



Forest Carbon Accounting for Oregon

The Forest Carbon Task Force

and

Forest Inventory and Analysis

74th OREGON LEGISLATIVE ASSEMBLY--2007 Regular Session

Enrolled House Bill 3543



Established:

- *Oregon Climate Change Research Institute.* Directed by Dr. Phil Mote
- *Oregon Global Warming Commission.* Chaired by Angus Duncan

SECTION 12. (1) The Oregon Global Warming Commission shall track and evaluate:
.....(i)

- The carbon sequestration potential of Oregon's forests
- Alternative methods of forest management that can increase carbon sequestration and reduce the loss of carbon from wildfire
- Changes in the mortality and distribution of tree and other plant species
- The extent to which carbon is stored in tree-based building materials



❑ Oregon Global Warming Commission's Roadmap to 2020

- Develop a Greenhouse Gas Accounting Methodology by sector
- Forestry key actions:
 - Establish a Carbon Inventory for Oregon Forests
 - Invest in Research to understand the impacts of climate change on carbon storage in forests
 - Pursue Reforestation/Afforestation
 - Advance Energy and Forest policies supporting biomass facilities

The Oregon Global Warming Commission

Interim Roadmap to 2020



Roadmap Elements as Adopted by the Oregon Global Warming Commission on October 28, 2010

The Interim Roadmap As Adopted Will Be Incorporated into the Commission's 2011 *Report to the Legislature*.

October 29, 2010



OGWC

Forest Carbon Technical Committee 2010

Forestry Technical Committee Members

Name	Organization
Brian Kernohan	Forest Capital Partners
Andrew Yost	Oregon Department of Forestry
Angus Duncan	Global Warming Commission
Linc Cannon	Oregon Forest Industries Council
Beverly Law	Oregon State University
Elaine O'Neill	CORRIM
Greg Miller	Weyerhaeuser
Mark Harmon	Oregon State University
Olga Krankina	Oregon State University
Rick Brown	Defenders of Wildlife
Steve Dettman	EcoTrust
Evan Smith	The Conservation Fund
Mike Cloughsey	Oregon Forest Resource Institute
Peter Weisberg	The Climate Trust
Jeannette Griesse	Bureau of Land Management
Tom Demeo	US Forest Service



Global Forest Watch Report

GEOS
INSTITUTE

Clearcutting our Carbon Accounts¹

How State and private forest practices are subverting Oregon's climate agenda

By John Talberth,² Dominick DellaSala,³ and Erik Fernandez⁴

November 2015

- Concluded that the timber Industry is taking credit for the emissions reductions achieved by non-profits, small landowners, and government
- Information used was unreliable and OGWC was overlooking statutory responsibilities



Forest Carbon Task Force 2016...reconvened

- First Meeting July 2016
- Second Meeting October 2016
- Third Meeting February 2017
- Fourth Meeting Oct 19?

Members of the new Forest Carbon Task Force included:

Catherine Mater
Dr. Greg Latta,
Dr. Mark Harmon,
Dr. Beverly Law,
Dr. Jeremy Fried,
Dr. Thomas Bucholz
Dr. Dominick DellaSala
Andrew Elsbree,
Brian Kittler
Mark Stern
Cassie Phillips

Mater Engineering
University of Idaho
Oregon State University
Oregon State University
Forest Inventory and Analysis
Spatial Informatics Group
Geos Institute
Green Diamond
Pinchot Institute
The Nature Conservancy
Weyerhaeuser

Oregon forest carbon stocks and flux in the aughts: a rapid response FIA analysis

