



WESTCARB

Terrestrial Carbon Sequestration

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DOCKET

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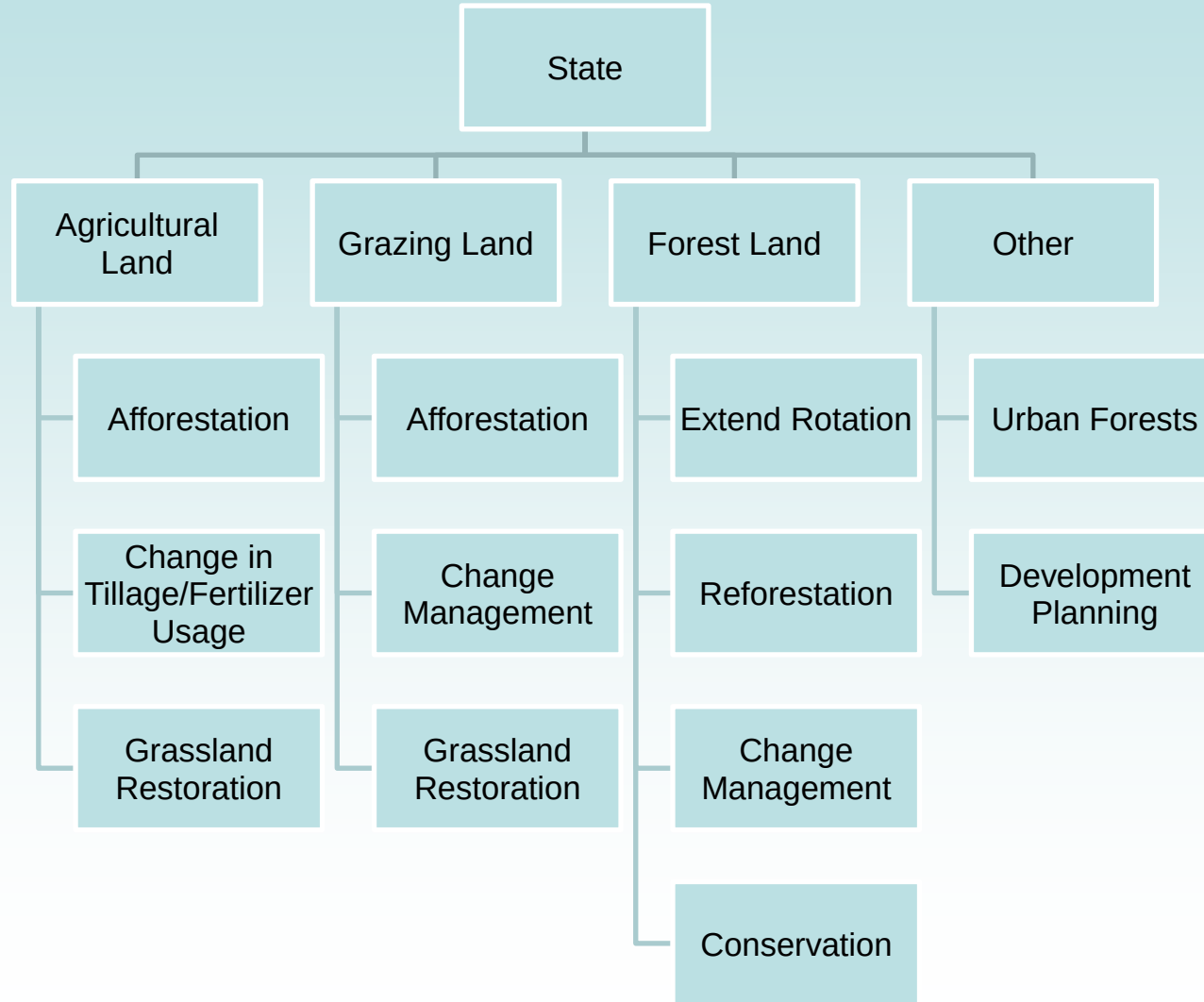
DATE May 26 2009

