Costs and Benefits of Oak Reestablishment on Grasslands

Presentation by Pelayo Alvarez
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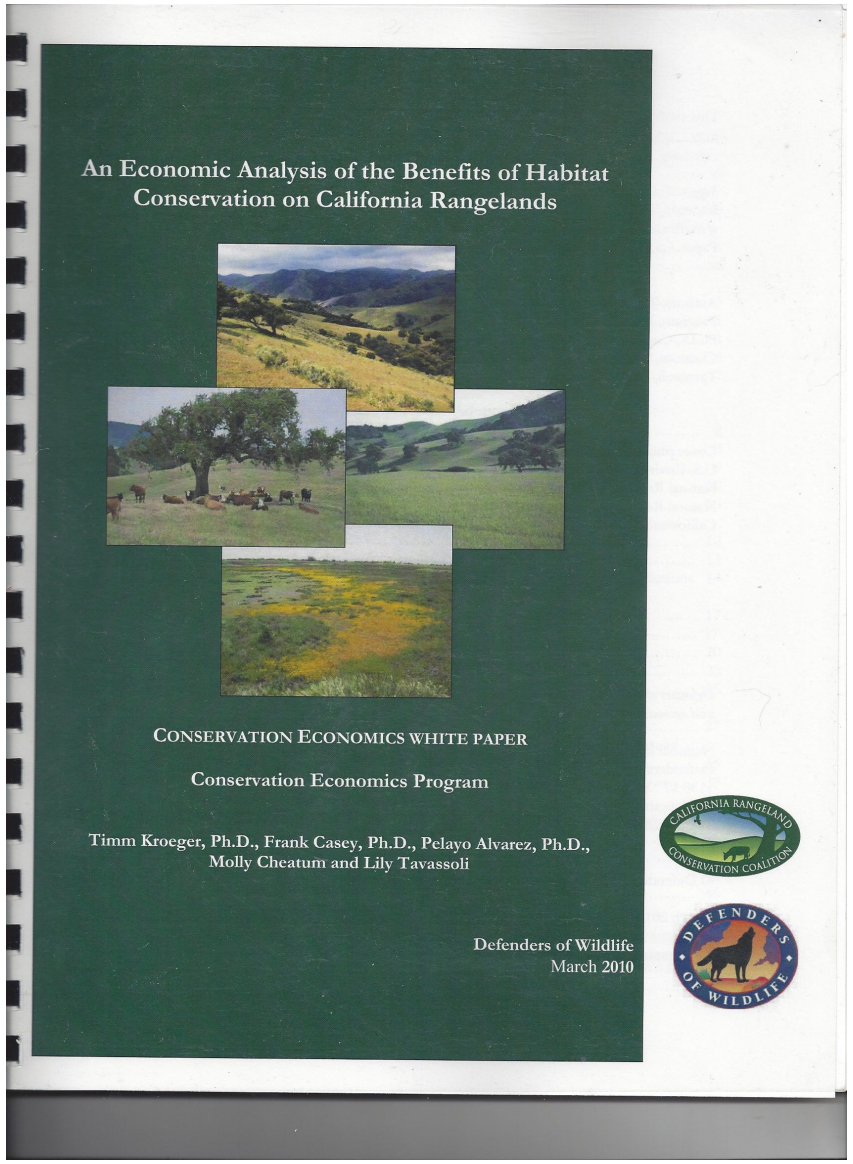
Planting and Protecting Oaks: A Hands-on Workshop for Rural Land Managers

Costs and Benefits of Oak Reestablishment on Grasslands

Private costs and public benefits of conservation practices in Tehama, Butte, Glenn and Shasta

- <u>Oak Reestablishment</u>
- Restoration of Native Perennial Grasses
- Grazing Management, water development, fencing riparian areas, riparian restoration