OREGON GLOBAL WARMING COMMISSION TASK FORCE
SALEM, OR
6 OCTOBER 2016

Jeremy S. Fried, USFS PNW Research Station, FIA Portland

Statistical estimates provided by Olaf Kuegler & Andrew Gray





- Sampled 146,570 trees on 4,842 plots
- Field tally of DBH, Ht, Species, Cull, Decay Class
 - used to derive volume, biomass and carbon per tree
- These feed inventory estimates of in-forest C flux
- **Uncertainties include:**
 - Measurement error (very low)
 - Equation error (generally unbiased)
 - Equation selection error (many equations; which best?)
 - Sampling error (antidote: large sample; stratification)
- modeling (e.g., RS) that builds on these data only adds additional uncertainty that is rarely well- quantified but is almost certainly of far greater magnitude



Table 5. Estimates of carbon stocks in Oregon by pool type, from FIA data 2001-2010 (soil C modeled), by ecoregion section and owner group

Coast Range

Owner	Area (ac)	AG_livet_Cton		AG_snag_Cton		DWM_Cton		Foflo_Cton		carbon_soil_org		All pools combined	
		Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac
BLM	794,448	55.6	70.0	3.7	4.6	8.3	10.5	5.1	6.4	42.7	53.7	115.3	145.1
NFSres	62,281	5.6	89.4	0.5	8.5	0.5	8.0	0.6	10.3	3.8	61.0	11.0	177.2
NFSunr	711,453	59.0	82.9	5.7	8.0	6.9	9.7	7.7	10.8	43.8	61.6	123.0	172.9
Other	62,114	2.4	38.4	0.2	2.6	0.4	5.7	0.9	13.9	4.6	73.8	8.3	134.3
PI	2,203,390	74.7	33.9	3.9	1.8	21.8	9.9	19.8	9.0	129.5	58.8	249.8	113.3
PNI	736,450	23.7	32.2	1.0	1.3	4.7	6.3	6.7	9.1	50.0	67.8	86.1	116.9
State	656,638	37.0	56.3	2.9	4.5	8.1	12.4	6.6	10.1	37.5	57.1	92.1	140.3
Eco Total	5,226,774	257.9	49.3	17.9	3.4	50.7	9.7	47.4	9.1	311.7	59.6	685.6	131.2

All Ecoregions

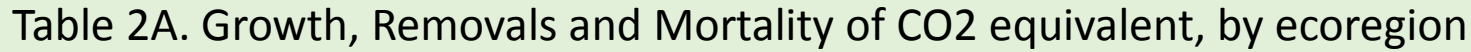
Owner	Area (ac)	AG_livet_Cton		AG_snag_Cton		DWM_Cton		Foflo_Cton		carbon_soil_org		All pools combined	
		Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac	Mill. Tons	Tons/ac
BLM	3,742,376	140.2	37.5	11.2	3.0	19.6	5.2	18.9	5.1	175.3	46.9	365.3	97.6
NFSres	2,408,117	114.2	47.4	24.0	9.9	18.5	7.7	13.5	5.6	96.5	40.1	266.7	110.7
NFSunr	11,692,038	453.1	38.8	58.0	5.0	85.8	7.3	78.3	6.7	493.4	42.2	1,168.6	99.9
NPS	166,922	8.4	50.3	1.1	6.6	1.2	7.1	0.6	3.9	4.9	29.2	16.2	97.0
Other	220,105	6.2	28.1	0.5	2.1	1.0	4.4	1.9	8.5	13.0	59.2	22.5	102.2
PI	6,545,455	165.7	25.3	9.4	1.4	53.4	8.2	42.5	6.5	316.8	48.4	587.8	89.8
PNI	4,351,377	88.8	20.4	4.2	1.0	16.9	3.9	25.7	5.9	227.2	52.2	362.9	83.4
State	939,097	45.1	48.0	3.5	3.7	10.3	11.0	7.9	8.4	50.9	54.2	117.7	125.4
State total	30,065,488	1021.6	34.0	111.8	3.7	206.7	6.9	189.4	6.3	1,378.1	45.8	2,907.6	96.7



