

HOW VEGETATION MANAGEMENT IS AFFECTED BY SITE QUALITY

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Thunder Road Resources Co

What can be influenced??

- Conifer Growth
- Conifer Survival
- Efficacy
- Species Composition
- Chemical Prescription
- Cost
- Return on Investment

What is the most important reason to control competing vegetation??

- Conifer survival and growth
 - So how do the effects of vegetation management vary between sites??
 - Real vs. perceived site index
 - Percent vs. absolute growth
 - Competition thresholds

The Garden of Eden Experiment

Bob Powers PSW

- Focused on ponderosa pine
- Replicated over a wide variety of sites across northern California
- Complete factorial treatment structure that included:
 - Total vegetation control with herbicides
 - Fertilization
 - Insect control
 - Non Treated
 - All combinations of herbicide, fertilization and insect control treatments
- Evaluated over twenty years

SITE INDEX DIFFERENCES AS ESTIMATED FROM BORDERING NATURALS AND PLANTATION DOMINANTS

Site Index (height at 50 years) from:

Plantation

Natural Planted
(Feet)

Natural Planted
(Meters)

Feather Falls

100 138

30 42

Whitmore

75 100

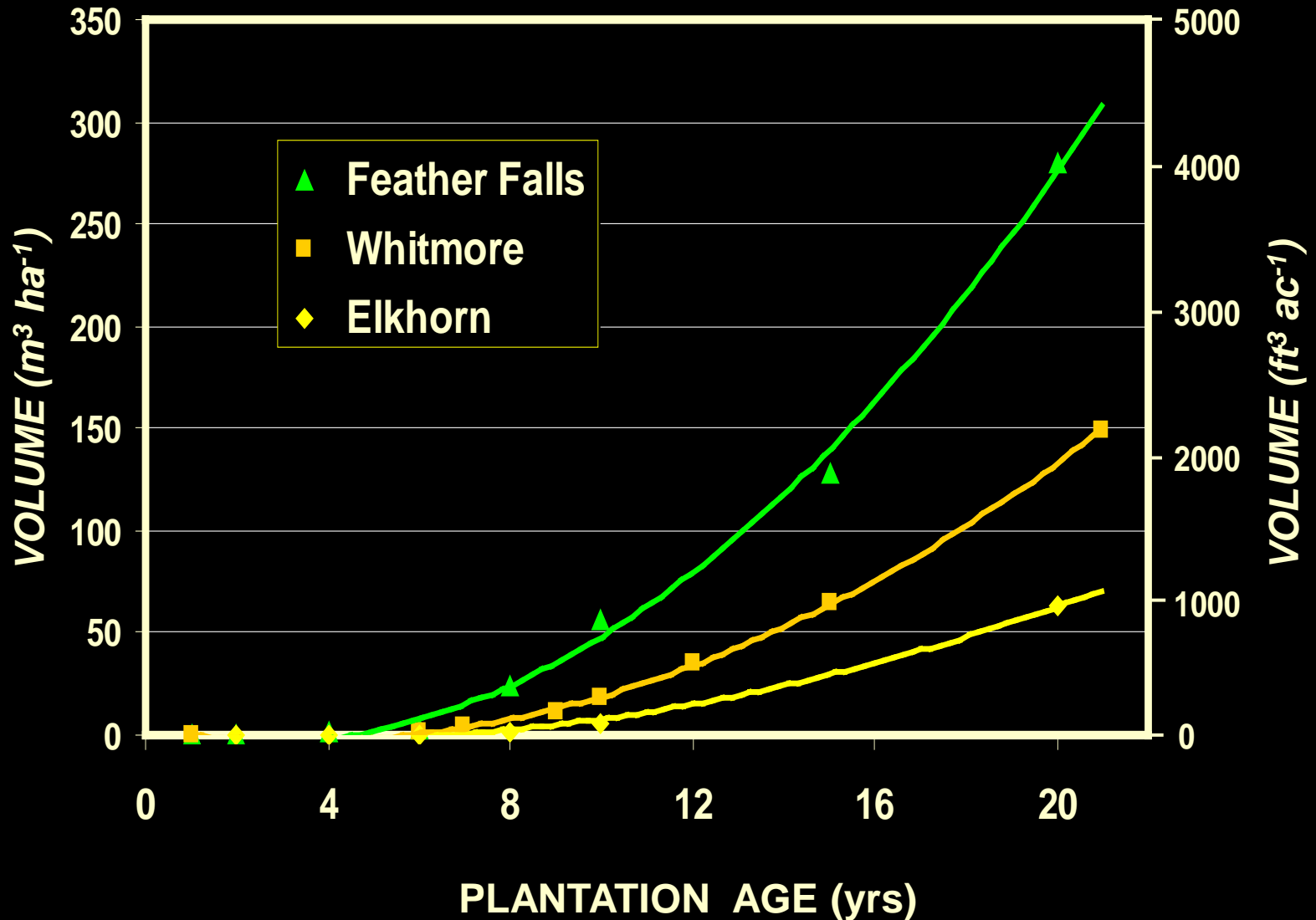
23 30

Elkhorn Ridge

56 75

17 23

CUMULATIVE VOLUME PRODUCTION ON THREE GARDEN OF EDEN SITES FREE OF WEED COMPETITION



Control

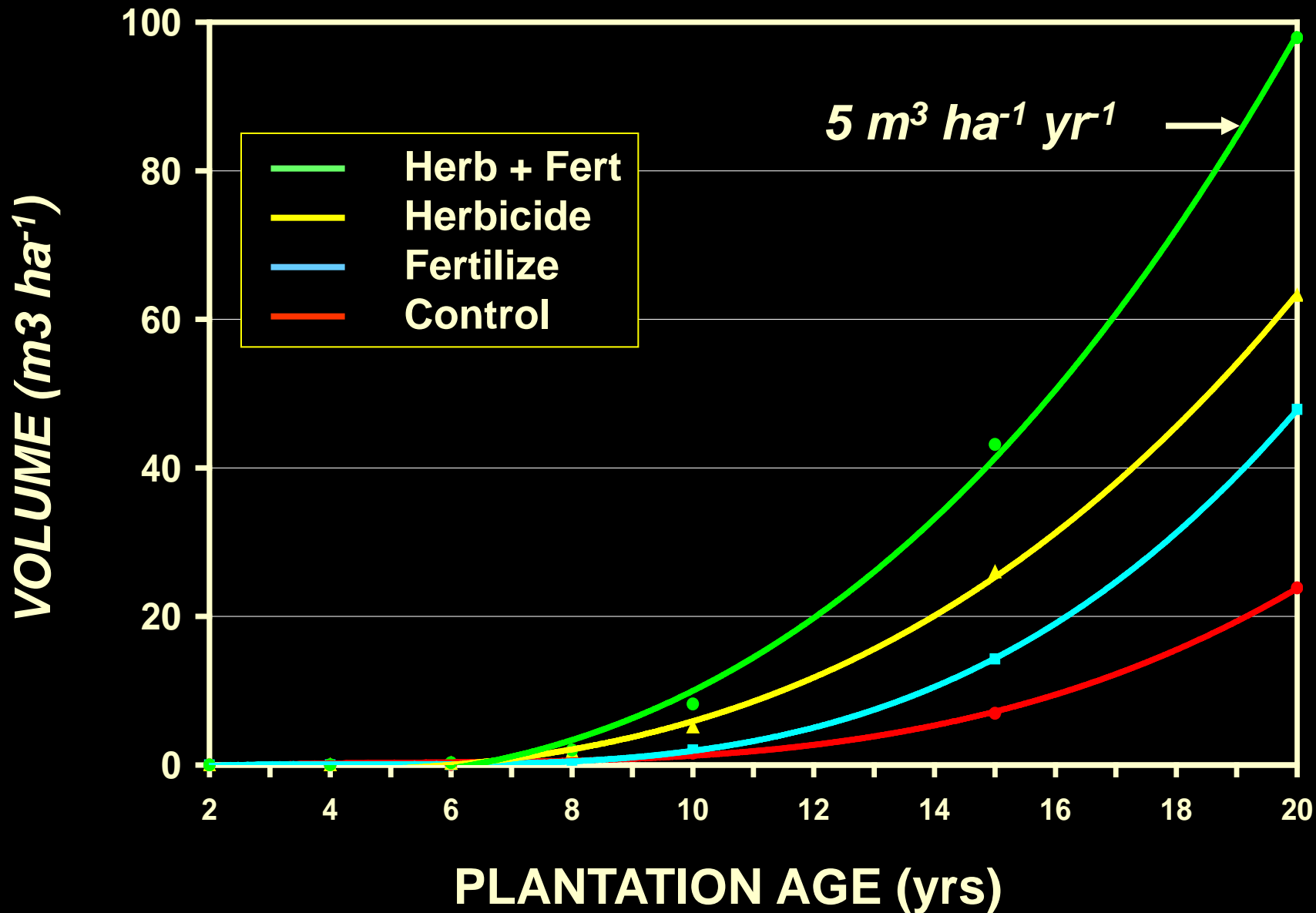


ELKHORN RIDGE

Herbicide + Fertilization



VOLUME TREND AT ELKHORN RIDGE



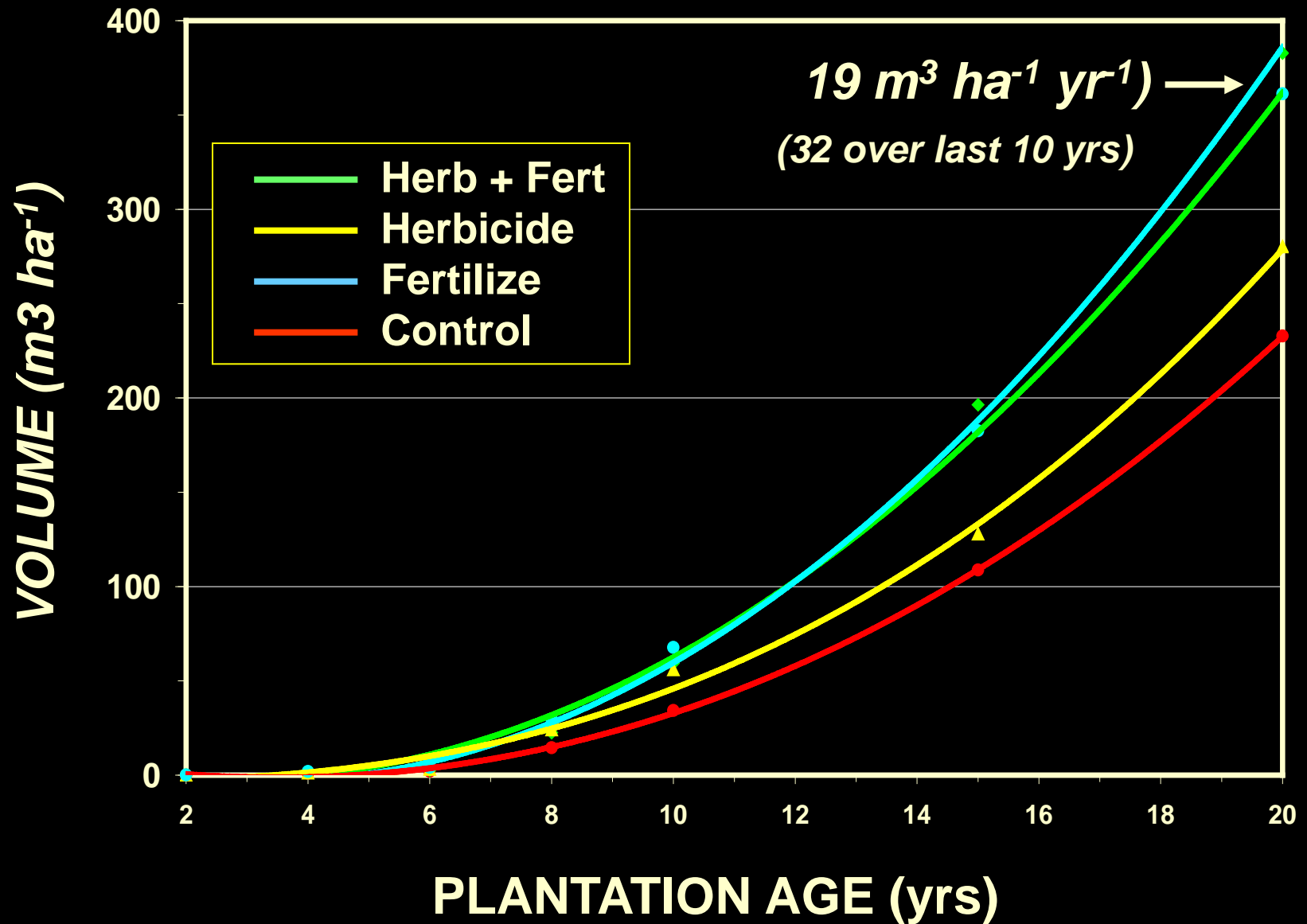
Herbicide + Fertilization

FEATHER FALLS

Control



VOLUME TREND AT FEATHER FALLS

