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Terrestrial Carbon Sequestration and Emission Reduction Pilot Activities in Shasta County, California

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Phase II Objectives: Terrestrial Sequestration

- Validate and demonstrate the terrestrial carbon sequestration opportunities identified in Phase I, through pilot projects, methodology development, reporting, and market recognition

- Research to inform decisions by policymakers, communities, and businesses on how to invest in CCS technology development and deployment to achieve climate change mitigation objectives

Three pilot activities

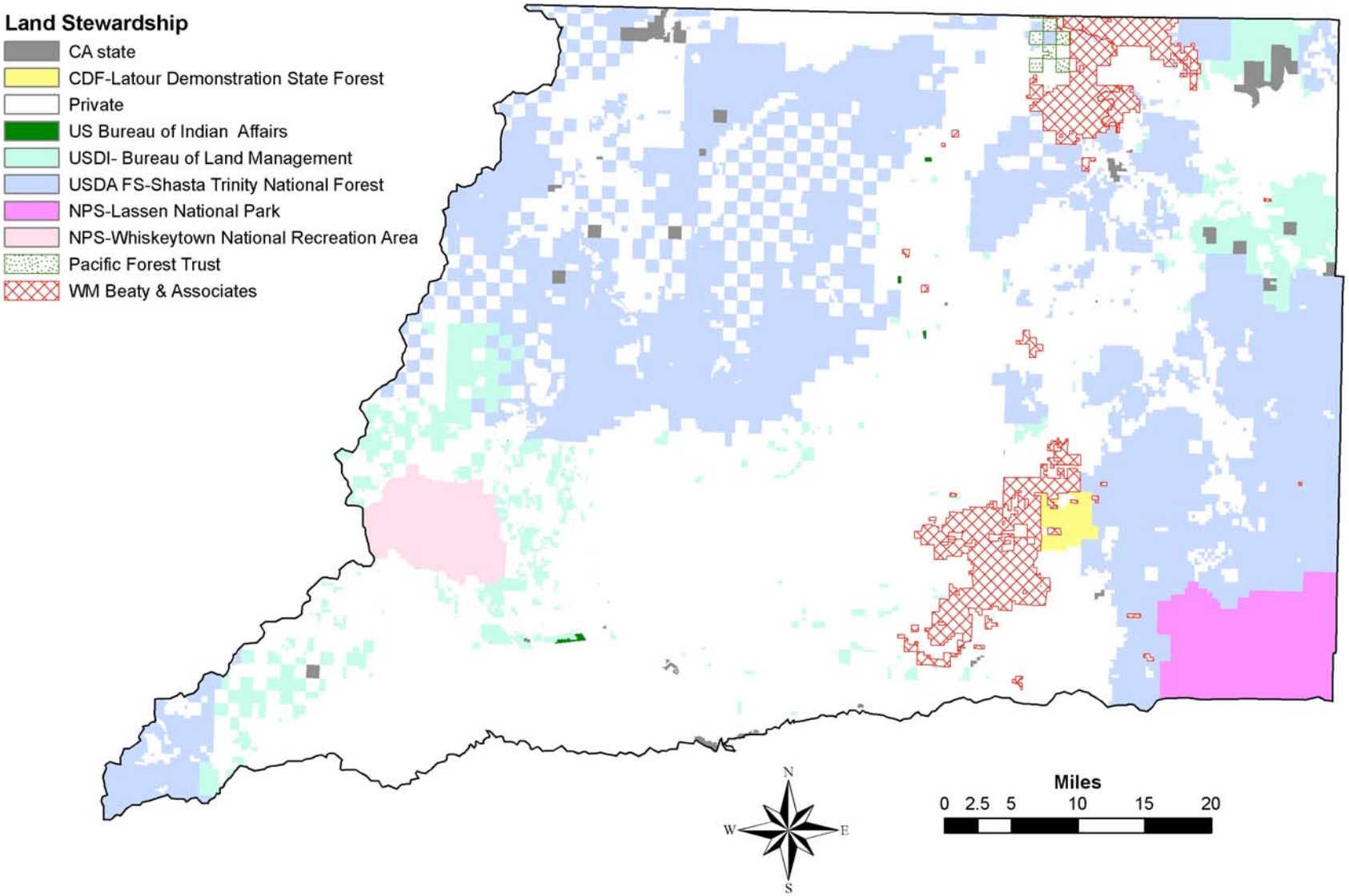
Afforestation/reforestation ►

Forest management to increase sequestration ▼

Reducing emissions from catastrophic wildfire (fuel reduction and biomass energy) ▲

WESTCARB Shasta County partners

- Western Shasta RCD
- WM Beaty & Associates
- Pacific Forest Trust
- California Department of Forestry and Fire Protection
- Pacific Gas & Electric
- USDA Forest Service
  - Shasta Trinity National Forest
  - Lassen National Forest
  - Pacific Southwest Research Station
- National Park Service
  - Whiskeytown National Recreation Area
  - Lassen Volcanic National Park
- USDI Bureau of Land Management
- Individual ranchers and landowners
- Wheelabrator Shasta Energy Company
- California Climate Action Registry
- The Climate Trust
- California Forest Products Commission


