

RESEARCH

Appendix A: Organic Carbon Proxy and Lipid and Lignin Biomarker Data for Soils, Vegetation, and Aquatic Samples Collected from the Yuba River Watershed

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Table A1 TOC, TN, C:N_a and stable isotope values (in per mil) for soil, vegetation and aquatic samples collected from the upper Yuba River watershed. Samples for which values were below detection are noted as not detected (n.d.). The mean and standard deviation are reported for soil, charcoal, and aquatic sample groups.

Sample ID	TOC (%)	TN (%)	C:N _a	δ ¹³ C _{TOC} (‰)	δ ¹⁵ N _{TN} (‰)
Soil					
MS1	0.36	0.01	2787	-26.81	-3.94
MS2	0.45	0.03	1738	-27.71	-3.84
US1	4.63	0.39	11.79	-27.57	1.57
US2	1.12	0.03	32.29	-28.54	n.d.
US3	1.17	0.03	35.85	-24.36	-1.44
US4	3.55	0.18	20.25	-23.42	-0.57
US5	1.82	0.12	15.20	-24.71	-2.80
FS1	5.78	0.20	28.42	-25.09	-5.80
FS2	16.05	0.48	33.78	-29.59	-5.75
FS3	9.29	0.34	27.01	-28.05	-4.73
SS1	0.27	0.02	13.50	-32.94	-1.44
SS2	0.61	0.03	20.17	-28.49	-2.57
AS1	4.33	0.35	12.42	-29.41	-7.30
AS2	5.45	0.50	10.80	-26.94	-0.82
AS3	5.61	0.43	12.99	-29.18	-5.43
AS4	5.00	0.36	14.01	-28.94	-2.59
Mean ± S.D.	4.09 ± 4.12	0.22 ± 0.18	21.49 ± 9.10	-27.61 ± 2.39	-3.16 ± 2.40
Charcoal					
CC1	31.15	1.09	28.56	-27.18	-7.16
CC2	29.61	0.86	34.43	-31.60	-2.76
Mean ± S.D.	30.38 ± 1.09	0.98 ± 0.16	30.54 ± 3.59	-29.39 ± 3.12	-4.96 ± 3.11

Sample ID	TOC (%)	TN (%)	C:N _a	δ ¹³ C _{TOC} (‰)	δ ¹⁵ N _{TN} (‰)
Vegetation					
V1	41.89	0.74	56.58	-29.21	-7.44
V2	44.37	0.61	72.53	-29.08	-7.10
V3	39.80	0.51	77.86	-30.29	-9.22
V4	46.69	0.94	49.77	-28.94	-9.69
V5	46.31	0.58	79.68	-26.15	-9.77
V6	46.96	1.01	46.51	-27.90	-10.62
V7	43.75	2.16	20.28	-28.79	-5.06
V8	46.33	1.44	32.19	-28.33	-8.25
V9	46.07	0.57	81.51	-27.31	-10.41
V10	41.15	1.03	39.95	-28.59	-4.64
V11	38.02	0.91	41.78	-30.54	1.09
V12	43.57	1.00	43.78	-27.82	0.77
Mean ± S.D.	43.74 ± 2.96	0.96 ± 0.46	55.73 ± 21.19	-28.58 ± 1.21	-6.69 ± 4.05
Aquatic					
PL1	37.73	6.25	6.04	-33.72	3.48
PL2	32.46	5.84	5.56	-33.33	2.58
PL3	10.37	0.78	13.38	-27.71	-1.62
POM1	n.d.	n.d.	n.d.	n.d.	n.d.
POM2	0.18 ^a	0.02 ^a	9.88	-31.63	1.13
POM3	0.16 ^a	0.02 ^a	7.96	-32.31	1.26
ALG	n.d.	n.d.	n.d.	n.d.	-1.29
Mean ± S.D.	26.85 ± 14.52	4.29 ± 3.05	8.50 ± 3.40	-31.74 ± 2.39	0.92 ± 2.04

a. TOC and TN for POM samples are reported in μg L⁻¹.

Table A2 Fatty Acid (FA) data for samples collected from the upper Yuba River watershed. Long chain FA (LCFA), short chain FA (SCFA), polyunsaturated C₁₆, C₁₈, and C_{20+C22} FA, branched FA (BrFA including iso- and anteiso- C₁₅, C₁₇ and C₁₉ compounds) and diacids (C₁₄, C₁₆, C₁₈, C₂₀, C₂₂, and C₂₄) are reported as percent (%) of the total FA. Total FA are reported in $\mu\text{g g}^{-1}$ dry weight.

