Electronic Supplement 1

Unit Descriptions for trenches excavated across the Highway 50 transect.

Trench across the western Desatoya range fault west of Edwards Creek

Unit 1, alluvial fan gravels coarsening upwards from massive, well sorted medium to coarse grained sand, to bedded gravels in a sand matrix, to moderately bedded, clast supported, imbricated, subangular to subrounded cobbles. Upper ~60 cm of Unit 1 is overprinted by a Btk soil horizon with stage II carbonate developmentUnit 2, fissure fill, loose sand, gravel, and vertically aligned cobbles derived from Unit 1. Unit 3, fault scarp derived colluvium, poorly sorted, massive, loamy sand with gravel, upper ~30 cm is a buried Btk soil horizon characterized by clay texture, distinct subangular blocky peds, carbonate nodules and filaments, and 1 cm thick carbonate fillings in cracks. Unit 4, fault scarp derived colluvium, tan, sandy loam with gravel, tapers away from fault zone, upper 20 cm is a buried Btk soil horizon characterized by sandy clay loam texture, subangular blocky peds, olive brown color,m and carbonate stringes trending parallel parallel to upper contact and penetrating cracks through unit. Unit 5, tan, clean sand. Unit 6, Av and Btk soil horizons. Unit 7, fault scarp colluvium, loose, poorly sorted, infills fault zone.

Trench across the eastern Toiyabe Range fault at Tar Creek

Unit 1, moderately bedded, imbricated, poorly sorted, subangular to subrounded pebble to boulder clasts in sand matrix. Unit 2, intact block of Unit 1 material backtilted into fault zone. Unit 3, debris facies of penultimate event colluvium (dark gray), unsorted, carbonate coated pebbles and cobbles in a silty sand matrix. Unit 4, wash facies of penultimate event colluviums (dark gray), massive, carbonate rich, silty sand to sandy silt with trace clasts and is characterized by numerous 1 to 4 cm thick east dipping platy partings of pedogenic carbonate. Unit 5, most recent earthquake colluvium (light gray), loose sand and trace cobbles, thins to east. Unit 6, fissure fill material, loose, unconsolidated, silty sand with randomly oriented clasts. Unit 7, loose surface soil, sandy silt with trace pebbles (Av and Btk horizon of soil profile).

Trench 1 across the Simpson Park Mountains fault north of Walti Hot Springs

Unit 1, laminated sands and silts. Unit 2, thinly bedded, well-sorted sand and gravel channel deposits. Units 1 and 2 may be distal alluvial fan, prograding delta, or nearshore lacustrine deposits. Unit 3, fault scarp colluvium (shaded light gray) dense, sand and silt with trace gravel and stage II carbonate morphology. Unit 4, matrix supported subrounded cobbles. Unit 5, high-energy beach deposit, well sorted, well bedded, backset subrounded to rounded pebbles. Unit 6, sand with gravel Bwk soil horizon with stage 1+ carbonate development. Unit 7, sandy loam A horizon. Unit 8, most recent earthquake colluvium (shaded dark gray), loose, poorly sorted sand and gravel.

Trench 2 across the Simpson Park Mountains fault at the mouth of Pine Creek

Trench 2 is located at latitude 39.84821, longitude –116.58388. Unit 1, alluvial fan deposits interbedded subrounded to subangular, pebbles to cobbles, poorly sorted, matrix supported, includes lenses of fluvial deposits, moderately sorted, grain supported gravels and sand. Unit 2, graben fill from most recent earthquake (shaded gray), loose unconsolidated sand, gravel, and cobbles, vertically aligned clasts, and intact, backtilted blocks of Unit 1. Unit 3, clast supported subangular gravel possibly raveled off the scarp. Units 4, 5, 6, 7, and 10, sand and gravel alluvial fan deposits. Unit 8, loose, poorly sorted sand and gravel, fault scarp colluvium related to most recent earthquake (shaded gray). Unit 9, weak A and AB soil horizons.

Trench across the Butte Range fault zone

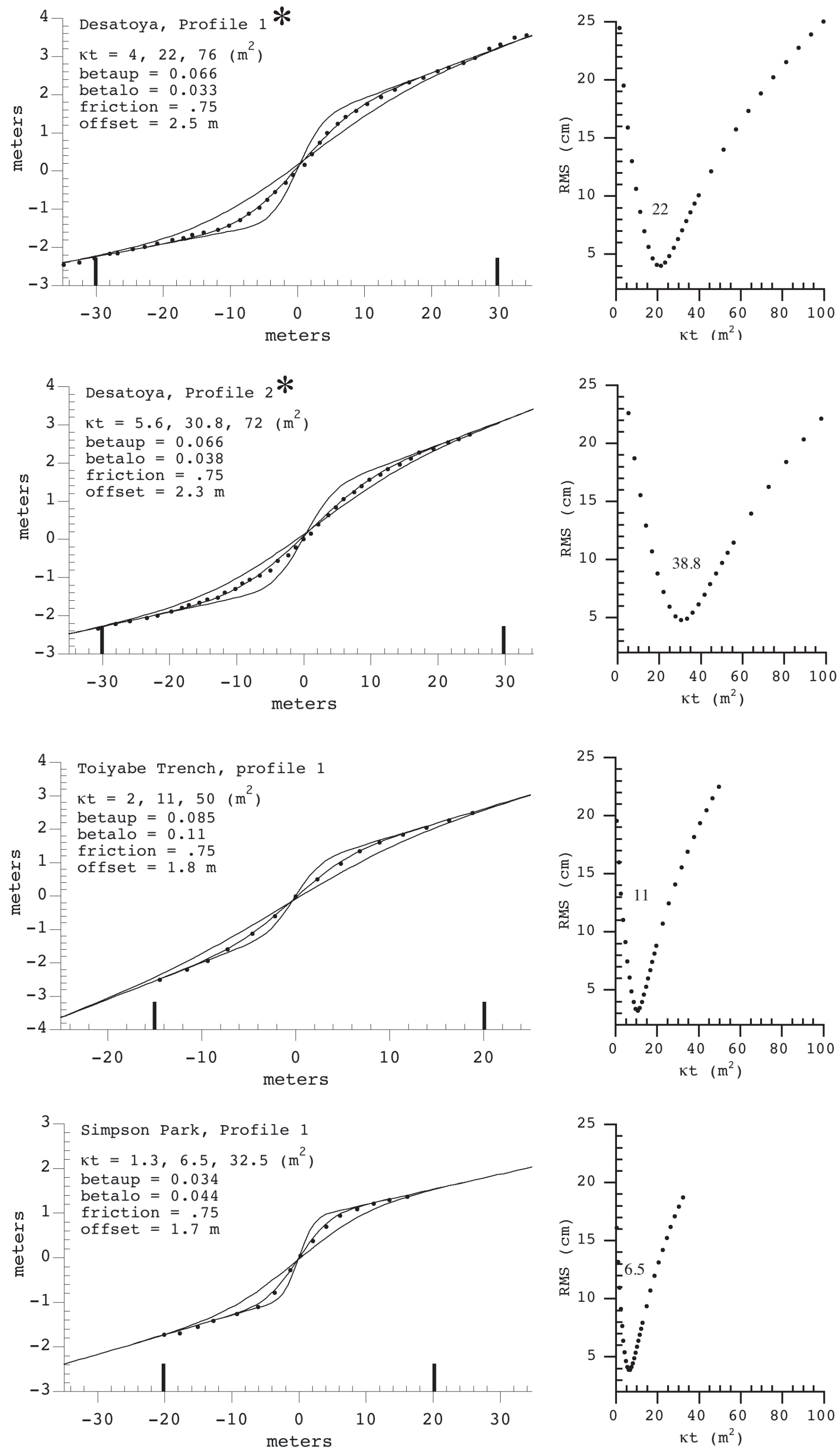
Unit 1, alluvial fan deposits, alternating layers of clast supported and matrix supported gravels. The upper part of Unit 1 is characterized by an ~ 50-60 cm thick pedogenic carbonate horizon (Btkm) with tight cementation and thick carbonate coats surrounding stones consistent with stage II+ to III carbonate development (Birkeland, 1999). Unit 2, massive, cemented, sandy clay loam with randomly oriented gravel and carbonate filaments. The western side of Unit 2 contains thin (5 cm thick) laminated carbonate stringers. The upper 40 cm of Unit 2 is a buried soil characterized by fine texture and dark color. Unit 2 is graben fill related to the oldest earthquake (shaded dark gray). Unit 3, massive, non-cemented, gray brown sandy loam with gravel. Thin carbonate coats on the base of clasts and the lack of filaments in the matrix within Unit 3 is consistent with stage I+ carbonate development (Birkeland, 1999). Unit 3 is graben fill related to the penultimate earthquake (colored white). Unit 4, massive, unconsolidated silt loam to sandy loam with randomly oriented gravel that rests against the footwall block, buries Unit 3, and fills fissures that extend to the base of the trench. Several clast supported pebble and gravel channel deposits at the base of Unit 4 between meters 22 and 32, indicate fluvial transport of sediment likely sourced from a small gully south of the trench. Downhill oriented stringers of gravel within Unit 4 adjacent to the footwall are consistent with fault scarp derived colluvium related to the most recent earthquake (shaded light gray).

Trench across the Egan Range fault zone

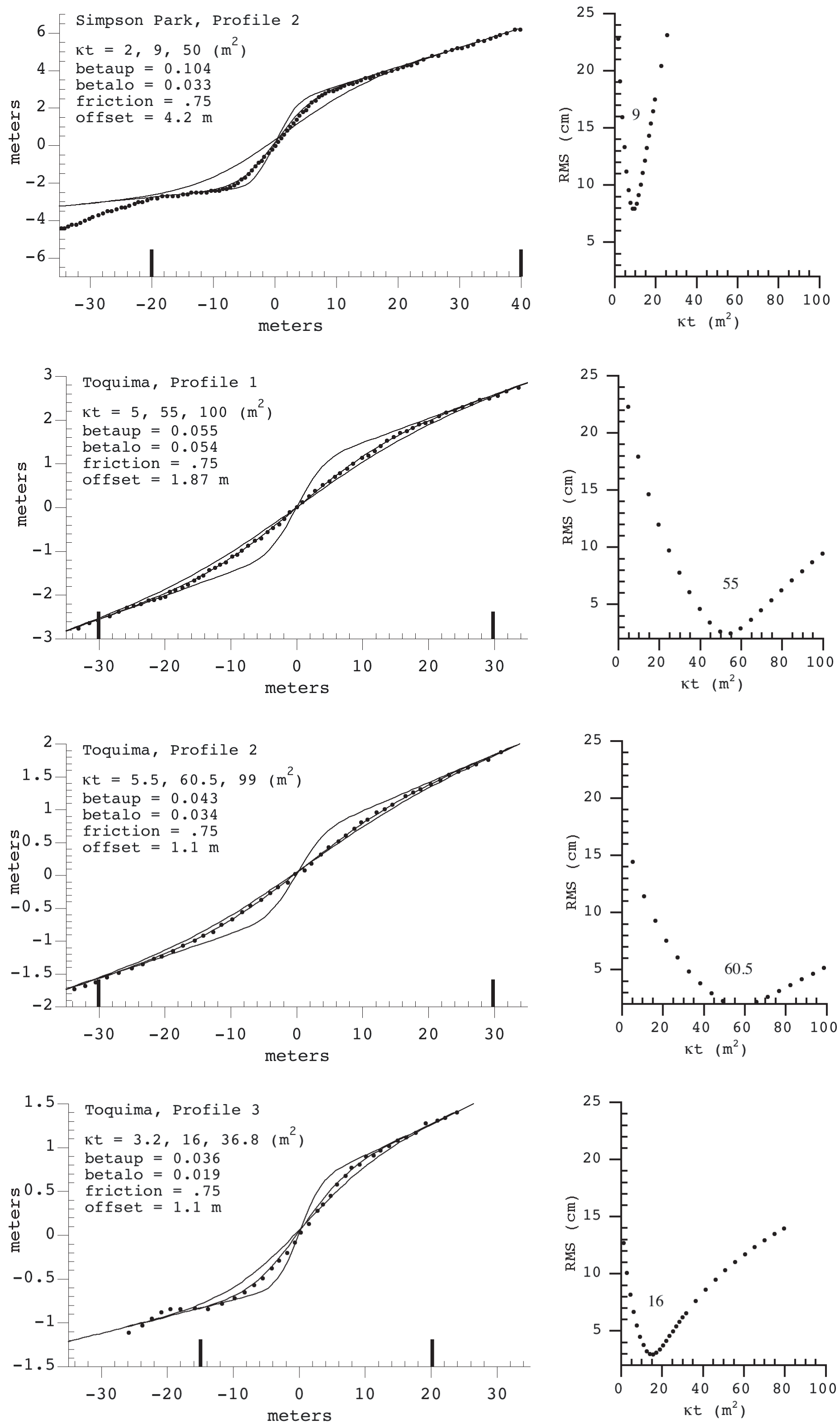
Unit 1, alluvial fan and fluvial channel deposits, well-bedded gravel and sand, with few cobbles. Unit 2, matrix supported gravels with thin carbonate stringers. Unit 3, deformed interbeds, and sheared and aligned clasts of Unit 1 material within the fault zone. Unit 4, eastward thinning colluvial deposit (shaded dark gray), carbonate rich sandy loam matrix with randomly oriented clasts. Unit 5, loose, unconsolidated Av and Btk soil horizons. A 40-80 cm thick 2Bkm soil horizon indicated by black vertical lines contains clasts with continuous carbonate coats and white carbonate rich matrix consistent with stage II to II+ carbonate development (Birkeland, 1999).

Natural exposure of the Schell Creek Range fault at Piermont Creek

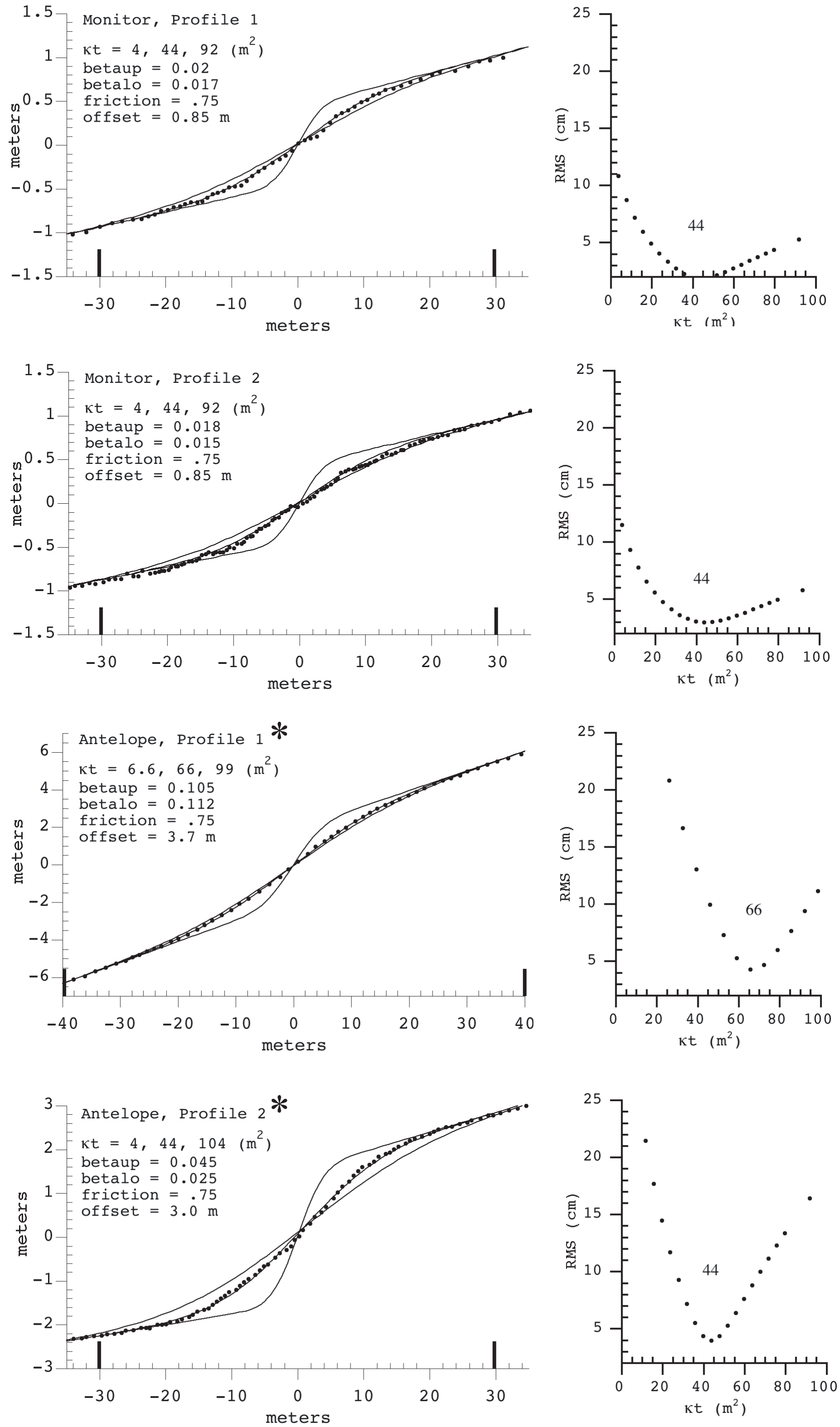
Unit 1, moderately bedded gray sandy gravel. Unit 2, tan, massive, buried Btk soil horizon with well-cemented continuous carbonate matrix and thick carbonate coats surrounding clasts indicating stage III carbonate morphology Birkeland, 1999). Unit 3, gray, moderately bedded sandy gravel to gravelly sand. Unit 4, moderately well cemented 2Btk soil horizon with thick CaCo3 coats on most clasts and a continuous carbonate matrix indicating stage stage II+ to III carbonate development. Unit 5, loose light brown gravelly sand, Av-Bw soil horizons. Unit 6, penultimate colluvium (shaded light gray), white, well cemented, imbricated gravels to cobbles that dip ~50° east from the fault zone and flatten across the graben. Unit 7, downward tapering fissure containing loose unconsolidated cobbles and gravels and vertically aligned clasts (shaded intermediate gray). Unit 8, fault scarp colluvium (shaded dark gray), unconsolidated poorly sorted, sand and gravel with trace cobbles, fining upward. Vertical black lines indicate carbonate soil development.