Land Stewardship
CA state
CDF-Latour Demonstration State Forest
Private
US Bureau of Indian Affairs
USDI- Bureau of Land Management
USDA FS-Shasta Trinity National Forest
NPS-Lassen National Park
NPS-Whiskeytown National Recreation Area
Pacific Forest Trust
WM Beaty & Associates
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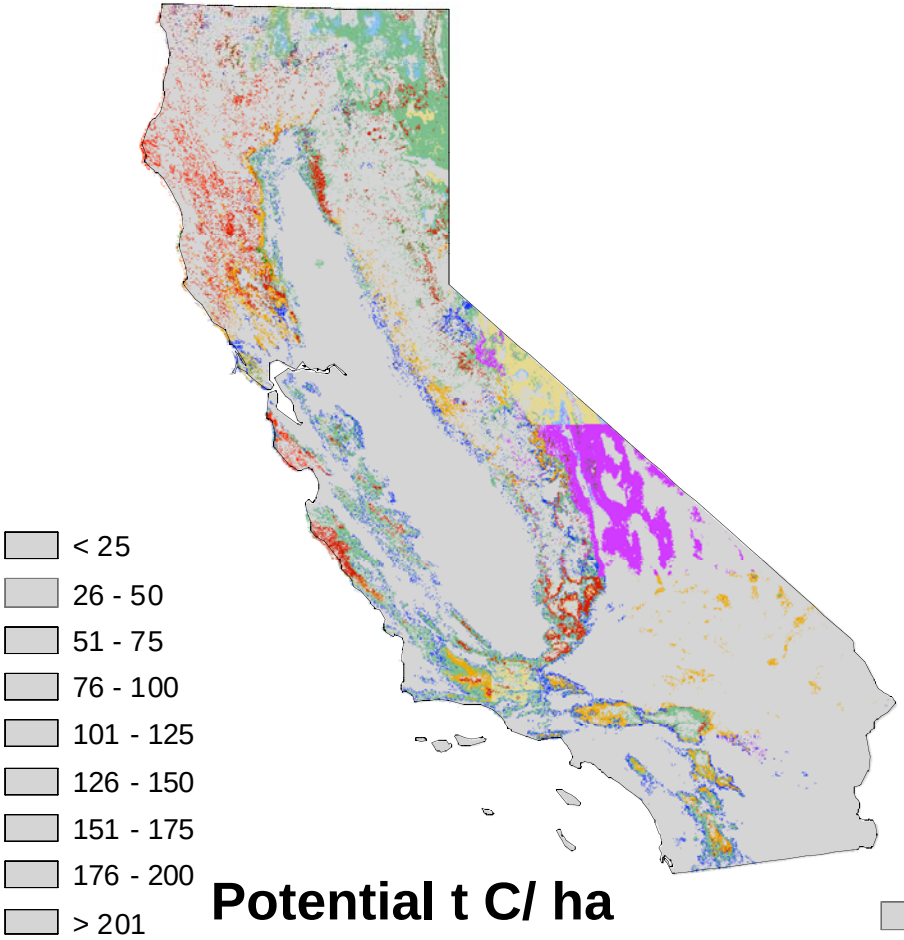
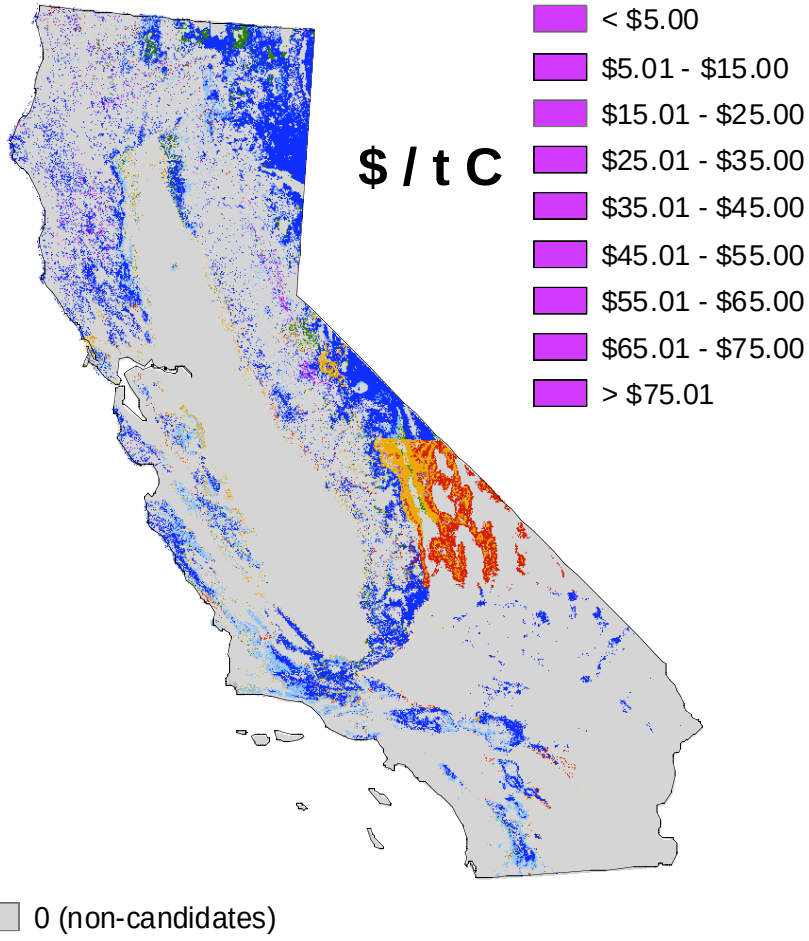
Evolving policy context for terrestrial sequestration

