WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
westcarb.org

WESTCARB Annual Business Meeting

Latour Carbon Sequestration Demonstration: Afforestation

Tim Robards & Doug Wickizer
California Dept. of Forestry & Fire Protection
tim.robards@fire.ca.gov

Phoenix, AZ
November 9, 2006

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
westcarb.org

Latour Carbon Sequestration Demonstration

Funded by the California Energy Commission

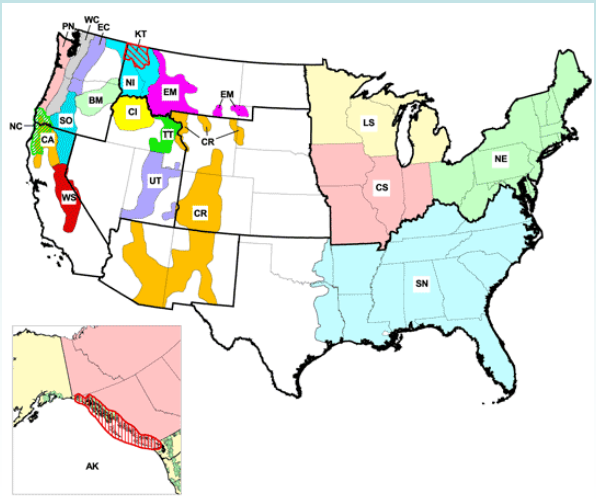
Contents

- Landscape Management System (LMS)
- Protocol Selection
- Harvest Schedule
- Entity / Leakage
- Baseline / Additionality
- Lessons Learned & Next Steps

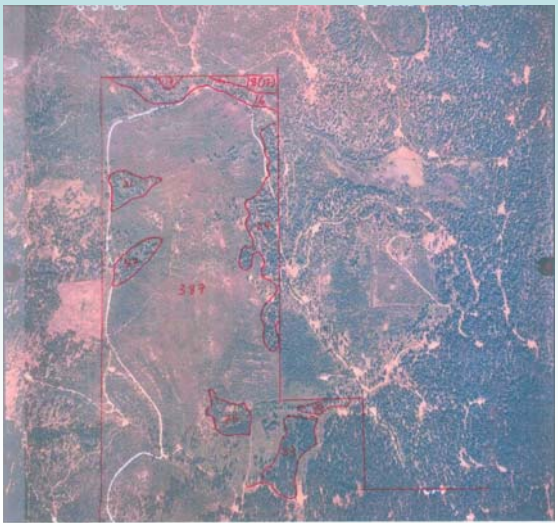
LMS

"Its purpose is to develop the concepts and tools needed to help forests provide the wide range of values people want -- including commodities, wildlife habitat, fire safety, employment, and carbon sequestration."

FVS: Forest Vegetation Simulator



Protocol Selection



Name THP QMD TPA BA/Ac MBF Volume Gross

STAND_387

Notes

	QMD	TPA	BA/Ac	MBF Volume Gross
Conifer	10.1	60.1	33.4	4.2
Hardwood	9.0	3.0	1.3	0.0
Total	10.0	63.1	34.7	4.2

Biging site index: 110

Dunning Site Class: 1

Percent Tree Cover: 25.0% Sighting Tube

18.7% Models

SUBPLOT

Species	TPA: <1'	1 - 3'	3 - 6'	6' - 4.5"
Incense Cedar	8.0	16.0	0.0	8.0
Jeffrey Pine	0.0	0.0	0.0	4.8
Lodgepole Pine	0.0	0.0	1.6	3.2
Ponderosa Pine	3.2	3.2	3.2	19.2
Sugar Pine	0.0	4.8	1.6	0.0
White Fir	384.6	137.8	70.5	17.6

WHR KMC 3 S

SHRUBS

Species	Cover	Height
	4	0.3
C	3	4.9
CH	15	4.0
M	16	4.4
MA	0	4.0
O	1	1.6

Total: 63

No. of Plots for Shrubs: 156

Friday, November 08, 2002 Page 11 of 12

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 7

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 8

Harvest Schedule

- Project
- Entity
- LMS: No Optimization
- Hardwire Constraints (GIS overlays)
- Proposed Management First
- Baseline Second
- California MSP or NTMP Rules

