Table 2. Radiocarbon data from the Wet fan trench site, Susitna Glacier fault.

Field number[1]	Lab number[2] (CAMS-)	Location x, y (m)	Unit number	^{13}C[3] (0/00)	Reported age[4] (yr B.P.)	Calibrated age[5] (cal. yr B.P.)	Comments
WF01-R2	140705	4.56, 3.04	4b	–25	590±35	530–660	Thin peat stringer near base of unit 4b, 3 cm above WF01 deformation unconformity.
WF01-R3	115398	4.56, 3.02	3a	–25	4,005±35	4,410–4,570	Top of thick peat section (unit 3a) directly below WF01 deformation unconformity.
WF01-R4t	115401	3.60, 2.82	3c	–25	935±35	770–930	Top of younger peat section (unit 3c) directly below WF01 deformation unconformity.
WF01-R5	120450	3.42, 2.80	3c	–25	1,355±40	1,180–1,340	Top of younger peat section (unit 3c) directly below WF01 deformation unconformity.
WF01-R6	120451	4.68, 3.10	4b	–25	1,920±40	1,730–1,970	Thin peat stringer at base of unit 4b, 3 cm above WF01 deformation unconformity.
WF01-R6b	140704	4.68, 3.05	3a	–25	770±35	660–740	Top of thick peat section (unit 3a) directly below WF01 deformation unconformity.
WF01-R7a	140707	1.28, 1.75	3a	–25	820±45	670–900	Top of thick peat section (unit 3a) directly below WF01 deformation unconformity.
WF01-R7b	140708	1.30, 1.73	3a	–25	2,245±35	2,150–2,340	Peat sample (unit 3a) directly above Jarvis Creek ash.
WF01-R7c	140709	1.32, 1.71	3a	–25	3,040±35	3,160–3,360	Peat sample (unit 3a) directly below Jarvis Creek ash.
WF01-R7d	140710	1.52, 1.54	3a	–25	5,785±40	6,350–6,630	Base of thick peat section (unit 3a).
WF03-R1	115397	2.23, 1.80	4b	–25	2,510±40	2,370–2,750	Thin peat stringer in unit 4b, 2 cm above WF03 deformation unconformity.
WF03-R2t	115399	2.24, 1.78	3a	–25	2,475±40	2,360–2,720	Top of thick peat section (unit 3a) directly below WF03 deformation unconformity.
WF03-R2b	115400	2.26, 1.70	3a	–25	3,195±35	3,360–3,480	Peat sample (unit 3a) directly below Jarvis Creek ash.
WF03-R3	140706	1.58, 1.18	3a	–25	2,175±35	2,060–2,320	Base of thick peat section (unit 3a); probably several thousand years too young.

[1]All samples are from trench WF01 (WF01-R#) or trench WF03 (WF03-R#); samples processed by G.G. Seitz.
[2]Laboratory identifier: CAMS, Center for Accelerator Mass Spectrometry (AMS), Lawrence Livermore National Laboratory.
[3]All values assumed.
[4]1σ analytical uncertainties reported by AMS laboratory.
[5]2σ calibrated age range; calibration from computer program OxCal (version 4.0, Bronk Ramsey, 1995, 2001, 2008) and the IntCal 2004 atmospheric data set (Reimer and others, 2004).

Table 3. Chemical analysis and correlation of tephra samples from the Wet fan trench site, Susitna Glacier fault.