- CalEPA Climate Action Team – five forestry strategies
  - Afforestation, conservation, forest management, fuel reduction/biomass energy, urban forestry
  - 34 $MMTCO_2e$ by 2020
- Air Resources Board AB32 implementation
  - Forestry protocols adoption and development
  - Early actions
  - Economic and Technology Advancement Advisory Committee
  - Market Advisory Committee

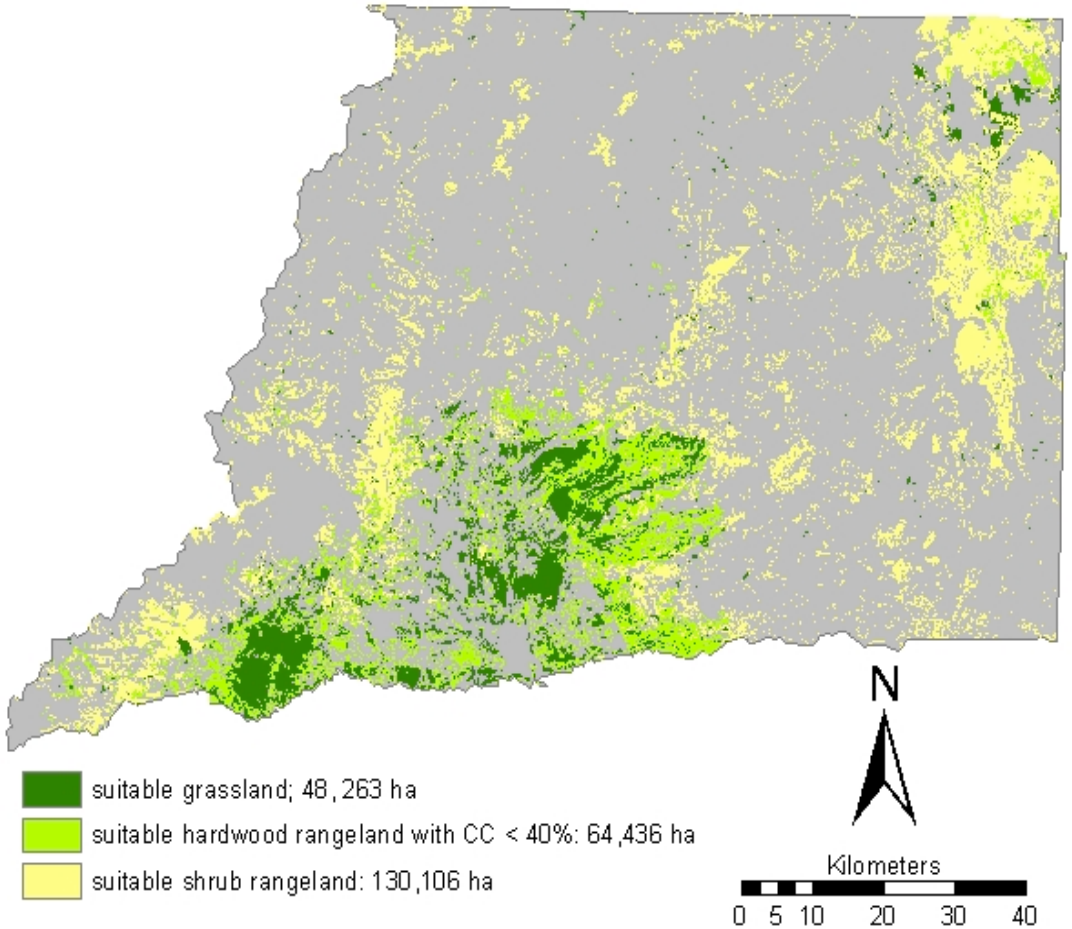
Afforestation – Statewide analysis
Potential sequestration and cost (40 Years)