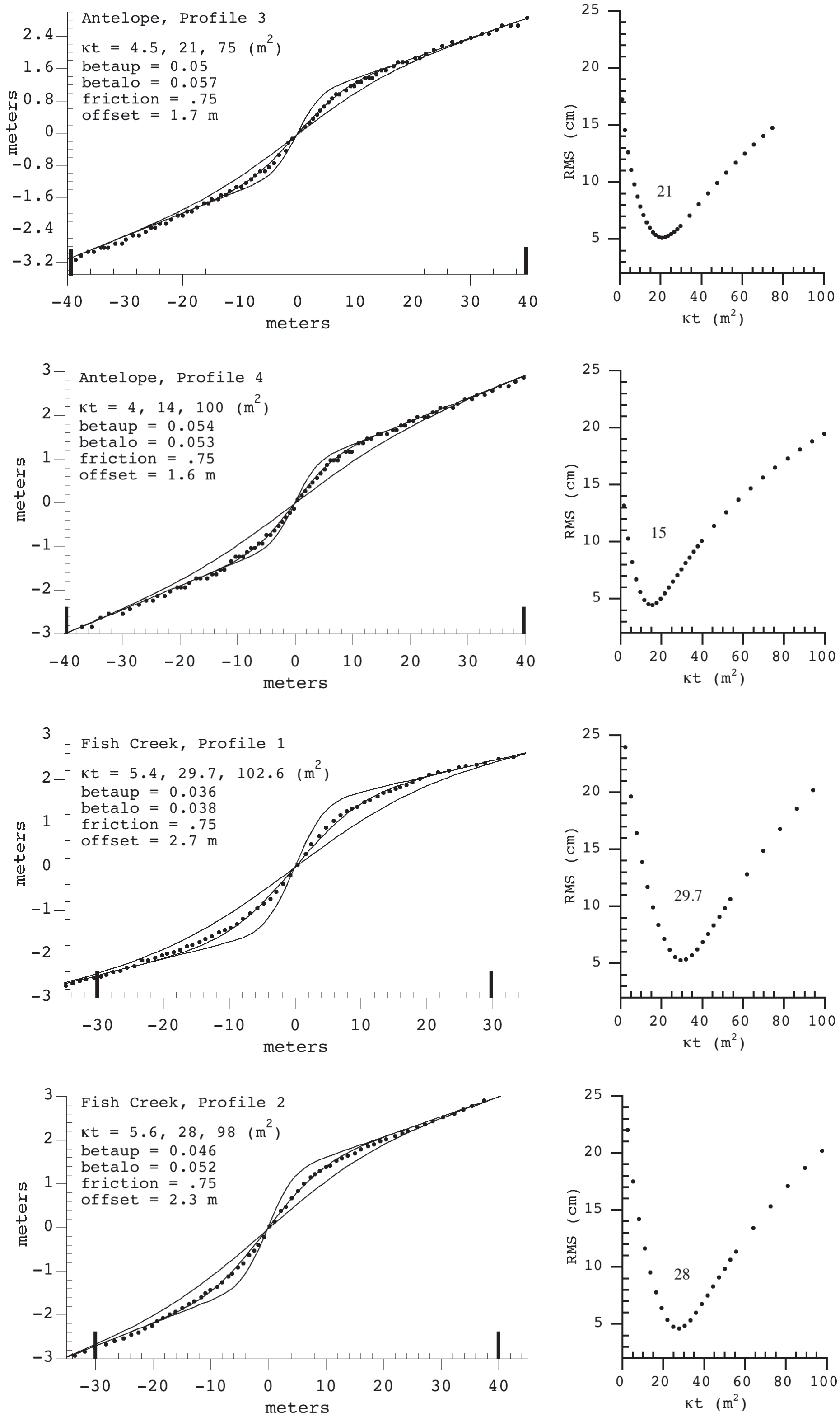
Electronic Supplement 2. Fault scarp profiles and diffusion analyses used to estimate the age of single event fault scarps. Profiles across multiple event scarps are used to estimate offset and are shown with asterisk (*).



Electronic Supplement 2 (continued).



Electronic Supplement 2 (continued).



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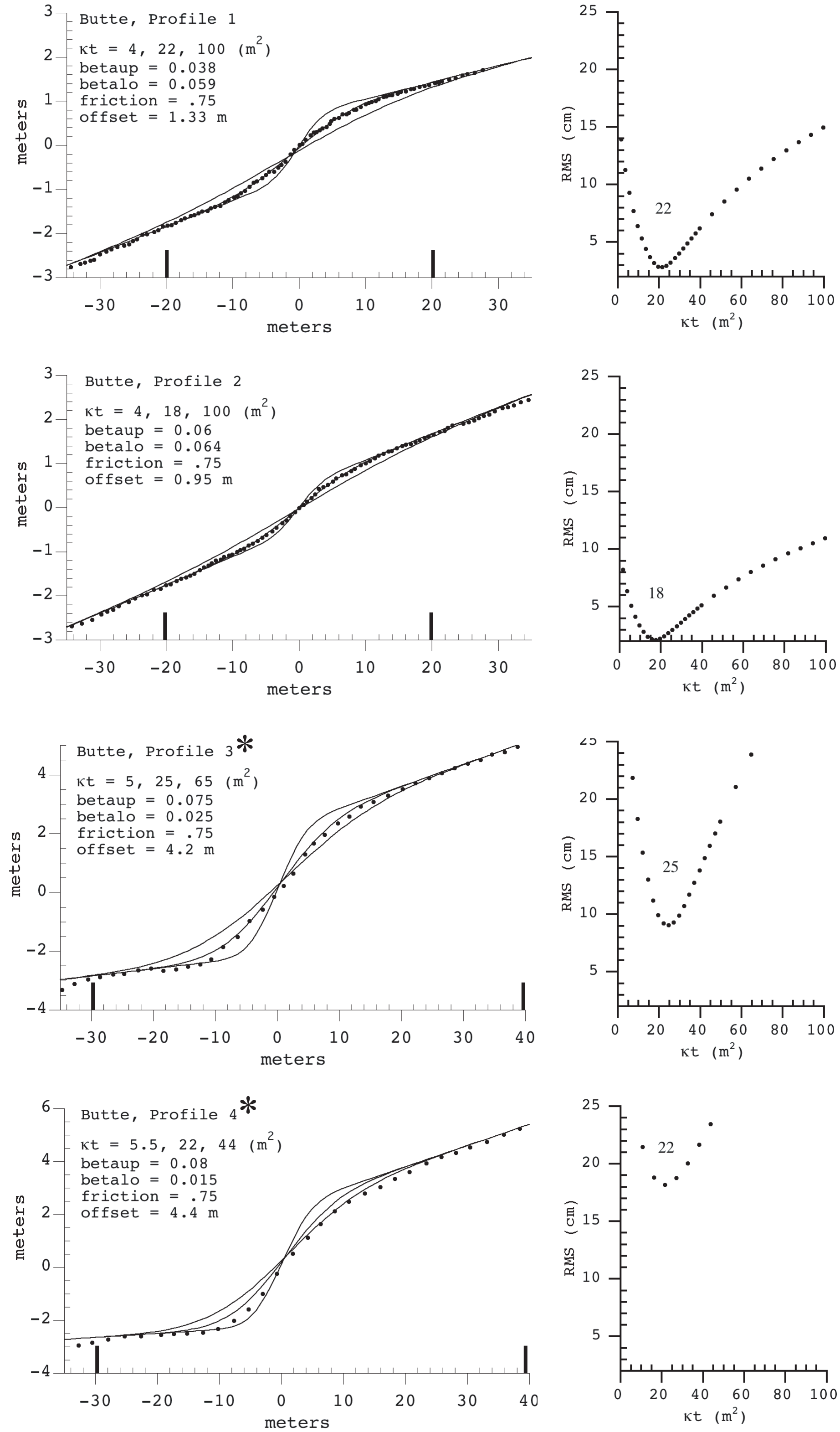
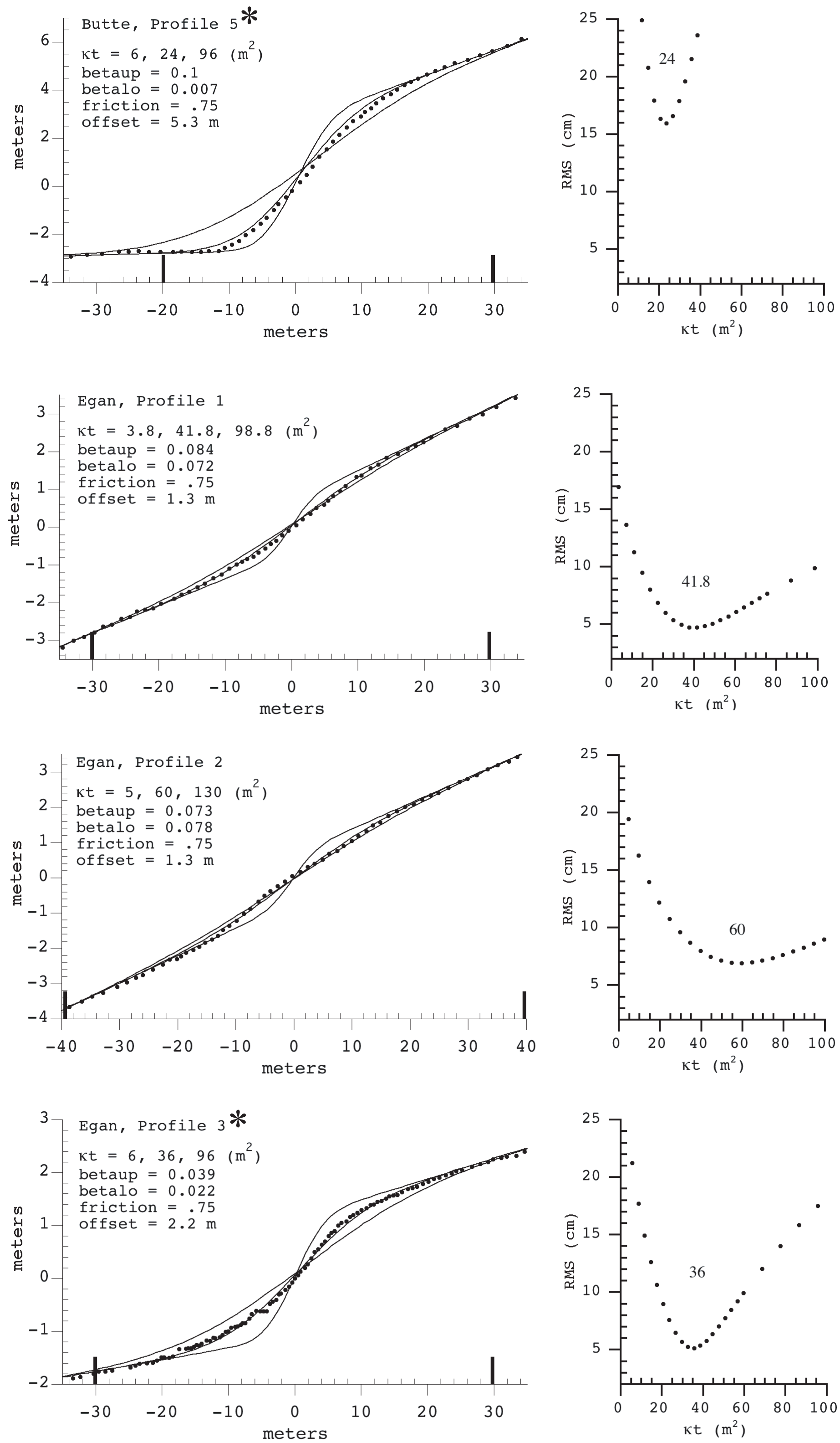
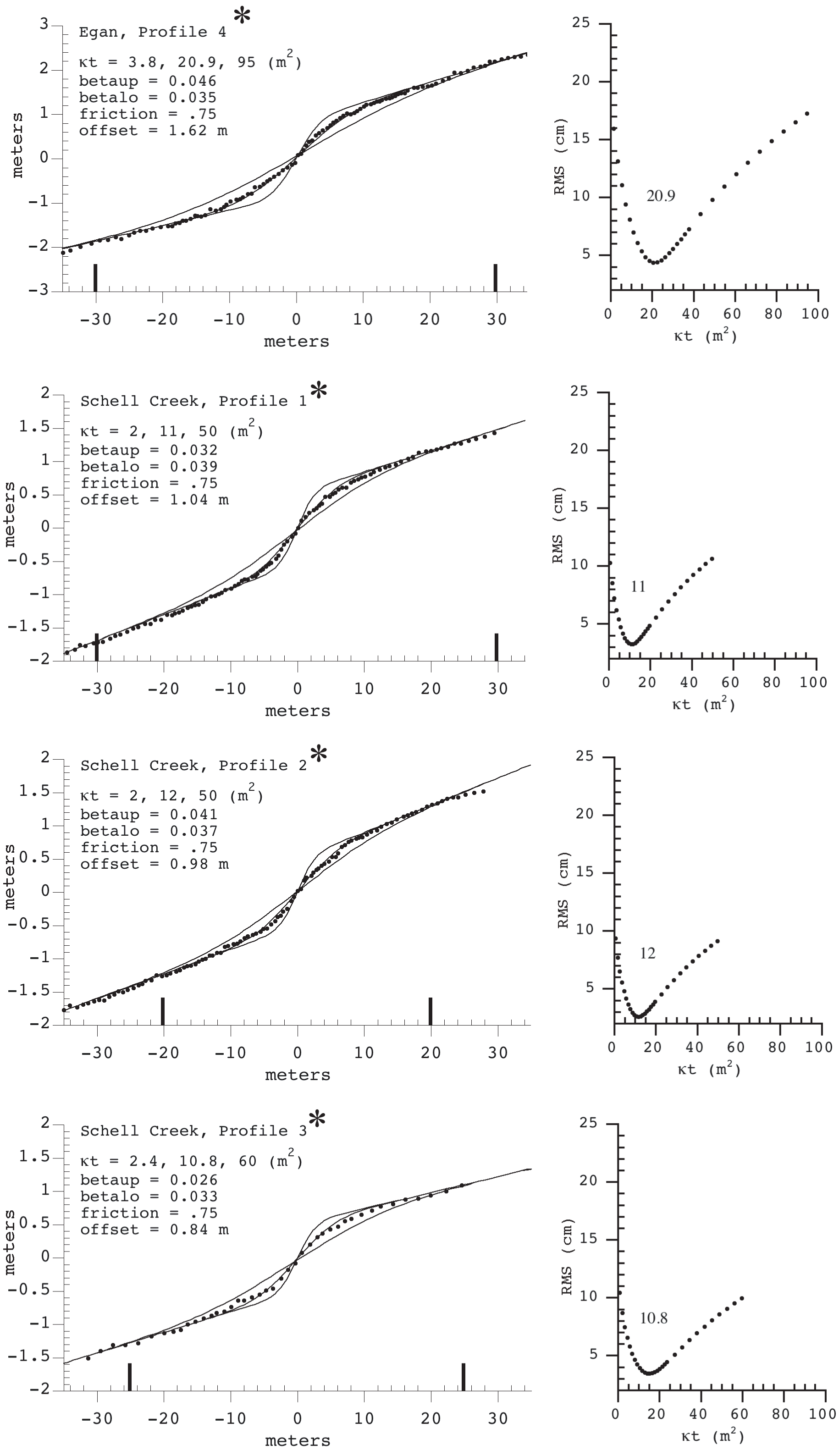


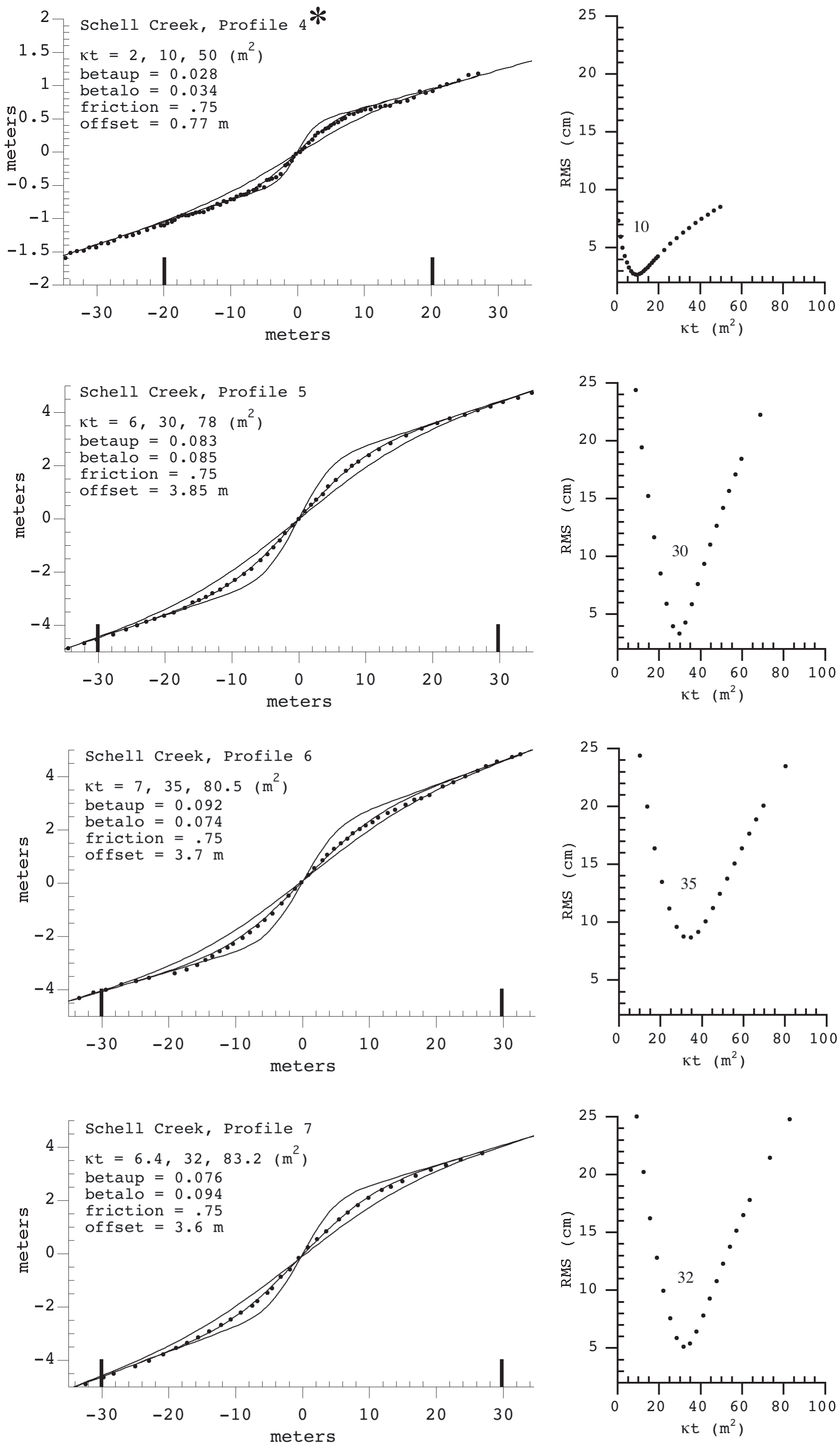
Electronic Supplement 2 (continued).