Table 2A. Growth, Removals and Mortality of CO2 equivalent, by ecoregion

West Cascades

	Public										Private				Total	
	NFS		BLM		NPS		State		OP		PI		PNI		Total	
	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE
	thousand metric tons per year															
Time 1	943,419	25,864	93,720	16,962	22,672	7,389	2,999	2,189	2,620	2,727	147,060	16,413	21,315	6,603	1,233,805	36,394
Gross Ingrowth	1,160	67	171	71	13	5	7	7	--	--	1,460	259	108	43	2,919	280
Ingrowth	72	38	--	--	--	--	--	--	--	--	--	--	--	--	72	38
Reversion	1,232	75	171	71	13	5	7	7	--	--	1,460	259	108	43	2,991	282
Total	13,990	365	2,437	403	321	107	71	57	50	52	5,449	640	739	219	23,057	868
Accretion																
Gross Growth	15,222	378	2,608	428	334	111	79	64	50	52	6,908	726	847	242	26,048	954
Mortality	7,589	574	474	150	265	120	60	59	--	--	652	124	77	36	9,117	620
Removals	989	229	54	40	--	--	--	--	186	193	5,792	1,188	619	443	7,640	1,292
Cut Trees			--	--	--	--	--	--	--	--	--	--	--	--		
Diversion																
Total	989	229	54	40	--	--	--	--	186	193	5,792	1,188	619	443	7,640	1,292
Net Growth: gg-M	7,632	660	2,134	413	70	80	19	16	50	52	6,256	680	770	227	16,931	1,055
Net Change: gg-M-R	6,644	694	2,080	407	70	80	19	16	-136	141	464	1,300	151	450	9,291	1,600
Time 2	1,009,896	27,025	114,269	19,243	23,354	7,555	3,192	2,298	1,251	1,302	151,480	18,087	22,530	6,721	1,325,972	39,114



	Public										Private					
	NFS		BLM		NPS		State		OP		PI		PNI			
	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE	Total	SE
	thousand metric tons per year															
Time 1	1,776,928	27,917	434,725	22,653	22,672	7,389	153,243	12,212	15,077	5,741	610,831	26,036	204,422	17,048	3,217,898	44,066
Gross Ingrowth																
Ingrowth	2,711	87	950	163	13	5	249	59	88	41	6,127	490	1,175	181	11,313	549
Reversion	266	60	20	11	--	--	82	57	13	13	15	10	258	127	654	152
Total	2,977	103	969	164	13	5	331	85	101	43	6,142	490	1,433	220	11,966	566
Accretion	29,998	410	11,206	528	321	107	4,512	331	458	157	22,427	1,001	6,836	584	75,758	1,181
Gross Growth	32,975	425	12,175	564	334	111	4,843	368	559	174	28,569	1,152	8,269	661	87,724	1,322
Mortality	15,847	765	1,872	248	265	120	938	231	63	36	3,385	393	890	121	23,260	933
Removals																
Cut Trees	2,996	343	760	256	--	--	2,741	742	299	216	24,013	2,345	3,890	867	34,698	2,569
Diversion	38	15	10	11	--	--	--	--	--	--	--	--	7	5	55	19
Total	3,035	343	771	256	--	--	2,741	742	299	216	24,013	2,345	3,896	867	34,754	2,569
Net Growth: gg-M	17,129	870	10,303	606	70	80	3,905	405	496	157	25,183	1,146	7,379	625	64,465	1,586
Net Change: gg-M-R	14,094	933	9,532	635	70	80	1,165	856	197	212	1,171	2,682	3,483	953	29,711	3,178
Time 2	1,917,834	29,052	529,110	24,300	23,354	7,555	164,942	13,929	16,936	6,153	622,608	29,434	238,728	19,396	3,513,511	48,602

Time 2



Agenda For the Third Meeting Feb 2017

Overall Goal: Deliver a report to the State of Oregon that provides:

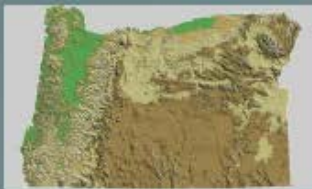
1. A baseline estimate of carbon in Oregon's forests
2. A quantitative description of carbon flows among forest pools
2. Projections of how these quantities and flows may be affected by anticipated climate change
3. A quantitative description of carbon flows into and out of the forest from natural and human interventions.



