APPENDIX A: VALUE OF AGING TIMBER WITH ALTERNATIVE CARBON CALCULATION

As noted in section on riparian zone management, alternative methods for crediting carbon could be used. In particular, the method used in section 2 above to estimate sequestered carbon credits storage in forest products, but ignores carbon already stored on the stump at the time the contract is signed. Since harvests do lead to some emissions, these emissions are not initially counted as emissions to the atmosphere. In this appendix, alternative carbon sequestration estimates are presented using METHOD 3 discussion in section 3. The alternative method would be consistent with a method for valuing carbon that rented additional carbon above the baseline when the additional carbon was there. See Sohngen and Mendelsohn (2003) for a discussion of rental rates.

The results of these alternative estimates of the marginal costs of carbon sequestration are shown in **Tables A1 and A2** for permanent contracts, and **Tables A3 and A4** for 20 year discounted contracts. The main difference is that this method suggests substantially more carbon could potentially be sequestered. These don't actually represent new carbon relative to the methods used within the main text of the report, but different crediting methods that reveal a different impact on landowners. The costs of holding trees longer remains the same, but under this alternative property rights scheme, owners of current forests are credited for the sequestered carbon they hold on the site for a few more years. While the marginal costs look substantially different in this case, the costs overall are still relatively high in this region Marginal cost curves for these two scenarios are also estimated and presented in **Figures A1 and A2**.

Table A1 (*Permanent Contract – Discounted Carbon*). Net carbon sequestered and $$ per ton for increasing rotation ages X years above economically optimal rotation ages (the rotation ages for this analysis are shown in Table 6) in California timber region 7.

	t C per hectare			$ per t C		
	5 years	10 years	15 years	5 years	10 years	15 years
HWD Hi	2.82	3.36	2.13	$37	$97	$319
HWD Med	6.03	9.39	10.66	$14	$36	$72
HWD Low	3.12	4.99	5.77	$17	$43	$75
DF Hi	15.92	29.83	41.97	$234	$236	$235
DF Med	11.60	21.73	30.59	$270	$266	$261
DF Low	55.66	62.51	68.52	$40	$65	$81
PP Hi	10.05	18.91	26.69	$218	$222	$223
PP Med	6.39	12.00	16.93	$243	$242	$239
PP Low	4.90	9.26	13.11	$237	$233	$228
FS Hi	10.80	20.40	28.88	$76	$79	$82
FS Med	5.19	9.83	13.97	$102	$101	$99
LP Avg.	5.45	10.22	14.42	$235	$235	$232
RW Hi	11.99	22.75	32.35	$311	$316	$317
RW Med	10.18	18.98	26.63	$530	$519	$506

HWD = hardwood species; DF = Douglas fir; PP = ponderosa pine; FS = fir-spruce; LP = lodgepole pine; RW = redwood; Hi= high site quality; Med = Medium site quality; Low = low site quality; Avg =average site quality.

Table A2 (*Permanent Contract – Discounted Carbon*). Net carbon sequestered and $$ per ton for increasing rotation ages X years above the legally mandated rotation age in California timber region 7.

	t C per hectare			$ per t C		
	5 years	10 years	15 years	5 years	10 years	15 years
HWD Hi	-6.14	-12.15	-17.87	--	--	--
HWD Med	0.43	-0.02	-1.04	$2,045	--	--
HWD Low	0.39	0.30	-0.11	$1,117	$2,603	--
DF Hi	16.00	29.99	42.17	$248	$248	$247
DF Med	11.72	21.97	30.94	$293	$288	$282
DF Low	63.57	68.36	63.32	$46	$77	$113
PP Hi	10.05	18.91	26.69	$215	$218	$220
PP Med	6.44	12.09	17.05	$261	$258	$254
PP Low	5.24	8.31	5.11	$299	$343	$761
FS Hi	11.41	21.47	30.34	$116	$116	$115
FS Med	5.70	9.30	6.88	$134	$150	$276
LP Avg.	5.68	10.64	15.00	$312	$304	$294
RW Hi	11.80	22.40	31.87	$283	$291	$295
RW Med	10.52	16.24	8.20	$744	$861	$2,289

HWD = hardwood species; DF = Douglas fir; PP = ponderosa pine; FS = fir-spruce; LP = lodgepole pine; RW = redwood; Hi= high site quality; Med = Medium site quality; Low = low site quality; Avg =average site quality.