RECD. May 26 2009

*Integrated Energy Policy Report Workshop
May 26, 2009*



Terrestrial Sequestration Options

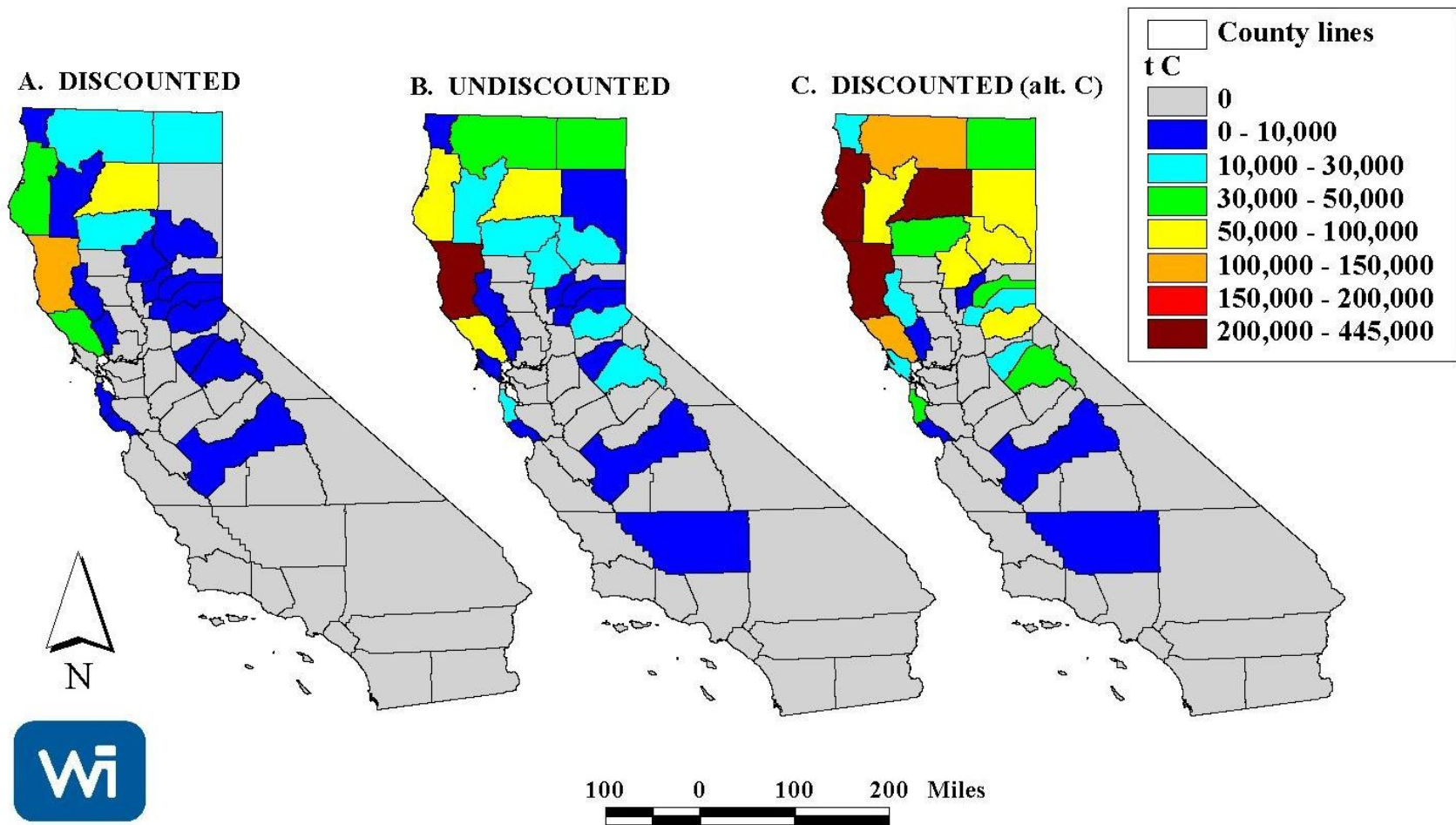


Change Forest Management

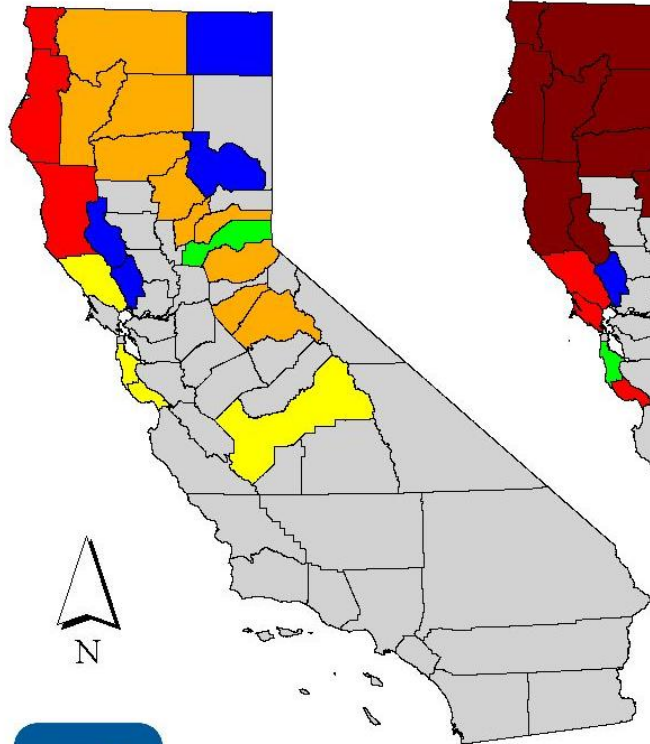


Source: Tim Pearson, Winrock International

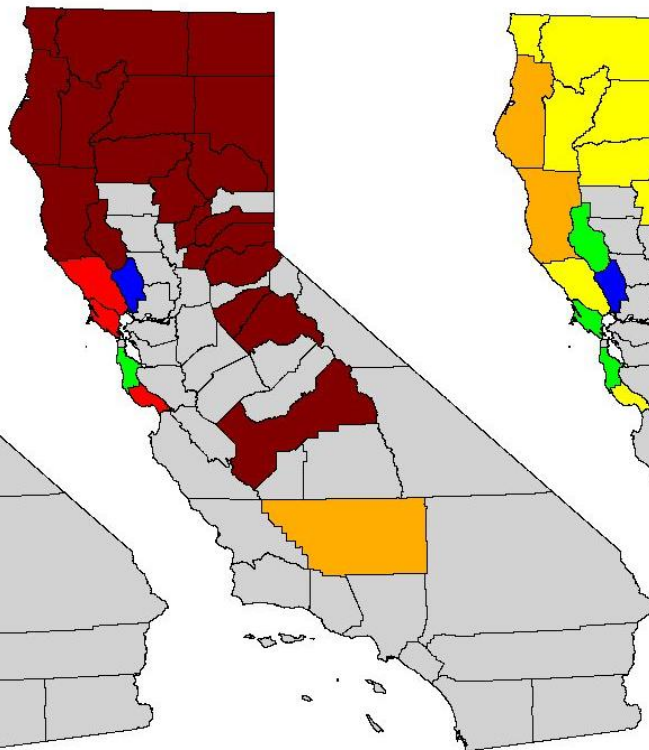
- Rotation length
- Slash left in forest
- Volume logged
- Assess wood products
 - Quantity
 - Type
 - Turnover