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Introduction

- Oaks savannas are a small to moderate carbon sink
- - 0.40 (tC/ac/yr) - Grasslands: - 0.21tC/ac/yr), (Ma et al., 2007)

- C accrual of blue oaks is slow, it may take up to 20 years (Gamman 2008)

- C sequestration by oaks depends on their growth: species, precipitation, browsing pressure (livestock and wildlife), exposure to direct sunlight, soil type etc

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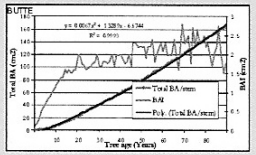
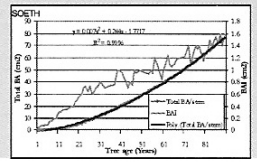
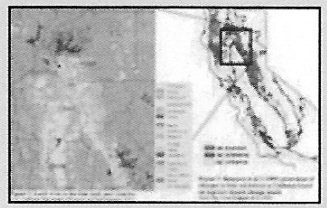
HIGH ESTIMATE		LOW ESTIMATE
High *(0.91 tC/ac/yr)*	**Difference in NEE between grasslands and mature oak savannas** *(tC/ac/yr)*	**Low** *(0.19 tC/ac/yr)*
High *(Butte site; Fig. 3.3)* 	**Oak growth** *(total Basal Area Increment/ac/yr)*	**Low** *(Soeth site, Fig. 3.3)* 
High *(No reduction from climate change; Table 3.8)*	**Grassland acreage suitable for oak planting** *(ac)* 	**Low** *(73% reduction overall from climate change; Table 3.8)*

Figure 3.7: Major assumptions underlying the net carbon uptake estimates for oak planting

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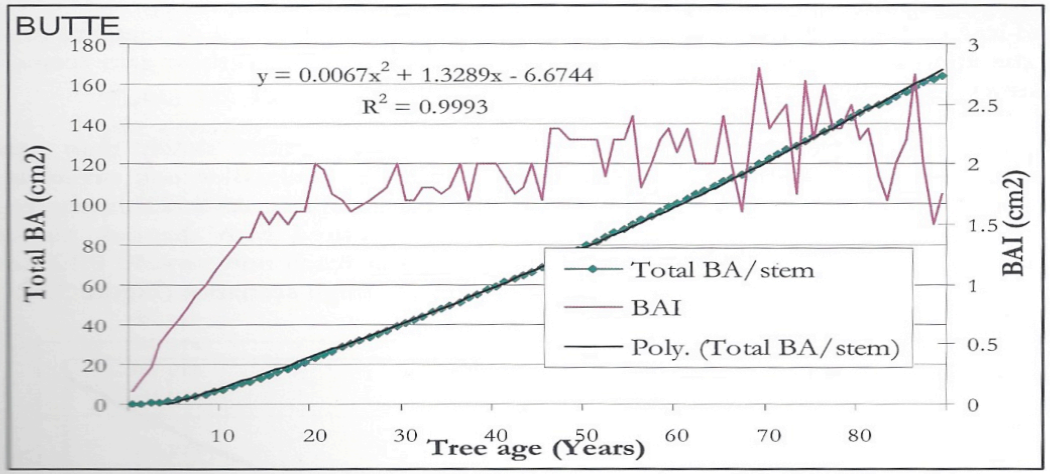

Figure 3.3: Actual BAI and mean BA/stem at Butte and Soeth sites studied by Kertis et al. (1993) and polynomial equation best describing growth in mean BA/stem at each site

High (Butte) and low (Glenn) growth curves of blue oaks (Kertis et al 1993)