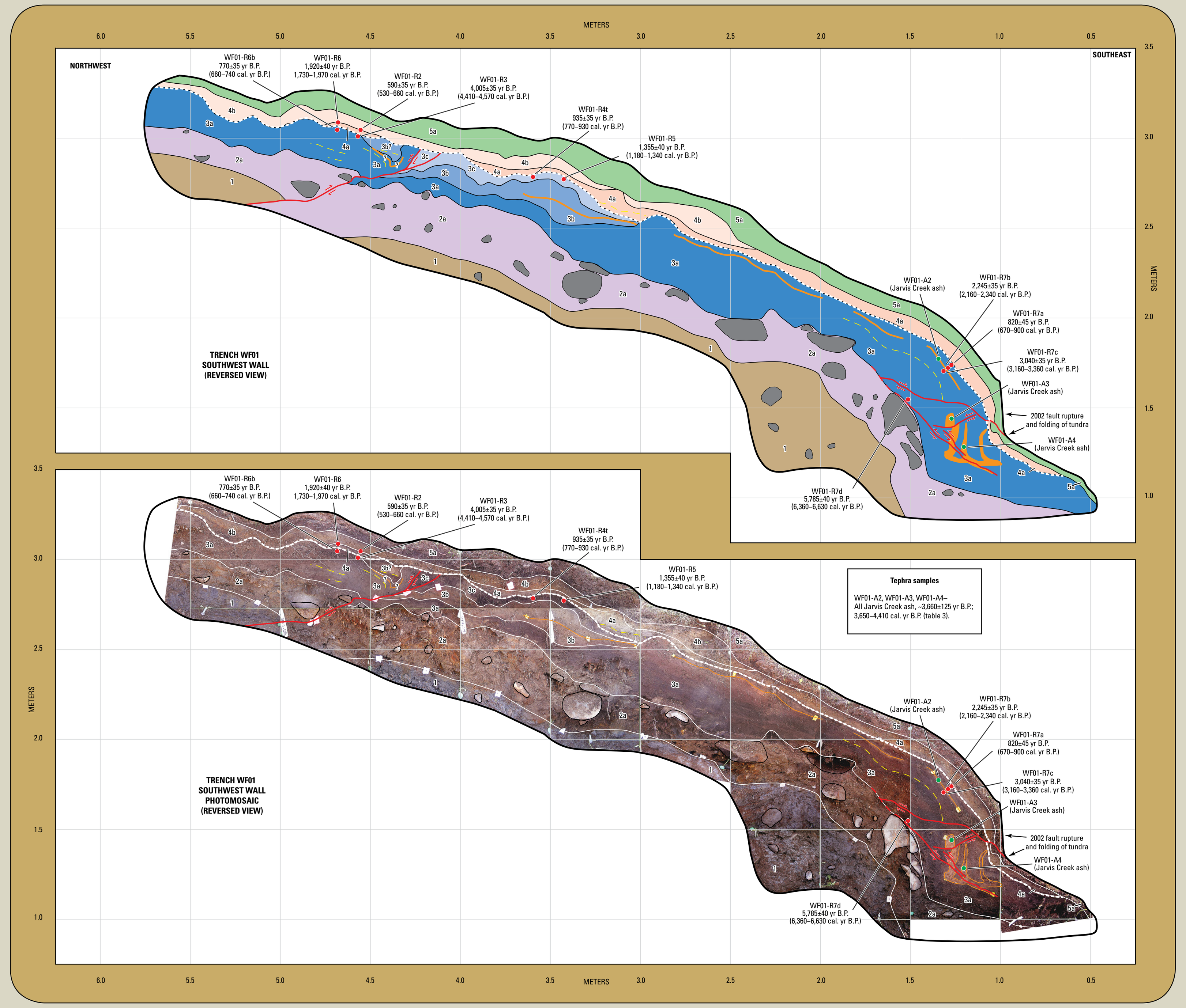
Field number[1]	ACT number[2]	Trench number, wall	Location x, y (m)[3]	Na_2O_4	MgO	Al_2O_3	SiO_2	Cl	K_2O	CaO	TiO_2	Fe_2O_3	Comments
WF01-A2	4002	WF01, SW	1.34, 1.77	4.29	0.58	14.29	73.39	0.37	2.76	2.33	0.21	1.78	Correlates with Jarvis Creek ash (J.E. Begét, written commun., 2005; ~3,650±150 yr B.P.,
n=10				0.48	0.08	0.72	0.75	0.07	0.20	0.18	0.17	0.11	Riehle and others, 1990; ~3,660±125 yr B.P., Begét and others, 1991; 3,690–4,405 cal. yr B.P.).[5]
WF01-A3	4003	WF01, SW	1.27, 1.44	4.31	0.51	14.48	73.60	0.31	2.78	2.21	0.20	1.60	Correlates with Jarvis Creek ash.
n=11				0.29	0.13	0.36	0.42	0.09	0.36	0.16	0.18	0.38	
WF01-A4	4004	WF01, SW	1.20, 1.30	3.97	0.59	14.55	73.52	0.36	2.84	2.19	0.26	1.72	Correlates with Jarvis Creek ash.
n=12				0.40	0.10	0.33	0.60	0.04	0.22	0.20	0.23	0.23	
WF03-A1	4005	WF03, SW	3.0, 1.83	3.92	0.56	14.80	73.64	0.34	2.80	2.31	0.26	1.83	Correlates with Jarvis Creek ash.
n=13				0.26	0.09	0.39	0.67	0.08	0.19	0.26	0.21	0.34	
WF03-A1	4005b	WF03, SW	3.0, 1.83	3.92	0.53	14.57	73.64	0.36	2.86	2.21	0.16	1.75	Duplicate analysis. Correlates with Jarvis Creek ash.
n=13				0.26	0.16	0.52	0.80	0.08	0.19	0.26	0.22	0.34	
WF03-A2	4006	WF03, NE	1.79, 1.25	4.24	0.54	14.24	73.61	0.35	2.78	2.20	0.21	1.83	Correlates with Jarvis Creek ash.
n=23				0.31	0.06	0.40	0.58	0.06	0.13	0.15	0.18	0.14	
04DEN 3-1	4007	WF03, NE	4.70, 2.10	4.02	0.52	14.64	73.51	0.35	2.79	2.21	0.18	1.77	Correlates with Jarvis Creek ash.
n=26				0.44	0.11	0.40	0.82	0.04	0.12	0.17	0.18	0.27	
04DEN 4-1	4008	WF02, NE	2.70, 1.85	4.08	0.55	14.29	73.70	0.34	2.85	2.16	0.20	1.83	Correlates with Jarvis Creek ash.
n=20				0.47	0.13	0.46	0.74	0.04	0.15	0.20	0.20	0.19	
04DEN-4-2	4009	WF02, NE	3.0, 1.94	4.39	0.59	14.67	72.55	0.35	2.84	2.53	0.28	1.80	Correlates with Oshetna tephra (J.E. Begét, written commun., 2005; ~6,000±150 yr B.P.,
n=22				0.55	0.10	0.45	0.59	0.07	0.19	0.37	0.22	0.30	Child and others, 1998; 6,500–7,245 cal. yr B.P.).[5] Lower SiO_2 values and presence of mafic shards distinguish Oshetna tephra from Jarvis Creek ash.
04DEN-4-2	4009	WF02, NE	3.0, 1.94	4.16	1.05	15.53	69.61	0.43	2.72	3.30	0.56	2.63	Analysis of mafic shard population. Correlates with Oshetna tephra.
n=7				0.83	0.78	0.88	0.84	0.09	0.39	0.25	0.22	0.54	