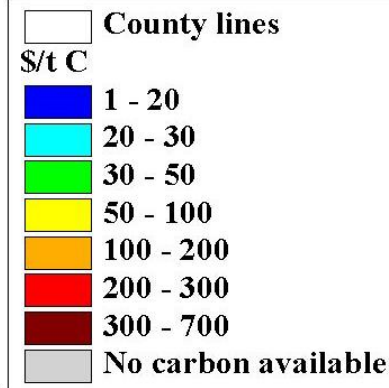
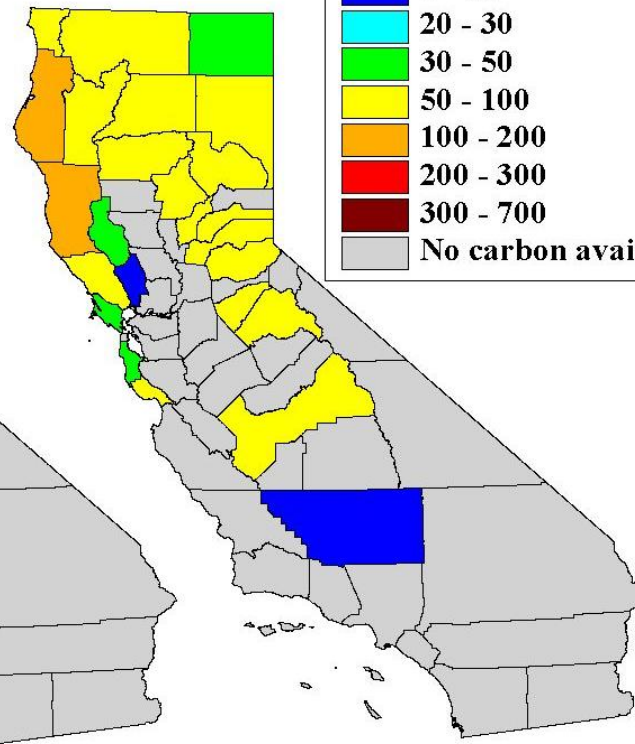
A. DISCOUNTED



B. UN-DISCOUNTED



C. DISCOUNTED (alt. C)



70 0 70 140 Miles

Conserve Forests



Source: Tim Pearson, Winrock International

- Stop forest conversion to non-forest
- Sierra Mixed Conifer (150 year old forest)
 - 376 tC/ha
- Redwood (150 year old forest)
 - 478 tC/ha

Afforestation/ Reforestation

- Convert agricultural or grazing land back to forest
 - Return to native forest
 - Convert to forest land for timber production



Source: Tim Pearson, Winrock International



- Rate of Carbon Sequestration for Douglas Fir

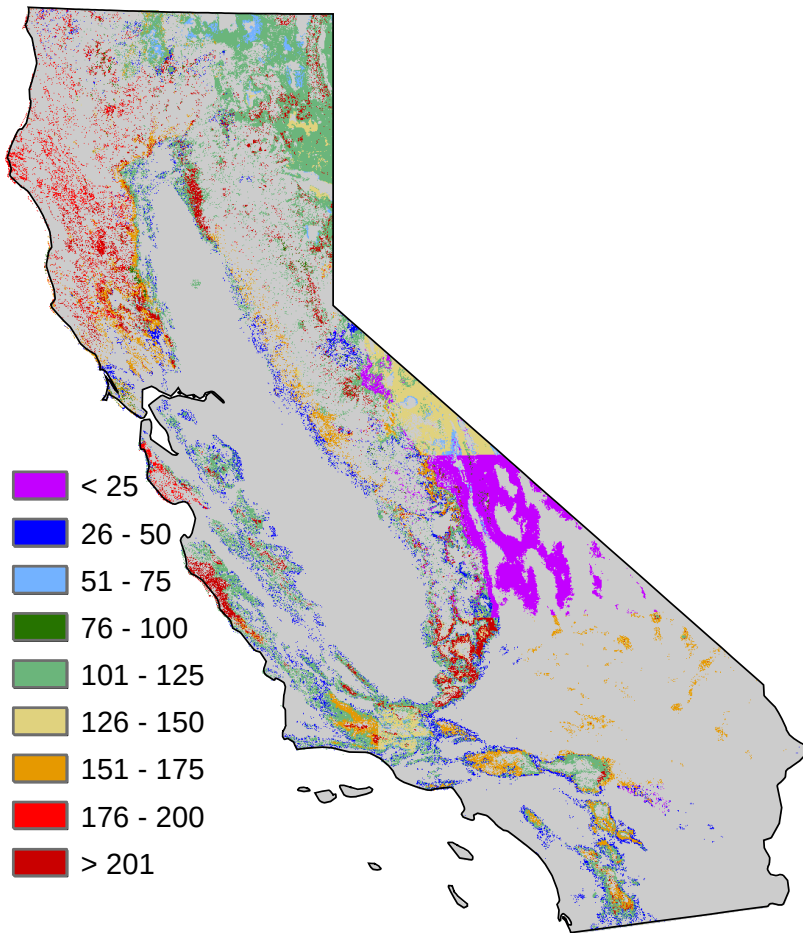
$$\begin{aligned} &5 \text{ tC/ha yr} \times 20 \text{ yrs} \\ &= 100 \text{ tC/ha} \\ &= 148 \text{ tCO}_2/\text{ac} \end{aligned}$$