Agenda For the Third Meeting Feb 2017

Purpose:

- Finalize a baseline estimate of carbon storage in Oregon's forests for submission to the Oregon State Legislature within the next three months
 - A progress report on findings for subsequent steps
 - A work plan for completing both static and dynamic portraits of forest carbon accounting.
-
1. Review FIA data tables; which tables can we agree to use as our reference for prevailing carbon (CO₂e) content in Oregon forests?
 2. Review 2017 OGWC Biennial Report description of work plan
 3. Review Dr. Harmon's "Proposed System to Estimate Carbon Stores and Changes in Oregon's Forest Sector"
 4. Review Fire emissions data presented by Dr. Bev Law



Oregon's Forest Carbon Picture

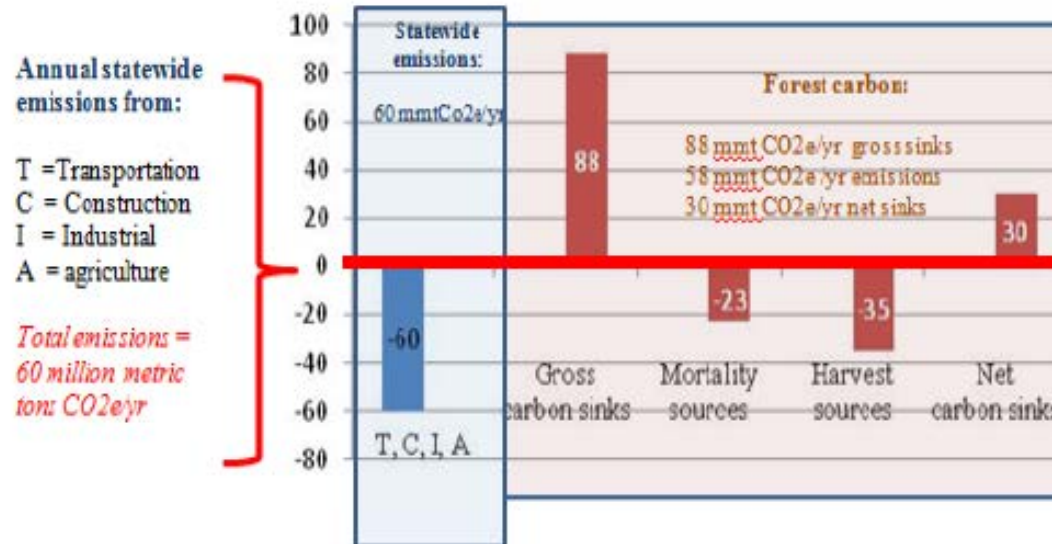
The Forest Carbon Picture in Oregon: *A Key Role in the State's Carbon Footprint and Performance* *(Final)*

July 2017

Prepared by Catherine M. Mater
Oregon Global Warming Commission Member
Chair – Commission Forest Advisory Task Force

Oregon carbon sinks and sources per year
(2012 all other statewide sources; 2011-2015 forest carbon)

(million metric tons CO₂e)



Forests:
key carbon performer

- All other statewide carbon sources
- Forest carbon sources and sinks

Net carbon sinks from forests
= 30 mmt CO₂e/yr ...