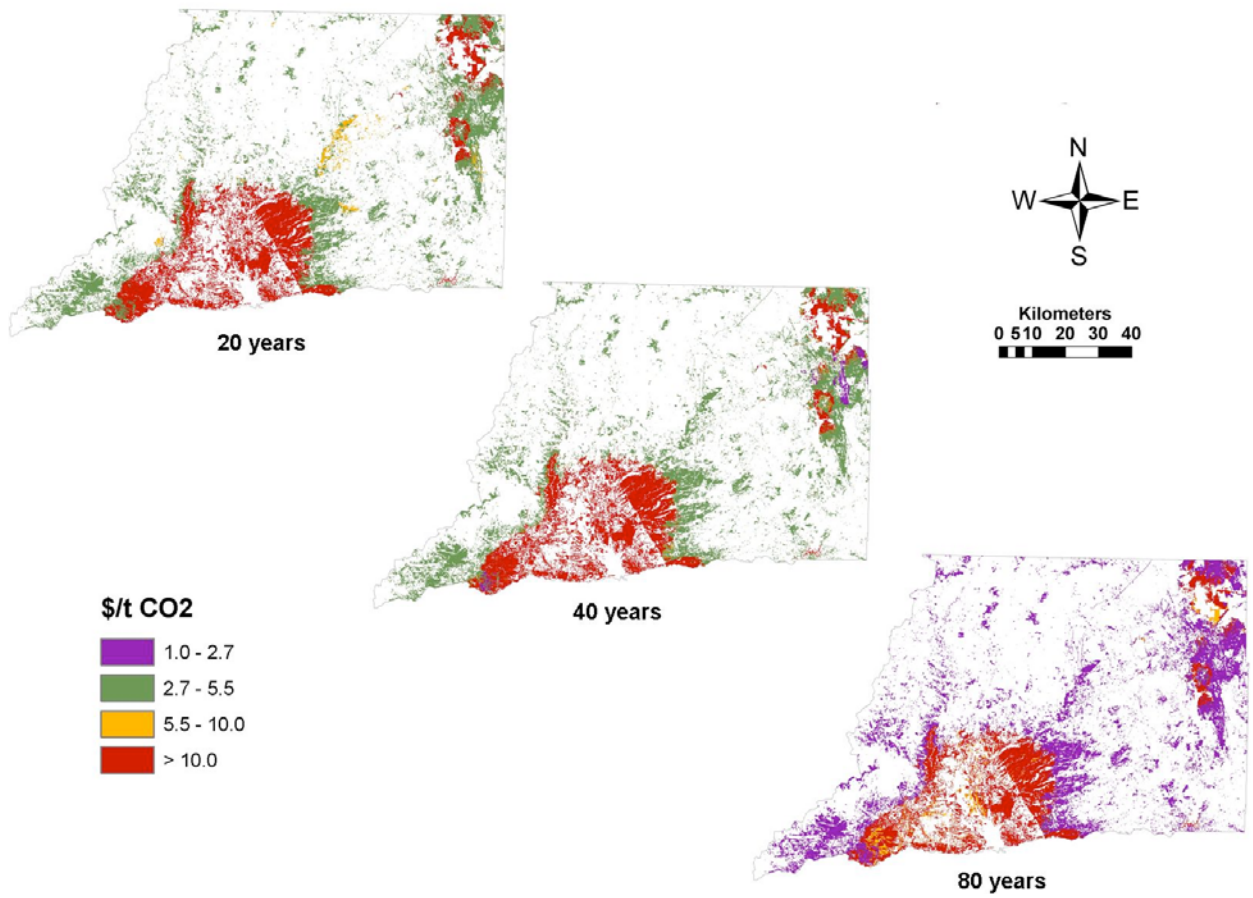
Afforestation at Shasta County level

- Candidate range-lands suitable for afforestation:
  - 600,000 acres (80% of total rangeland)
  - Grassland: 119,210 acres
  - Hardwood rangeland: 159,157 acres
  - Shrub rangeland: 321,362 acres