Summary of Available Carbon

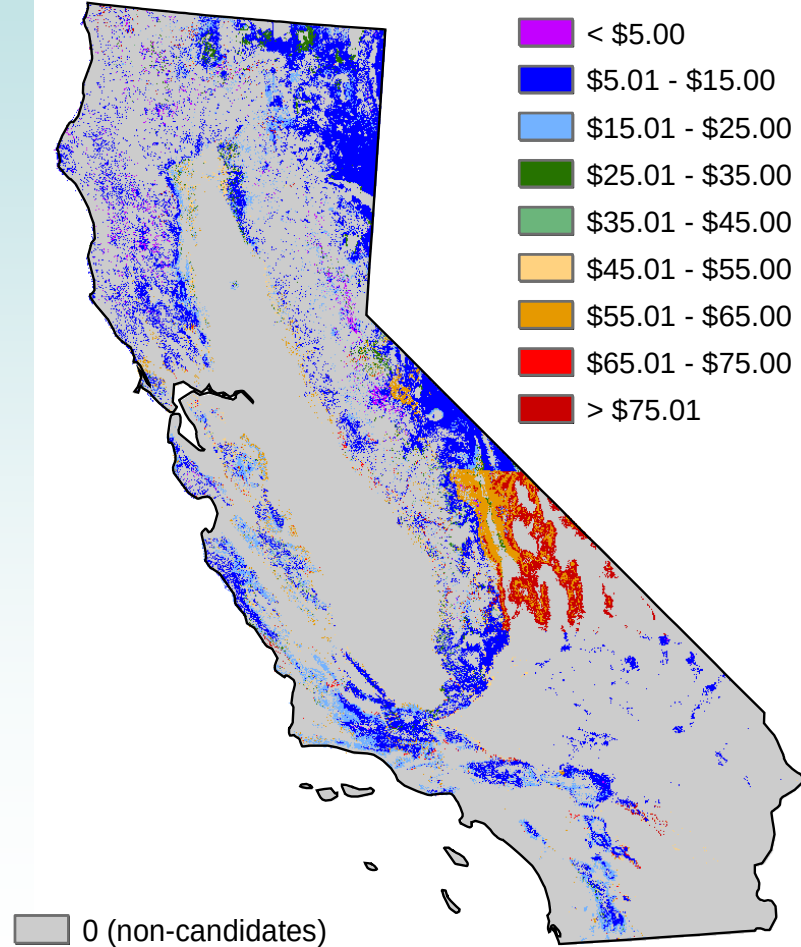
Activity	Quantity of C—MMT CO ₂			Area available—million acres		
	20 years	40 years	80 years	20 years	40 years	80 years
Forest management						
Lengthen rotation						
≤\$13.6						
(discounted C)	3.47	--	--	0.31	--	--
≤\$13.6						
(undiscounted C)	2.16	--	--	0.30	--	--
Increase riparian buffer-width						
≤\$13.6	3.91 (permanent)			0.044		
Grazing lands						
Afforestation						
≤\$13.6	887	3,256	5,639	12.03	17.79	20.76
≤\$5.5	345	3,017	5,504	2.72	14.83	19.03
≤\$2.7	33	1,610	4,569	0.20	5.68	13.34