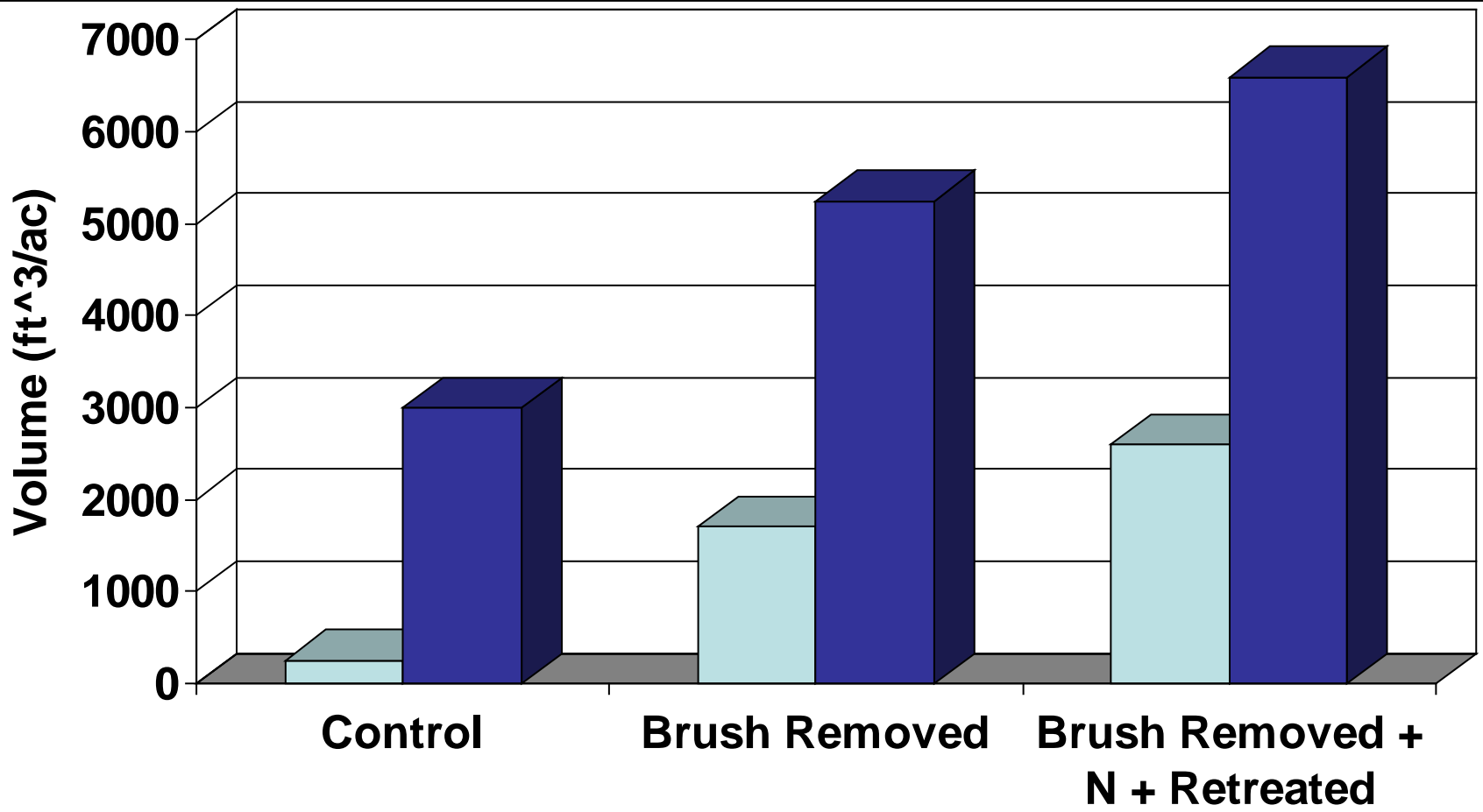


Balderston Plantation

Bob Powers PSW

- Precursor to Garden of Eden Experiment
- Two soil types on the same location
 - Mariposa (poor site)
 - Cohasset (high site)
- Treatments
 - Non treated
 - Vegetation removed
 - Fertilized
 - Vegetation removed + fertilized
- Plots were re-measured 37 years after treatment

Balderston Ponderosa Pine Stand Volume 37 Years After Treatment



■ Mariposa ■ Cohasset

So What?

- Percent growth increases from vegetation control are greatest on poor sites
- However, absolute volume growth response is largest on good sites
- The best money spent would therefore be on good sites
- However..... Without adequate vegetation control on poor sites, there will be no plantation.

Competition Thresholds

- How much competition is too much??
 - Depends on the site quality
- Conifers can deal with more competition on higher site ground
- On poor sites (dry east side Cascades) as little as 15% cover can kill a first year plantation

Competition Thresholds for Ponderosa Pine on a Poor California Site – Oliver, 1984

