



Site Carbon Pool Quantification

PINEMAP 2013 Annual Meeting Field Tour
Tier III site, Taliaferro County, GA

PINEMAP carbon sampling is conducted on plots at Tier II sites varying in a number of attributes including age, level of fertilization and competition control, planting stock, thinning, and planting density. These plots are located on roughly 130 active research sites spanning the natural range of loblolly pine. The data gathered from these sites will allow us to address how above- and below-ground carbon pools vary with climate, soils, stand development, and previous management.

Using standardized protocols, crews can sample the various above- and below-ground carbon pools including standing stems, soil, understory vegetation, forest floor, and coarse woody debris. The biomass and nutrient content data gathered from each of these components can then be scaled to estimate total ecosystem carbon.



Figure 1. Measuring diameter (left) and height (right) on standing live and dead trees. These data are later used in models to estimate total tree volume and determine total carbon of standing stems.



Figure 2. Forest floor after removal of the Oe/Oa layer (duff) and Oi layer (litter). Duff includes the dark, partly decomposed organic material (unrecognizable plant forms) above mineral soil. Litter is on top of duff and includes recognizable plant parts, such as leaves and flowers and twigs < 2.5 cm in diameter. This material is dried, weighed, ground, and analyzed for nutrient content.



Figure 4. Use of a soil bucket auger to collect soil samples to a depth of one meter. Soils are placed by depth (0-10 cm, 10-20 cm, 20-50 cm, and 50-100 cm) on a tarp, homogenized, and then weighed. These samples can then be subsampled in the field and taken to the lab for processing to ultimately determine total carbon of the soil.

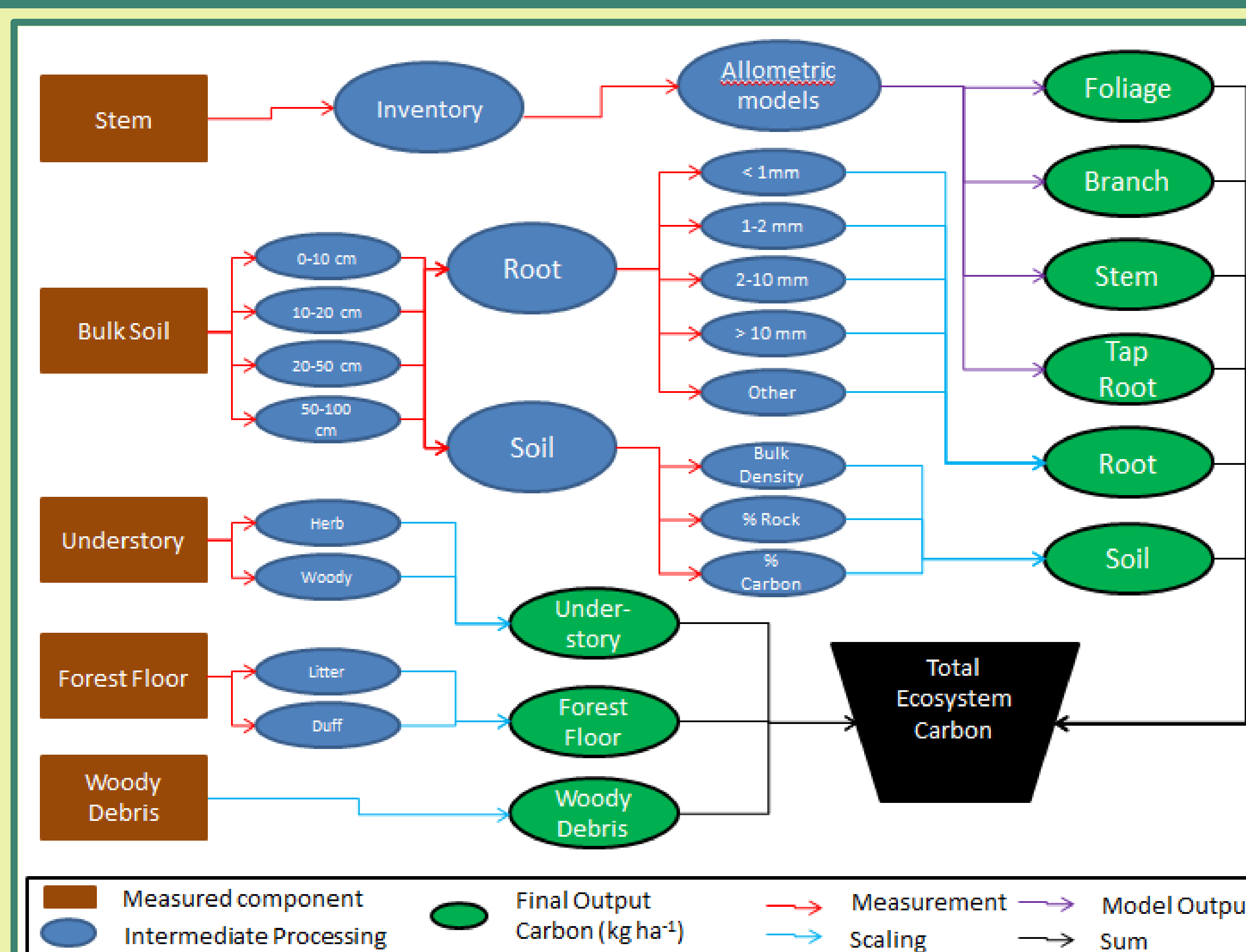


Figure 3. Flow chart illustrating how field measured components are scaled to estimate total ecosystem carbon.