Electronic Supplement 2 (continued).



Electronic Supplement 2 (continued).



Electronic Supplement 2 (continued).

Electronic Supplement 3

Regional location maps (DEM's), surficial geologic strip maps, and other supporting informatiion for each rangefront studied.

Northwest flank Desatoya Range

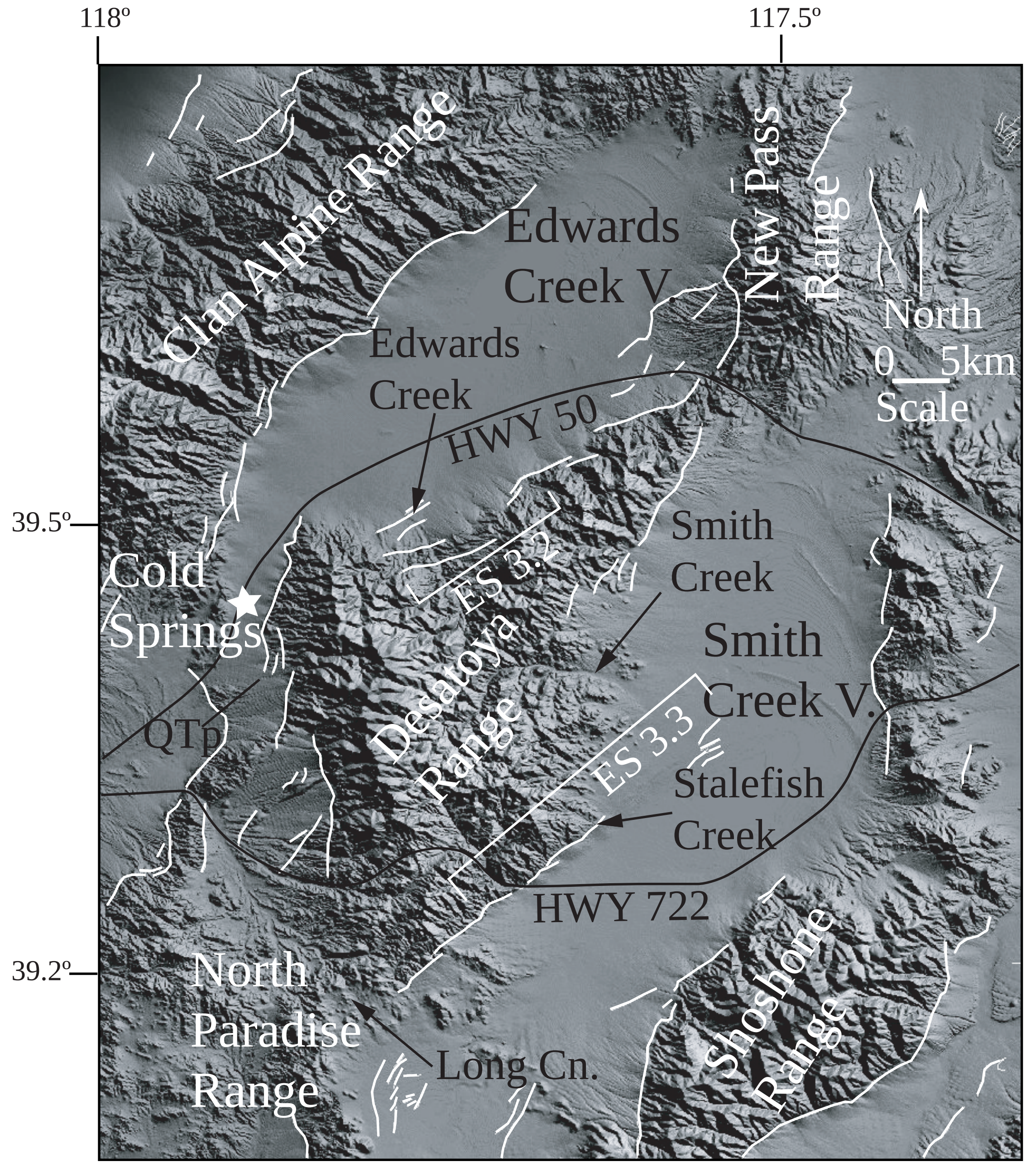


Figure ES 3.1. Physiographic map of the Desatoya Range and surrounding region. Previously mapped faults shown in white. Settlement of Cold Springs shown by white star. Highways shown by black lines. Locations of surficial geologic strip maps (Figures ES 3.2 and ES 3.3) are indicated.

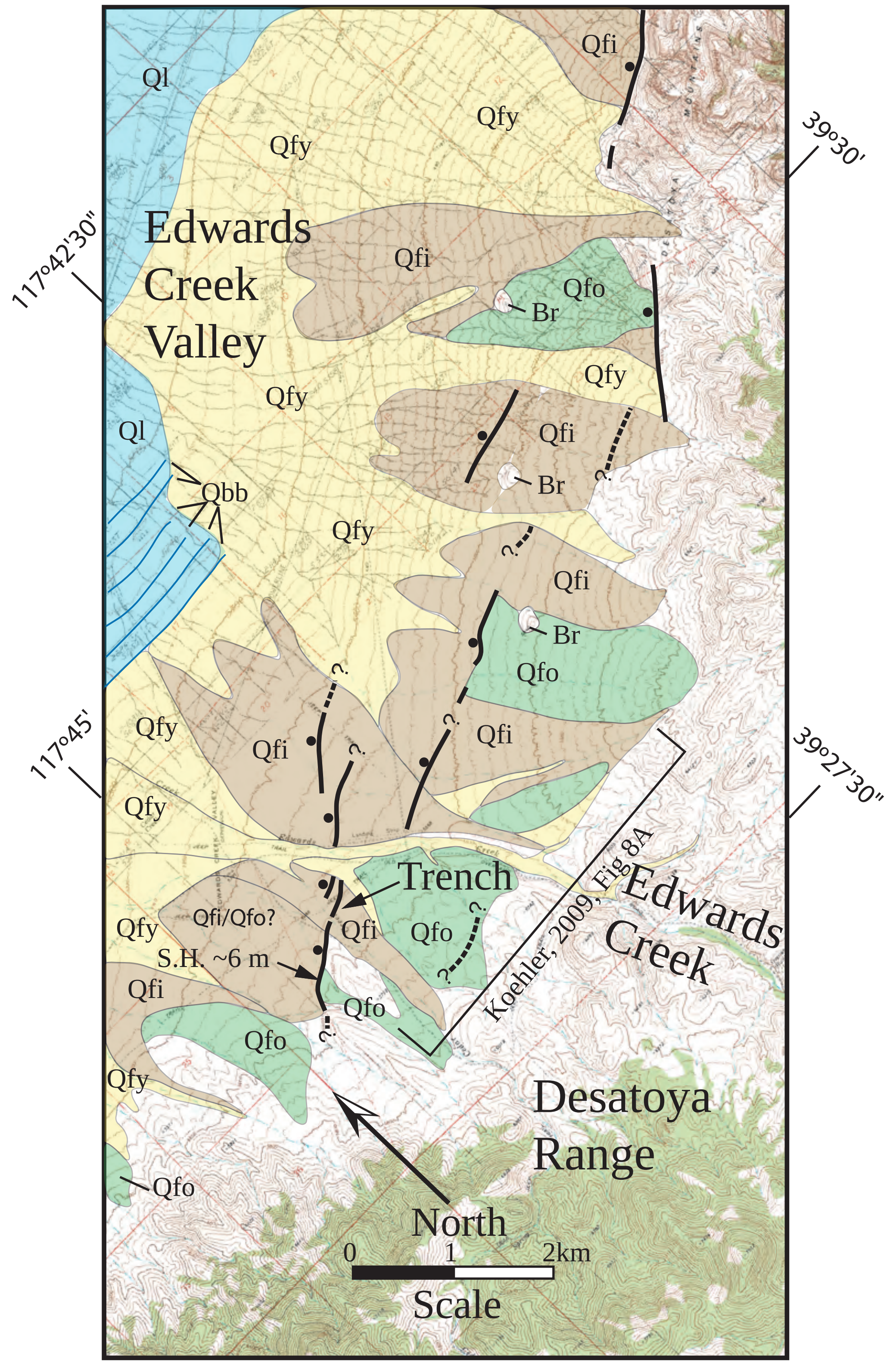


Figure ES 3.2. Surficial geologic map along the west side of the Desatoya Range in the vicinity of Edwards Creek, showing traces of the western Desatoya Range fault. Location of air photo, Figure 8A of Koehler (2009) also shown.

Southeast flank Desatoya Range

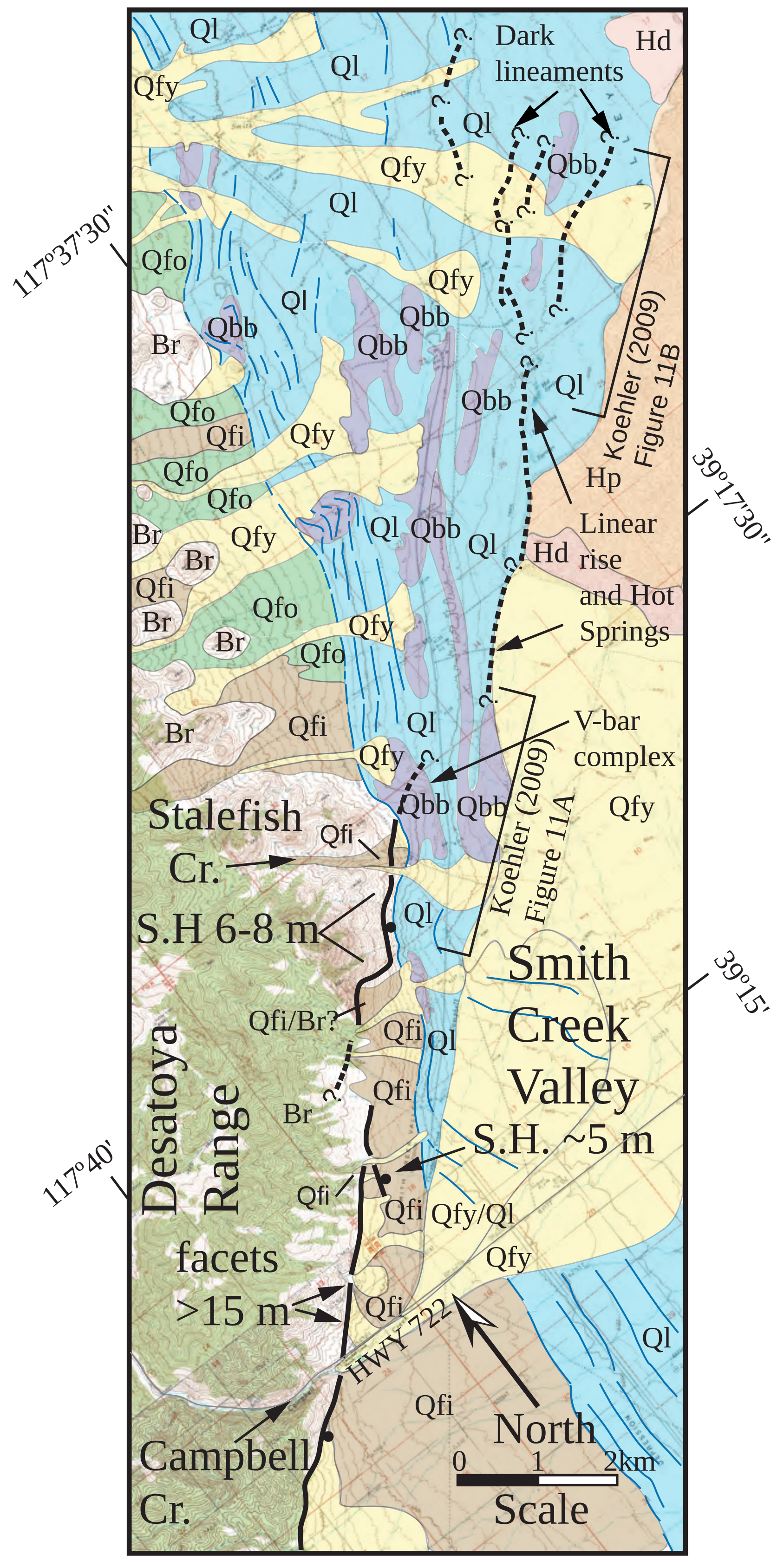


Figure ES 3.3. Surficial geologic map showing traces of the eastern Desatoya Range fault and possible projection into young deposits associated with pluvial Lake Desatoya. Locations of air photos, Figures 11A and 11B from Koehler (2009) also shown.

Character of faulting along the southeast flank, Desatoya Range

The southeastern Desatoya rangefront consists of a southern and northern fault trace separated by an ~ 12 km left step across the vicinity of Smith Creek (Figure ES 3.1). The northern rangefront fault trace extends N30E for ~17 km from Smith Creek to Highway 50. The tectonic geomorphic expression of the northern trace is subdued and characterized by rounded facets, low relief, and long shallow gradient alluvial fans. The muted topography and less developed rangefront morphology along the northern trace suggests a lower rate of fault displacements than the southern trace.

The southern trace extends ~ 20 km at N42E from Long Canyon to Stalefish Creek (Figure ES 3.1). Tectonic geomorphology along southern trace consists of a sharp linear rangefront with distinct oversteepened bedrock facets (>15 m high), several scarps in Qfi surfaces, and short steep alluvial fans (Qfy) that are actively burying Qfi surfaces and the fault trace (Figure ES 3.3). Prominent lacustrine constructional bar complexes and shoreline berms associated with pluvial Lake Desatoya are deposited on Qfi surfaces and cut by Qfy fans.

North of Stalefish Creek, the fault may continue on trend for another ~10 km based on a series of hot springs arranged along a linear rise (Figure ES 3.3). The rise consists of spring, aeolian, and lake deposits and is moister than the surrounding area. At the northern end of this linear rise, the position of the fault may coincide with anastamosing dark toned lineaments observed on air photos (Figure ES 3.3). In the field, the lineaments are characterized by groundwater seeps and aligned vegetation and do not exhibit vertical displacement.

Toiyabe Range

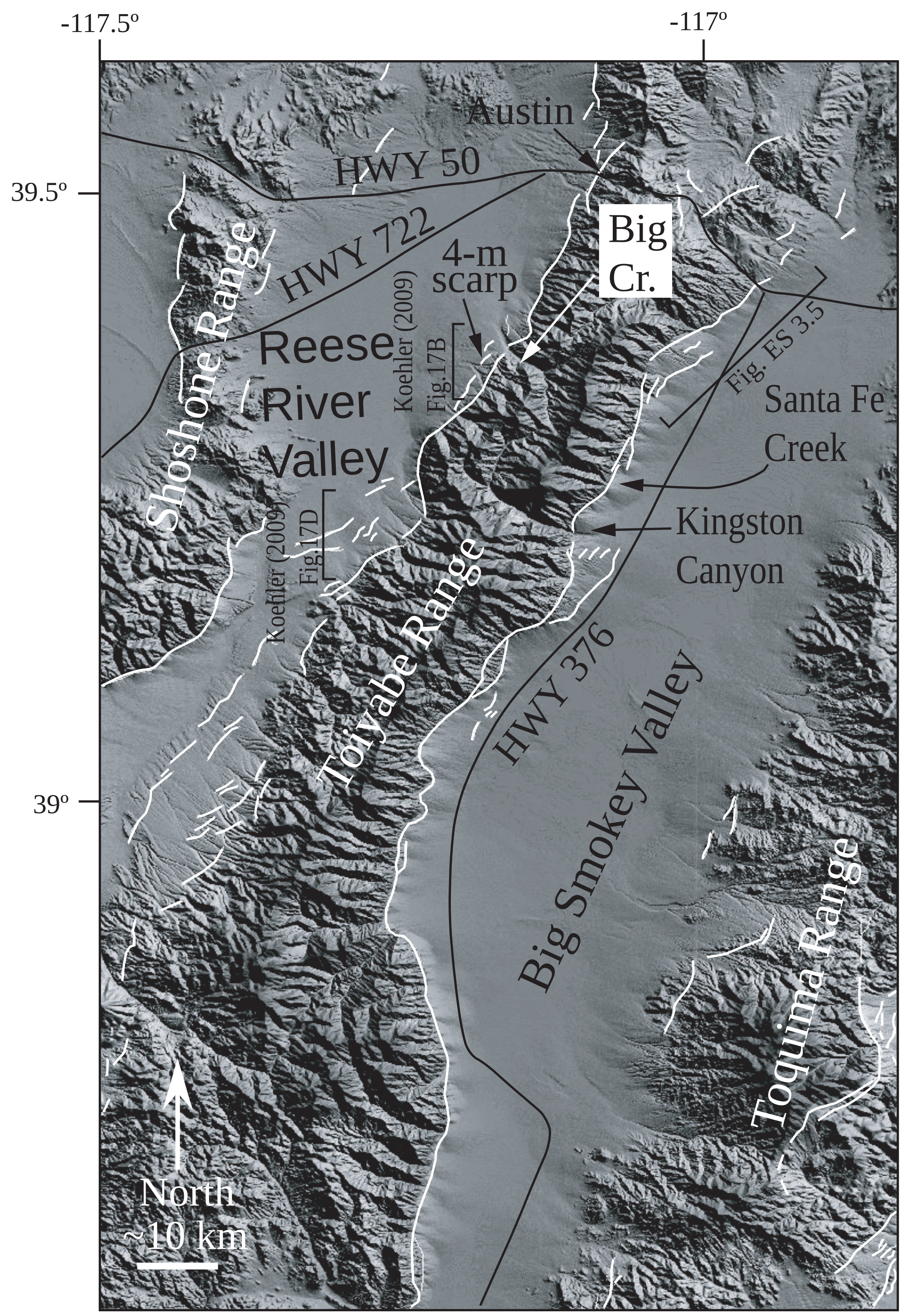


Figure ES 3.4. Physiographic map of the Toiyabe Range. Previously mapped faults shown in white. Area of detailed Quaternary mapping shown on Figure ES 3.5 is annotated. Location of 4-m-high scarp in Qfi alluvium along the western flank of the range (latitude 39.3477, longitude –117.1727) is shown. Location of photographs from Figures 17B and 17D in Koehler (2009) also indicated.