Afforestation – CA statewide analysis

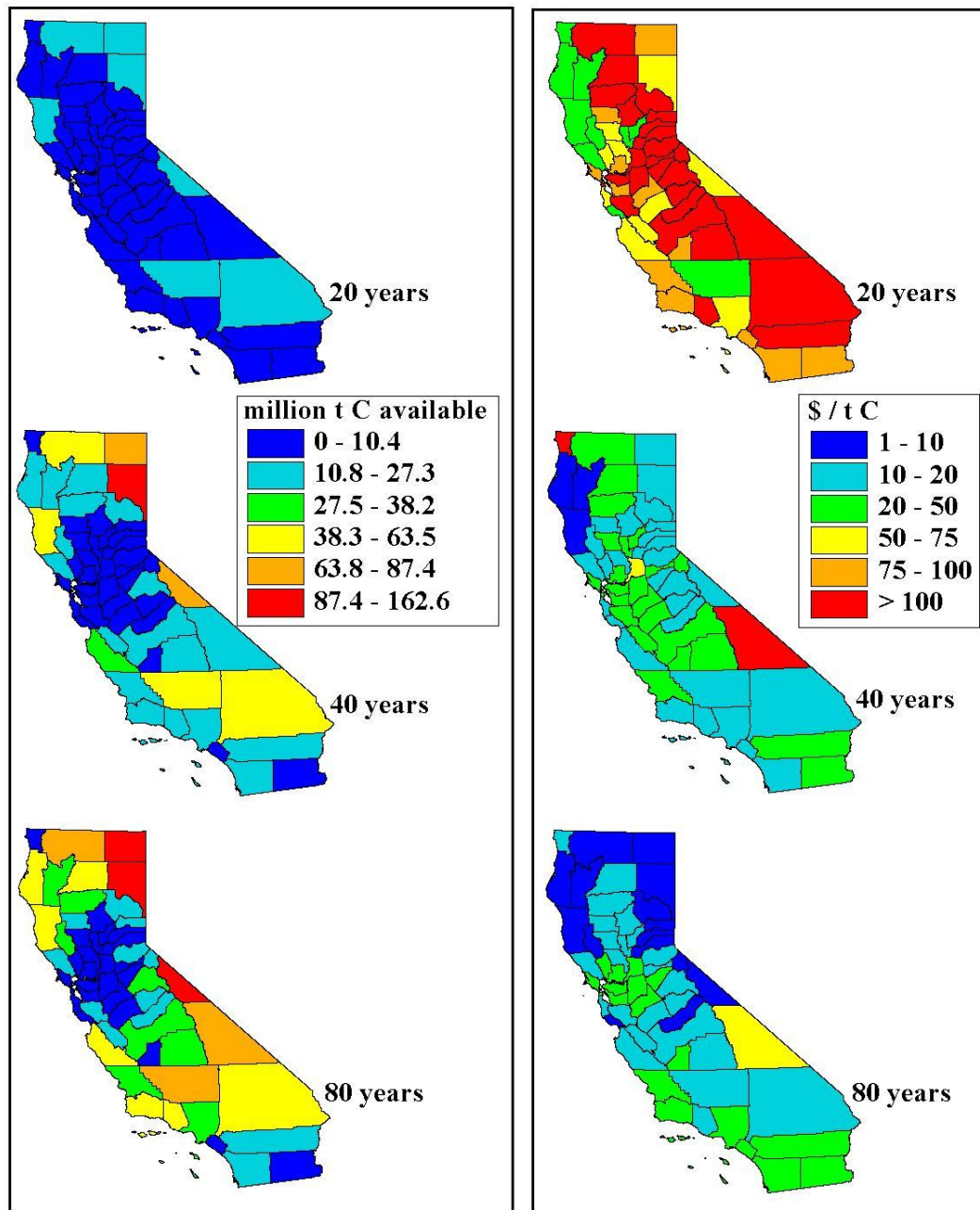
Potential sequestration and cost (40 Years)