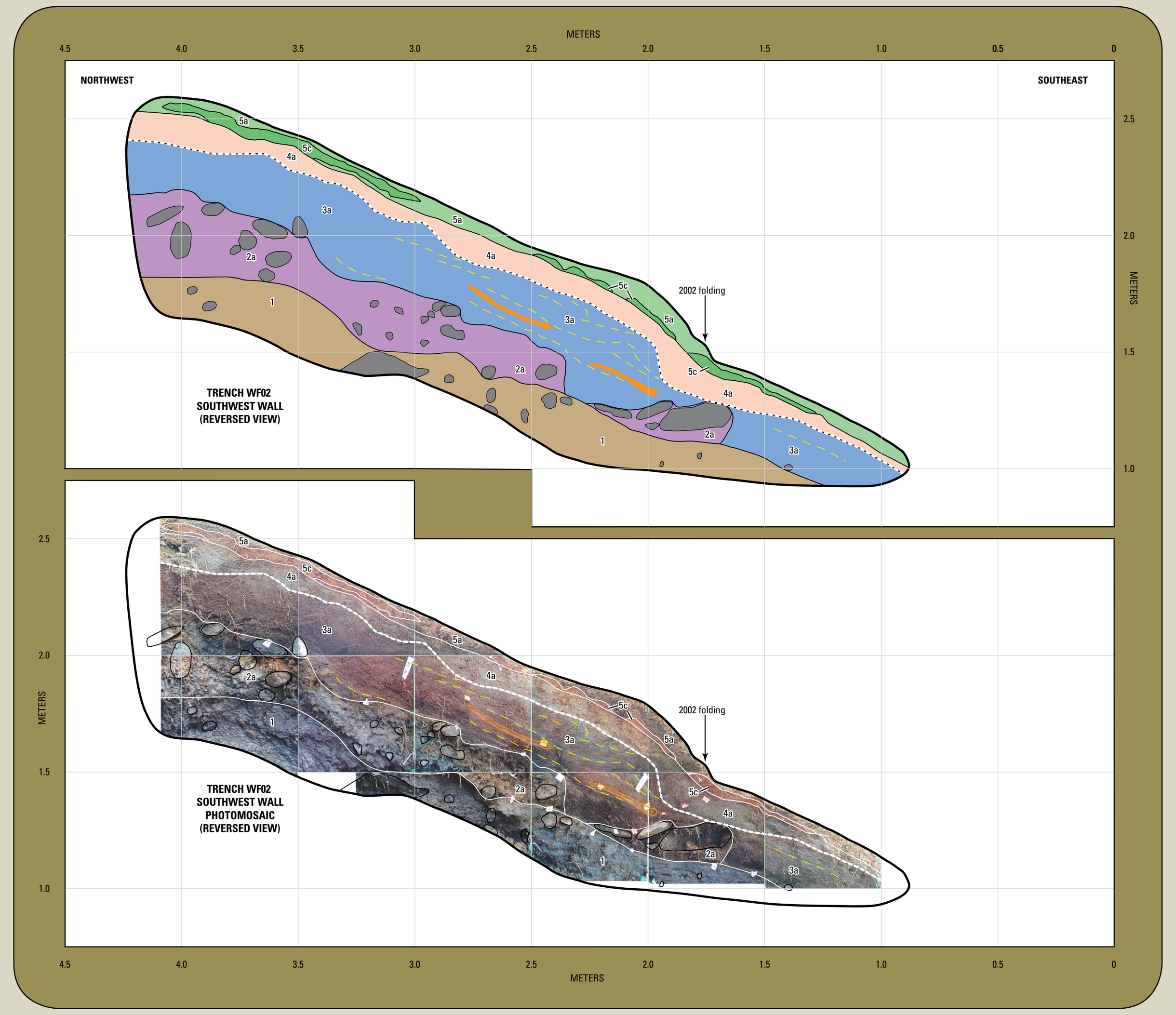
[1]Number, n, of microprobe analyses used in final data reduction.
[2]All samples analyzed and correlated by J.E. Begét (written commun., 2005) at Alaska Center for Tephrochronology (ACT), University of Alaska, Fairbanks, Alaska.
[3]See logs for locations.
[4]All values measured by electron microprobe and normalized to 100 percent. First value is mean of 'n' analyses, second value is 1σ standard deviation.
[5]2σ calibrated age ranges of Jarvis Creek ash (3,660±125 yr B.P.; Begét, and others, 1991) and Oshetna tephra (6,000±150 yr B.P., Child and others, 1998); calibration from computer program OxCal (version 4.0, Bronk Ramsey, 1995, 2001, 2008) and the IntCal 2004 atmospheric data set (Reimer and others, 2004).

