

Table 2
Electron microprobe analysis of volcanic glass shards from tephra layers in cores from Carp Lake and comparative data for shards of correlative or chemically similar tephra layers of the northwestern U.S. ^a

Ash No. of shards	Lab No.	SiO ₂ sd ^b	Al ₂ O ₃ sd	Fe ₂ O ₃ sd	MgO sd	MnO sd	CaO sd	TiO ₂ sd	Na ₂ O sd	K ₂ O sd	Total (O) sd	Total (R)
<i>MSH layer Ye</i>												
Carp Ash-1 (major) <i>n</i> D 13	T-279-1	75.73 0.71	14.12 2.23	1.36 0.09	0.34 0.02	0.04 0.02	1.61 0.06	0.23 0.04	4.32 0.10	2.24 0.08	100.49 0.82	99.99
MSH (Ye713721) ^c <i>n</i> D 10±15	T3,4	75.89 na	14.01 na	1.34 na	0.35 na	0.05 na	1.67 na	0.18 na	4.36 na	2.15 na	96.96 na	100.00
Carp Ash-1 (hi Fe, lo Ca) <i>n</i> D 7	T279-1	75.68 0.83	13.87 0.24	1.40 0.07	0.34 0.04	0.04 0.04	1.47 0.12	0.22 0.04	4.67 0.08	2.32 0.05	98.77 0.85	100.01
Carp Ash-2 (major) <i>n</i> D 13	T281-3	75.98 0.79	14.32 0.46	1.25 0.08	0.34 0.04	0.04 0.02	1.65 0.09	0.14 0.04	4.15 0.15	2.13 0.09	97.67 1.13	100.00
MSH Ye (10=70) ^c <i>n</i> D 10±15	T5-3	75.66 na	14.52 na	1.32 na	0.34 na	0.03 na	1.68 na	0.13 na	4.16 na	2.06 na	96.38 na	100.00
MSH Ye (8=93) <i>n</i> D 6	T5-3	76.12 0.17	14.40 0.34	1.25 0.06	0.34 0.02	0.05 0.02	1.72 0.05	0.16 0.02	3.85 0.40	2.11 0.04	97.54 0.80	100.00
<i>Mazama ash bed</i>												
Carp Ash-3 <i>n</i> D 12	T279-2	72.76 0.95	14.60 0.26	2.04 0.10	0.46 0.04	0.06 0.02	1.49 0.06	0.43 0.06	5.48 0.10	2.68 0.08	97.87 1.22	100.00
Mazama Ash (avg. 94) <i>n</i> D 1400		72.81 0.35	14.64 0.23	2.13 0.04	0.45 0.02	0.05 0.01	1.60 0.06	0.43 0.02	5.19 0.18	2.70 0.08	na	100.01
<i>No close matches</i>												
Carp Ash-4 <i>n</i> D 15	T279-3	77.74 1.29	12.89 0.29	0.88 0.05	0.13 0.02	0.03 0.03	0.97 0.11	0.10 0.03	4.22 0.19	3.04 0.15	96.20 1.54	100.00
<i>MSH layer C</i>												
Carp Ash-5 (bulk) <i>n</i> D 15	T279-4	76.54 1.57	13.83 0.29	0.97 0.07	0.26 0.01	0.03 0.02	1.58 0.07	0.10 0.03	4.34 0.16	2.41 0.11	95.13 2.14	99.99
MSH Cw (8=93) ^d <i>n</i> D 6	T5-11	76.81 1.12	14.03 0.19	0.91 0.03	0.27 0.02	0.03 0.02	1.66 0.10	0.12 0.02	3.92 0.21	2.24 0.04	96.10 1.52	99.99
MSH CwSH (10=70) ^c <i>n</i> D 10±15		76.89 na	13.66 na	0.94 na	0.26 na	0.03 na	1.69 na	0.10 na	4.12 na	2.30 na	94.11 na	100.01
MSH Cy ^c <i>n</i> D 10±15	T32-5	76.15 na	14.05 na	1.03 na	0.30 na	0.04 na	1.62 na	0.12 na	4.32 na	2.36 na	95.29 na	99.99
<i>Like MSH layer C, but older</i>												
Carp Ash-8 <i>n</i> D 13	T281-3	76.49 0.68	14.17 0.16	1.00 0.08	0.23 0.02	0.04 0.02	1.52 0.05	0.10 0.03	3.96 0.08	2.49 0.05	91.88 0.86	100.00
Carp Ash-9 <i>n</i> D 13	T281-5	77.07 0.81	13.73 0.58	0.93 0.10	0.18 0.05	0.03 0.03	1.58 0.21	0.11 0.04	3.85 0.21	2.53 0.20	93.37 0.72	100.01
<i>Unnamed tephra layer in Palouse Fm, Washington</i>												
Carp Ash-10 <i>n</i> D 6	T279-5	75.43 0.70	14.38 0.07	1.20 0.06	0.38 0.05	0.04 0.03	1.81 0.04	0.12 0.01	4.39 0.15	2.24 0.09	93.20 0.83	99.99