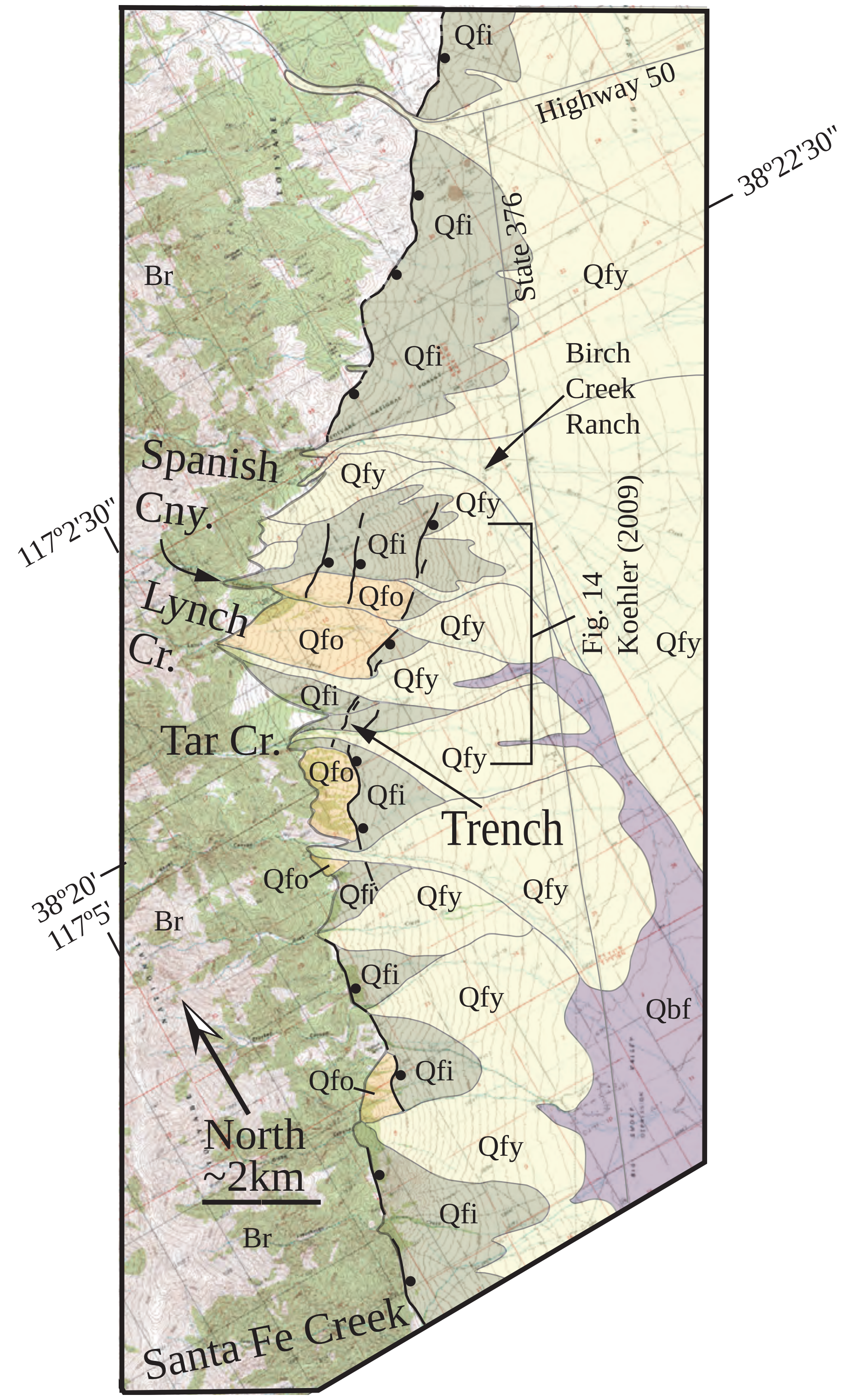


Figure ES 3.5. Surficial geologic map showing fault traces of the Eastern Toiyabe Range fault and Quaternary deposits directly south of US Highway 50. Trench location indicated. Location of air photo from Figure 14 in Koehler (2009) is also shown.

Character of faulting along the eastern Toiyabe Range

Within the map area along the eastern Toiyabe rangefront, a Qfi surface is displaced by two sub-parallel traces that extend ~N60E in the vicinity of the trench site (Figure ES 3.5). Scarps range from 1.5-2m and 2-3 m on the southeastern and northwestern traces, respectively. North of Lynch Creek, the northwestern trace projects along the base of a Qfo surface and is characterized by a sinuous 13-20 m high scarp and a possible 0.5 m splay scarp that trends N72E into a Qfi surface. Young alluvial fan surfaces (Qfy) associated with Tar Creek, Lynch Creek, and Spanish Canyon are not offset. North of Spanish Canyon the fault consists of two additional traces that step left towards the rangefront. The middle trace and upper trace offset Qfo and Qfi surfaces by ~ 2 meters and a Qfo surface by over 20 m, respectively. North of Birch Creek, the fault projects along the rangefront to US Highway 50.

Electronic Supplement 3 (continued)
Regional location maps (DEM's), surficial geologic strip maps, and other supporting information for each rangefront studied.

Simpson Park Mountains

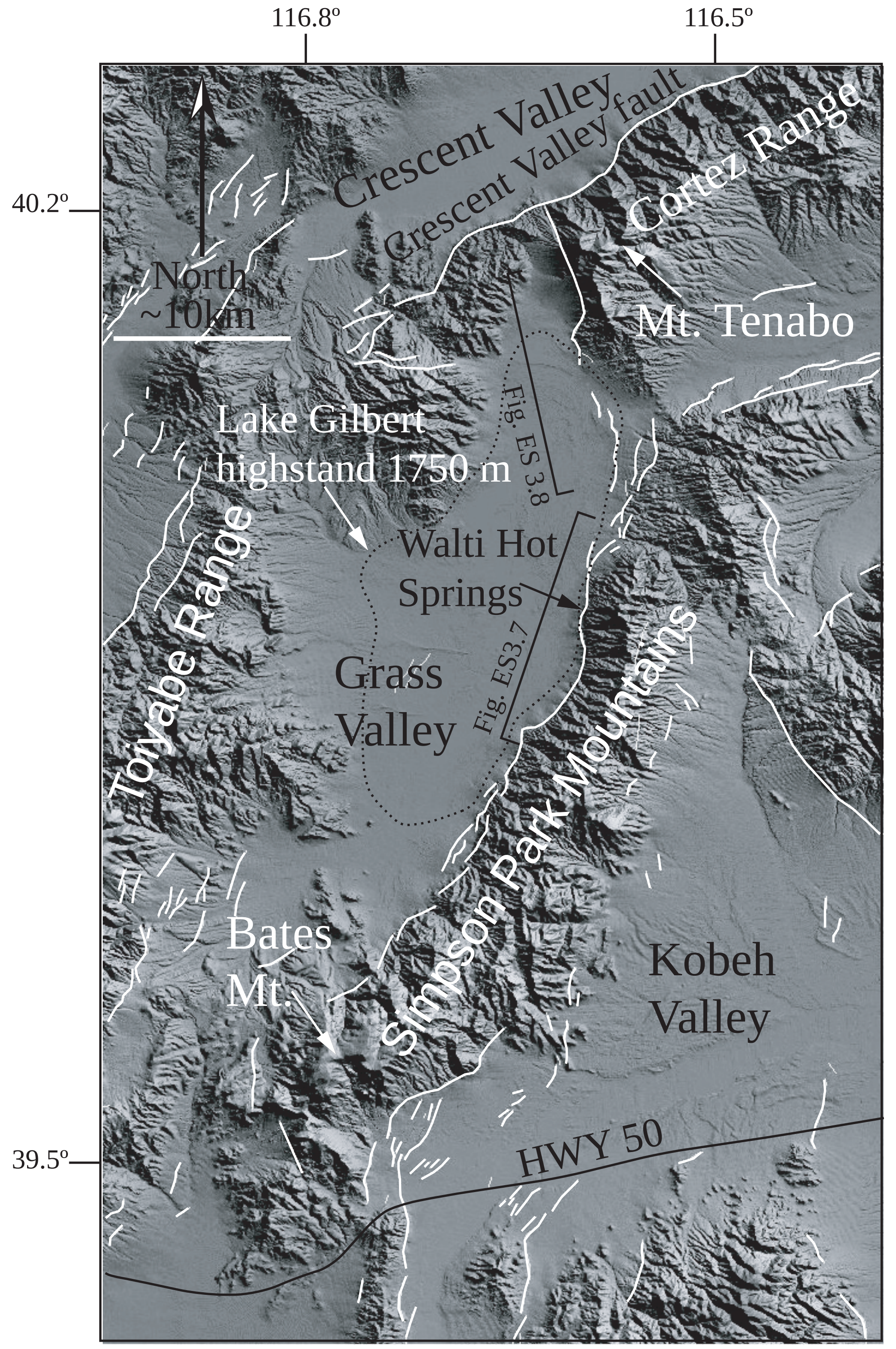


Figure ES 3.6. Physiographic map of the Simpson Park Range and Grass Valley. Previously mapped faults shown in white. Approximate outline of pluvial lake Gilbert highstand shown by dotted black line. Locations of detailed Quaternary strip maps (Figures ES 3.7 and ES 3.8) are also shown.

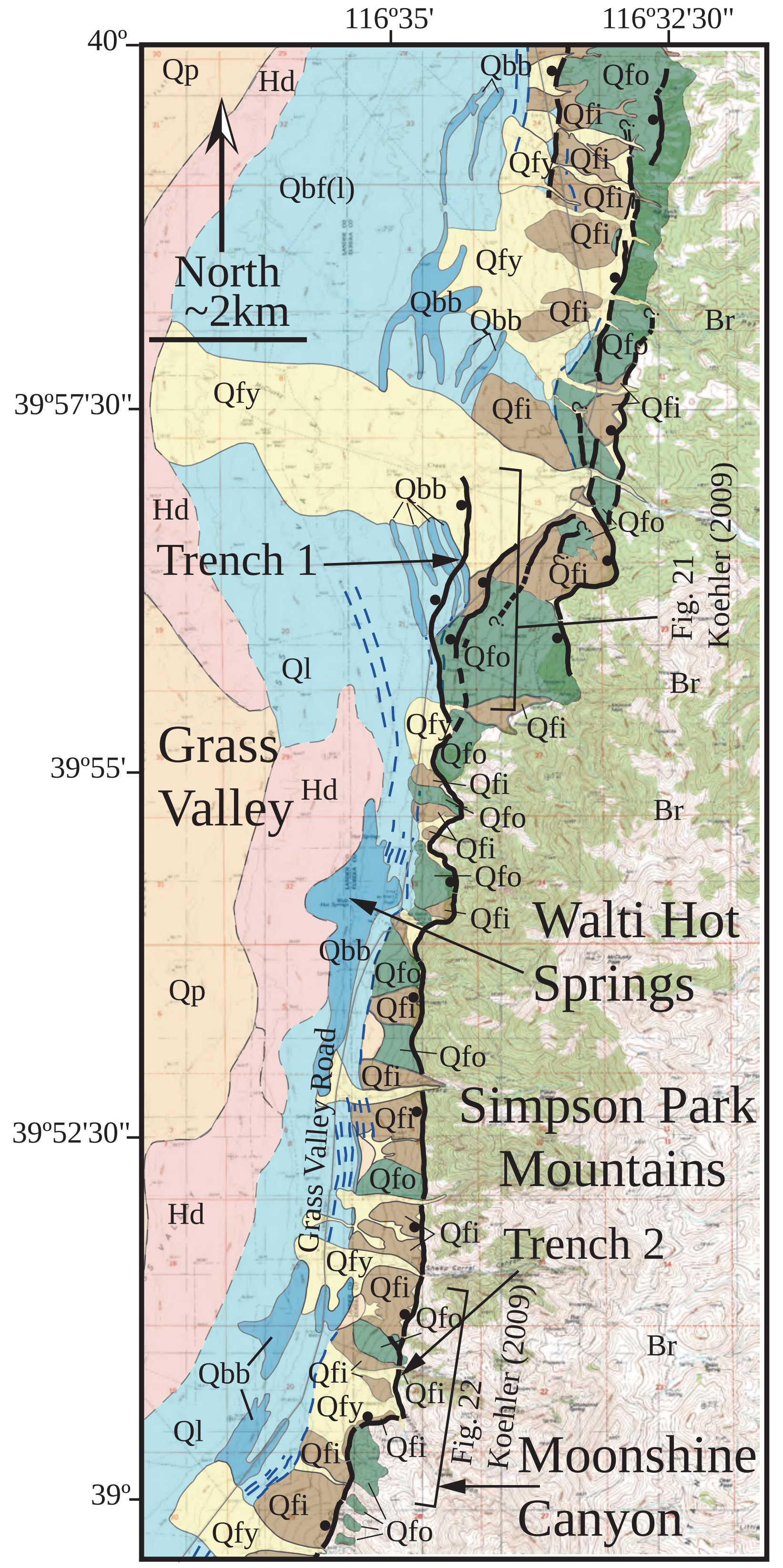


Figure ES 3.7. Surficial geologic map of the Simpson Park Mountains fault in the area north of Moonshine Canyon within the Walti Hot Springs and Fagin Mountain USGS 7.5 minute topographic quadrangles. Locations of Trench 1 and Trench 2 are shown. Location of air photos from Figures 21 and 22 in Koehler (2009) also indicated.

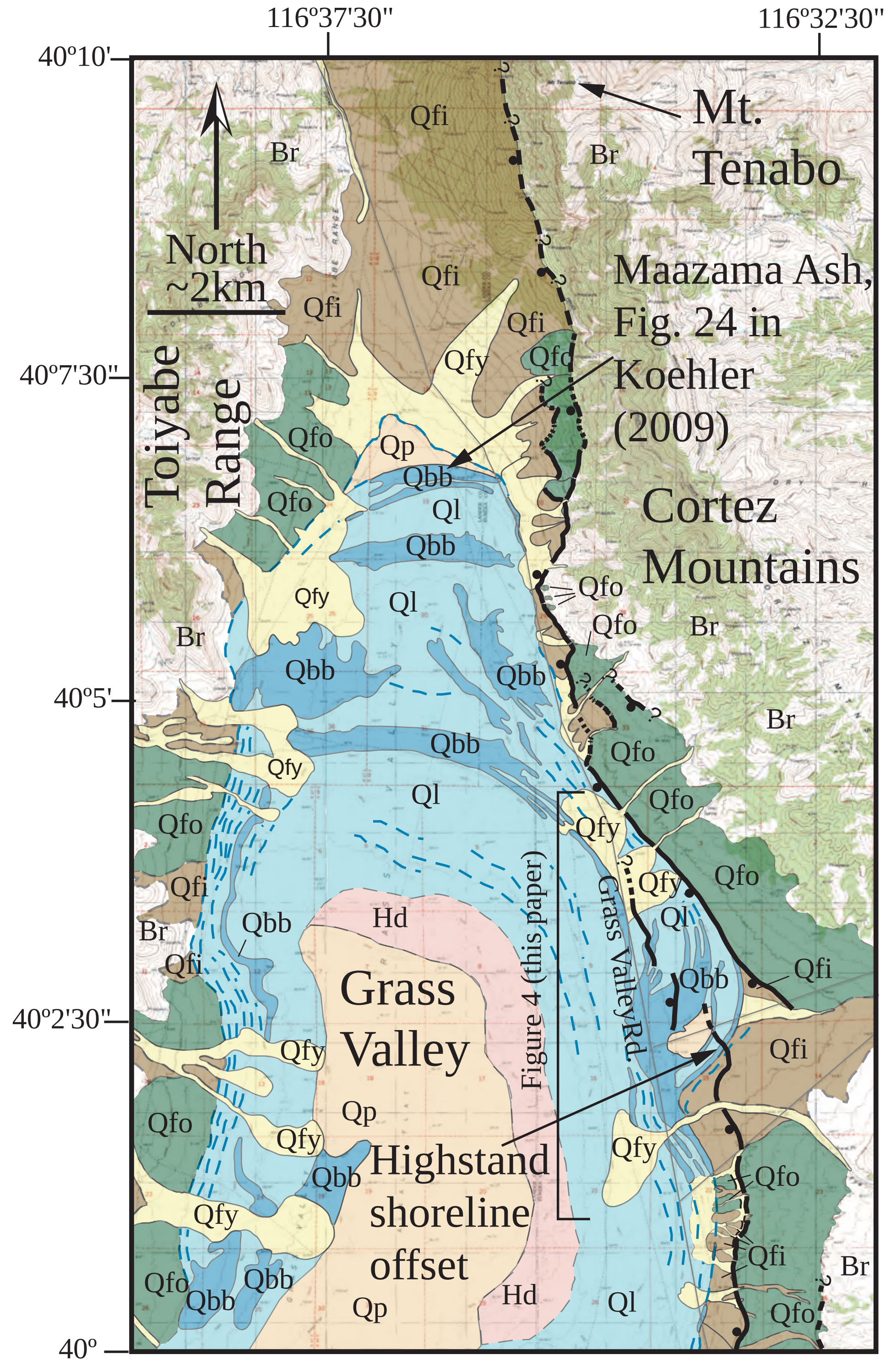


Figure ES 3.8. Surficial geologic map of the Simpson Park Mountains fault in the northern part of Grass Valley within the Cortez, Cortez Canyon, Wenban Spring, and Dugout Spring 7.5 minute USGS topographic quadrangles. Location of Maazama ash site (Figure 24 in Koehler, 2009) is shown. Location of Figure 4 (this paper) is also shown.