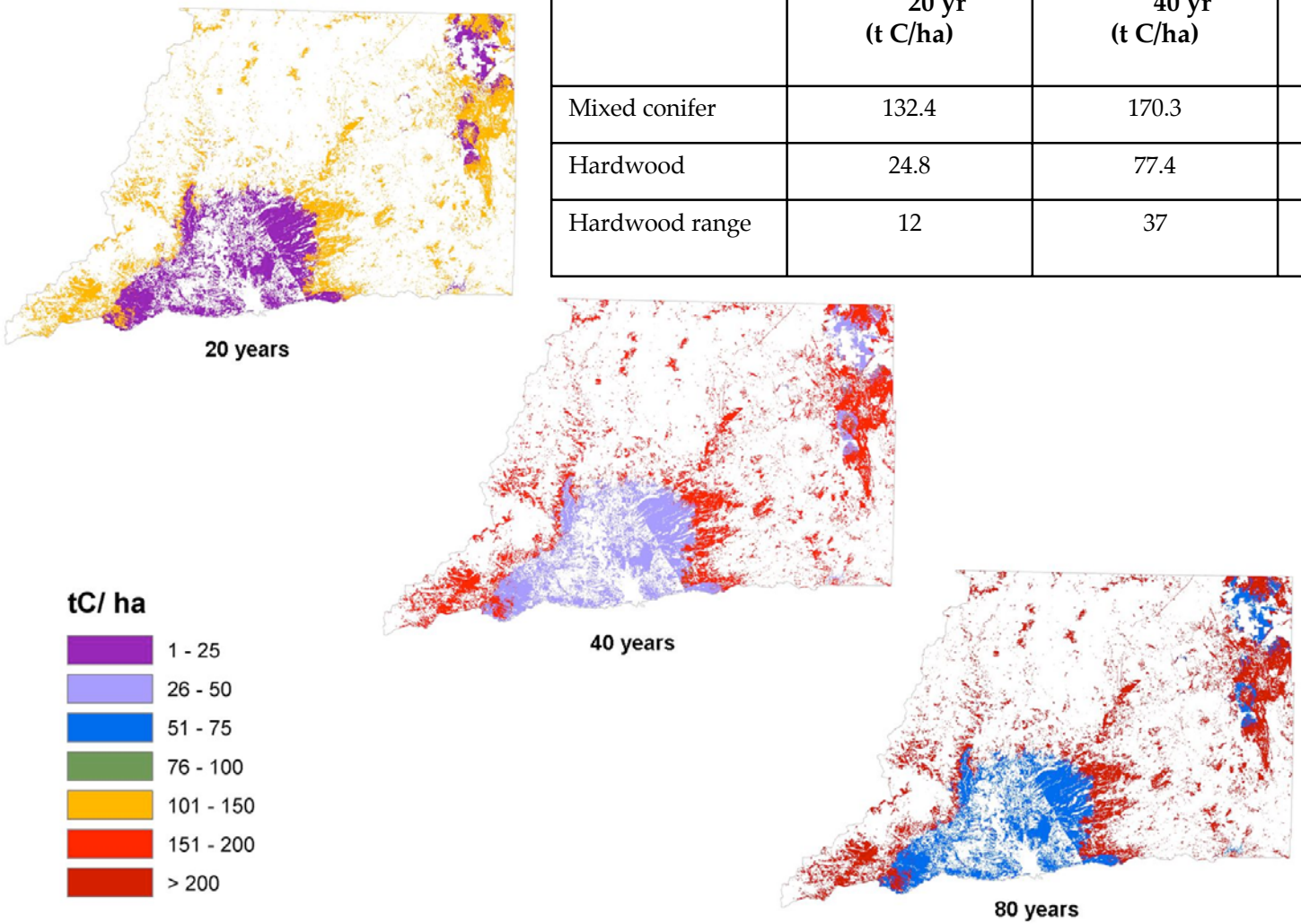
Costs of afforesting rangelands

- Opportunity costs
- Conversion costs
- Maintenance costs
- Measurement and monitoring costs
- Present value of all costs



Rates of carbon accumulation

Forest class	Carbon stock at 20 yr (t C/ha)	Carbon stock at 40 yr (t C/ha)	Carbon stock at 80 yr (t C/ha)
Mixed conifer	132.4	170.3	411.1
Hardwood	24.8	77.4	217.5
Hardwood range	12	37	59