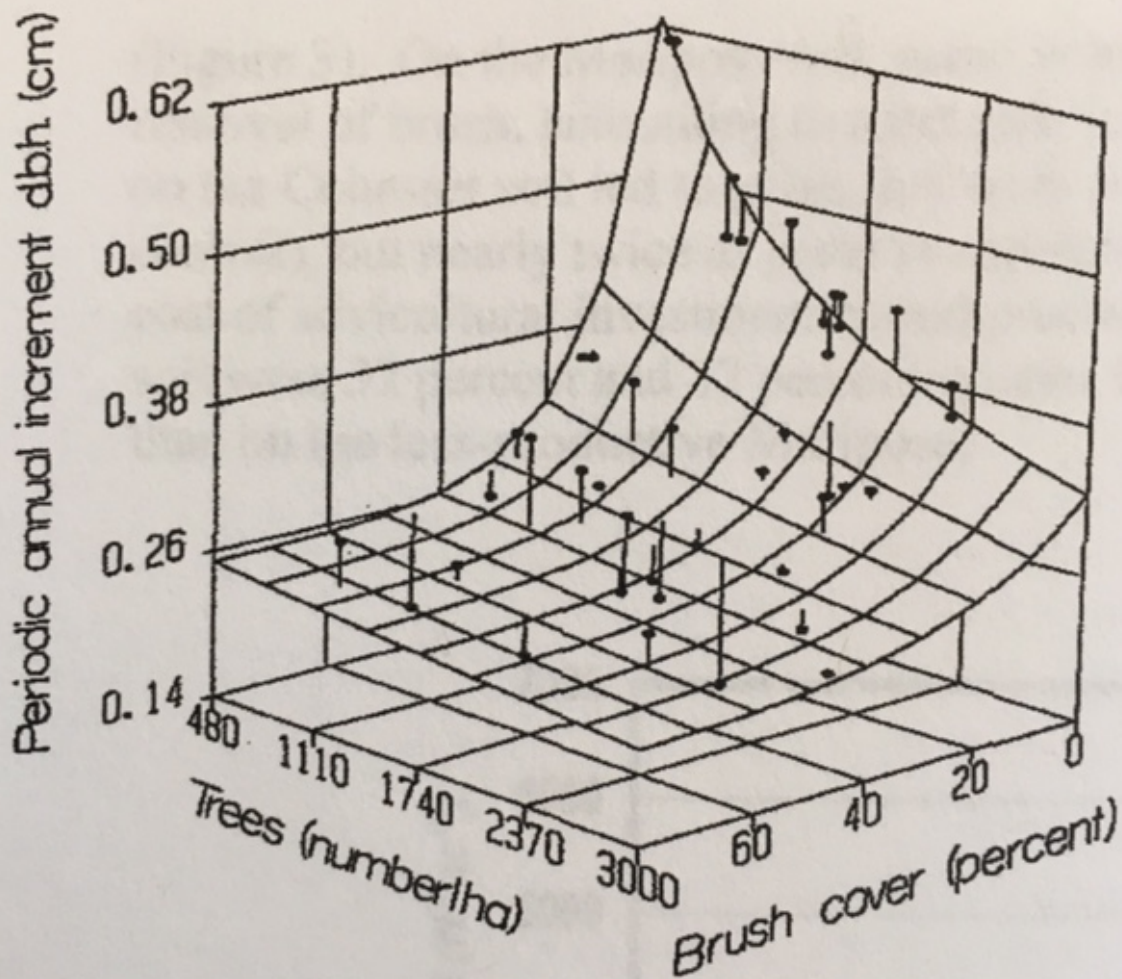


Figure 2—At brush coverages greater than about 30 percent, periodic annual diameter increment of ponderosa pine planted at a poor site was similar regardless of spacing.

Ponderosa Pine First Year Survival on Three Different Sites in the Non Treated Controls

Site Quality	PP Survival	% Tot Cover
Poor	60.0	52
Moderate	93.0	93
High	97.0	97

You Should Be Able to Develop Your Vegetation Management Strategy Based on the Site

- Site Index
- Aspect
- Annual Precipitation
- Soil Type
- Elevation

Site Index

High Site Doug fir / Tanoak?