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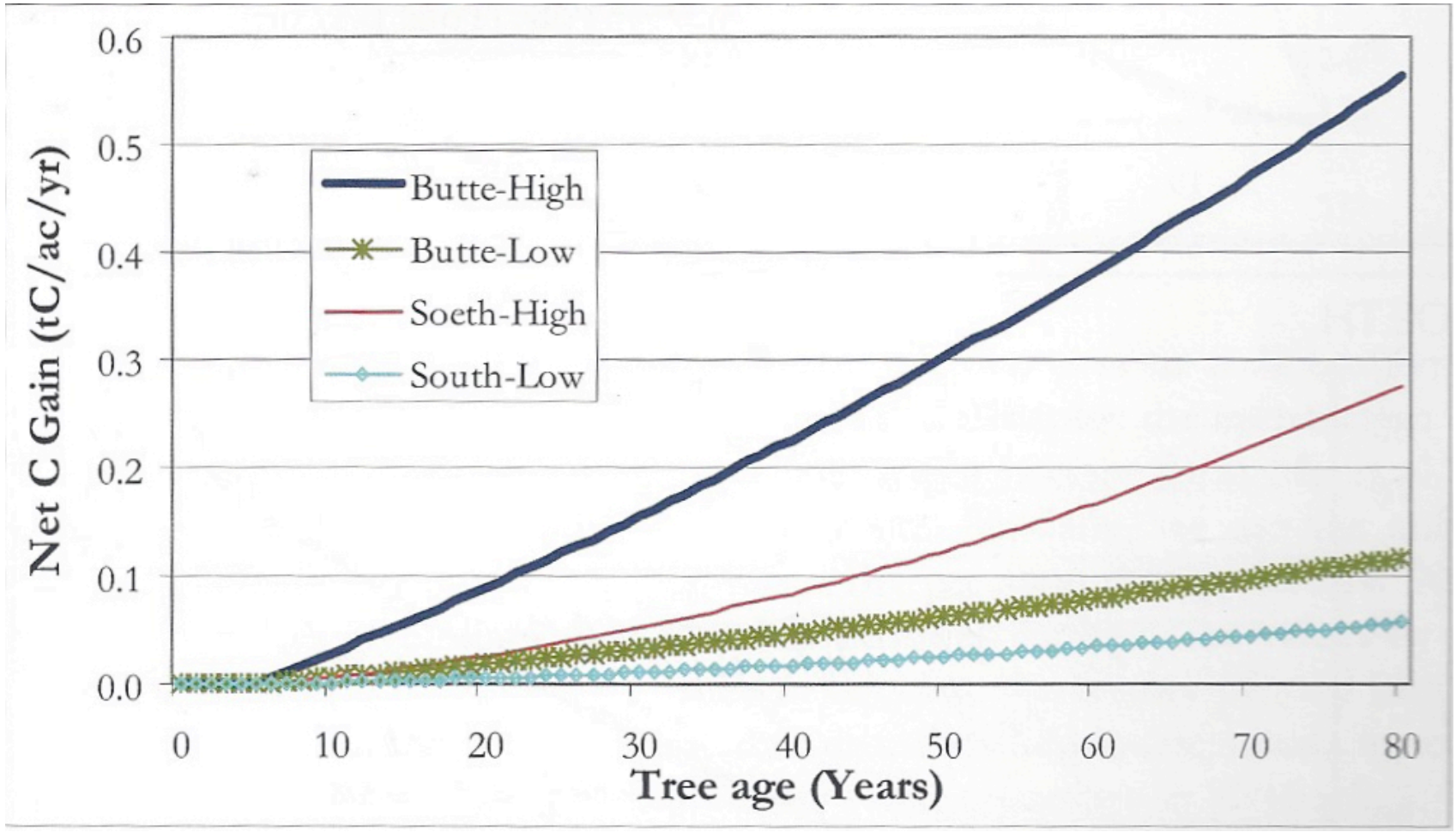

Carbon gain trajectories for oak plantings on grasslands

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Table 3.8: Grassland acreage in the study area by county, and percentages and acres potentially suitable for oak planting

County	*Acres*	*Potentially suitable for oak planting*			
		Scenario 1 (High)		*Scenario 2 (Low)*	
		Percent	*Acres*	*Percent*	*Acres*
Butte	77,768	100%	77,800	50%	38,900
Glenn	170,570	90%	153,500	0%	0
Shasta	127,333	100%	127,300	50%	63,700
Tehama	438,757	90%	394,900	23%	98,700
Total	814,428		753,500		201,300

Note: Includes both wet herbaceous (wet meadows and Tule-Cattail-Sedge) and dry herbaceous grasslands (annual grasses and forbs). See text for scenario details.

