Geologic Field Guide to Shevlin Park.

by

Bob Jensen

Park History

The John C. Fremont Expedition left The Dalles on November 25, 1843. On night of December 4, they camped in the meadows along Tumalo Creek. Later of the journey they crossed Winter Rim and dropped down to Summer Lake on December 16 and entered Nevada south of Warner Lakes on December 26.

Sometime prior to 1919, an irrigation canal (Tumalo Ditch) was constructed from an intake just south of what would become Shevlin Park, north through the area of the park and north to irrigate lands south of Tumalo.

On January 20, 1921, The Bend Bulletin reported that the Shevlin-Hixon Company had made made a gift to the city of Bend of over 250 acres in Tumalo canyon. The deed was signed by F.P. Hixon (president) and R.W. Wetmore (secretary) and provided that the Shevlin Memorial Park “shall be open at all times as a public playground”. The deed also reserved the right to cross the park for future logging operations.

In the November 14, 1939 issue, The Bend Bulletin reported that Brooks-Scanlon Lumber Company was beginning clearing for a new railroad grade west of Bend which would eventually extend to Sisters and in the March 5, 1941 issue the paper reported that work on the high trestle across Tumalo Creek was nearing completion. The curved trestle (Figure 1) was about 675 feet long and about 60 feet above Tumalo Creek. A few months later the Brooks-Scanlon logging camp moved from the former location SE of Newberry to a new location near Bull Springs. Six years later the logging camp was moved to Sisters following the opening of a new railroad route to Sisters.

Figure 1 - Brooks-Scanlon trestle across Tumalo Creek canyon.

On February 9, 1957, The Bend Bulletin reported that the rails had been removed from the Tumalo Creek trestle with the switch from railroad logging to truck logging. Later the trestle was taken down and a small bridge was built using two of the trestle footings as the footings for the bridge (Figure 2). In 1993, the bridge was modified to look like a covered bridge for the Disney film “Homeward Bound.”

On Aug. 4, 1990, the Awbrey Hall burned south along the eastern edge of Shevlin Park. In 10 hours the fire burned 3,500 acres and 22 homes. The burn was 6 miles long and less than a mile wide

Park Geology

Within Shevlin Park are exposures which reveal more than 600,000 years of Central Oregon geologic history. Three pyroclastic flows have come out of the Cascades west of Bend producing ash-flow tuffs. Between eruptions, streams cut channels into earlier ash-flow tuffs and those channels helped guide the flow of later pyroclastic flows and lava flows. The current channel for Tumalo Creek began forming around 300,000 years ago when a lava flow filled the previous channel east of Shevlin Park. About 170,000 years ago another pyroclastic flow swept across the area. A portion was channeled down the Tumalo Creek drainage where it thickened and welded to form what is now known as the Shevlin Park Tuff. Continued erosion by Tumalo Creek has cut a channel through the Shevlin Park Tuff to exposes the older Tumalo Tuff and Desert Spring Tuff.

Figure 2 - Hixon Crossing bridge built on footings from old Brooks-Scanlon trestle.

Figure 3 - Pyroclastic flow on Volcán de Fuego (Fuego) in Guatemala on June 3, 2018.

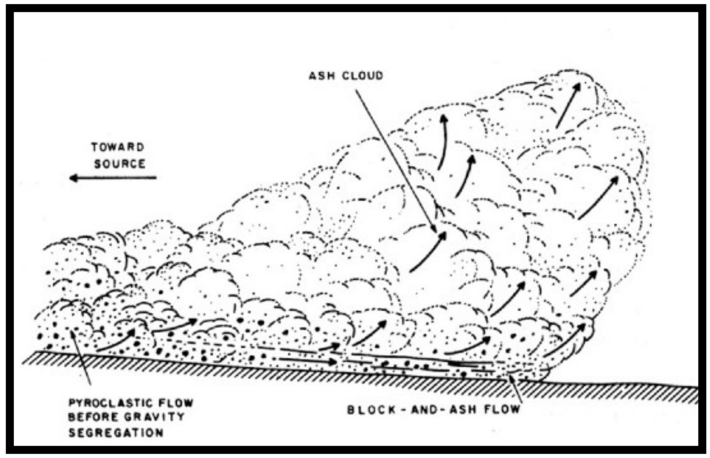

Figure 4 - Pyroclastic flow.

Pyroclastic Flows

Pyroclastic flows are the result of the most explosive kinds of volcanic eruptions. Pyroclastic flows are high-density mixtures of hot, dry rock fragments and hot gases that move away from the vent that erupted them at high speeds (Figure 3). They move at speeds of around 80 kilometers (50 miles) per hour, but have been observed traveling at 700 kilometers per hour (about 450 miles per hour). They normally have temperatures between 200°C and 700° C (390-1300°F), but they can exceed temperatures of 1,000°C (1,832°F). Rhyolite glass and pumice begins to weld at 600-750°C. Consequently, many thick pyroclastic flows tend to be welded, and even develop columnar jointing on cooling.