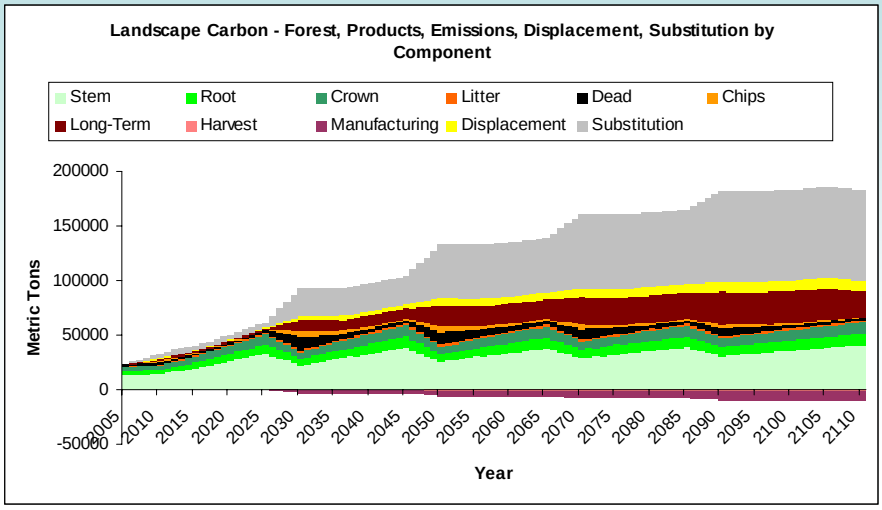
LMS carbonseq.ini

```
carbonseq.ini - Coefficients carbon sequestration computations for LMS

There are sections for various components of carbon that makeup trees,
including:

    Foliage, Live Branches, Dead Branches, Stem, Bark, and Roots

Each component has species specific equations and coefficients to accomplish
the computations.  This file defines the known species, equation used, and
coefficents.

Equation 1: Biomass = exp( b0 ) * (dbh ** b1)
            same as Biomass = exp( b0 + b1 * ln( dbh ) ) - after Jenkins et al. 2003
            same as ln( Biomass ) = b0 + b1 * ln( dbh )
Equation 2: Biomass = b0 + b1 * (d**2 * ht/100)
Equation 3: Biomass = b0 + b1 * (d**2 * ht/100) - b2 * (d**2 * ht/100)**2

Coeficients and equations come from:

Gholz, H.L., C.C. Grier, A.G. Campbell, and A.T. Brown. 1979. Equations
   and their use for estimating biomass| and leaf area of plants in the
   Pacific Northwest. Forest Research Laboratory, Oregon State University,
   Corvallis. Research Paper 41. 37 p.

Updated 2/19/2003 to include Equation form 4 from Ter-Mikaelian and Korzukin 1997:
Equation 4: Biomass = b0 * d ** b1

Ter-Mikaelian, M. T. and M. D. Korzukhin. 1997. Biomass equations for
    sixty-five North American tree species.  Forest Ecology and Management.
    97(1997): 1-24.

Updated 7/10/2004 to include support for Jenkins et al. 2003 coefficients and equations:
AboveGround (AB) biomass equation is the same as Equation 1 from Gholz et al. 1979.
Component biomass estimates are computed as a ratio of AB using Equation form 5:
Equation 5: Ratio = exp( b0 + b1/dbh )
            Biomass = AboveGroundBiomass * Ratio
     LiveBranch (LB) biomass is computed by subtraction:
        (LiveBranchBiomass = AboveGroundBiomass - FolioageBiomass - StemBiomass - BarkBiom

Jenkins, J.C., D.C. Chojnacky, L.S. Heath, and R.A. Birdsey. 2003. National-Scale
   Biomass Esitmators for United States Tree Species. Forest Science. 49(1): 12-35.
```