Consider climate change, shrubs converting into grasslands will increase acreage, uncertain precipitation may be a problem for oak establishment.

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Table 3.10: Total carbon stored in oak tree biomass in study area counties

County	*Total tC*
Butte	3,283,286
Glenn	1,341,899
Shasta	4,955,757
Tehama	7,616,397
TOTAL	17,197,339

Source: Gaman (2008)

Total carbon stored in oak tree biomass in study area

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Table 3.7: Estimated cumulative average net carbon uptake per acre from oak planting on grasslands in the study area

Scenario:	*High C Gain*	*Low C Gain*
Time span	*tC/ac, cumulative*	
10 yrs	0.1	0.0
20 yrs	0.7	0.1
30 yrs	2.0	0.4
40 yrs	3.9	0.8
50 yrs	6.6	1.4
60 yrs	10.0	2.1
70 yrs	14.3	3.0
80 yrs	19.6	4.1
90 yrs	25.7	5.3
100 yrs	32.9	6.8

Potential benefits at current C market prices

Low 6.8 t C/ acre x $5/t C= **$34/acre**

High 32.9 t C/acre x $5 = **$165/ acre**

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Table 3.11: Budget of oak restoration project on Bob Cat Ranch, California

Description	*Quantity*	*Unit*	*Cost/Unit*	*Total*
Services and Labor				
Labor – Landowner, Audubon, US FWS	280	hours	50	$14,000
Hired crews (cage installation)	80	hours	10	$800
Equipment rental	40	hours	40	$1,600
Subtotal services and labor				$16,400
Supplies and Expendables				
Acorns	200	unit	0.25	$50
Tubex tree protectors and stakes	100	units	3.65	$365
Native grass straw	20	bales	9	$180
Round-up herbicide	128	oz	0.5	$64
Woven wire 12 gauge 4x2 4ft tall	9	rolls	128	$1,152
T-Post 6ft	200	post	4.15	$830
Electrical wire	1	rolls	15	$15
Irrigation hose	4	rolls	100	$400
2 inch PVC	200	feet	0.6	$120
Pressure compensating emitters	100	units	0.45	$45
Miscellaneous irrigation supplies	1	lump	200	$200
Bird boxes (4 blue bird and 1 owl)	6	lump	40	$240
Subtotal Supplies and Expendables				$3,661
TOTAL				$20,061

Source: Personal Communication. Chris Rose. California Audubon Society. May, 2008.

Budget for Bobcat Ranch: 200 acorns, weed control and shelters Hourly rate $50/hour ($100/acorn. Landowners may be able to reduce labor costs to $51/ acorn (at $15/h) : Cost per acre of oak plantings for different tree densities

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Table 3.13: Cost per acre of oak plantings for different tree densities

Oak density (Stems/acre)	*Project acreage at given seedling density*	*Cost/acre*	
		*High **	*Low **
108	1	$20,061	$10,261
54	2	$10,031	$5,131
27	4	$5,015	$2,565

* High costs are based on labor costs shown in Table 3.11; low costs are based on reduced costs of $15 per hour of landowner labor input.

Average in CA $3,000 o $6,000/ acre

Remember potential revenue = $34/acre to $165/acre

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Additional benefits:

- Water quality: erosion control
- Air quality
- Soil quality
- Forage production?
- Habitat (hunting, recreation)
- Climate change mitigation
- Open space, views, cultural

What is the problem?