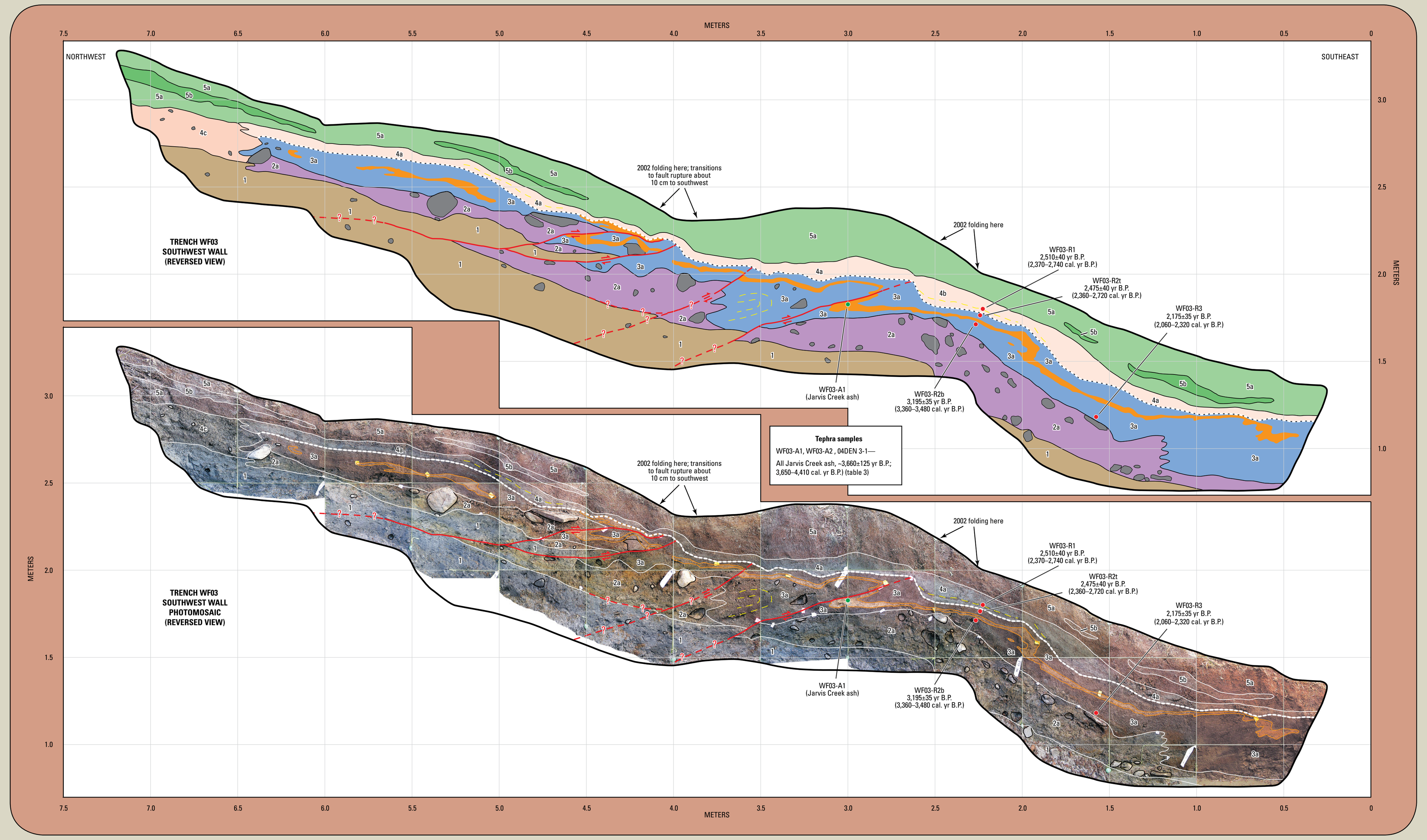
Table 4. Unit descriptions from Wet fan trench site, Susitna Glacier fault.