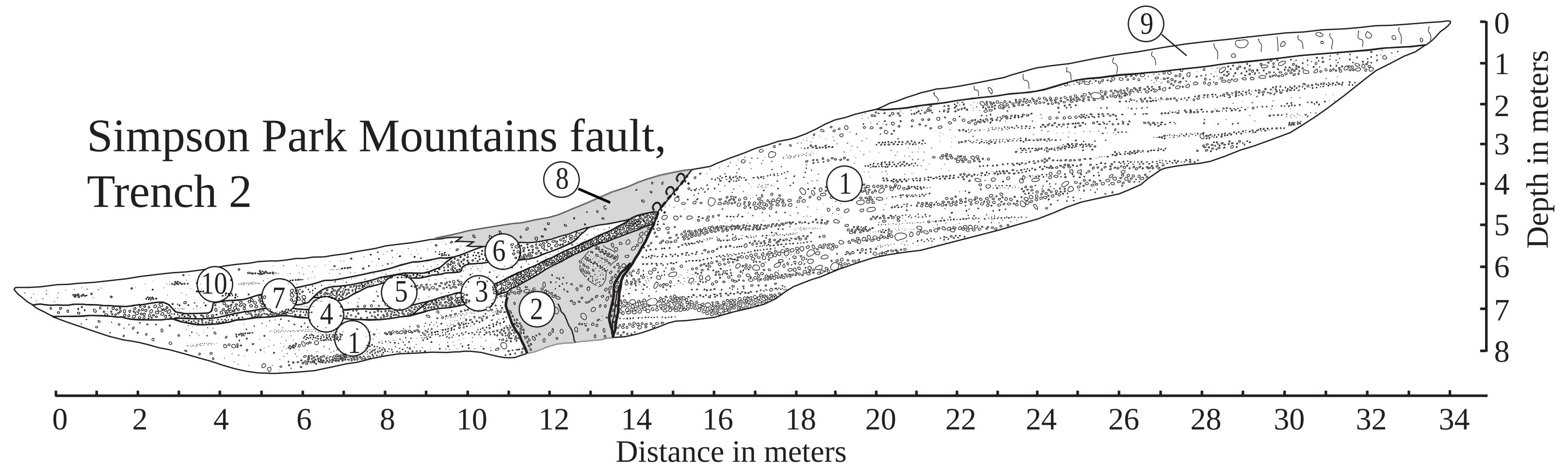


Figure ES 3.9. Stratigraphic log of the Trench 2 exposure along the Simpson Park Mountains fault located at latitude 39.84821, longitude –116.58388.

Character of faulting along the Simpson Park Mountains fault zone

Along the southern part of the mapping area, between Moonshine Canyon and Walti Hot Springs the fault is a singular trace that follows a sawtooth pattern along the bedrock alluvial fan contact. The fault offsets Qfi and Qfo deposits in canyon salients with scarps up to 4 meters, and is expressed by well-defined facets, and prominent vegetation, spring, and bedrock lineaments. North of Walti Hot Springs, to the southern edge of the Cortez Mountains, the fault splits into at least three splays, becomes more sinuous, and displaces alluvial fans and pluvial landforms related to pluvial Lake Gilbert with scarps of 1 to greater than 10 meters. Between Walit Hot Springs and the Cortez Mounains, old alluvial fans are preserved adjacent to the rangefront, which is characterized by rounded and subdued facets. Along the Cortez Mountains, the fault is a singular trace where it is coincident with the highstand shoreline of Lake Gilbert for approximately 4 km before projecting uphill towards Mt Tenabu.

Description of Trench 2, Simpson Park Mountains fault zone

Trench 2 was excavated across an ~4 m high scarp in a young alluvial fan at the mouth of Pine Creek, ~6 km south of Walti Hot Springs along the rangefront (Figure ES 3.7). A sketch of the exposure is shown on Figure ES 3.9. Structural and pedogenic relations observed in the trench supports the occurrence of one paleoearthquake that ruptured the surface after the deposition of Unit 1, creating an ~3-m-wide graben and an ~4 m high west facing scarp. Unit 2 is interpreted to represent graben fill material that toppled into the graben during the earthquake. During or shortly after the earthquake, a debris layer of colluvium (Unit 3) was deposited on the graben fill material. Subsequently, the hanging wall was buried by young alluvial deposits (Units 4, 5, 6, 7, and 10) and fault scarp derived colluvium (Unit 8).

Electronic Supplement 3 (continued)
Regional location maps (DEM's), surficial geologic strip maps, and other supporting information for each rangefront studied.

Toquima Range

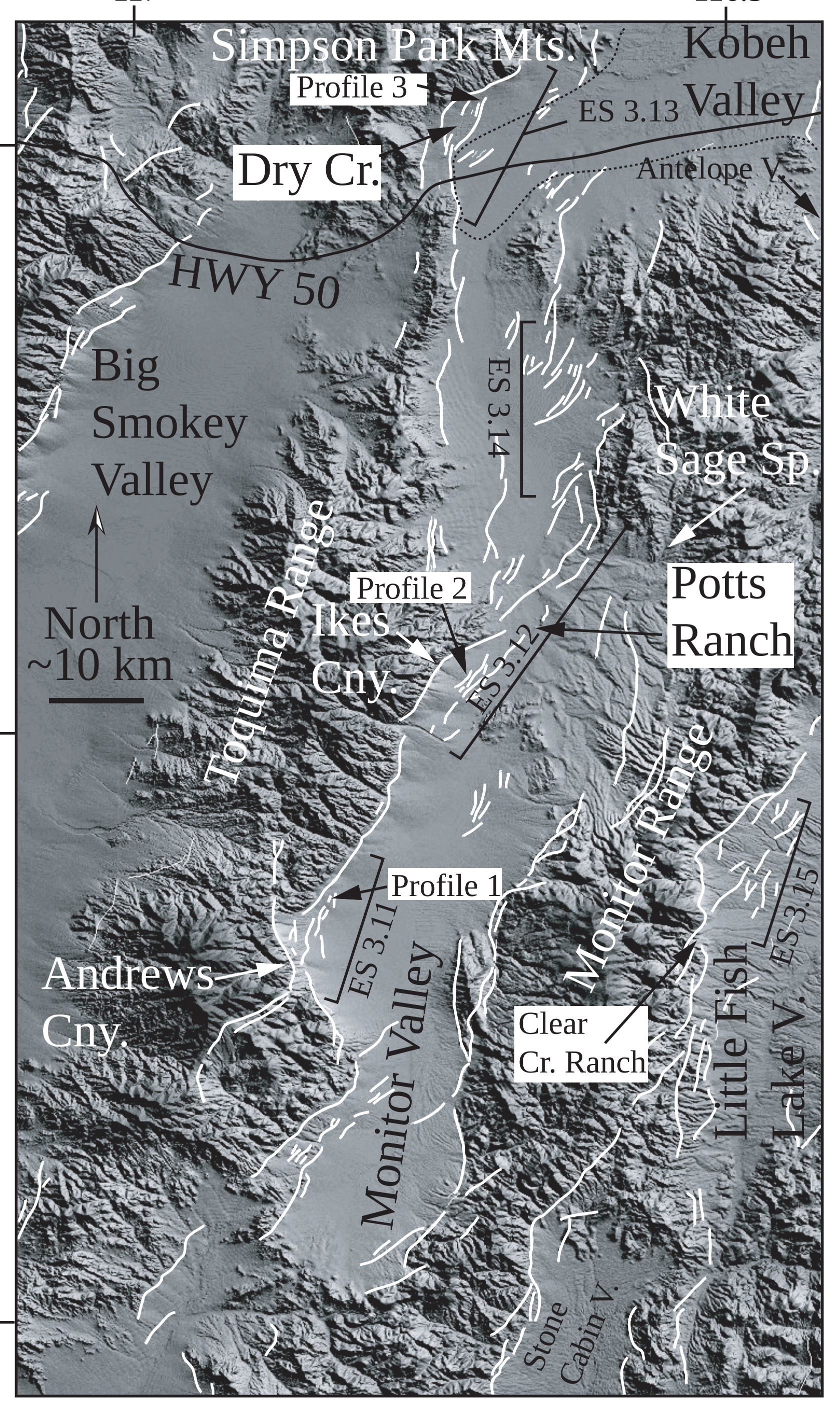


Figure ES 3.10. Physiographic map of the Toquima and Monitor Ranges. Previously mapped faults shown in white. Locations of Quaternary strip maps along the eastern Toquima Range, and the western Monitor Range, as well as an air photo along the eastern Monitor Range are indicated. Locations of fault scarp profiles along the Toquima Range are labeled.

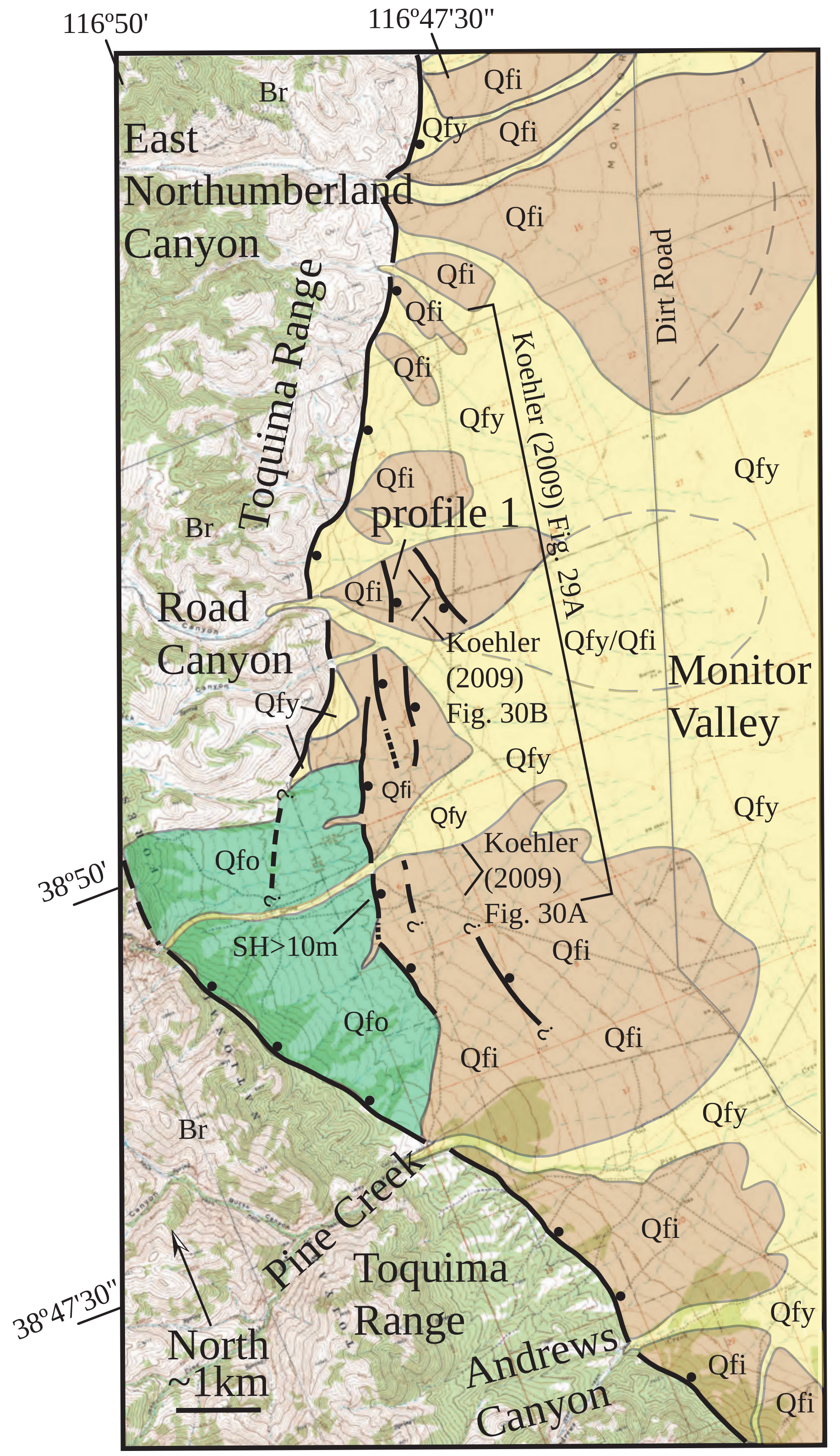


Figure ES 3.11. Surficial geology and fault splays of the eastern Toquima Range fault between Andrews Canyon and East Northumberland Canyon. Location of scarp profile 1 is indicated. Locations of photographs and air photos from Figures 29A, 30A, and 30B in Koehler (2009) are also shown. S.H.; scarp height.

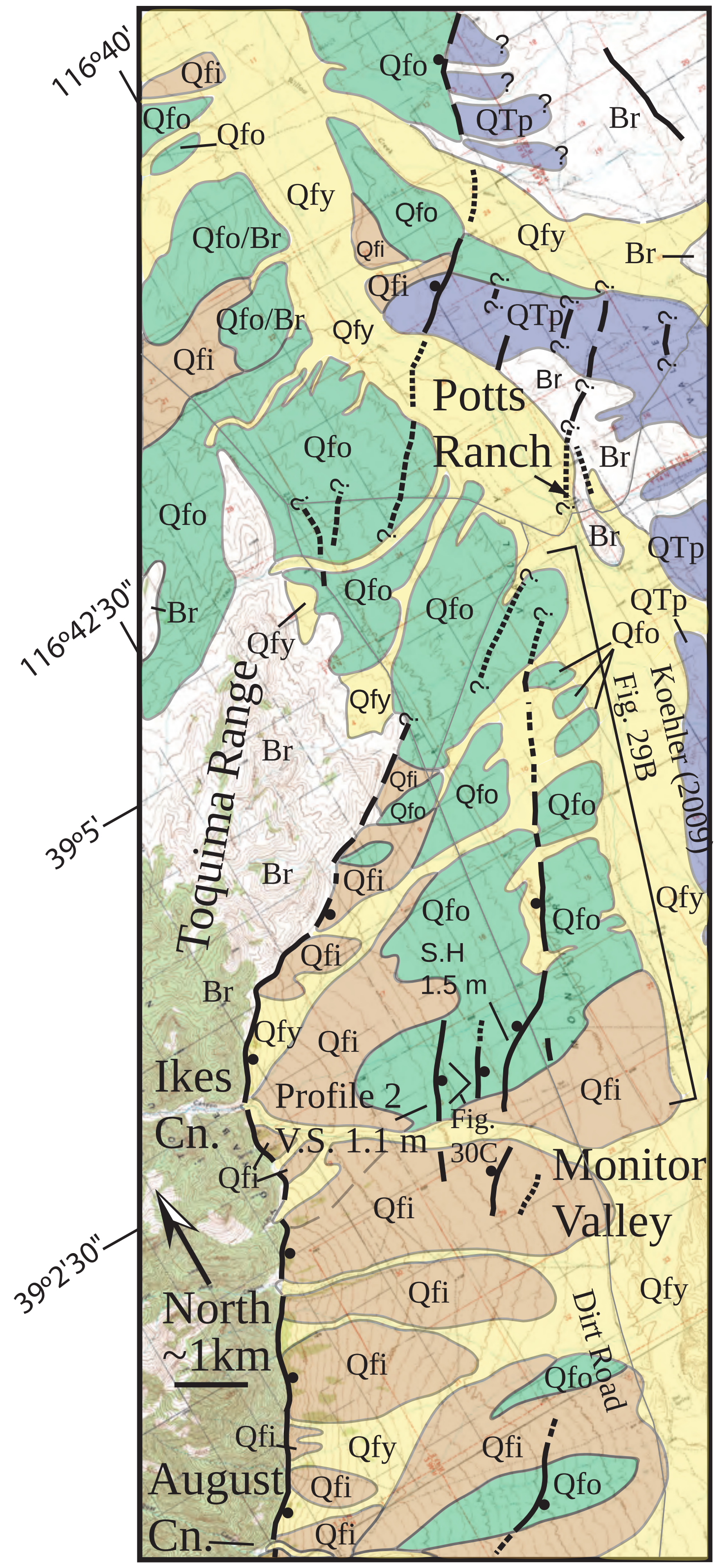


Figure ES 3.12. Map of Toquima Range fault and Quaternary geology in the vicinity of Potts Ranch. Traces of the Toquima Range fault project across the valley and are along strike with traces of the Monitor Range fault that bounds the northeastern side of the valley. Location of scarp profile 2 is annotated. Locations of air photos and photographs, Figures 29B and 30C from Koehler (2009) are also shown. V.S.; vertical separation.

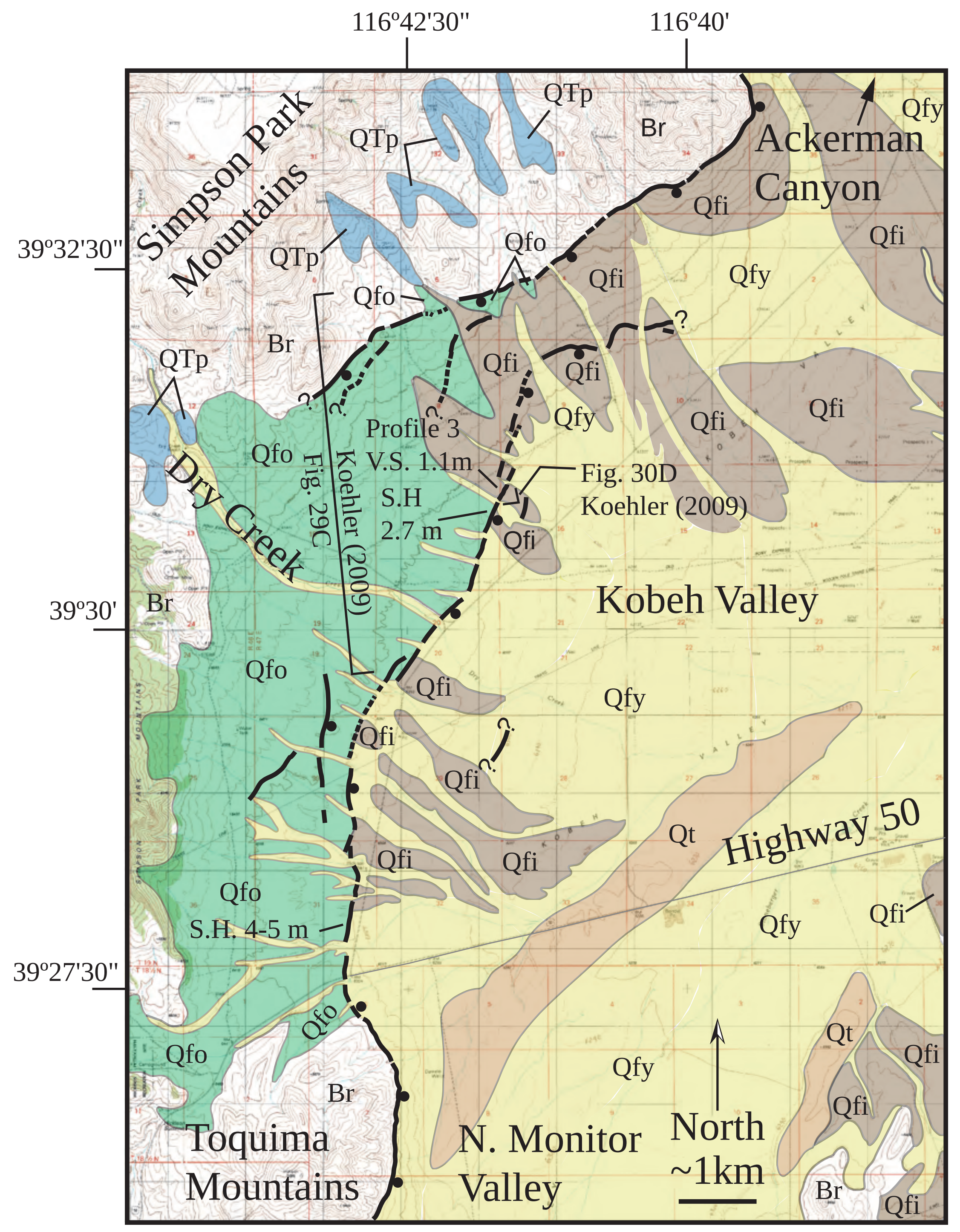


Figure ES 3.13. Surficial geologic map of Quaternary fault traces that extend north of the Toquima Range into western Kobeh Valley and bound the southeastern side of the Simpson Park Mountains. Location of scarp profile 3 northeast of Dry Creek is annotated. Locations of air photos and photographs, Figures 29C and 30D from Koehler (2009) are also shown. S.H., scarp height. V.S., vertical separation. Qt, Quaternary terrace.