Afforestation in Phase II: objectives

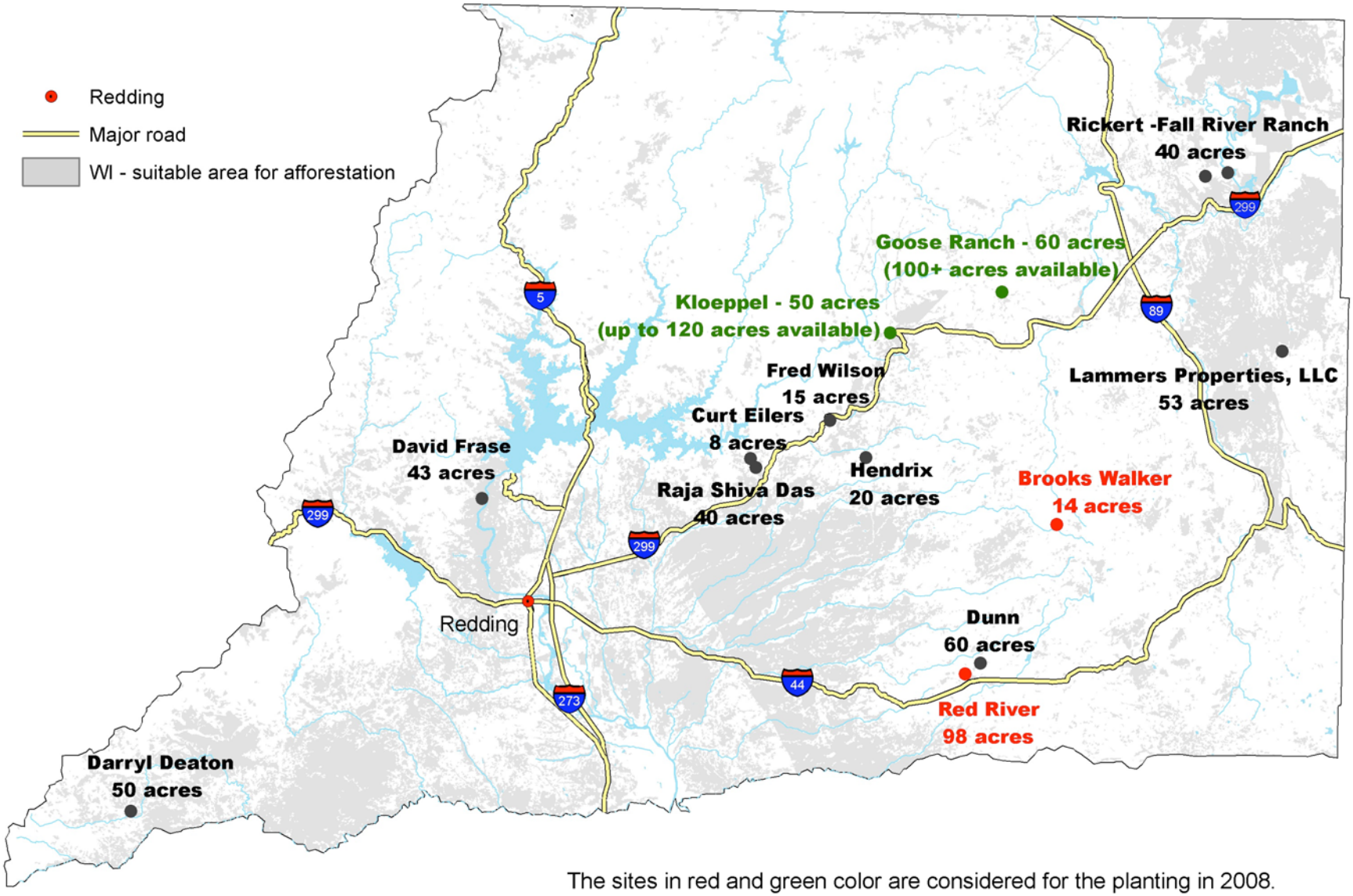
- Validate Phase I potential through actual pilots
  - Baseline carbon stocks
  - Carbon accumulation potential
  - Costs (site prep, planting, maintenance, MMV, registration/reporting)
- Explore conditions of landowner participation
  - Are the project designs assumed in Phase I those of most interest to landowners? What type of landowners? Under what conditions?
- Gain on-the-ground experience in site prep requirements, planting, maintenance, carbon registries/markets for expansion/replication
- "Road-test" Registry protocols and inform protocol development