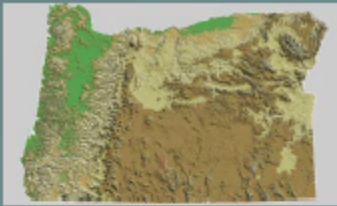
... equivalent to 50% of all other
statewide emissions per year

88

58

30

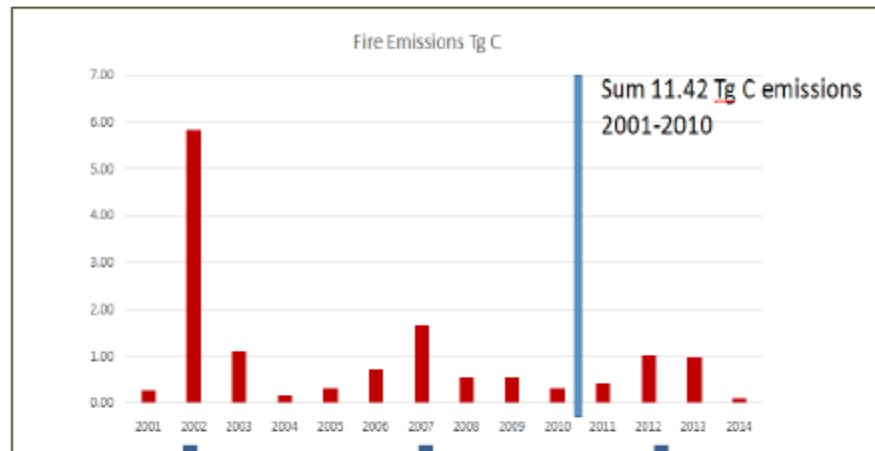
Forest carbon by the numbers ...



Oregon's Forest Carbon Picture (preliminary)

(do not cite or circulate)

Average annual CO₂e emissions from fire (2001-2005 compared to 2011-2014)



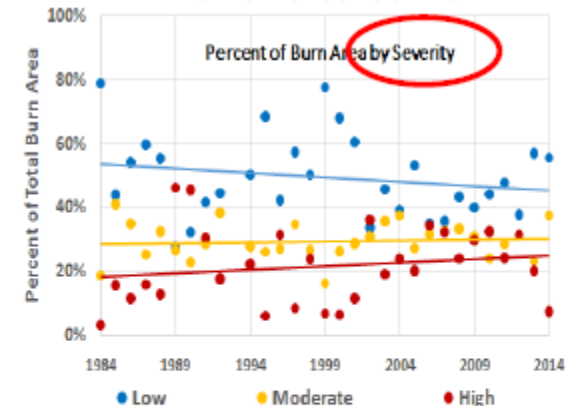
2002: ~600,000 acres burned in south western Oregon
(emissions from fire = 10% of all other sector emissions that year)

2007: ~200,000 acres burned northeast and southeast Oregon

2012: ~1 million acres burned in southeast Oregon

Why the difference?

Acres burned don't tell the story ...



Statistically, no changes in fire severity over last 30 years

Comparable



A Draft Report to the Legislature From the Chair of OGWC

- Recommends Legislature defer enacting new forest mgt policies
- Suggests five possible policy responses that the Commission hopes to develop into recommendations for State administrative and legislative action.
 1. Should Oregon set statewide (or regional) forest carbon capture targets?
 2. Should Oregon reconsider the priority uses for State forestlands , and elevate carbon capture as a priority goal?
 3. Should federal and state forest management practices be modified to prioritize carbon capture among multiple uses?
 4. If forest carbon capture is to be a higher priority, what combination of regulatory and incentive tools would be appropriate for different forests and ownerships?
 5. Where private development is adjacent to forested areas (WUI) do we have appropriate policies to optimize for carbon capture and sequestering (e.g., extent of WUI margins; further penetration of development into forests; fire management treatments)?



Conclusions

- FIA data is currently being presented as the empirical basis for forest carbon accounting to the Oregon Legislature
- FIA tables are being used for research and development of forest carbon management policies in Oregon
- Opportunity to expand partnership between state government, Oregon Department of Forestry and the FIA program
- Important to communicate uncertainties and limitations.
- Remeasured plot system excellent for estimating change but consistency in sampling design really important.
- Commendations to FIA analysts