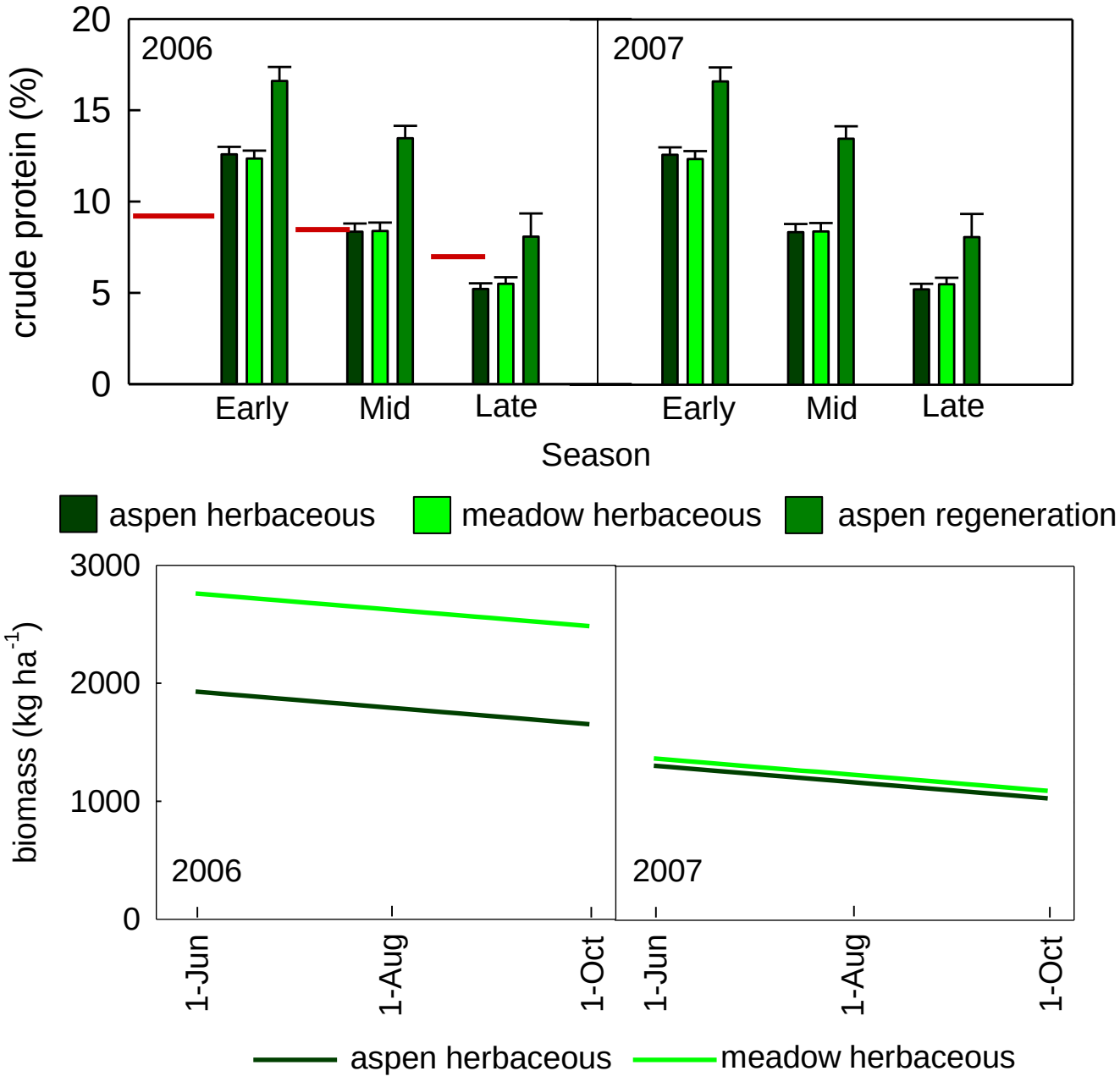


Model parameters: cyg removed from branches 0 / early season

Seasonal utilization by forage type



Crude Protein and Biomass



Conclusion

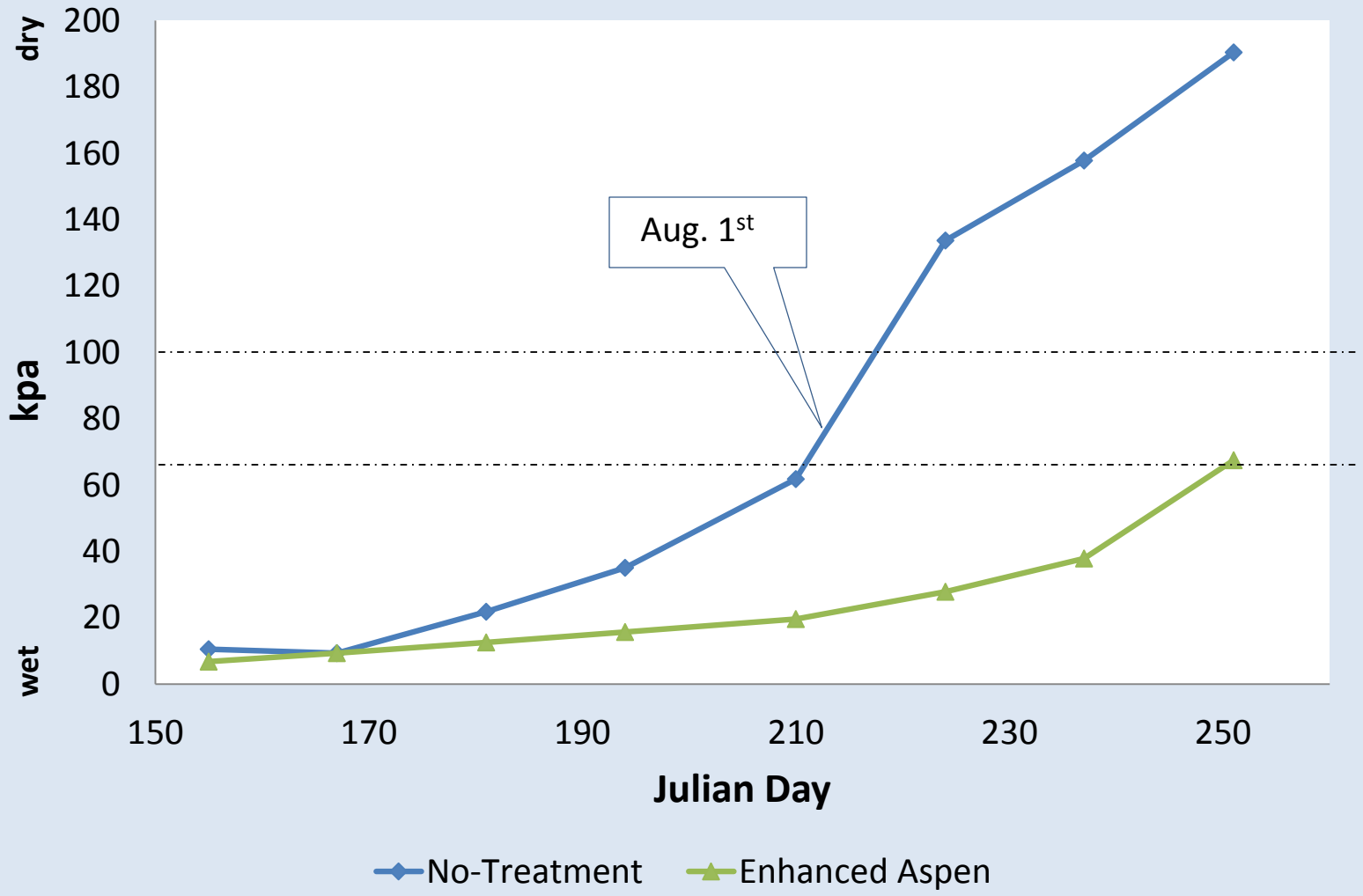
Lessons learned through monitoring

- Mechanically removing conifers has been a successful treatment to enhance aspen regeneration
- Management opportunities exist as an alternative for fencing in aspen stands with excessive cattle browsing
- Timing is important: mid season is when we saw cattle switch to aspen as well as have the most negative effect on individual growth
- Healthy aspen stands have the ability to adjust to future climate conditions

What does healthy resilient stand look like?