Afforestation in Phase II: activities

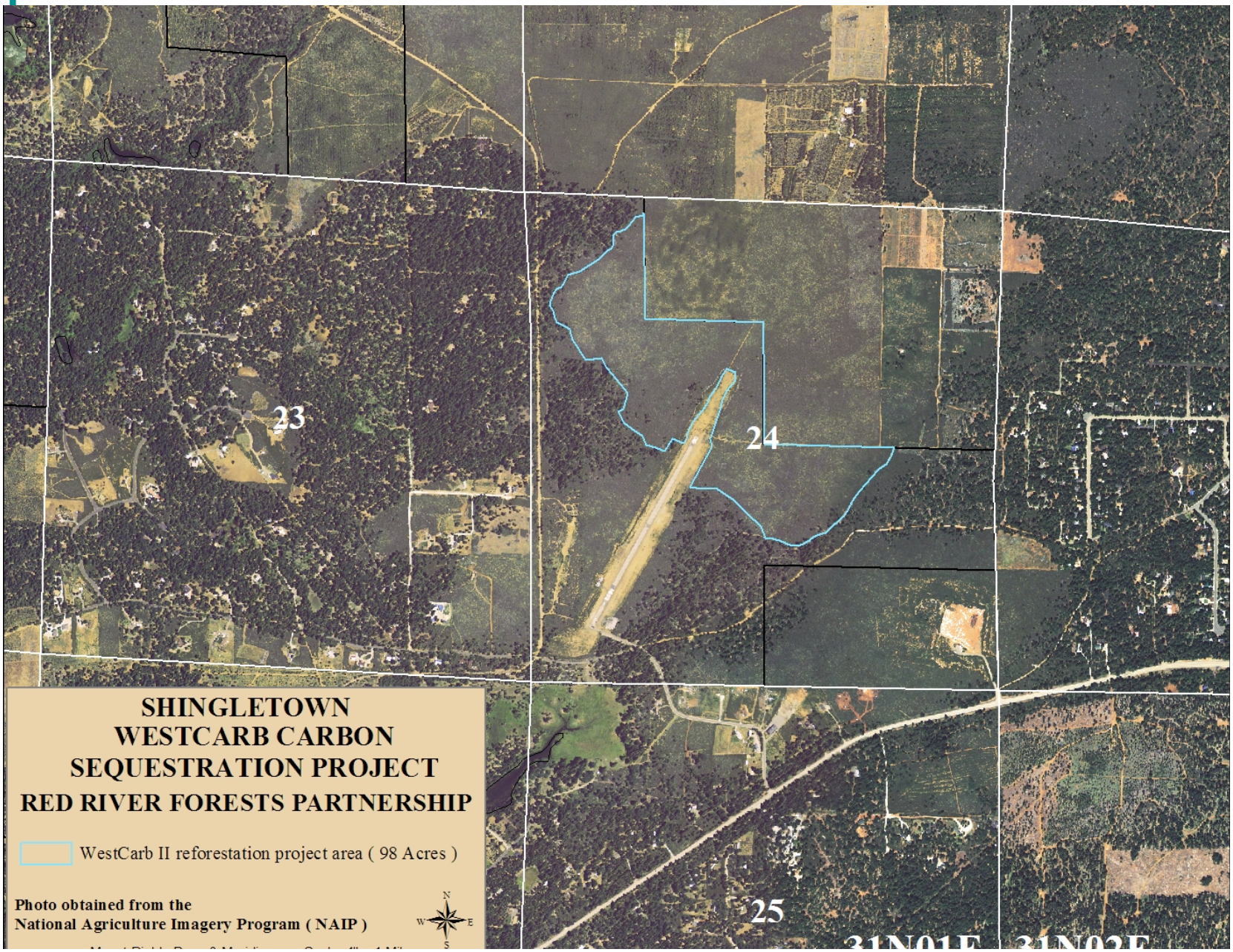
- Refine classification of lands for afforestation potential
- Set criteria for distribution of pilot plantings
- Recruit landowners for cost-shared afforestation pilots; negotiate agreements
- Prepare planting & maintenance plans
- Source seed and grow seedlings in nurseries
- Take baseline carbon measurements
- Implement site prep, planting, and initial maintenance treatments
- Collect data on establishment and maintenance costs
- Model carbon accumulation
- Test reporting protocols; work with willing landowners to explore options for reporting projects and/or selling credits

Afforestation in Phase II: current status

- ~400 landowners contacted, through mailings and watershed groups
- 44 interviewed in formal survey on willingness, cost-sharing, site conditions, acres, species preferences, etc.
- 14 site-specific planting plans developed
  - Acres, soils, seed zone, site class, precipitation, current vegetation; step-by-step plan for site prep, planting, chemical and mechanical treatments; estimated costs including WESTCARB and landowner portions
  - Planting in 2008 and 2009
- 5 landowner agreements signed (245 acres)
- 6 more may be negotiated (206 acres)
- Afforestation subcontractor under contract and site prep underway for 2008 planting