Sample ID	LCFA	SCFA	Polyunsaturated FA			BrFA	Diacids	Total FA ($\mu\text{g g}^{-1}$)
			C16	C18	C20+C22			
Soil								
MS1	11.6	47.3	0.0	5.5	0.0	0.6	2.0	25.8
MS2	17.4	25.6	0.0	14.2	2.0	3.8	0.5	19.2
US1	27.7	19.4	0.0	2.5	0.0	3.9	17.5	100.8
US2	2.8	31.5	0.0	0.0	0.0	0.0	5.6	57.0
US3	7.7	11.5	0.0	1.9	15.3	0.0	16.9	59.2
US4	11.2	16.5	0.0	26.4	0.0	0.0	10.6	134.0
US5	26.6	12.3	0.0	8.9	0.7	2.8	0.0	47.3
FS1	15.3	46.7	0.0	4.3	0.0	2.0	0.4	205.9
FS2	27.3	30.3	0.0	5.4	0.0	1.1	1.6	319.4
FS3	29.5	25.7	0.0	3.1	0.0	2.7	2.8	189.6
SS1	9.3	31.7	0.0	7.8	0.5	1.5	2.0	15.8
SS2	6.5	19.6	0.0	20.5	2.4	1.2	1.1	54.2
AS1	12.3	23.9	0.0	6.9	1.3	2.4	0.6	162.7
AS2	22.5	20.4	0.0	9.7	0.0	4.1	3.9	64.2
AS3	35.4	16.8	0.0	4.4	0.3	1.8	0.5	125.2
AS4	18.8	21.7	0.0	10.5	1.5	3.2	0.5	130.8
Charcoal								
CC1	30.2	19.5	0.0	4.9	0.0	1.9	7.2	929.7
CC2	8.5	33.9	0.0	21.7	0.2	1.3	0.3	1011.5
Vegetation								
V1	15.5	38.1	0.0	20.4	0.0	0.0	1.1	1244.2
V2	11.3	40.2	0.0	12.1	0.8	0.0	0.8	2604.8
V3	15.3	28.1	0.0	19.5	0.0	0.0	1.9	1550.4
V4	10.5	19.0	0.0	29.3	1.7	6.1	8.4	2951.3
V5	10.7	31.8	0.0	13.8	0.0	1.1	6.3	1861.7
V6	4.6	37.2	0.0	29.7	0.3	1.3	0.2	4504.6
V7	8.1	41.4	0.0	21.6	2.3	0.4	0.0	3060.9
V8	20.1	29.0	0.0	24.7	0.0	0.0	4.9	1923.1
V9	39.8	9.0	0.0	7.4	0.6	2.1	8.1	808.7
V10	4.4	17.0	0.0	45.0	13.3	0.9	2.6	1820.8
V11	6.7	35.9	0.0	37.7	0.0	0.0	0.0	1745.1
V12	3.2	29.8	0.0	44.2	0.0	0.0	0.0	3125.1
Aquatic								
PL1	15.5	57.2	0.0	2.1	0.3	2.9	0.0	8422.9
PL2	11.3	59.0	0.0	3.4	0.5	2.8	0.0	8185.4
PL3	15.3	68.1	0.0	1.2	0.2	1.4	0.0	2470.7
POM1	10.5	50.9	0.0	18.4	2.2	1.0	0.0	12.4 ^a
POM2	10.7	34.9	0.0	31.4	0.0	1.8	0.0	10.5 ^a
POM3	4.6	58.5	0.0	3.5	0.0	1.5	0.0	6.8 ^a
ALG	8.1	43.8	1.9	16.0	3.0	1.8	0.0	1477.5

a. Total FA for POM samples are reported in $\mu\text{g L}^{-1}$.

Table A3 Sterol data for samples collected from the upper Yuba River watershed are presented as a percent (%) of the total sterol concentration. Aquatic sterols include 27-nor-methylcholesta-5,22-dien-3 β -ol and cholesta-5,22-dien-3 β -ol, and plant sterols include 24-methylcholesta-5-en-3 β -ol (campesterol), 24-ethylcholesta-5,22-dien-3 β -ol (stigmasterol), and 24-ethylcholest-5-en-3 β -ol (sitosterol). Total sterol concentrations are reported in $\mu\text{g g}^{-1}$ dry weight.