- Stand Characteristics
  - High Density
  - Multiple Size Classes
  - Low conifer density
- Health
  - High crown ratio and basal area increment
- Diverse understory

Soil Moisture Availability



Recommendations

- ✓ Supplementation program to meet the demand for CP and key nutrients.
- ✓ Keep meadow forage use at recommended levels
- ✓ Move cattle from aspen areas as growing season use of terminal leaders approaches 20%
- ✓ Incorporate some mid-late and full season rest into a 5 -10 year grazing plan – cohorts to escape above the browse line.
- ✓ Initial rest may be needed for severely degraded stands and easily accessible by cows

Ecological Importance

- Landscape heterogeneity

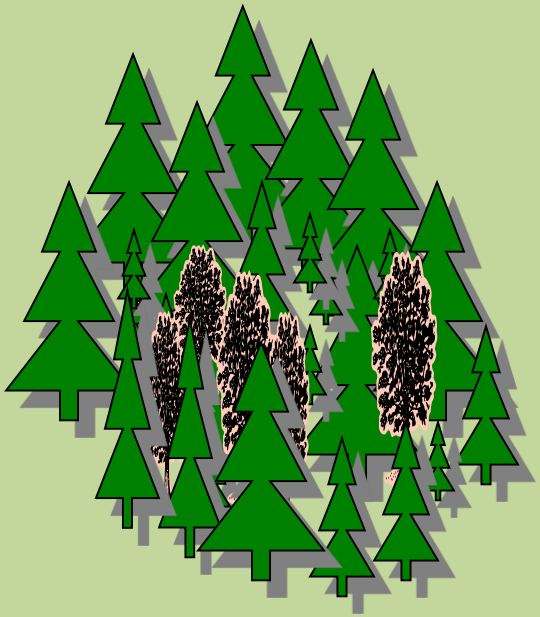
- Associated with higher levels of biodiversity: plants, birds, butterflies and invertebrates

- Provide: higher forage quality as well important habitat structure for birds and mammals
- Water yields: aspen communities have less intercept and a lower duration of transpiration compared to conifer communities

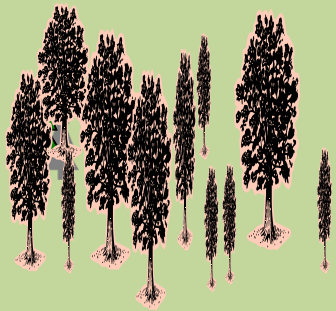
Conclusions

- ✓ There is disproportionate utilization of aspen trees from mid to late season compared to utilization of the meadow and understory in the same time frame.
- ✓ Forage quantity and quality are important – as herbaceous forage biomass decreases & approaches minimal nutrient density requirements, cattle begin to widen forage selection resulting in excessive aspen utilization
- ✓ Timing is important mid season is when we saw cattle switch to aspen as well as have the most negative effect on individual aspen growth

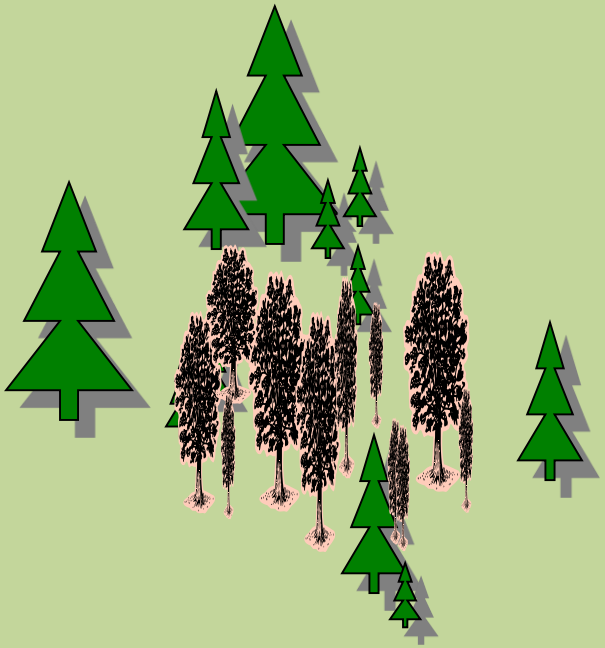
Stand versus Landscape Treatments



No Treatment



Stand



Landscape