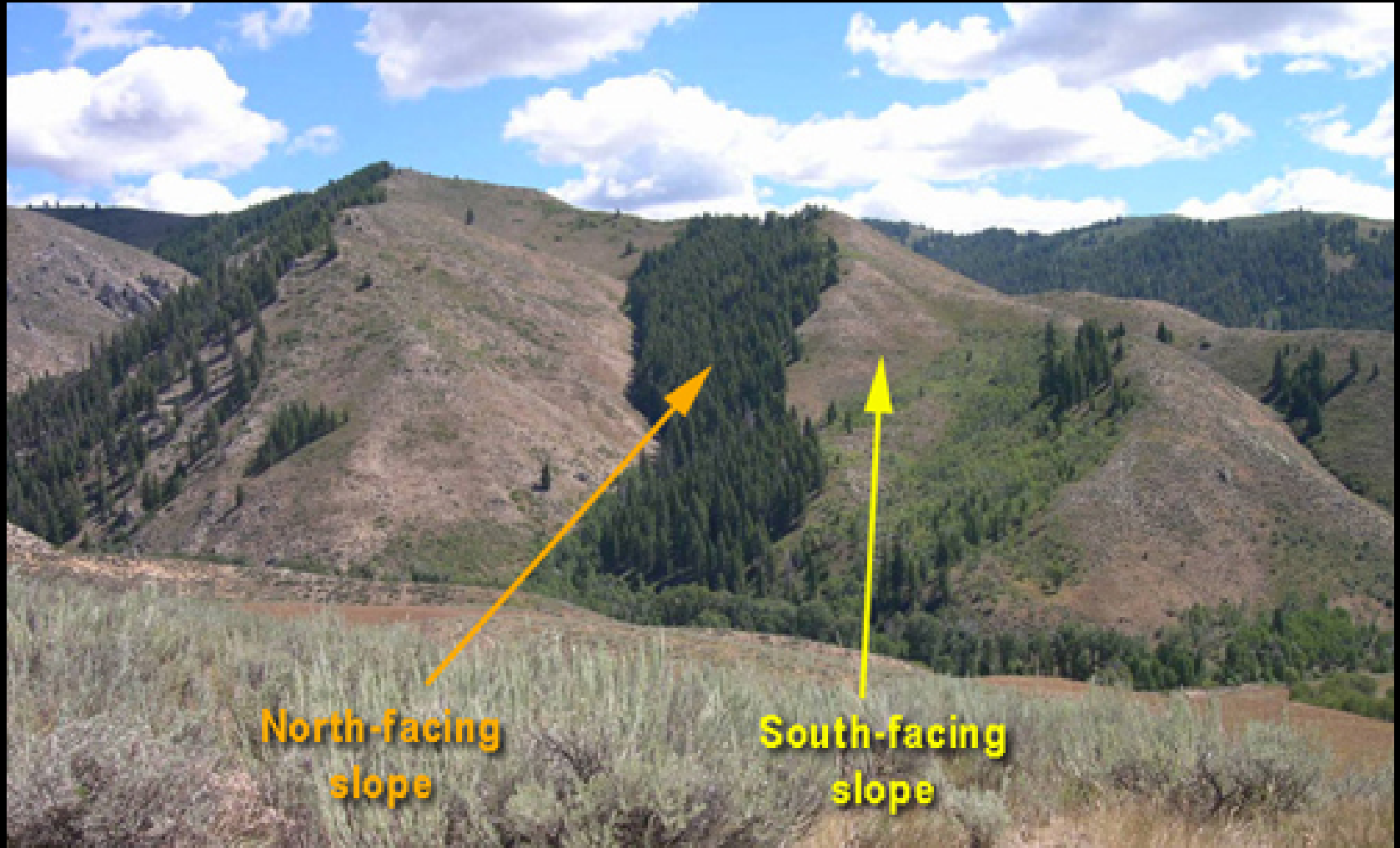
Low Site P Pine / White Oak
and Whiteleaf Manzanita?



Influence of Site Index

- Competing vegetation is adapted to specific sites
- High sites are generally comprised of large, fast growing difficult to control species
- Low sites are generally comprised of drought adapted species with thick cuticle layers and are extremely water efficient
- They also tend to be the most competitive for water
- Complete vegetation control may not be necessary on very good sites and almost always needed on poor sites

Aspect



Influence of Aspect

- Aspect will not only influence the type of competing vegetation present on a site but conifer species as well
- South slopes are usually harsher sites, with shallower soils and hardy vegetation adapted to dryer conditions
- Aspect will affect what conifer species are planted and therefore what herbicides can be used based on conifer tolerance
- South aspects usually require more vegetation control for establishment than wetter and cooler north slopes

Annual Precipitation



Influence of Annual Precipitation

- Annual precipitation will influence what season you can apply certain herbicides (soil actives)
- It will also influence the size and type of vegetation present
- Conifers will put up with higher amounts of competition on wetter sites

Soil Type



Influence of Soil Type

- Soil type can effect how herbicides work and behave in the environment
- Soil organic matter can bind to soil active herbicides and reduce their efficacy
- Well drained soils with low organic matter can be more conducive to herbicide movement. Especially on steep slopes in wet areas
- Soil type has a strong influence on the vegetation complex present

Elevation



Influence of Elevation

- Elevation can influence the season of application for soil active herbicides
 - Generally high elevation sites where soil moisture mostly comes in the form of snow are treated in the fall versus low elevation units that are treated in the spring
- Vegetation complexes will change with elevation
- Application seasons are shorter the higher the elevation
- Site quality can also be influenced by elevation

So How Do You Take in All of This Information and Develop a Vegetation Management Strategy Based on Site Quality??