Potential t C/ ha

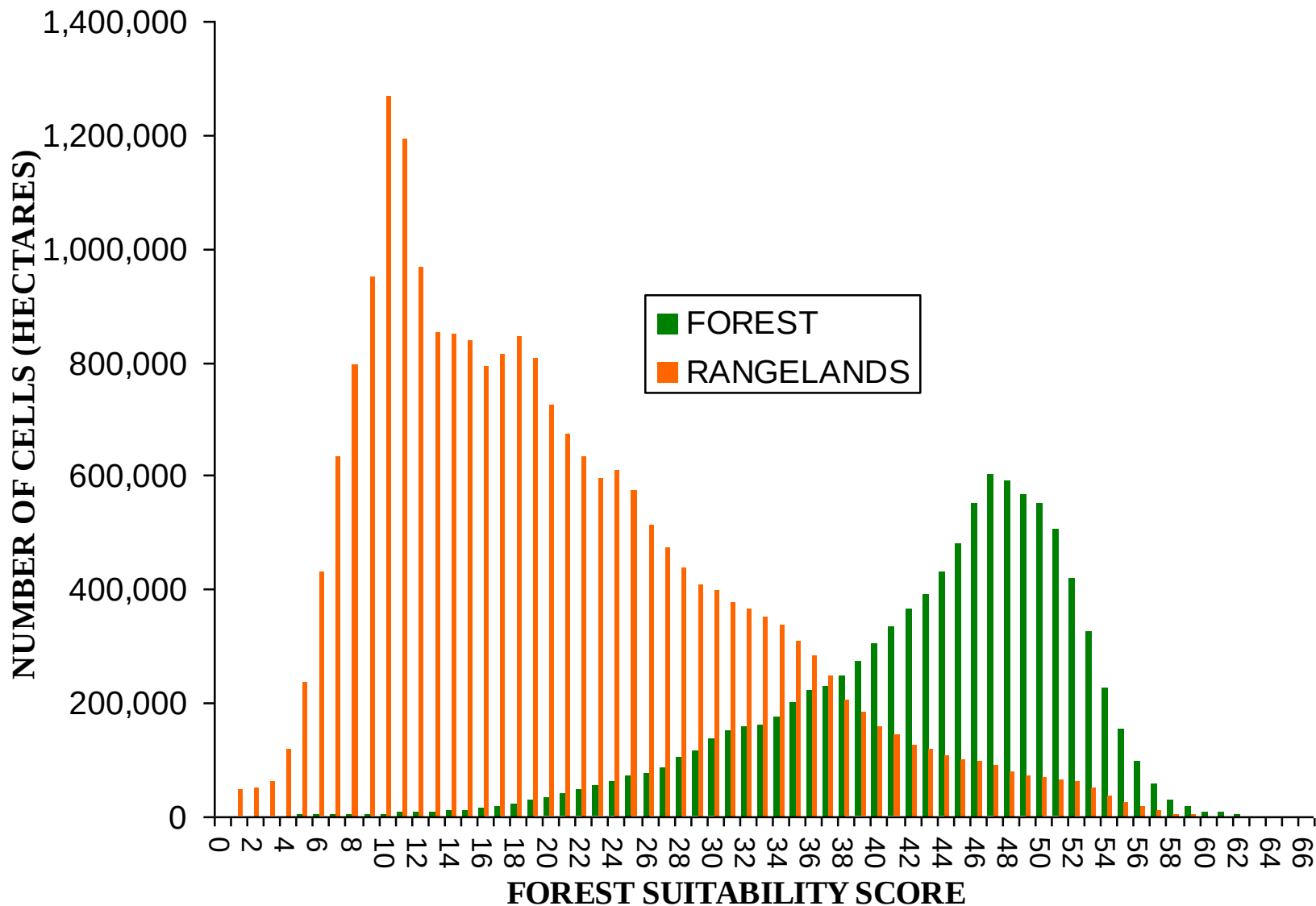


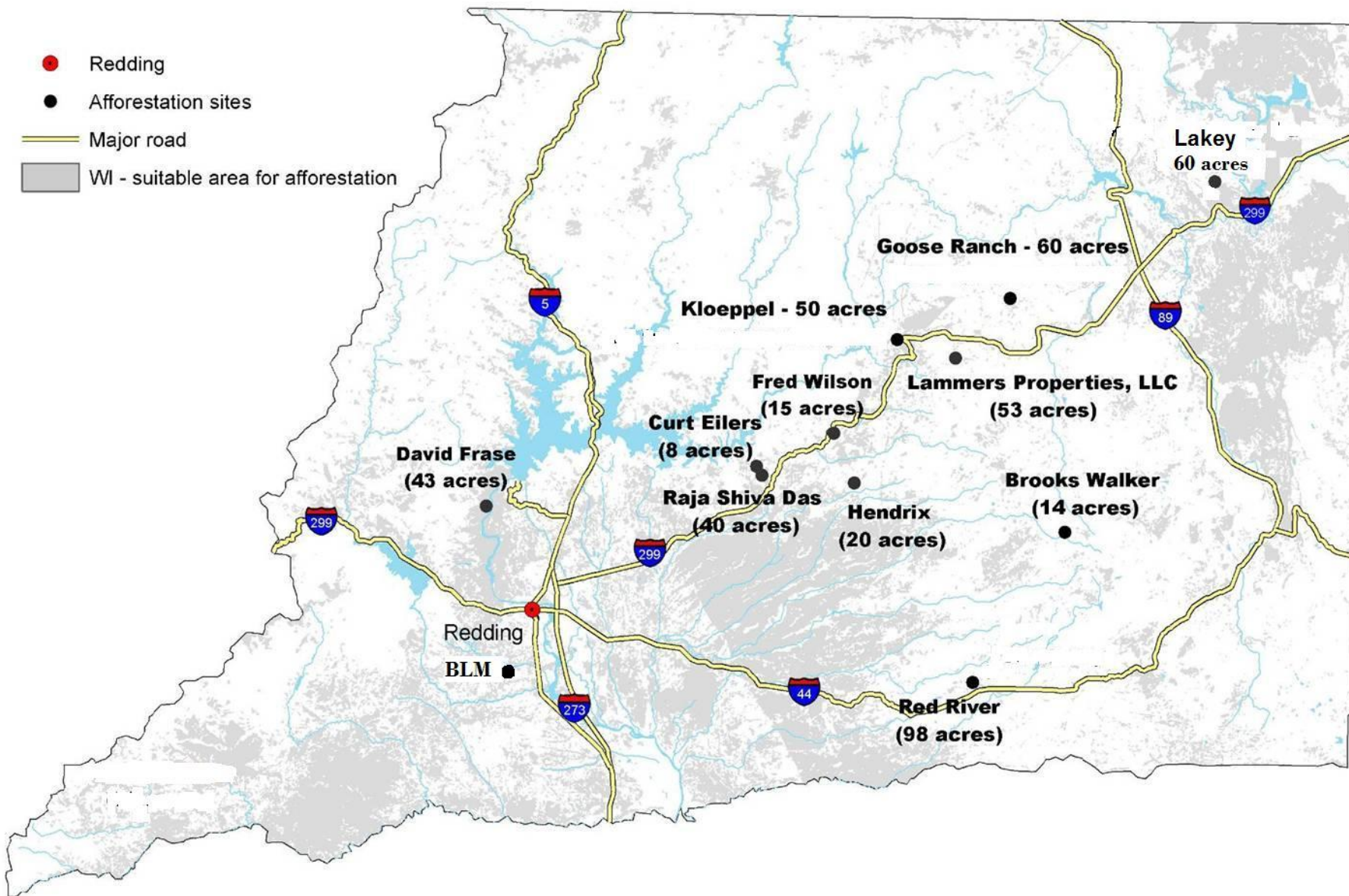
\$ / t C



200 0 200 400 Miles













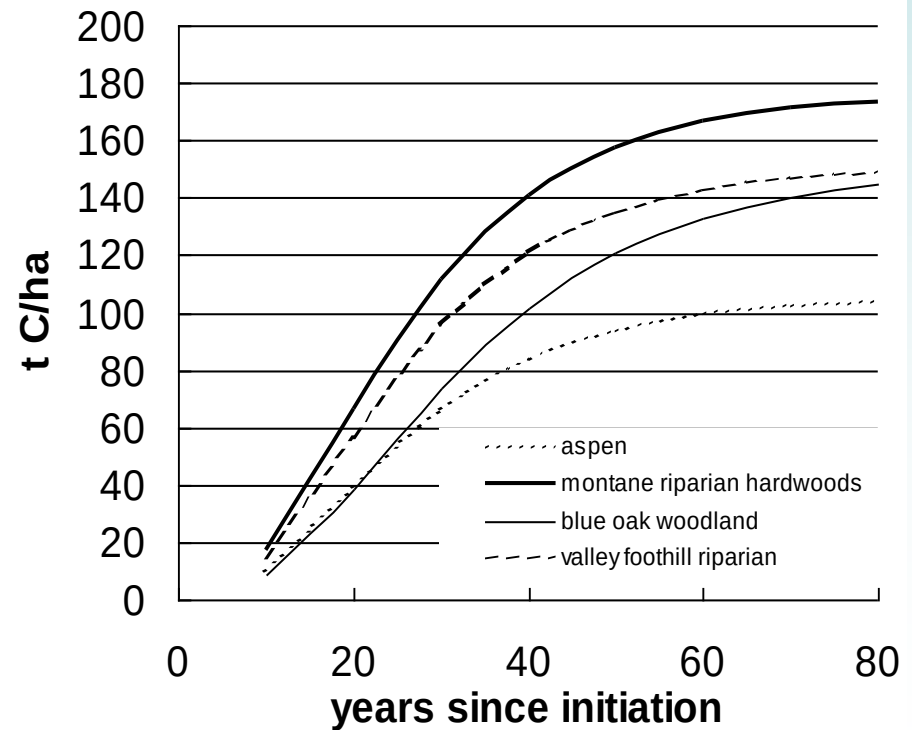
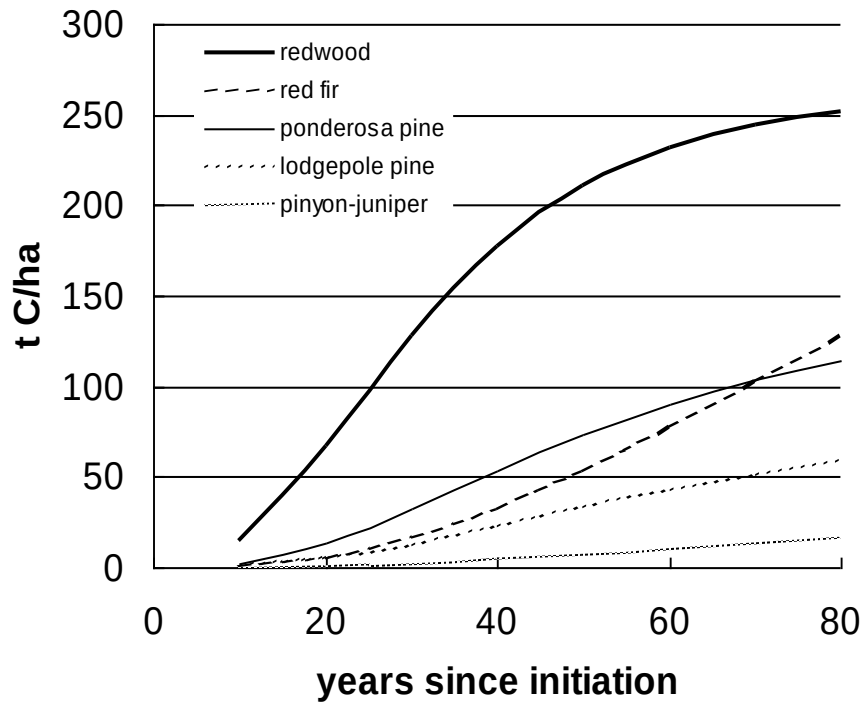
Shasta afforestation preliminary baseline

Project	Baseline vegetation	Baseline C prior to site prep		
		Mean (tCO ₂ /ac)	95% CI (tCO ₂ /ac)	# plots taken
Red River Forests Partnership	Greenleaf manzanita	11.4	5.2	8
Brooks Walker	Greenleaf manzanita	13.3	6.9	5
Hendrix-Philipps	Whiteleaf manzanita	41.3	15.9	10
Goose Valley Ranch	Whitethorn	84.2	36.8	10
Sivadas	Old whiteleaf manzanita	53.6	54.9	11
Wilson	Whiteleaf manzanita	26.6	8.6	7
Lammers	Greenleaf, deer brush, whitethorn	17.9	8.3	7
Kloeppel	Greenleaf, deer brush	18.6	8.5	9