The sites in red and green color are considered for the planting in 2008.
The sites in black could be considered in the selection for the planting in 2009.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SHINGLETOWN
WESTCARB CARBON
SEQUESTRATION PROJECT
RED RIVER FORESTS PARTNERSHIP
WestCarb II reforestation project area (98 Acres)
Photo obtained from the
National Agriculture Imagery Program (NAIP)
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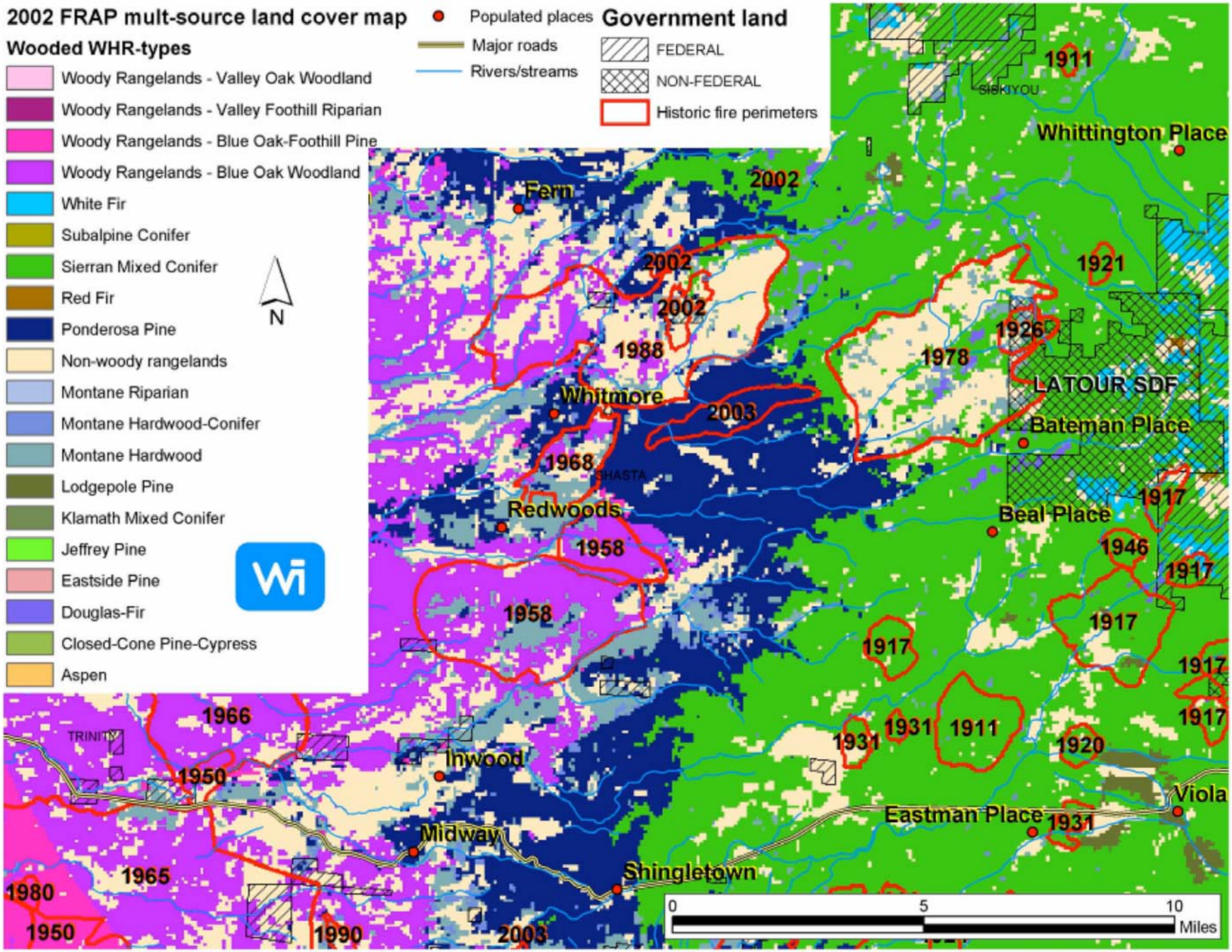
Preliminary findings 1

- Lot of landowner interest in conducting afforestation for carbon
- Projects from 8 to 98 acres, average 40
- Operational costs range from $500 to $1,000/acre, average $750
- Landowners are willing to share costs
- Afforestation process and costs are well understood; however –
  - Lot of landowner uncertainty about carbon markets
  - Low opportunity-cost, flexible projects providing multiple future revenue streams
  - Not all landowners appear able/willing to meet current forest protocol requirements for reforestation


2002 FRAP mult-source land cover map
Wooded WHR-types
Woody Rangelands - Valley Oak Woodland
Woody Rangelands - Valley Foothill Riparian
Woody Rangelands - Blue Oak-Foothill Pine
Woody Rangelands - Blue Oak Woodland
White Fir
Subalpine Conifer
Sierran Mixed Conifer
Red Fir
Ponderosa Pine
Non-woody rangelands
Montane Riparian
Montane Hardwood-Conifer
Montane Hardwood
Lodgepole Pine
Klamath Mixed Conifer
Jeffrey Pine
Eastside Pine
Douglas-Fir
Closed-Cone Pine-Cypress
Aspen
Populated places
Major roads
Rivers/streams
Government land
FEDERAL
NON-FEDERAL
Historic fire perimeters
N
Fern
Whitmore
Redwoods
Inwood
Midway
Shingletown
Eastman Place
Viola
Beal Place
Bateman Place
Whittington Place
LATOUR SDF
SISKIYOU
SHASTA
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Preliminary findings 3

- Projects have substantial co-benefits
  - Healthier forest with habitat diversity
  - Timber and biomass fuel values
  - Fire risk reduction (interrupt brush and burn cycle)
- Projects with biomass removal for biopower are challenging; added cost and added benefit
  - Improves overall GHG balance of project (by GHG emissions of biopower alternative displaced)
  - Need for a local processing industry, as in fuel reduction case

CAT
950G

- 98-acre brush afforestation
- Baseline carbon stocks 17 tCO_2/acre
- Carbon accumulation potential, estimated, at 40 years: 250 tCO_2/acre
- Sequestration benefit 23,000 tCO_2 (40 years)
- Biomass fuel yield 10 BDT/acre conservative
- Fossil fuel displacement benefit 489 tCO_2e (year 1)

Contact info

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