Table A3 (*20 Year Contract – Discounted Carbon*). Net carbon sequestered and $$ per ton for increasing rotation ages X years above economically optimal rotation ages (the rotation ages for this analysis are shown in Table 6) in California timber region 7.

	t C per hectare			$ per t C		
	5 years	10 years	15 years	5 years	10 years	15 years
HWD Hi	0.89	3.03	4.92	$118	$108	$139
HWD Med	6.76	8.80	10.28	$13	$39	$75
HWD Low	3.50	4.58	5.38	$16	$47	$81
DF Hi	9.44	23.10	39.98	$394	$304	$247
DF Med	8.06	18.72	31.37	$388	$309	$254
DF Low	43.08	50.75	59.28	$51	$80	$94
PP Hi	6.91	15.88	26.06	$318	$264	$228
PP Med	4.71	10.41	16.77	$329	$279	$242
PP Low	4.34	8.91	13.65	$268	$242	$220
FS Hi	9.02	20.13	31.89	$91	$80	$74
FS Med	5.42	11.22	16.99	$98	$88	$81
LP Avg.	3.88	8.57	13.84	$330	$280	$242
RW Hi	9.73	21.32	33.71	$384	$338	$304
RW Med	5.33	12.93	23.35	$1,013	$763	$577

HWD = hardwood species; DF = Douglas fir; PP = ponderosa pine; FS = fir-spruce; LP = lodgepole pine; RW = redwood; Hi= high site quality; Med = Medium site quality; Low = low site quality; Avg =average site quality.

Table A4 (*20 Year Contract – Discounted Carbon*). Net carbon sequestered and $$ per ton for increasing rotation ages X years above the legally mandated rotation age in California timber region 7.

	t C per hectare			$ per t C		
	5 years	10 years	15 years	5 years	10 years	15 years
HWD Hi	1.31	2.04	2.70	$1,024	$1,166	$1,180
HWD Med	7.57	8.78	9.90	$116	$181	$218
HWD Low	4.04	4.70	5.31	$108	$168	$202
DF Hi	9.93	23.98	41.15	$400	$311	$253
DF Med	8.66	19.79	32.84	$397	$320	$265
DF Low	49.33	55.65	53.69	$59	$95	$133
PP Hi	6.91	15.88	26.06	$312	$260	$225
PP Med	4.88	10.72	17.19	$343	$291	$252
PP Low	5.07	8.69	6.62	$309	$328	$588
FS Hi	10.78	23.28	36.14	$123	$107	$96
FS Med	6.43	11.59	11.12	$119	$120	$171
LP Avg.	4.69	10.02	15.82	$378	$323	$279
RW Hi	9.26	20.47	32.56	$361	$319	$289
RW Med	7.81	13.94	9.94	$1,003	$1,003	$1,890

HWD = hardwood species; DF = Douglas fir; PP = ponderosa pine; FS = fir-spruce; LP = lodgepole pine; RW = redwood; Hi= high site quality; Med = Medium site quality; Low = low site quality; Avg =average site quality.