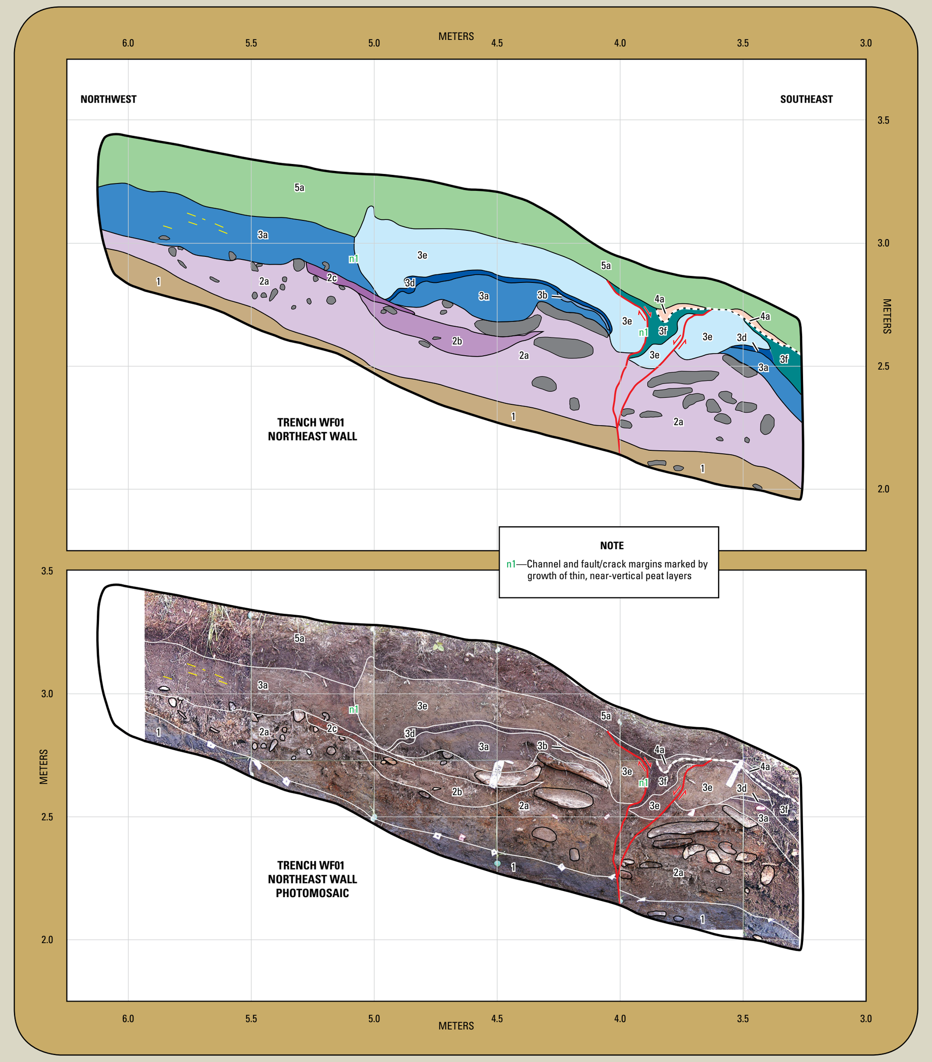
Unit number	Location horizontal, vertical (m)	Matrix grain size	Percent gravel	Largest clast (mm)	Sorting	Moist color	Wet consistence[1]	Lower boundary[2]	Soil development[3]	Genesis	Comments
Trench WF01, southwest wall											
1	5.40, 2.80	sandy silt	15	20	moderate	2.5Y 3/1	ss, ps	ne	none	Glacial till?	Angular clasts; glacial diamicton.
2a	5.20, 2.85	medium sand	25	130	poor	5YR 4/3-5/6	so, ps	a, i	none	Fluvial/debris flow	Rounded and angular clasts; variable colors; fluvial channel.
3a	4.25, 2.75	clayey silt	none	2	moderate	10YR 4/2	s, ps	a, s	none	Peat	Massive peat with thin silt stringers.
3b	4.75, 3.00	silty clay	none	1–2	well	10YR 3/2	s, ps	a, s-i	none	Fluvial; minor peat	Fine-grained fluvial.
3c	3.50, 2.78	silty clay	none	silt	well	10YR 2/1	vs, p	a, s	none	Peat; minor fluvial	Fine-grained fluvial.
4a	3.80, 2.83	clayey silt	none	silt	well	10YR 3/1	ss, p	a, s	none	Fluvial	Fine-grained fluvial.
4b	3.90, 2.90	clayey silt	none	1	moderate	10YR 3/4	so, ps	a, s	none	Fluvial	Fine-grained fluvial; oxidized soil? in unit 4.
5a	4.00, 3.00	clayey silt	none	silt	moderate	10YR 2/1	ss, vp	a, s	A horizon	Tundra mat	Soil duff; abundant roots.
Trench WF01, northeast wall											
2b	4.30, 2.68	clayey silt	5–10	110	moderate	10YR 3/2	ss, ps	c, s	none	Fluvial/debris flow	
2c	5.20, 2.87	clay	none	silt	v. well	10R 3/4	vs, vp	a, s	none	Bog iron	Small lens of bog iron in unit 2.
3d	4.15, 2.88	silty clay	none	silt	well	10YR 2.5/1	ss, vp	a, s	none	Peat	Thin peat bed in unit 3.
3e	4.25, 3.00	sandy silt	trace	6	moderate	10YR 4/3	so, ps	a, s	none	Fluvial, peat	
3f	3.35, 2.68	silty clay	none	silt	well	10YR 2/1	s, vp	a, s	buried A(?)	Peat	Peaty buried A horizon(?) in unit 3; some decayed roots.
Trench WF02, southwest wall											
1	2.49, 1.29	silty sand	15	110	v. poor	10YR 3/1	ss, ps	ne	none	Glacial till?	Angular clasts; glacial diamicton.
2a	2.70, 1.55	silty sand	15	100	v. poor	10YR 2/1	so, po	c, s	none	Fluvial/debris flow	Angular clasts.
3a	2.72, 1.71	clay	none	silt	v. well	7.5YR 3/1	ss, p	c, s	none	Peat	Massive peat with thin stringers of gray sandy silt.
4a	2.45, 1.88	clayey silt	none	silt	well	7.5YR 4/1	ss, p	a, i	none	Fluvial	
4a	1.65, 1.32	silty sand	none	1	moderate	10YR 4/1	ss, po	c, s	none	Fluvial	
5a	1.80, 1.55	clayey silt	none	silt	well	10YR 3/2	ss, vp	a, s	A horizon	Tundra mat	Soil duff; abundant roots.
5c	2.02, 1.72	silty clay	none	silt	well	2.5YR 2.5/4	ss, p	a, s	A horizon	Bog iron	Lens of bog iron in unit 5; contains some roots.
Trench WF03, southwest wall											
1	5.75, 2.25	clayey silt	15	480	poor	10YR 3/1	ss, ps	ne	none	Glacial till?	Glacial diamicton.
2a	2.70, 1.60	sandy silt	20	150	poor	2.5Y 3/1	ss, ps	a, s	none	Fluvial/debris flow	Very angular clasts.
3a	5.9, 2.68	silty clay	none	silt	v. well	7.5YR 2.5/2	vs, p	a, s	none	Peat	Massive peat.
4c	6.75, 2.90	fine sand	15	90	poor	7.5YR 3/1	ss, ps	c, i	none	Fluvial	Channel deposit?
4a	2.45, 1.90	clayey silt	none	fine sand	well	10YR 4/1	ss, p	a, s	none	Fluvial	
5a	3.30, 2.08	silty clay	none	silt	v. well	7.5YR 2.5/2	ss, vp	c, s	A horizon	Tundra mat	Soil duff; abundant roots.
5b	6.70, 3.05	clayey silt	none	fine sand	well	10YR 4/1	ss, ps	c, s	none	Fluvial	Thin, intermittent sandy silt beds in unit 5.