Sample ID	Aquatic sterols	Brassicasterol	Cholesterol	Plant sterols	Total sterols (mg g ⁻¹)
Soil					
MS1	0.0	9.0	1.8	79.4	1.8
MS2	0.0	8.3	3.0	88.7	2.1
US1	0.0	2.4	5.8	91.8	50.6
US2	0.0	0.0	0.0	0.0	0.0
US3	0.0	0.0	0.0	100.0	1.0
US4	0.0	3.2	2.2	90.6	16.7
US5	0.0	2.6	6.1	91.3	7.8
FS1	0.0	6.8	3.2	90.0	13.1
FS2	0.0	3.3	1.3	94.1	63.4
FS3	0.0	5.5	1.2	91.0	46.2
SS1	0.0	5.8	5.2	89.0	0.4
SS2	0.0	11.7	1.1	87.2	87.2
AS1	0.0	2.1	3.0	94.9	19.0
AS2	0.2	0.1	5.0	69.0	21.1
AS3	0.0	3.9	2.3	93.8	29.5
AS4	0.0	3.6	4.8	91.6	21.2
Charcoal					
CC1	0.0	3.2	0.0	88.1	125.6
CC2	0.0	2.1	1.0	96.9	62.4
Vegetation					
V1	0.0	0.0	0.0	100.0	248.4
V2	0.0	0.0	2.3	97.7	441.8
V3	0.0	0.0	0.0	88.6	370.2
V4	0.0	0.0	0.0	100.0	1171.0
V5	0.0	2.8	0.0	97.2	1413.2
V6	0.0	0.0	0.0	100.0	696.6
V7	0.0	0.0	2.2	97.8	681.8
V8	0.0	0.0	0.0	100.0	5416.4
V9	0.2	2.5	0.3	89.3	496.6
V10	0.0	1.2	0.3	98.5	743.1
V11	0.0	0.0	0.3	99.7	368.1
V12	0.0	0.0	0.8	96.4	704.9
Aquatic					
PL1	2.3	5.7	75.5	16.5	520.3
PL2	4.1	1.3	84.6	9.7	1164.9
PL3	1.5	2.9	32.4	63.2	52.2
POM1	6.6	9.4	18.3	65.7	1.0 ^a
POM2	5.8	20.0	16.6	57.6	0.7 ^a
POM3	5.9	8.3	19.7	66.1	0.8 ^a
ALG	1.4	8.4	25.2	65.1	37.1

a. Total sterols for POM samples are reported in $\mu\text{g L}^{-1}$.

Table A4 Lignin phenol data for soil, vegetation and charcoal samples collected from the upper Yuba River watershed. The sum of 8 lignin phenols ($\Sigma 8$) are reported in $\mu\text{g g}^{-1}$, and the carbon normalized lignin concentrations ($\Lambda 8$) are reported in $\text{mg g}_{\text{TOC}}^{-1}$. Ratios of lignin phenols, including C/V, S/V, (Ad/Al)v, and 3,5-Bd:V are also presented here. Samples for which lignin values are not available are noted as n.a. The mean and standard deviation are reported for soil, char, vegetation, and aquatic sample groups.

Sample ID	$\Sigma 8$	$\Lambda 8$	C/V	S/V	(Ad/Al)v	3,5-Bd:V
Soil						
MS1	0.02	0.52	0.70	0.24	0.49	0.20
MS2	0.04	0.95	0.14	0.22	0.51	0.07
US1	1.16	2.51	1.09	1.04	0.37	0.06
US2	0.03	0.26	0.14	0.25	0.81	0.19
US3	0.09	0.79	0.17	0.24	0.43	0.06
US4	0.48	1.35	0.56	0.28	0.31	0.05
US5	0.43	2.34	0.39	0.48	0.44	0.02
FS1	2.22	3.85	0.13	0.14	0.39	0.03
FS2	5.07	3.16	0.26	0.15	0.33	0.06
FS3	2.51	2.70	0.15	0.18	0.32	0.06
SS1	0.01	0.49	1.09	0.43	0.68	0.13
SS2	0.01	0.20	0.73	0.02	1.05	0.10
AS1	0.71	1.65	0.83	0.34	0.41	0.08
AS2	1.06	1.94	0.56	0.18	0.43	0.04
AS3	1.38	2.46	1.05	0.43	0.36	0.07
AS4	0.78	1.57	0.64	0.36	0.45	0.07
Charcoal						
CC1	7.96	2.55	0.11	0.16	0.42	0.06
CC2	2.93	0.99	1.16	0.38	0.69	0.08
Vegetation						
V1	14.90	3.56	1.78	0.19	0.17	0.02
V2	34.13	7.69	0.90	0.08	0.14	0.00
V3	43.95	11.04	1.62	1.43	0.13	0.00
V4	5.90	1.26	0.07	0.56	0.24	0.06
V5	17.29	3.73	0.01	0.18	0.28	0.02
V6	17.78	3.79	0.01	0.31	0.18	0.03
V7	11.82	2.70	0.00	0.73	0.20	0.06
V8	18.04	3.89	1.12	0.31	0.20	0.04
V9	40.36	8.76	4.04	0.10	0.23	0.05
V10	0.76	0.18	0.45	0.74	0.58	0.71
V11	43.31	11.39	5.62	0.58	0.14	0.00
V12	32.93	7.56	1.98	4.78	0.20	0.02
Aquatic						
PL1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
PL3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
POM1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
POM2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
POM3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ALG	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.