Character of faulting along the eastern Toquima rangefront

North of Andrews Canyon, the fault splays off the rangefront, where it is expressed as several sub-parallel anastamosing traces (Figure ES 3.11). The most prominent trace extends ~N15E along the base of a large deeply incised remnant Qfo surface that is preserved above a >10-m-high scarp. Qfi surfaces in the vicinity of Road Canyon are cut by several east facing scarps (1.75 to 3 m) that extend N10W to N15E and an ~1.5 m west facing scarp that marks the eastern edge of a wide graben. Young alluvial fans inset into Qfo and Qfi surfaces, extend to the valley floor, and are not displaced. At East Northumberland Canyon, the fault is buried at the rangefront by young fans and colluvium. Alluvial scarps are also preserved east of the mouth of Ikes Canyon including two subparallel ~ 1 m high east facing scarps and an ~ 1.5 m high antithetic west facing scarp (Figure ES 3.12). Additionally, north of Dry Creek, short sinuous, ~1-2.5 m high scarps step left and merge with the eastern Simpson Park Mountains rangefront (Figure ES 3.13).

Monitor Range

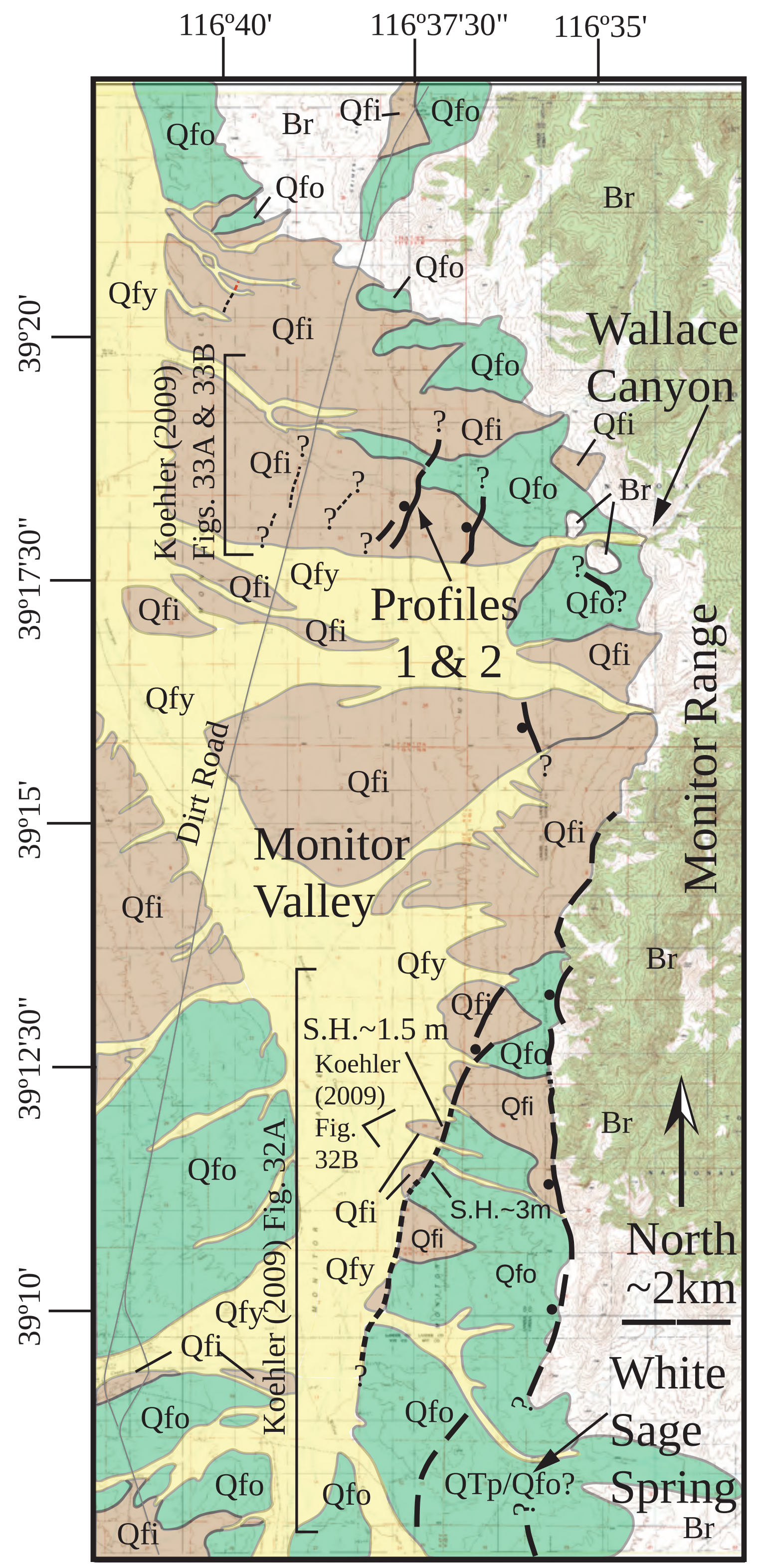


Figure ES 3.14. Surficial geologic map of the northwest side of the Monitor Range and traces of the western Monitor Range fault. Location of fault scarp profiles 1 and 2 are shown. Location of air and ground photos, Figures 32A, 32B, 33A, and 33B from Koehler (2009) are also shown. S.H.; scarp height.

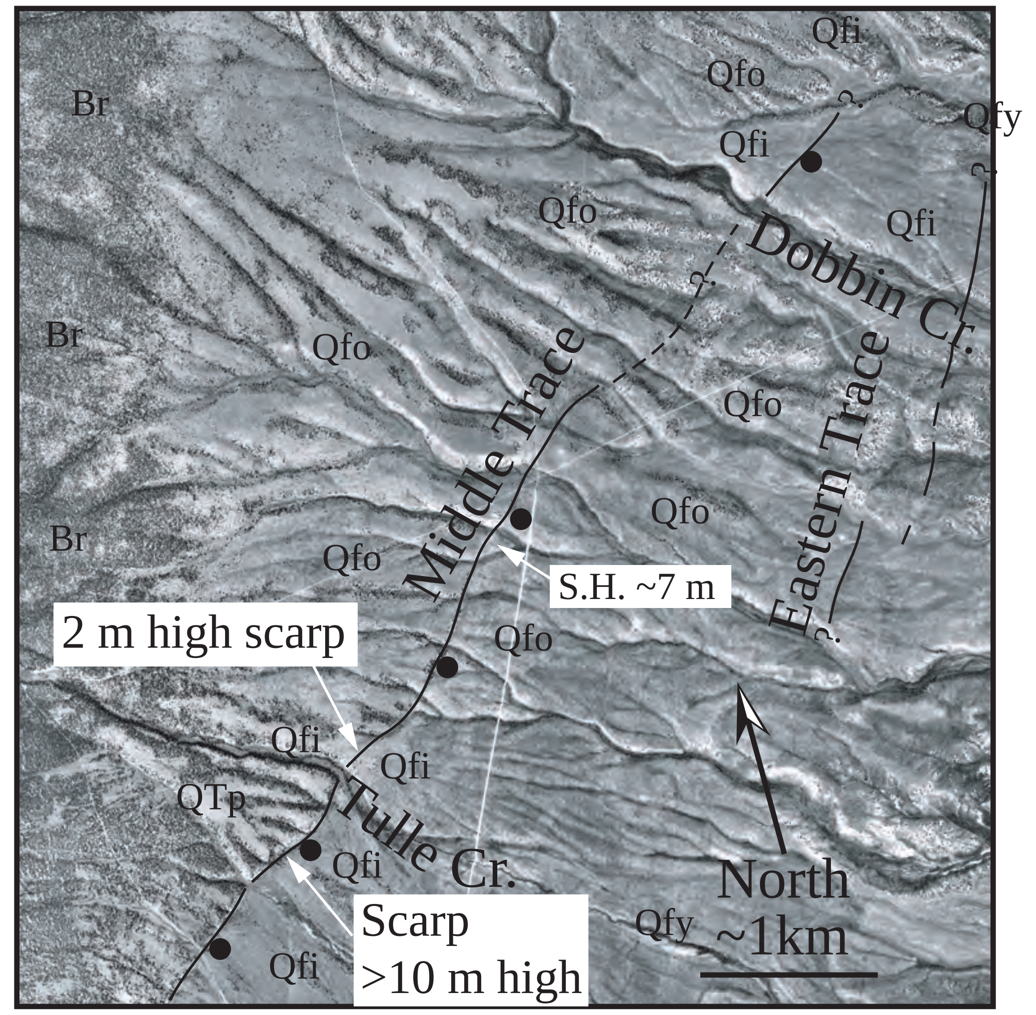


Figure ES 3.15. Aerial photograph of the eastern Monitor Range fault zone extending across alluvial fan deposits of Little Fish Lake Valley. S.H.; scarp heights on Qfi, Qfo, and QTp surfaces are annotated.

Character of faulting along the west flank, Monitor Range

Rangefront morphology south of White Sage Spring is weakly developed and characterized by a large deeply dissected pediment surface (Figure ES 3.10). North of White Sage Spring, the crest of the range increases in elevation and the western rangefront is characterized by a sharp over-steepened bedrock alluvium contact and well-developed facets. A map of the section of the rangefront near here (Figure ES 3.14) shows two west dipping fault traces that project southwestward across the valley toward the Toquima Range. Here, a bajada of old (Qfo) and intermediate (Qfi) alluvial fans are preserved along the rangefront and are displaced by the western trace by scarps between 1 and 3 m. Northward at Wallace Canyon, the fault steps west away from the rangefront where it is expressed as several discontinuous, subtle, <1 m high west-facing scarps distributed across a Qfi surface (Figure ES 3.14). The expression of active faulting appears to terminate north of Wallace Canyon coincident with a westward curve in the crest of the range, diminishing relief, and less prominent rangefront morphology.

Character of faulting along the east flank, Monitor Range

The eastern rangefront trace is sinuous and trends relatively north-south, but bends to N50E along the northern side of the valley. Rangefront morphology indicative of active normal faulting is most pronounced near Clear Creek Ranch, and characterized by steep triangular facets, vertical bedrock outcrops, and 1 km of relief. The photo in Figure ES 3.15 shows the east dipping middle trace of the fault projecting N45E from the rangefront near Tulle Creek across the piedmont slope. A large pediment surface preserved directly south of Tulle Creek and coalesced old alluvial fans (Qfo) have been displaced >10 m and >7 m, respectively. Qfi fans inset into the Qfo bajada are displaced ~2 m. The eastern trace is also associated with scarps in Qfo and Qfi deposits that are generally smaller and less preserved than scarps associated with the middle trace.

Electronic Supplement 3 (continued)

Regional location maps (DEM's), surficial geologic strip maps, and other supporting information for each rangefront studied.

Antelope Range

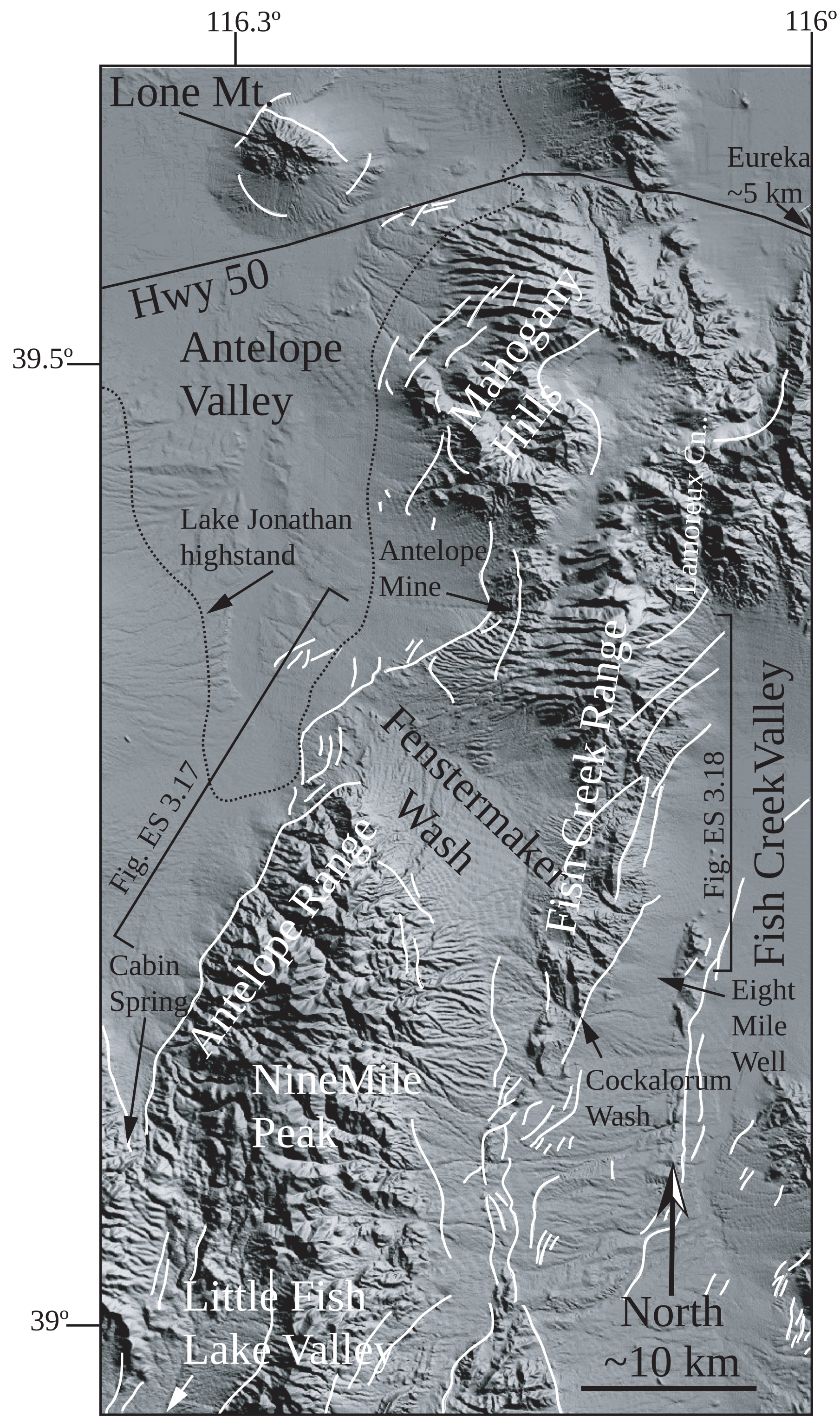


Figure ES 3.16. Physiographic map of the Antelope and Fish Creek Ranges. Previously mapped faults shown in white. Maximum known area of Pre-late Pleistocene Lake Jonathan from Reheis (1999) shown by black dotted line. Locations of detailed strip maps Figures ES 3.17 and 3.18 are indicated.

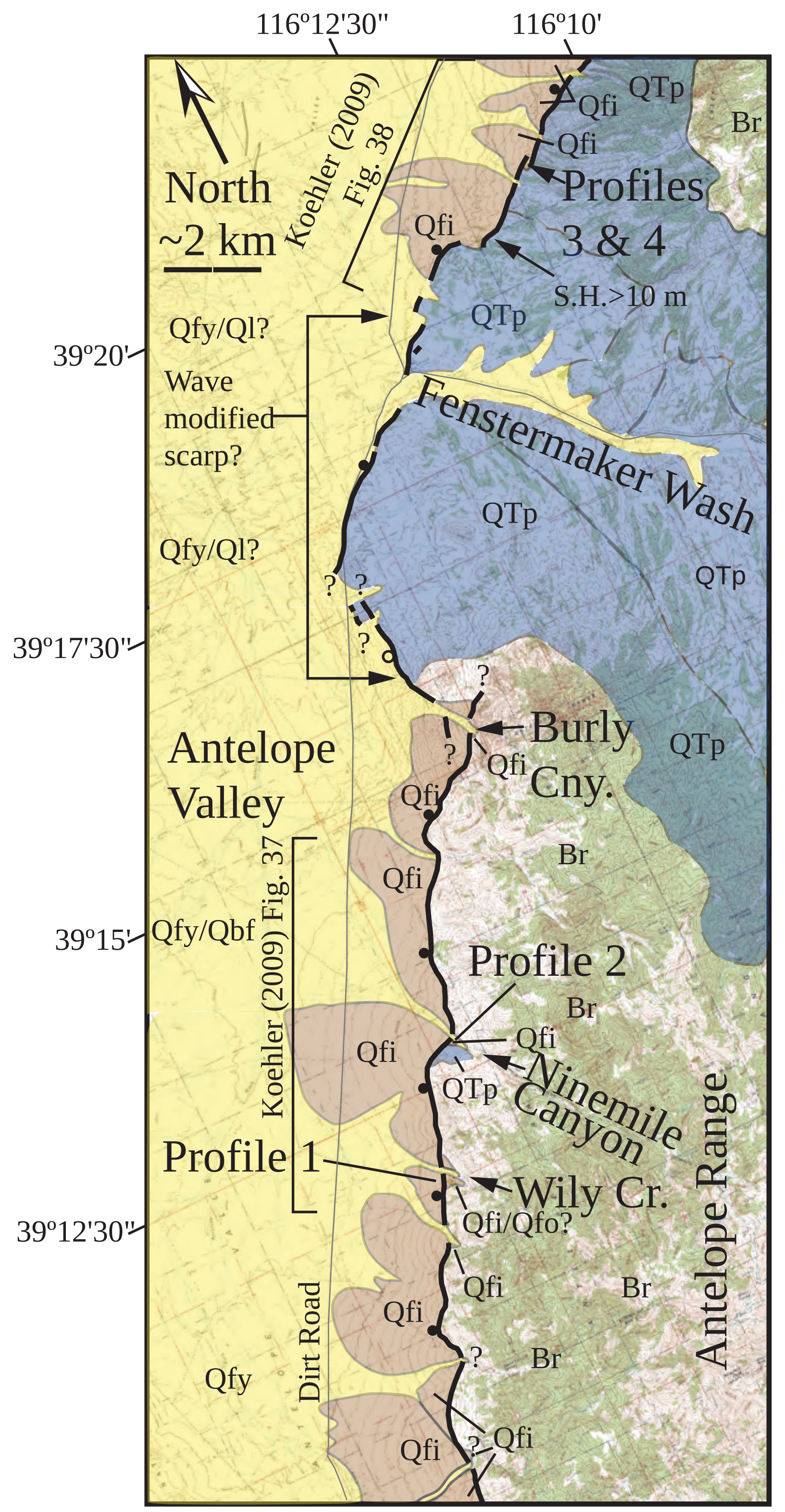


Figure ES 3.17. Surficial geologic map of the Antelope Range fault in the vicinity of Fenstermaker Wash. Location of fault scarp profiles 1, 2, 3, and 4 are shown. Location of air photos from Figures 37 and 38 (Koehler, 2009) are annotated. The mouth of Wily Creek (Figure 7, this paper) is also indicated.