[1]Wet consistence: so, nonsticky; ss, slightly sticky; s, sticky; vs, very sticky; po, nonplastic; ps, slightly plastic; p, plastic; vp, very plastic.
[2]Lower boundary: ne, not exposed; Distinctness: a, abrupt (1 mm–2.5 cm); c, clear (2.5–6 cm); Topography: s, smooth; i, irregular.
[3]Maximum soil development in unit at this location.





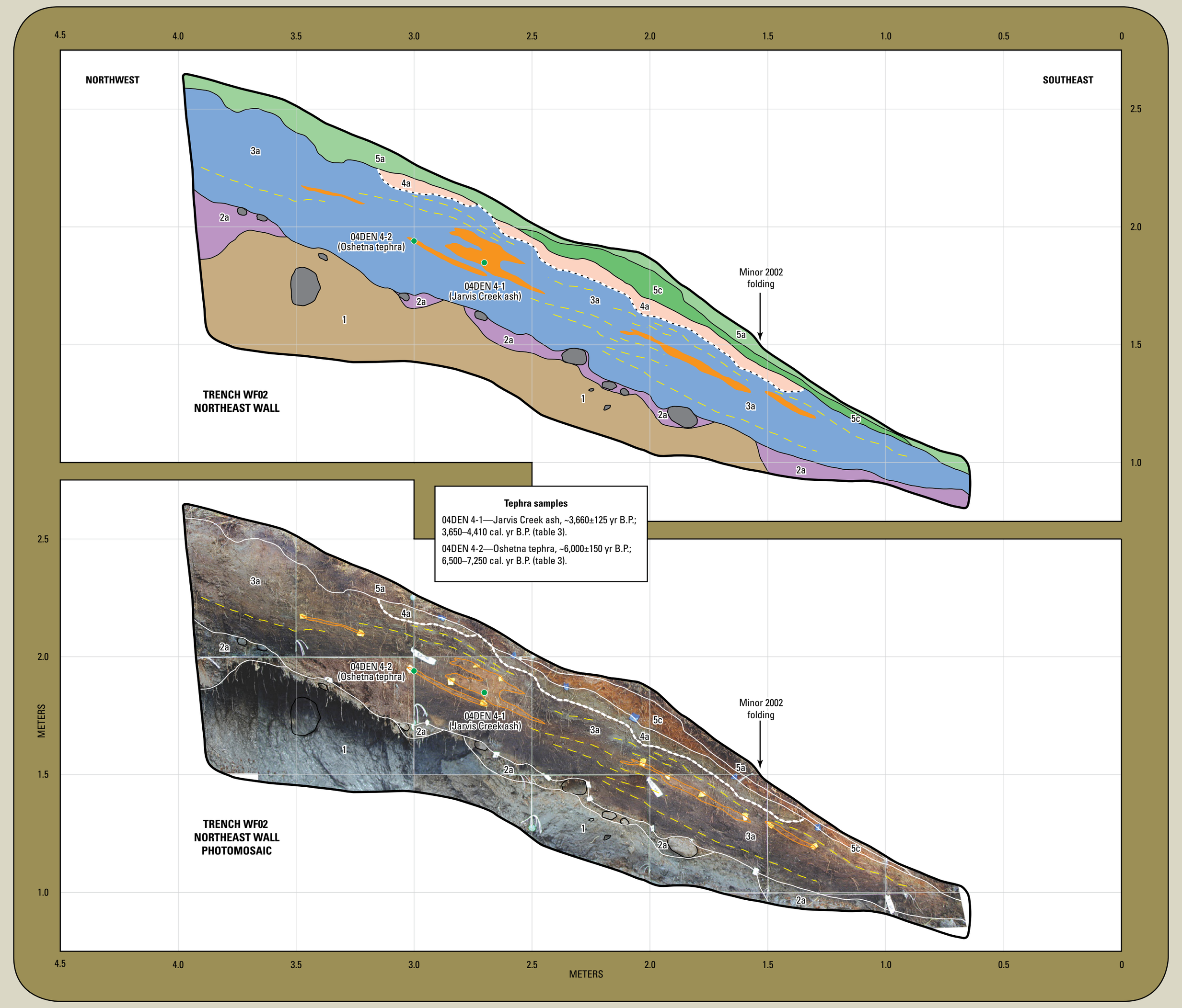


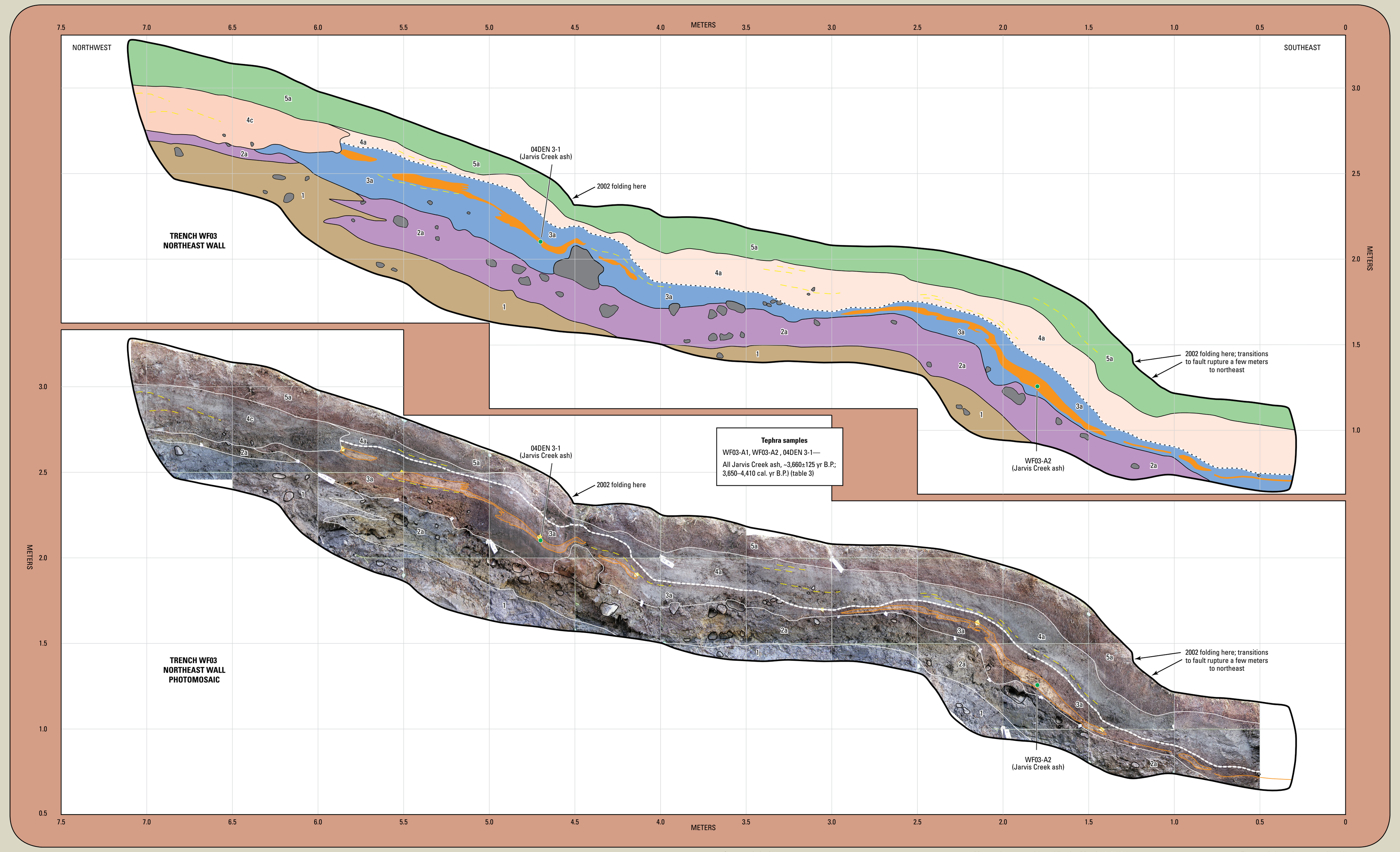


EXPLANATION

Trench unit (table 4)
- 1 — Glacial diamicton (till)
- 2a — Fluvial/debris flow sandy gravel
- 2b — Fluvial/debris flow silty gravel
- 2c — Bog iron lens
- 3a — Peat with silt stringers
- 3b — Mixed fluvial silty clay and peat
- 3c — Mixed peat and fluvial silty clay
- 3d — Thin peat bed
- 3e — Mixed fluvial sandy silt and peat
- 3f — Peat
- 4a — Fluvial silt and sand
- 4b — Oxidized fluvial silt and sand
- 4c — Fluvial sandy gravel (channel fill)
- 5a — Organic soil (tundra mat)
- 5b — Fluvial silt beds in unit 5a
- 5c — Bog iron lens in unit 5a
- Volcanic ash