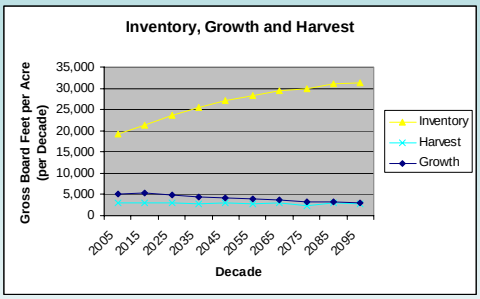
Table Display

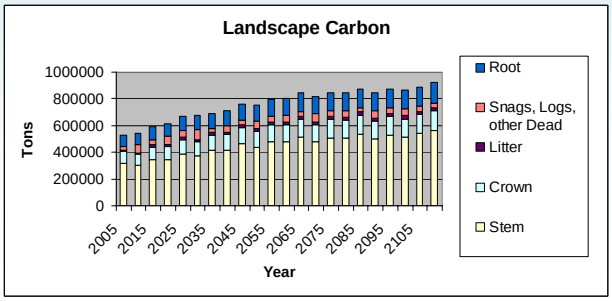
Landscape Forest Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Total	23024.83	25484.13	33241.66	43362.73	54571.99	48536.9	50518.18	56683.67
Stem	13454.29	14266.71	19786.67	26296.89	32789.32	22169.8	27920.75	33167.62
Root	3651.684	3886.093	5393.357	7156.909	8904.614	6052.869	7601.744	9002.277
Crown	3737.483	4013.586	5575.029	7371.124	9122.731	6265.946	7819.275	9192.256
Litter	373.7485	557.6748	790.7243	1067.793	1358.828	1194.879	1281.631	1455.219
Snags, Logs, other Dead	1807.622	2760.072	1695.882	1470.014	2396.499	12853.4	5894.787	3866.296
Landscape Products Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Total	0	3646.474	2821.052	2333.649	2045.842	20436.48	15845.92	13135.24
Short-Term Hogfuel	0	949.4635	560.6487	331.0575	195.4861	5653.451	3338.306	1971.236
Short-Term Chips	0	1066.17	629.5625	371.7504	219.5149	5556.435	3281.02	1937.409
Long-Term	0	1630.841	1630.841	1630.841	1630.841	9226.597	9226.597	9226.597
Landscape Emissions Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Total	-2.566965	-520.5121	-520.5121	-520.5121	-520.5121	-3148.808	-3148.808	-3148.808
Harvest	-2.566965	-67.36751	-67.36751	-67.36751	-67.36751	-389.1531	-389.1531	-389.1531
Manufacturing	0	-453.1446	-453.1446	-453.1446	-453.1446	-2759.655	-2759.655	-2759.655
Landscape Displacement Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Total	0	572.7707	572.7707	572.7707	572.7707	3913.62	3913.62	3913.62
Landscape Substitution Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Total	0	4470.917	4470.917	4470.917	4470.917	25294.53	25294.53	25294.53
Landscape Cumulative Carbon All Species								
Year	2005	2010	2015	2020	2025	2030	2035	2040
Forest	23024.83	25484.13	33241.66	43362.73	54571.99	48536.9	50518.18	56683.67
Forest,Products,Emissions	23022.26	28610.1	35542.2	45175.87	56097.32	65824.58	63215.3	66670.11
Forest,Products,Emissions,Displacement	23022.26	28233.4	35554.33	45417.58	56474.61	64084.75	63790.61	68612.49
Forest,Products,Emissions,Substitution	23022.26	33081.01	40013.12	49646.78	60568.24	91119.1	88509.83	91964.53
Forest,Products,Emissions,Displacement,Substitution	23022.26	32704.32	40025.24	49888.5	60945.53	89379.27	89085.14	93907.02