Character of faulting, western Antelope Range

South of Burly Canyon Quaternary deposits are in fault contact with bedrock along the rangefront (Figure ES 3.17). Scarps in intermediate alluvial fan surfaces (Qfi) occur at the mouths of most major drainages and range in height between ~2-4 m. At Ninemile Canyon, a pediment surface is preserved east of the rangefront above an ~25 m scarp on the south side of the canyon. Here, a Qfi surface inset into the pediment is cut by a well-rounded scarp accentuated by a graben. Young alluvial fans emanating from major drainages are not deformed by the fault, are inset >10 m into Qfi surfaces, and extend to the valley floor where they form a coalesced bajada in close proximity to the rangefront. North of Burly Canyon, the fault steps left and trends along the base of bedrock knobs and a pediment surface to the vicinity of Fenstermaker Wash. The location of the scarp is coincident with the mapped middle Pleistocene extent of pluvial Lake Jonathan, which obtained highstands around 670 kya, 760 kya, and 2 mya (Reheis, 1999). Several subtle low berms that parallel the fault upslope of the scarp may be remnant beach ridges associated with the lake. However, because late Pleistocene lake highstand elevations in Antelope Valley are not well documented, the scarp may have been modified by lacustrine processes in this area. North of Fenstermaker Wash, the fault is expressed as a >10 m high scarp along the base of a deeply dissected pediment surface (Quaternary/Tertiary sedimentary deposit of Lehner et al., 1961). A Qfi surface within a short step in the pediment scarp about 5 km north of Fenstermaker Wash is offset ~1.5 m across a splay of the fault that extends for ~250 m (Figure ES 3.17).

Fish Creek Range

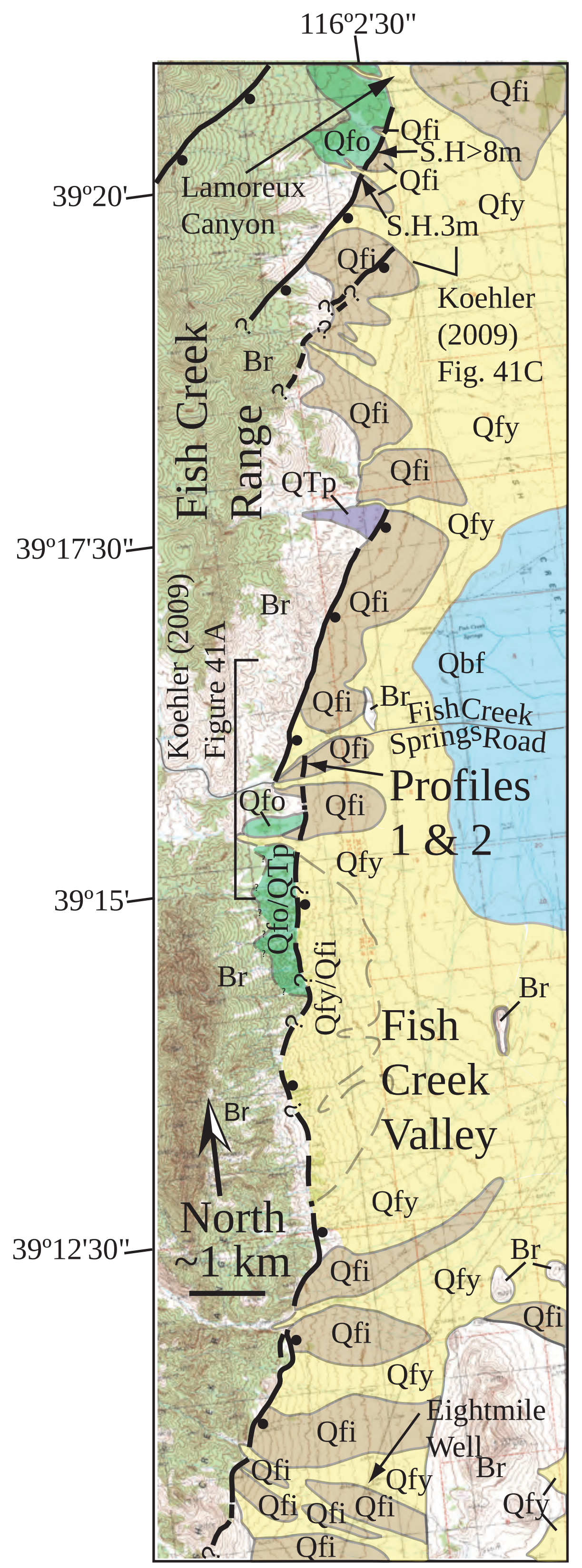


Figure ES 3.18. Map of the Fish Creek Range fault zone and Quaternary deposits within Fish Creek Valley. General location of fault scarp profiles 1 and 2 are shown. Location of air photos and photographs in Figures 41A and 41C (Koehler, 2009) are shown.

Character of faulting, eastern Fish Creek Range

In the vicinity of Eight Mile Well, the fault is characterized by an alignment of low, morphologically subdued bedrock hills and weak triangular facets. Qfi fans are locally in contact with the rangefront and have been inset by Qfy surfaces that emanate out of bedrock canyons, and are not displaced. About 2 km south of Fish Creek Springs Road, well-dissected old alluvial fan (Qfo) and pediment (QTp) surfaces are elevated and preserved west of the fault. Directly south of Fish Creek Springs Road, the fault displaces a Qfi surface ~2.5 m. The footwall surface has been incised 1 to 2 m by gullies and over 3 m by Qfy alluvial fans. North of Fish Creek Springs Road, the fault is characterized by four left-stepping en-echelon strands trending N25-N35E. Each strand is ~2-4 km long and characterized by moderately steep rangefront morphology and a sharp linear contact at the base of the bedrock. Where each fault strand projects away from the bedrock northeast into the valley, Qfi and Qfo/pediment surfaces are offset along degraded scarps between 2-3 and >10 m high, respectively (Figure ES 3.18).

Butte Range

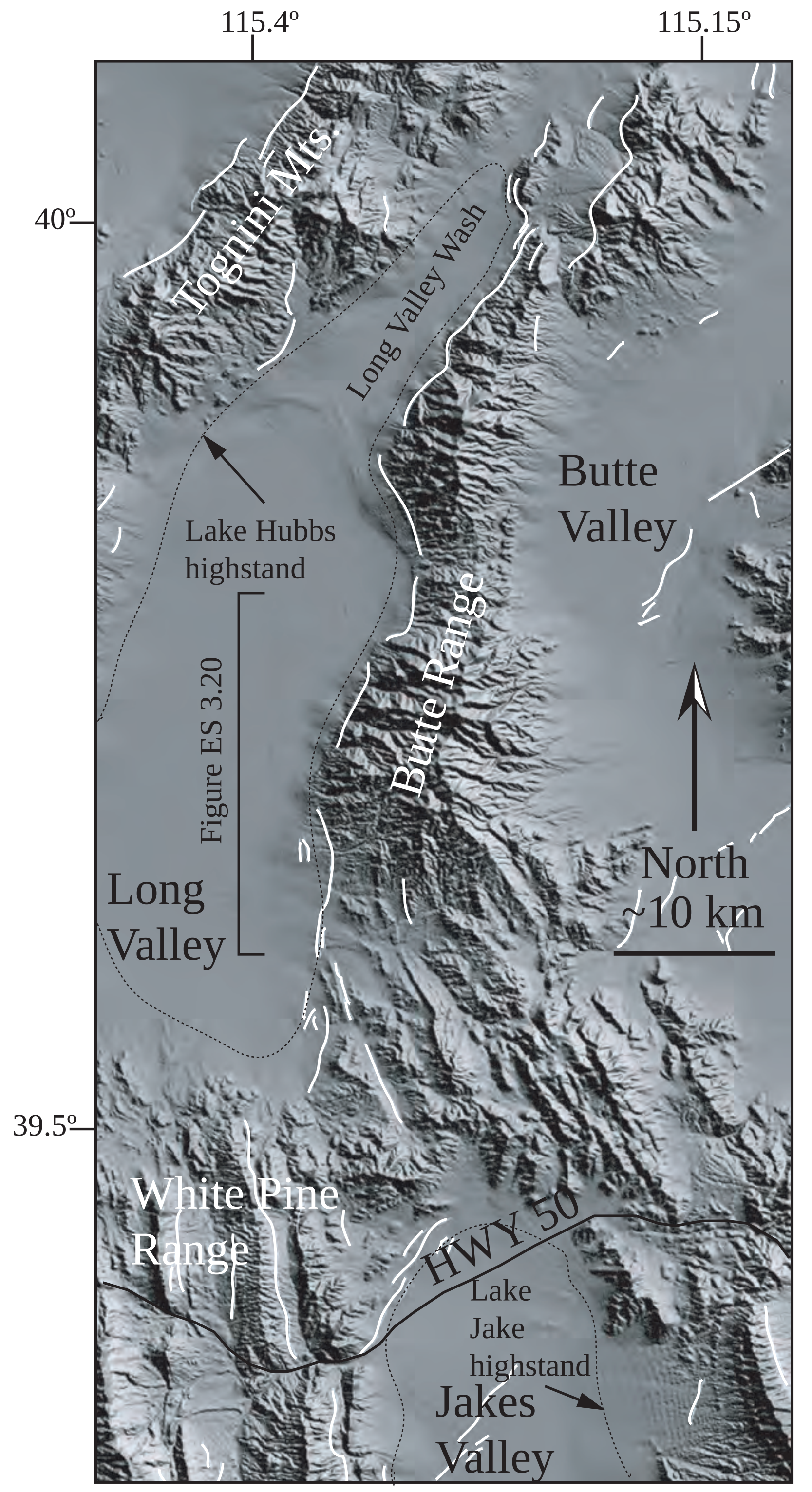


Figure ES 3.19. Physiographic map of the Butte Range and Long Valley. Previously mapped faults shown in white. Approximate outline of late Pleistocene pluvial lakes Hubbs and Jake shown by black dotted line (Reheis, 1999). Location of Quaternary surficial geologic map, Figure ES 3.20 is also shown.

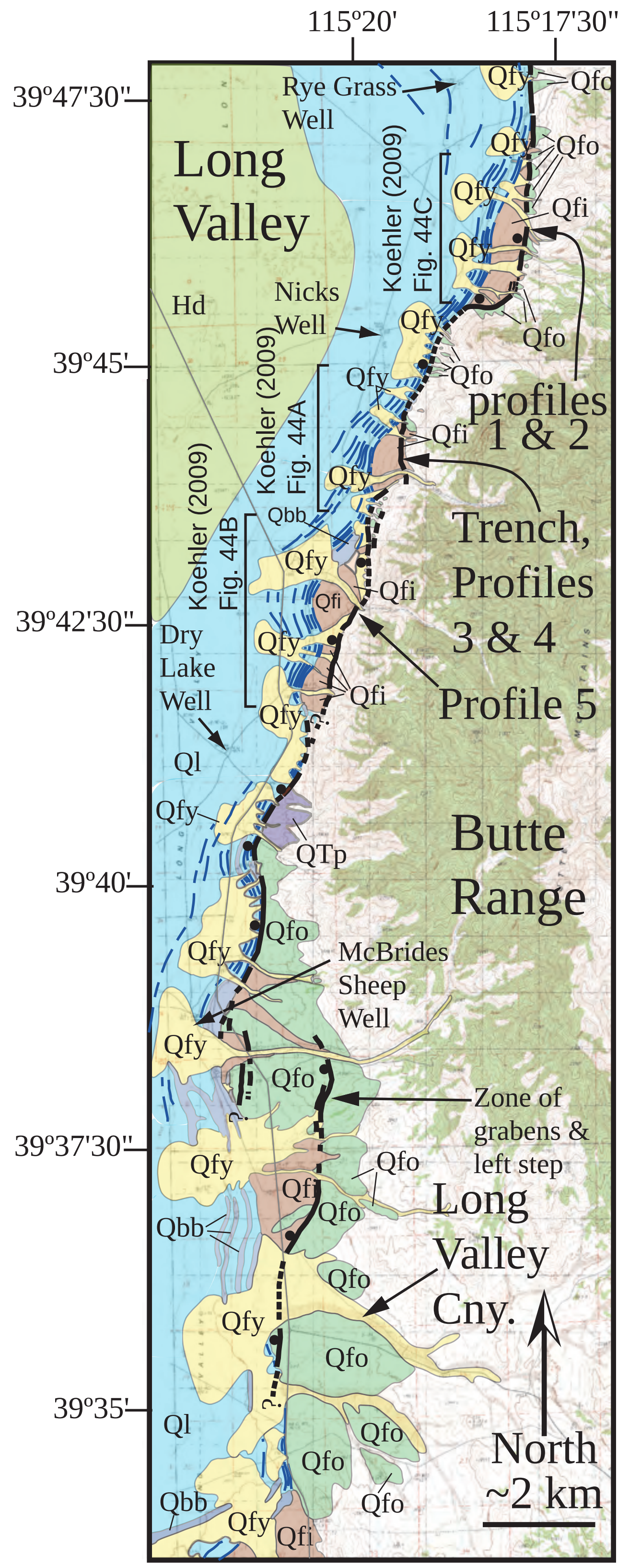


Figure ES 3.20. Map of the Butte Range fault zone and surficial geologic units of Long Valley. Topographic base maps from the Dickenson Well, Mc Brides Sheep Well, and Cabin Spring 7.5 minute USGS topographic quadrangles. Location of trench site and fault scarp profiles 1-5 are shown. Locations of air photos from Figures 44A, 44B, and 44C in Koehler, 2009 are also shown.

Character of faulting, west flank Butte Range

Within the map area shown on Figure ES 3.20, the fault trace is always buried by lacustrine (Ql) and young alluvial fan surfaces (Qfy). Directly north of Long Valley Canyon, the fault projects upslope where it is characterized by two large 100 to 200 meter wide grabens that form a 1.75 km overlapping left step across Qfo and Qfi surfaces. At McBrides Sheep Well, the fault makes another short overlapping left step (~0.5 km) and projects along the base of Qfo/pediment surfaces and bedrock where it has been modified by pluvial lake processes. From Dry Lake Well to Nicks Well the fault is expressed as an ~ N15E trending, sinuous trace that primarily extends above the highstand of Lake Hubbs along the rangefront. In this area, the fault offsets Qfi surfaces across 4 to 6 meter high scarps commonly associated with small grabens and does not deform lacustrine deposits. Thus, the scarp has been modified by shoreline processes. From Nicks Well, the fault bends ~1.5 km to the east and is expressed by three short parallel traces within the bend. The two western traces offset Qfi surfaces with scarps between 1 and 2 meters and the eastern trace extends to the north along the base of remnant Qfo surfaces. At the mouth of several small canyons, Qfi surfaces have been offset about 1 meter. North of the mapping area, large Qfo fans extend into the valley and the fault continues along the rangefront to the mouth of Long Valley Wash.

Electronic Supplement 3 (continued)

Regional location maps (DEM's), surficial geologic strip maps, and other supporting information for each rangefront studied.