CL-90A (1) ^d D Carp Ash-10 <i>n</i> D 10	T255-3	75.52 0.68	14.51 0.17	1.21 0.07	0.24 0.03	0.05 0.02	1.82 0.04	0.11 0.04	4.14 0.12	2.29 0.05	92.65 na	100.00
CL-90A (2) ^d D Carp Ash-10 <i>n</i> D 16	T255-3	75.38 0.68	14.51 0.17	1.29 0.07	0.35 0.04	0.06 0.03	1.84 0.04	0.13 0.05	4.19 0.16	2.25 0.05	92.85 na	100.00
Pelouse WA 5-19 ^d <i>n</i> D 5	T127-3	76.05 0.66	13.61 0.53	1.25 0.07	0.36 0.02	0.06 0.03	1.90 0.04	0.12 0.04	4.26 0.15	2.20 0.04	93.67 na	100.00
<i>No close matches (Ash-13 and Ash-11 match, except for MgO)</i>												
Carp Ash-13 <i>n</i> D 18	T343-1	74.74 0.92	13.50 0.28	1.88 0.10	0.39 0.04	0.03 0.02	1.42 0.07	0.38 0.06	3.81 0.10	3.84 0.14	96.63 1.20	99.99
Carp Ash-11 <i>n</i> D 13	T281-6	74.49 0.98	13.78 0.19	1.93 0.13	0.32 0.03	0.03 0.02	1.39 0.09	0.37 0.04	3.99 0.10	3.70 0.11	94.53 1.13	100.00
<i>Tephra layer E at Pringle Falls, Oregon</i>												
Carp Ash-14 <i>n</i> D 7	T352-1	73.43 0.51	14.34 0.17	2.11 0.07	0.41 0.01	0.04 0.03	2.04 0.03	0.25 0.04	4.30 0.11	3.08 0.06	94.64 0.84	100.00
Pringle Falls PF-88-E (1) <i>n</i> D 8	T173-6	73.65 0.62	14.46 0.13	2.13 0.07	0.42 0.03	0.04 0.03	2.00 0.04	0.26 0.05	4.03 0.10	3.02 0.05	95.64 na	100.01
Pringle Falls PF-88-E (2) <i>n</i> D 15	T169-2	73.41 0.60	14.61 0.52	2.14 0.07	0.43 0.04	0.04 0.02	2.06 0.03	0.26 0.05	3.95 0.11	3.10 0.05	95.70 na	100.00
<i>Andesitic tephra layer at Tulelake, California, and tephra layer KK at Summer Lake, Oregon</i>												
Carp Ash-15 <i>n</i> D 15	T352-2	62.72 0.43	16.30 0.20	6.28 0.25	2.10 0.15	0.11 0.03	4.86 0.22	0.87 0.06	4.70 0.23	2.05 0.11	99.13 0.52	99.99
Tulelake 61284-14 ASW ^d <i>n</i> D 8	T81-8	62.93 0.57	16.22 0.48	6.10 0.17	2.10 0.08	0.11 0.02	4.82 0.09	0.95 0.08	4.63 0.13	2.13 0.04	95.17 na	100.00
Summer Lake KK ^c <i>n</i> D 10±15	DR-33	62.79 na	16.28 na	6.19 na	1.98 na	0.11 na	4.73 na	0.98 na	4.82 na	2.11 na	na	99.99

Samples were analysed using a 5-channel JEOL 8900 electron microprobe, except as noted. See Table 1 for stratigraphic information and age assignments for Carp Lake ashes. MSH D Mount St. Helens; Total (O) D original total on analysis; Total (R) D total recalculated to 100% ^oid-free basis. The difference between Total (R) and Total (O) provides an approximation of the degree of hydration of the volcanic glass.

^a Analyses were done between 1977 and 1997 by Charles Meyer, U.S. Geological Survey, Menlo Park, California.

^b Standard deviations of compositions for shards analysed by the JEOL 8900 instrument are based on the actual concentrations obtained for the shard population; standard deviations for shards analysed by the SEQM instrument are based on counting statistics; standard deviations for shards analysed by the 3-channel ARL are not available (na).

^c Samples were analysed with an ARL 3-channel instrument.

^d Samples were analysed with a SEQM 9-channel instrument.