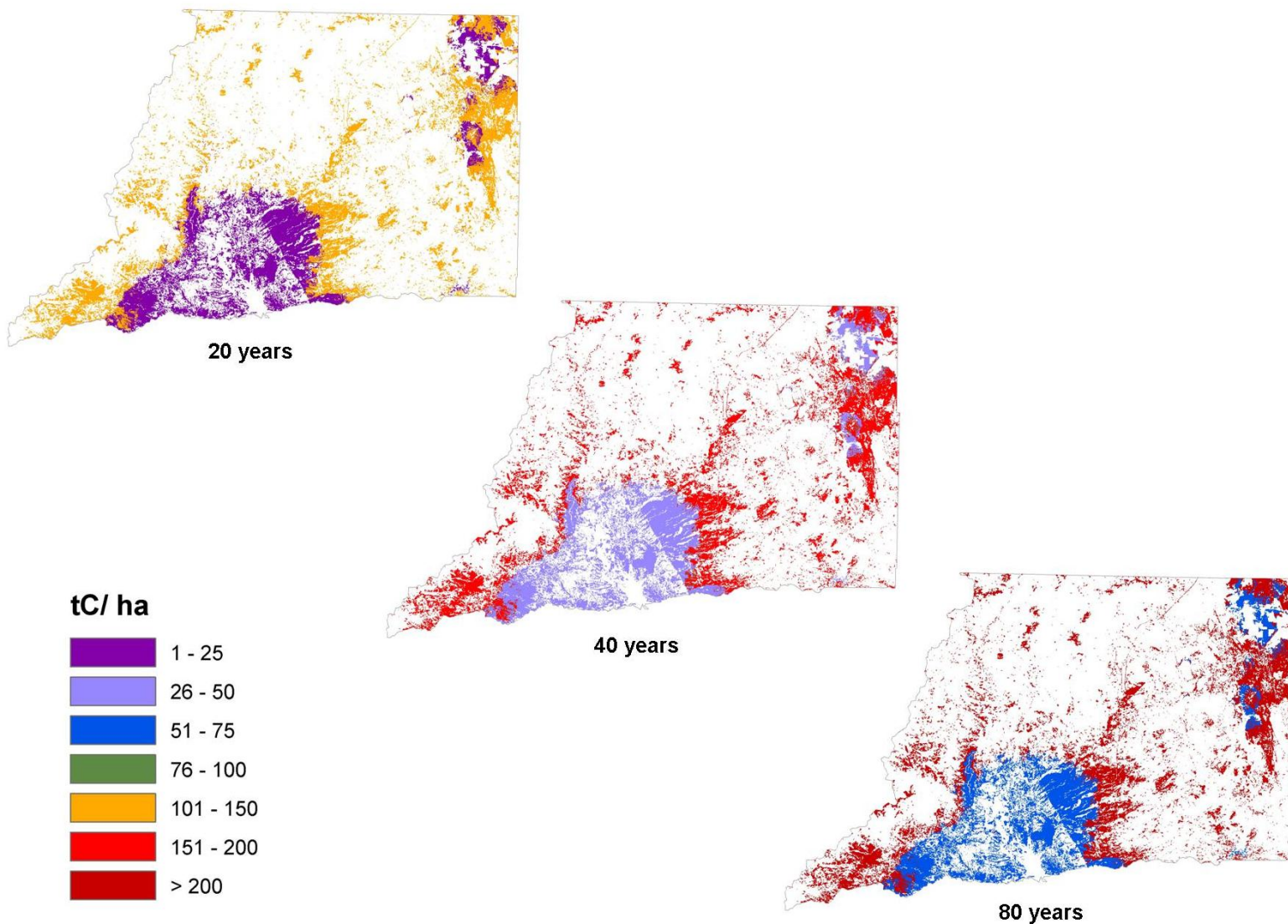
Shasta Afforestation Projects

Project	Acres	Description	Status
Red River Forest Partnership	98	Ponderosa pine afforestation, <i>brush removal for bioenergy</i>	Site prep done, planting done
Brooks Walker	14	Mixed conifer afforestation	Site prep done, planting done
Hendrix Phillips	20	Ponderosa pine afforestation, easement on property	Site prep done, planting done
Goose Valley	60	Mixed conifer afforestation, past fire site	Site prep done, planting done
Lammers	53	Mixed conifer afforestation, past fire site (1992)	Site prep fall 2008, planting in 2009
Frase	43	Ponderosa pine afforestation, affected by copper smelting in 1910	Site prep done, planting in 2009
Kloeppel	51	Ponderosa pine afforestation, past fire site (1992)	Site prep done, planting in 2009
Sivadas	38	Ponderosa pine afforestation	Site prep done, planting in 2009
Eilers	8	Oak pine afforestation	Collecting acorn crop, planting in 2009
Wilson	15	Ponderosa pine afforestation	Site prep done, planting in 2009
Lakey	60	Ponderosa pine afforestation, recent fire (2007)	Site prep done, planting in 2009
BLM	10	Oak woodlands	Agreement in process

Growth Curves



Rates for Carbon accumulation



Projections – 300 trees/acre

Year	tons CO ₂ /ac	
	Pine	Doug fir
2008	24.6	21.6
2018	23.7	22.4
2028	35.7	41.5
2038	73.2	98.0
2048	118.5	166.4
2058	178.9	242.8
2068	235.6	300.5
2078	300.6	344.2
2088	338.5	378.1

Costs for Carbon Management Projects

- Establishment costs
 - Site preparation
 - Buying and planting seedlings
 - Easements
 - Validation
- Maintenance costs
- Measurement costs
 - Registry
 - Variability
 - Project area



Costs for Carbon Management Projects

- Opportunity costs
 - Existing income from:
 - Farming
 - Grazing
 - Wood products

- Carbon alone rarely covers all costs

Policy issues

- Regulation of offsets, rather than of forest sector
- Ensuring additionality is critical
- Regulatory identification of forestry practices is inappropriate
- Co-benefits are high in forest projects

Contact info

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