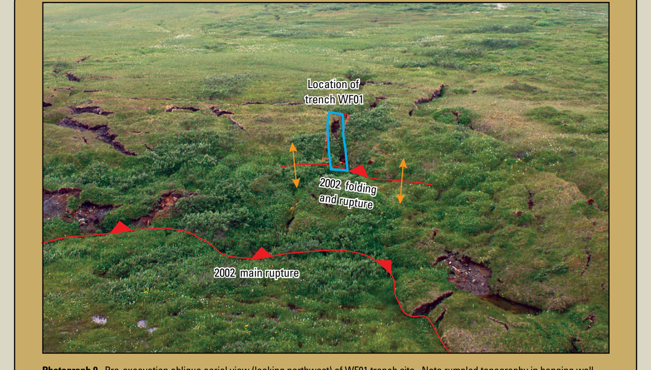
- Unit contact
- Bedding
- Unconformity, pre-2002 deformation
- Fault—Identity and existence certain, location accurate. Arrows show relative motion
- Fault dashed—Identity and existence certain, location inferred; queried where existence uncertain
- Thin bed of volcanic ash—Queried where identity uncertain
- Stones
- WF01-R6b 770±35 yr B.P. (665–740 cal. yr B.P.) — Radiocarbon sample, in radiocarbon and calibrated years (table 2)
- WF01-A2 (Jarvis Creek ash) — Volcanic ash sample and correlation (table 3)





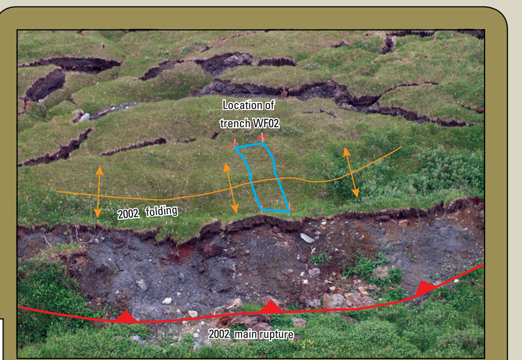
Photograph 7. View (looking northwest) of large normal fault scarp near location of scarp profile SGnorm-01 (see fig. 2 for location). Note smaller 2002 rupture (red arrow) superimposed on preexisting fault scarp (blue arrow) formed as a result of one or more pre-2002 surface ruptures. Trowel (circled) is 25 cm long. Photograph taken 08/15/2005.

Photograph 8. Close-up view (looking northwest) of 2002 normal fault rupture near location of scarp profile SGnorm-01 (see fig. 2 for location). Trowel (circled) is 25 cm long. Photograph taken 08/15/2005.

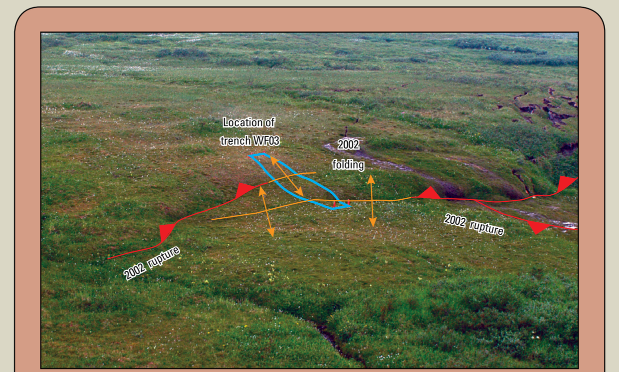


Photograph 9. Pre-excavation oblique aerial view (looking northwest) of WF01 trench site. Note rumpled topography in hanging wall probably caused by 2002 folding, minor surface rupture, and preexisting (pre-2002) scarps. Also note extensive extensional cracking in background. Photograph taken 07/03/2004.

EXPLANATION
- Thrust fault—Identity and existence certain, location accurate. Sawteeth on upper plate
- Anticline—Identity and existence certain, location accurate.



Photograph 10. Pre-excavation oblique aerial view (looking northwest) of WF02 trench site. Note rumpled topography probably caused by 2002 folding and preexisting (pre-2002) scarps. Also note extensive extensional cracking in background. Photograph taken 07/03/2004.



Photograph 10. Pre-excavation oblique aerial view (looking north) of WF03 trench site (see fig. 3 for location). Note presence of 2002 folding, rather than fault rupture, in area of trench. Photograph taken by D.P. Schwartz, 07/03/2004.

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LOGS AND GEOLOGIC DATA FROM A PALEOSEISMIC INVESTIGATION OF THE SUSITNA GLACIER FAULT, CENTRAL ALASKA RANGE, ALASKA

By
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