Working Spreadsheet for Forest Floor and Understory																				
Order#	Site	Plot	Group	Collection Date	Material (litter, duff, herb, woody)	Area sampled (m ²)	Sample ID	DD mass +bag (g)	Net Mass (g)	crucible #	crucible wt (g)	crucible wt + sample (g)	crucible post burn (g)	loss on ignition (g org/g sample)	% N	% C	Carbon (kg/ha)	Nitrogen (kg/ha)		
1	IMP106	con		1/7/30/2012	litter	0.49	12-1	1002	126	876							0.303728	49.0293	8765.315	90.0539
2	IMP106	con		2/7/30/2012	litter	0.49	12-2	1053	126	929							0.659566	47.7209	9045.602	125.048
3	IMP106	con		1/7/30/2012	duff	0.49	12-3	930	63	867	52a	27.38	28.61	27.77	0.682927	0.722844	31.68225	5605.819	127.8992	
4	IMP106	con		2/7/30/2012	duff	0.49	12-4	1174	63	1111	69a	27.12	28.31	27.43	0.739496	0.857338	37.59902	8525.002	194.3884	
5	IMP106	con		1/7/30/2012	herb		12-5	66	63	3									15	
6	IMP106	con		2/7/30/2012	herb		12-6	65	63	2									10	
7	IMP106	con		1/7/30/2012	woody		12-7	0	0	0									0	
8	IMP106	con		2/7/30/2012	woody		12-8	221	63	158									790	

Working Spreadsheet for Bulk Soil																						
Site	Plot	Group	Depth	Sample ID	total mass + spigoc bag (g)	sub mass wet WC (g)	sub mass dry WC (g)	DB total mass (g)	DB bag weight (g)	DB rock mass (g)	initial volume (mL)	DB rock volume (mL)	Bulk rock mass (g)	sample moisture content (g/g)	wet soil mass extracted (g)	Total dry soil mass sampled (g)	% N	% C	Nitrogen content (kg/ha)	Carbon content (kg/ha)		
IMP106	control		10-10	1	2536.6	1.15	36.46	31.2	146.3	14.1	3.6	20	21	15	1.41139806	0.1685897	2535.45	2093	0.047573	1.128123	671.4509	15922.31
IMP106	control		10-20	2	3375.2	1.15	37.83	32.39	152	13.6	2.6	20	21	144	1.49041879	0.1679531	3374.05	2663	0.024619	0.671185	366.9301	10003.46
IMP106	control		10-50	3	3478.1	1.15	38.16	36.99	146	14.1	1.1	20	21	48	1.43554328	0.231365	3476.95	14500	0.020971	0.486579	903.1598	21385.63
IMP106	control		150-100	4	3401.4	1.15	36.04	26.92	145	13.8	0	20	21	150	1.42642266	0.3387816	2200	18397	0.009568	0.1799258	683.3041	12831.17
IMP106	control		20-10	5	1156.4	1.15	30.85	25.86	137.1	13.6	0.1	20	20	12	1.33962501	0.1929621	1155.25	920	0.062349	1.574632	835.2456	21094.14
IMP106	control		210-20	6	4201.8	1.15	33.31	27.52	136.7	13.7	0.2	20	20	135	1.33311144	0.2103924	4200.65	3182	0.018663	0.579104	248.7996	7720.096
IMP106	control		220-50	7	3954.4	1.15	34.81	27.67	140.8	13.5	7.7	20	24	62	1.35731206	0.2580412	14500	10696	0.019036	0.458026	775.141	18650.52
IMP106	control		250-100	8	3455.5	1.15	30.11	22.26	118.8	13.8	0	20	20	78	1.13987841	0.3526505	2200	14164	0.009578	0.223913	545.9258	12761.61

Lateral Roots Sorted from Bulk Soil									
Site	Plot	Group	Depth	Sample ID	V fine	Medium	Coarse	Other Org.	root mass (g)
IMP106	control		10-10	1	0.39	0.712	2.025	2.13	0.53
IMP106	control		10-20	2	0.151	0.463	1.953	7.906	0.77
IMP106	control		10-50	3	0.049	0	1.252	0	0
IMP106	control		150-100	4	0.081	0	0	0	0.64
IMP106	control		20-10	5	0.572	0.9	1.372	5.609	2.52
IMP106	control		210-20	6	0.359	0.517	6.029	0	0.76
IMP106	control		220-50	7	0.029	0	3.6	0	0
IMP106	control		250-100	8	0.04	0.02	0.12	0	0.09

Figure 5. Biomass and nutrient data from a Tier II site control plot demonstrating data processing methods, as well as the size of various carbon pools (kg ha⁻¹).