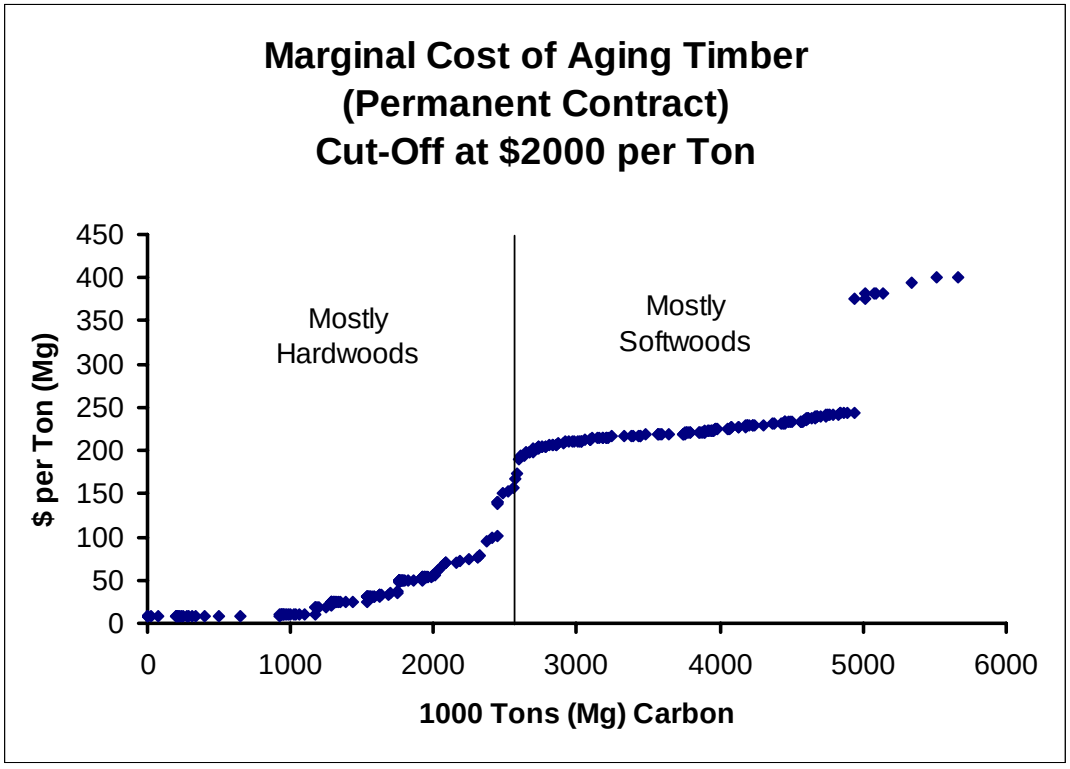

Figure A1. Marginal cost of carbon sequestration with aging timber under the permanent contract.

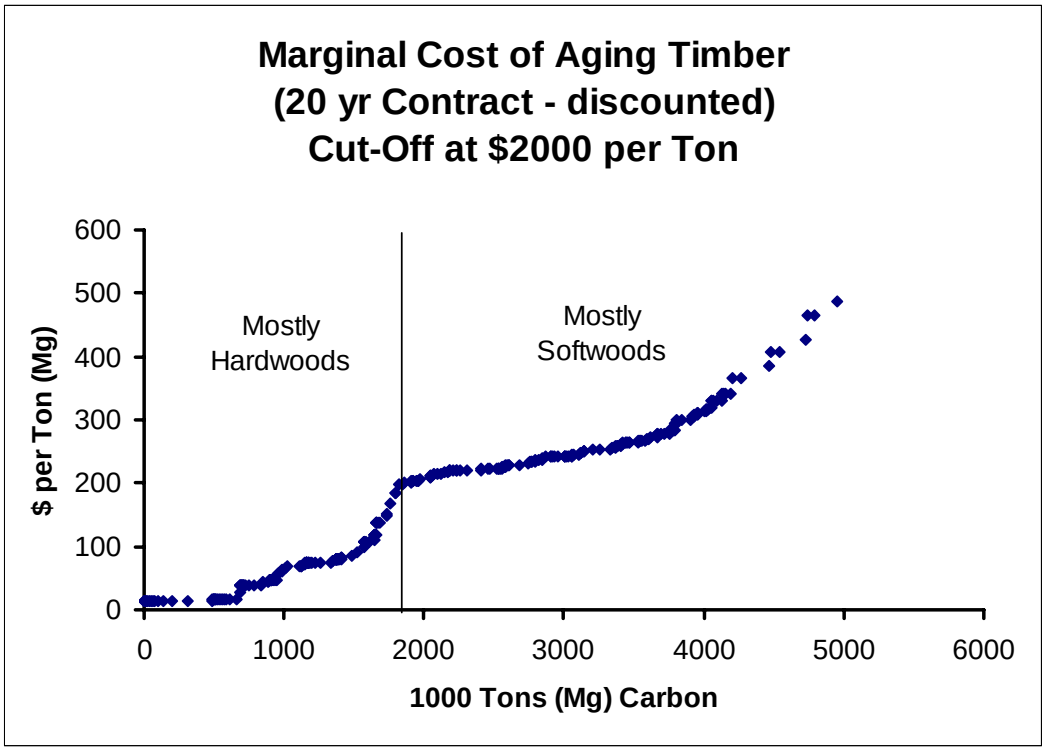

Figure A2. Marginal cost of carbon sequestration with aging timber under the 20 year contract.