- Your vegetation management objectives should be the same regardless of site.
- It's how you go about achieving those objectives that may differ by site
- If you choose to log poor site ground, you still have an obligation to reforest it
- The trick is to do it as efficiently and effectively as possible while making it a worthwhile investment
- It's easy to justify greater investments on good sites, but it's also way too easy to justify NOT investing on poorer sites

So How Do You Achieve All of This??

- You have to utilize ALL of the available tools in the vegetation management arsenal to be effective and efficient (products, equipment, application methods, timing, etc)
- A one size fits all approach does NOT work
- Success of a vegetation management program is not measured strictly in how much did it cost!
- Efficacy, stand growth, stocking level and cost all need to be considered
- The overall goal should be to achieve the best vegetation control in the most effective and efficient manner possible

So What are the Options??

- Aerial vs Ground Applications
 - Aerial is low cost, but not always the most effective
 - Currently ground waving wand applications are rivaling helicopter costs and can be used for more applications than just residual herbaceous treatments
- Pre-Harvest Site Preparation
 - Pre-treating woody brush and hardwoods at least one year prior to logging
 - Allows use of the most effective products without regard for conifer tolerance
 - Treated vegetation is undisturbed at treatment and efficacy is dramatically improved and long lasting
 - Hands down the most effective method of woody brush control period.
 - Broadcast, directed or hack and squirt methods
 - Allows lower use rates of residual herbicides for herbaceous control at planting
 - Improves soil moisture as units site fallow the season prior to planting

So What are the Options??

- Application Timing
 - Don't try to control everything in the world with one treatment to reduce application costs!
 - Foliar treatments should be applied from late spring to late summer
 - Residual herbicides for herbaceous control should be applied in either the fall or the spring depending on elevation
 - Putting a residual herbicide out in June the summer prior to planting serves no purpose whatsoever

So What are the Options??

- Alternative Application Methods That May Be More Effective
 - Directed ground spray applications
 - Hack and Squirt Applications
 - Waving wand broadcast applications
 - Basal bark treatments
 - Spot gun treatments
 - Aerial
 - Be Creative

So What are the Options??

- Product Choice
 - On poorer sites maybe focus on lower cost products that achieve the desired results (ie Atrazine vs Velpar, 2,4-D vs Garlon, etc)
 - Use the products for what they were designed for (ie Imazapyr for brush control, not residual herbaceous control)
 - Conifer tolerance. Utilize products that achieve the desired vegetation control but won't cause a replant situation (ie Cleantraxx, Esplanade F, Atrazine on larch, true firs, cedar, etc)
 - Know what vegetation is on your site and choose products that are appropriate (ie you don't want to use Cleantraxx, Esplanade F or Atrazine on a site that is dominated by perennial grass for example)

So What are the Options??

- Site Preparation vs. Release
 - Hands down, the best and most effective money you can spend is on **good site preparation!!!!**
 - Trees stressed from the start will NEVER grow like free to grow trees from the beginning
 - My favorite reforestation quote of all time “If you have a large release program, you’re probably f#\$@&&* up” - Mike Newton – Oregon State University

Conclusions:

- Be creative: Don't get locked into one system fits all
- Focus on site preparation vs release
- Anticipate what vegetation issues will occur on each site
- Be efficient but effective with your treatments
- Utilize the whole toolbox!
- Put in some long term growth plots that demonstrate the effect of good vegetation management
- Don't use the excuse "We can't afford to treat this site." Figure out a way to do it efficiently!