Graph Display



Entity / Leakage

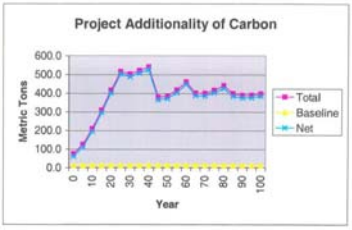


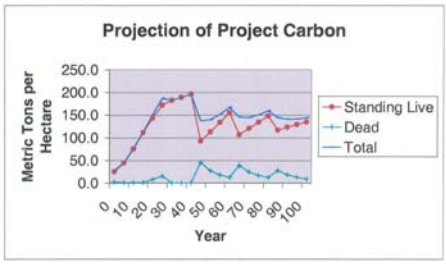


Baseline / Additionality

- California Forest Practices Law and Regulations
- Set at the Beginning
- Can go back to 1990
- **Forest Management**: Option C Standards
- **Reforestation**: Current vegetative cover
- **Conservation**: Local land use or site specific

Age	Carbon (metric tons/ha) Standing Live	Standing and Down Dead	Total	Project (metric tons) Total	Baseline	Net
0	24.7	1.9	26.7	73.6	13.8	59.8
5	43.9	1.2	45.1	124.4	13.8	110.6
10	74.4	1.2	75.6	208.7	13.8	194.9
15	110.5	1.3	111.8	308.6	13.8	294.8
20	142.3	7.7	150.1	414.2	13.8	400.4
25	171.4	15.2	186.6	515.0	13.8	501.2
30	181.8	0.0	181.8	501.9	13.8	488.1
35	188.6	0.0	188.6	520.4	13.8	506.6
40	195.5	0.0	195.5	539.6	13.8	525.8
45	91.9	45.0	136.9	377.8	13.8	364.0
50	112.2	27.0	139.1	383.9	13.8	370.1
55	133.1	17.6	150.8	415.8	13.8	402.0
60	154.5	12.2	166.8	460.2	13.8	446.4
65	106.4	38.6	145.0	400.2	13.8	386.4
70	120.0	24.3	144.3	398.4	13.8	384.6
75	133.7	16.5	150.2	414.6	13.8	400.8
80	147.4	11.8	159.2	439.5	13.8	425.7
85	116.3	27.6	143.9	397.1	13.8	383.3
90	122.7	17.8	140.5	387.8	13.8	374.0
95	128.7	12.3	141.1	389.3	13.8	375.5
100	134.5	8.9	143.5	395.9	13.8	382.1





Reforestation

Lessons Learned

- Be a Lumper, NOT a Splitter
- Cover Estimates
- Shrub Projections
- California Wildlife Habitat Relationships
- Evolving Process

Next Steps

- Complete Baseline Modeling
- Treatments Contract
- Assemble Protocol Packages
- Third Party Review
- Analyses of Alternative Baselines
  - Washington, Oregon Rules
  - Appropriate Approaches
- Feedback to Registry
- Reports

Outreach

- CA Board of Forestry and Fire Protection
- CCAR Certifier Training
- National Assoc. of Conservation Districts
- Society of American Foresters National Convention

California Forestland Incentives

Forest Incentive Types:

- Regulatory Streamlining:
  - New proposed Legislation on Streamlining
  - Stewardship NTMP or PTEIR (Board of Forestry and Fire Protection)
  - Environmental exemptions for light touch fuels treatment.
- Landowner Assistance
  - California Forest Improvement Program (75% share)
  - Vegetation Management Program (up to 90% share)
  - Proposition 40 Provide $5 mil/yr for seven years of private landowner fuels treatments. (grants up to full cost)
  - Umbrella Programmatic Environmental Documents. (PTEIR, PEIR, NTMP etc.)
  - Salmonid and Steelhead (SB 71)
  - Timberland Production Zone (tax benefit)
- Forest Legacy; Working Forest Conservation Easements
- **Federal**
  - Healthy Forest Initiative
  - US Forest Service ($50 Mil for Southern California bark beetle caused tree mortality)
  - NRCS ($150 Mil for Southern California Bark Beetle)

Real Carbon Sequestration