Egan Range

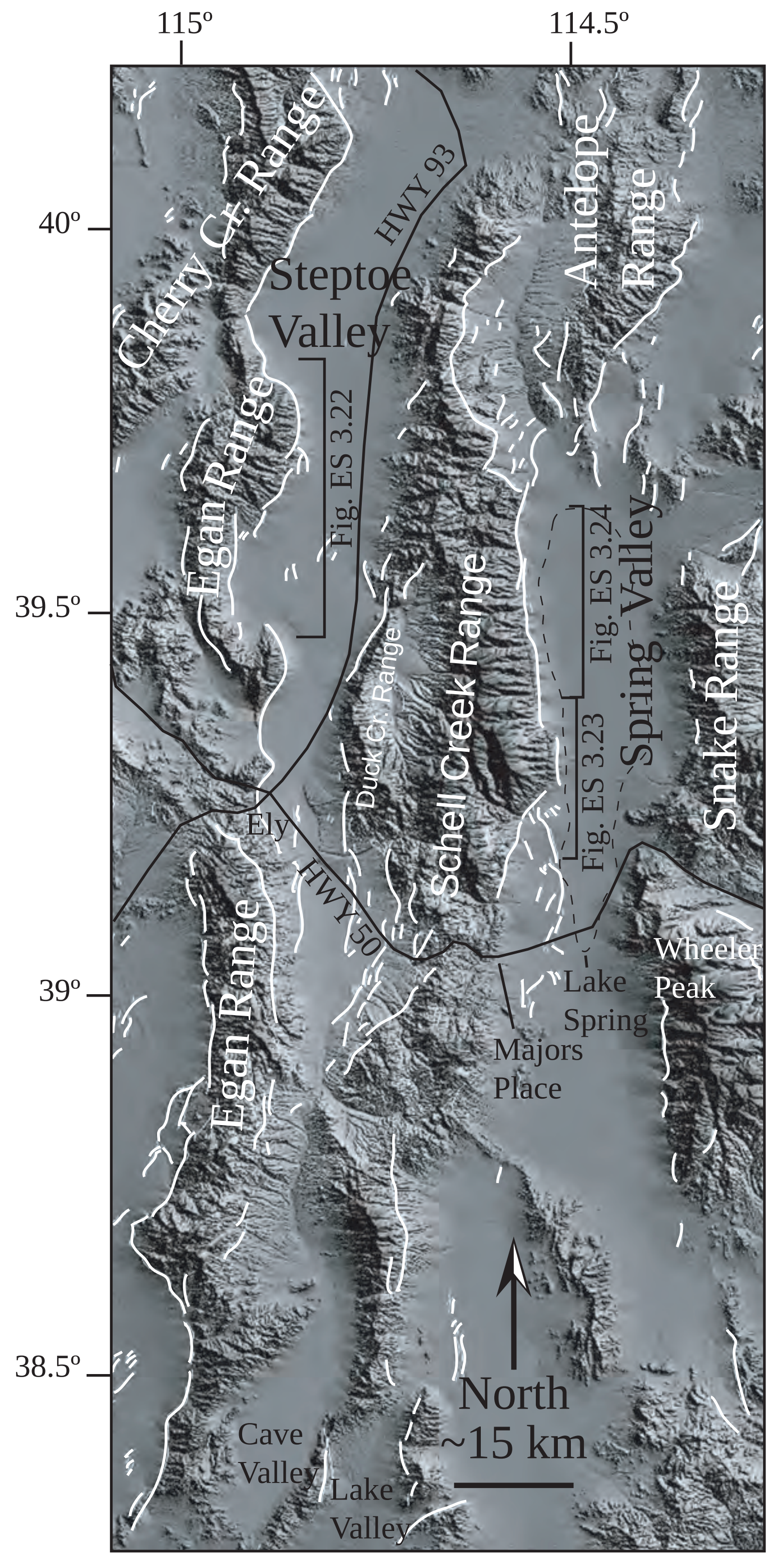


Figure ES 3.21. Physiographic map of the Egan and Schell Creek Ranges region. Previously mapped faults shown in white. Approximate outline of pluvial Lake Spring shown by black dashed line. Locations of Quaternary surficial geologic maps, Figures ES 3.22, ES 3.23, and ES 3.24 are also shown.

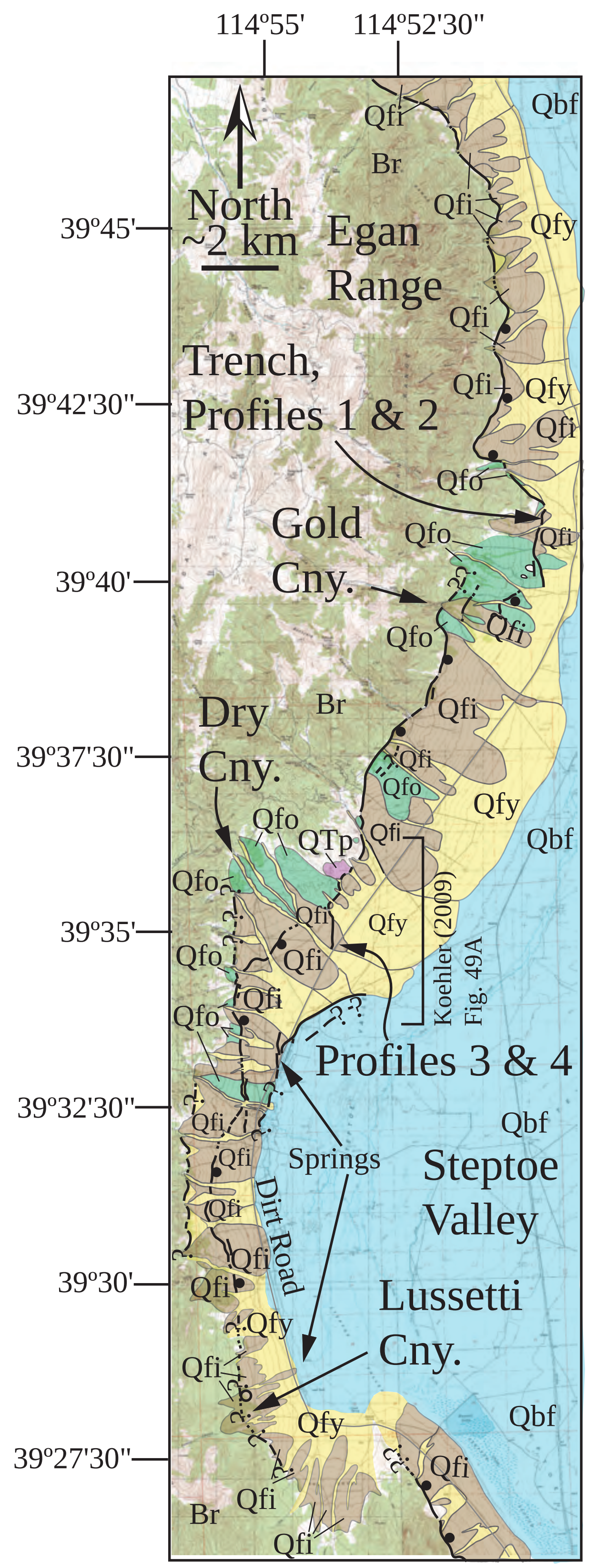


Figure ES 3.22. Surficial geologic map showing traces of the Egan Range fault and Quaternary deposits of Steptoe Valley along the eastern margin of the Egan Range. Map shows location of paleoseismic trench and fault scarp profiles 1-4. Location of air photo from Figure 49A in Koehler (2009) is also shown.

Character of faulting, east flank, Egan Range

The expression of the fault on a Quaternary surficial geologic map is shown onFigure ES 3.22. North of Lussetti Canyon, the fault is expressed as a north trending western rangefront trace, and a relatively continuous middle trace characterized by scarps, graben, and short steps across intermediate and old alluvial fan surfaces. A possible eastern trace extends along the alluvial fan/basin fill contact and is associated with scarps that cross topography, toanal lineaments, and pervasive spring activity. In the vicinity of Dry Canyon the fault elevates Qfo and pediment surfaces up to 15 m, and extends along the rangefront to Gold Canyon. North of Gold Canyon, the fault makes three overlapping east steps characterized by 4-5 m and 2 m high scarps in Qfo and Qfi surfaces, respectively.

Schell Creek Range

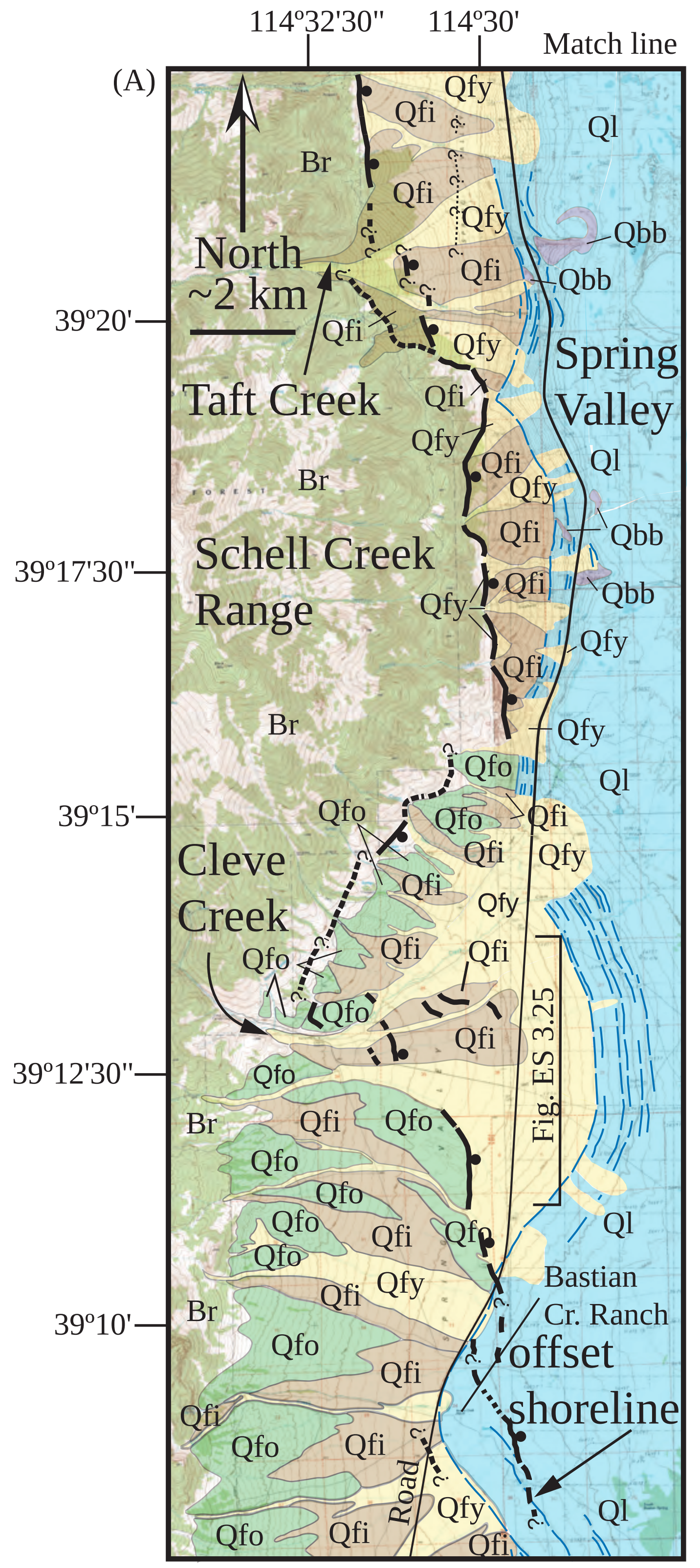


Figure ES 3.23. Surficial geologic map of the Schell Creek Range fault zone and Quaternary deposits of Spring Valley in the vicinity of Cleve Creek. Location of Figure ES 3.25 is indicated. Location of scarp profiles 1-4 are shown on the air photo in Figure ES 3.25.

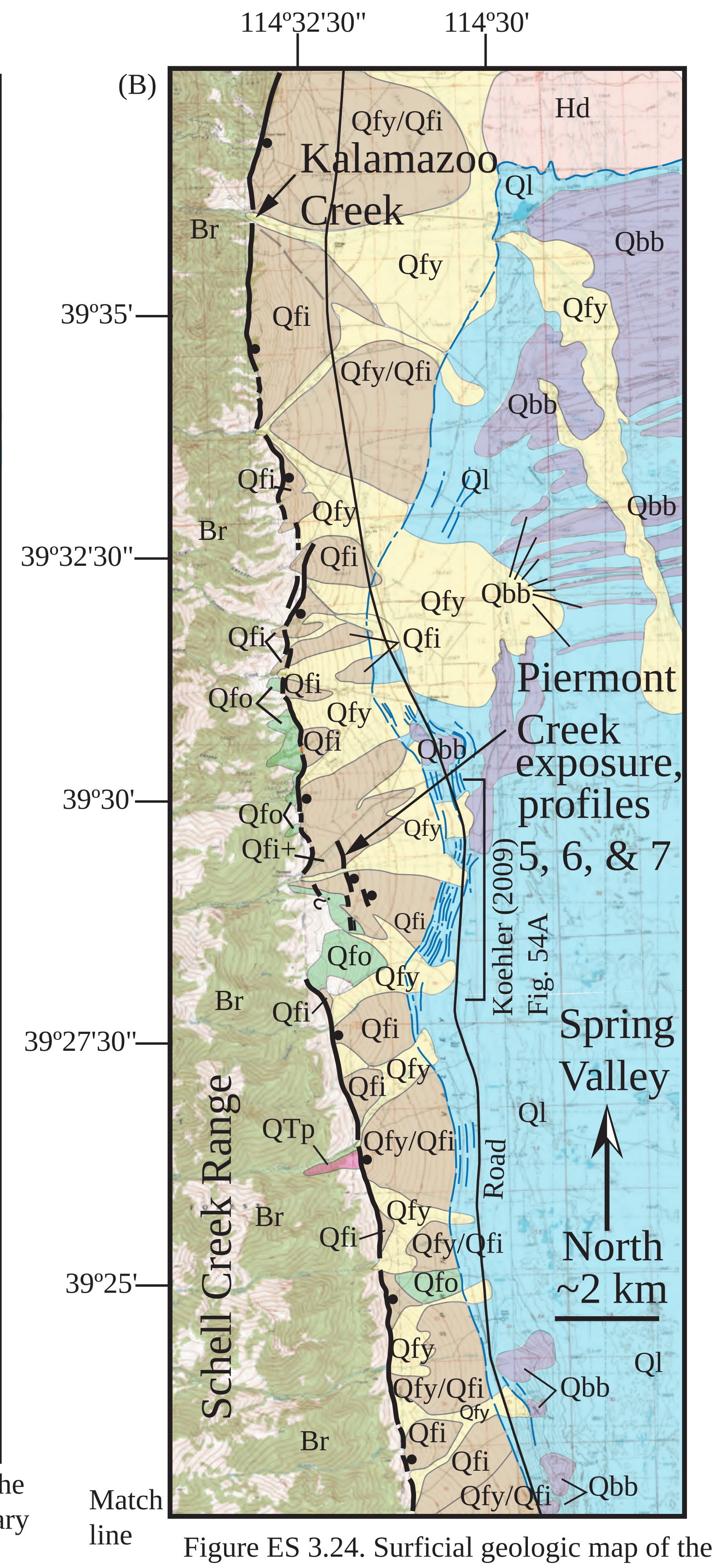


Figure ES 3.24. Surficial geologic map of the Schell Creek Range fault zone and Quaternary deposits of Spring Valley in the vicinity of Piermont Creek. Location of air photo of the Piermont Creek exposure site from Figure 54A in Koehler, 2009 is shown. Location of scarp profiles 5-7 are also shown.

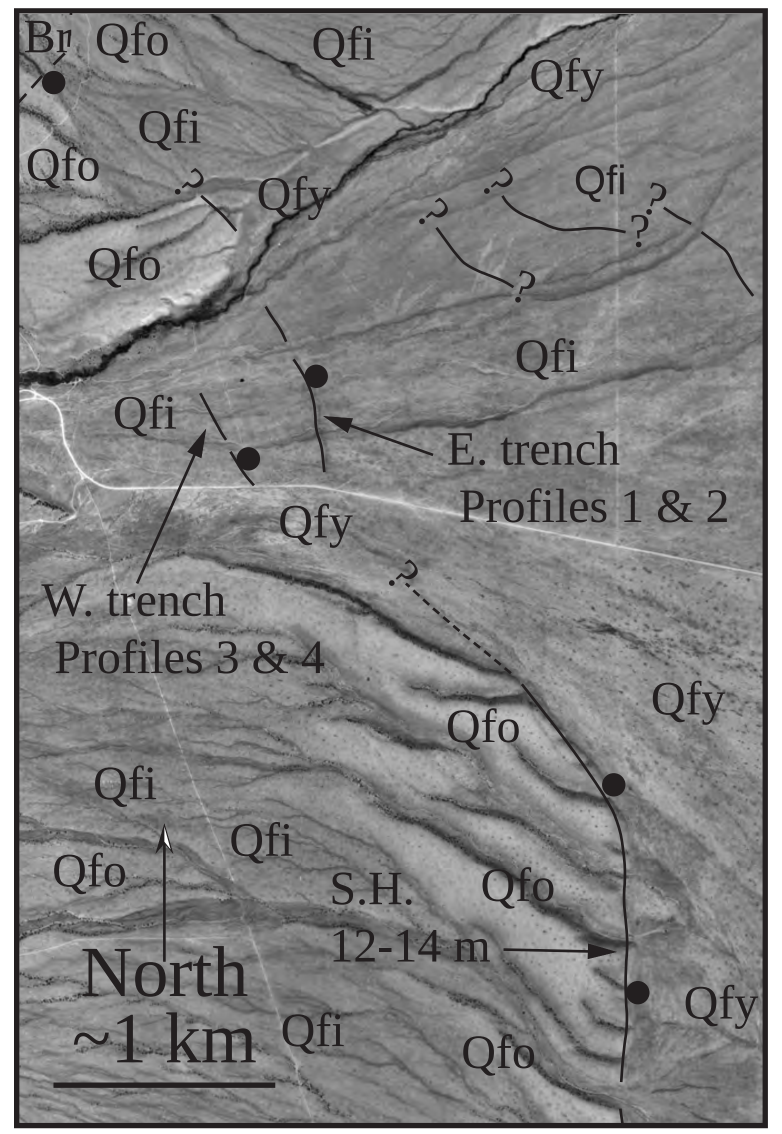


Figure ES 3.25. Aerial photograph of the Cleve Creek area showing progressively offset alluvial surfaces. Fault shown by dashed and solid black line. Coordinates for west trench are latitude 39.21089, longitude –114.52789, and east trench are latitude 39.21116, longitude –114..52387. General locations for scarp profiles 1-4 are shown.

Character of faulting, east flank Schell Creek Range

From Bastian Creek Ranch to Cleve Creek the fault is characterized by short overlapping traces that trend north-south oblique to shoreline features associated with Lake Spring. Directly east of Bastian Creek Ranch, the fault cuts topography and is characterized by an alignment of trees, an ~1-m-high scarp, and multiple springs. Large deeply dissected old alluvial fan surfaces are preserved along the rangefront west of the fault and shore features are deposited on intermediate age alluvial fans (Qfi). Young fan surfaces (Qfy) are inset into Qfi deposits and have buried basin fill deposits.

From Cleve Creek to the vicinity of Piermont Creek alluvial fan preservation along the rangefront is distinctly different than the area south of Cleve Creek. Along this section, small isolated remnants of Qfo surfaces are rare and Qfi surfaces dominate the landscape from the bedrock to the basin fill. The fault extends along the rangefront as a N10W continuous trace and is associated with distinct oversteepened basal facets in bedrock. Major drainages (i.e.Taft Creek) are actively depositing debris flow sediment on the Qfi surfaces adjacent to the rangefront. At Piermont Creek, the fault briefly steps away from the rangefront where a Qfo surface is preserved. Two left stepping en echelon fault traces trend across the Piermont Creek fan (Qfi) and are associated with grabens and scarps up to 4-5 m. North of Piermont Creek, the fault returns to the rangefront and extends as a continuous trace to the vicinity of Kalamazoo Creek. Prominent scarps along this section cut Qfi surfaces adjacent to the rangefront in several places.