Most pyroclastic flows consist of two parts: a basal flow of coarse fragments that moves along the ground, and a turbulent cloud of ash that rises above the basal flow (Figure 4). Ash may fall from this cloud over a wide area downwind from the pyroclastic flow. A pyroclastic flow will destroy nearly everything in its path. With rock fragments ranging in size form ash to boulders traveling at high speeds, pyroclastic flows knock down, shatter, bury or carry away nearly all objects and structures in their way.

Ash-flow Tuffs

The following information about the ash-flow tuffs in Shevlin Park comes from Sherrod and others, 2004.

Several pyroclastic eruptions of Pleistocene age are recorded by deposits exposed near Bend and in adjacent parts of the Cascade Range. From oldest to youngest, the major deposits are the Desert Spring Tuff, the Bend Pumice and Tumalo Tuff (tephra-fall and ash-flow deposits of a single magmatic episode), and the Shevlin Park Tuff. Each is sufficiently unique to form a marker bed useful for assigning relative ages to overlying and underlying units. Knowledge of the age of these deposits is derived mainly by stratigraphic correlation with distal tephra in the Basin and Range province of northern California and Nevada, the details of which are scattered throughout the geologic literature and constantly being refined.

Desert Spring Tuff (Figure 5)

Rhyodacitic ash-flow tuff. Ashy matrix is brownish orange, purple, or dark gray. Dark-gray pumiceous lapilli commonly contain phenocrysts of plagioclase, hypersthene, augite, and opaque minerals. Diagnostic characteristic is abundant apatite needles enclosed within most phenocryst phases. Silica content ranges from 68 to 69 percent (Mimura, 1992). Commonly contains basaltic lithic fragments. Thickness ranges from 5 to 11 m; lower part of unit is partially welded and columnar jointed. Imbrication indicates that direction of flow was from southwest to northeast (Mimura and MacLeod, 1978; Mimura, 1984). Normal polarity magnetization.

The Desert Spring Tuff was erupted about 0.6-0.7 Ma. This age is based on (1) a geochemical correlation of the Desert Spring Tuff with its distal fallout equivalent, the Rye Patch Dam ash bed in the Great Basin of western Nevada (Sarna-Wojcicki and others, 1989), and (2) the fact that the Rye Patch Dam ash bed underlies the Lava Creek B ash bed with small stratigraphic separation in cores from Tulelake, Calif. The age of the Lava Creek B ash bed is 0.62 Ma (Izett and Wilcox, 1982).

An age of 0.63 Ma was suggested for the Desert Spring Tuff (Sarna-Wojcicki and others, 1989) by correlating it to similar ash in a cored section near Tulelake, Calif., and thence by interpolation between the ages of Lava Creek B bed stratigraphically close above it and the Brunhes-Matuyama Chron boundary below (Rieck and others, 1992). In the 1980s, the chron boundary was customarily taken to be 0.73 Ma, but subsequent work has determined a more precise age of 0.78 Ma (Shackleton and others, 1990; Baksi and others, 1992). Presumably the slightly older chron boundary implies a slightly older age for the Desert Spring Tuff. The age range we suggest (0.6–0.7 Ma) is as accurate as is warranted currently, but more precise estimates could be made by assuming constant

Figure 5 - Desert Spring Tuff - Rhyodacite.
About 600,000 years old. Brownish orange, purple, or dark gray ashy matrix. Commonly contains dark-gray to black pumices. Also commonly contains basaltic lithic fragments. 68 to 69 percent SiO_2.

Figure 7 - Shevlin Park Tuff - Andesite.
About 170,000 years old. Dark-gray to black ashy matrix with lapilli and lithic. Lithic fragments of basalt, andesite, and rhyolite. 57 to 68 percent SiO_2, with a gap at about 63-65%.

Figure 6 - Tumalo Tuff - Rhyolite
About 400,000 years old. Pink ashy matrix with abundant pumice and lithic. 73 to 76 percent SiO_2.

Figure 8 - Densely welded Shevlin Park Tuff.
Black welded glass matrix with lithics.

sedimentation rate in the Tule Lake basin during the 0.17 million years between known dated events (magnetic chronozone boundary and age of Lava Creek B ash bed).

Tumalo Tuff (Figures 6 & 9) & Bend Pumice

Pink pyroclastic-flow deposits (Tumalo Tuff, ~13m) and thick underlying pumiceous fallout deposit (Bend Pumice, ~11m). Tephra fallout and pyroclastic flow resulted from single eruptive episode from vent west of Bend; pumiceous lapilli of the two deposits are mineralogically similar, containing phenocrysts of plagioclase, orthopyroxene, and minor amphibole, titanomagnetite, apatite, and zircon (Hill and Taylor, 1990). Silica content ranges from 73.1 to 75.7 percent (Mimura, 1992; Hill, 1985, 1992a). Well-developed imbrication in lower part and locally in upper part of Tumalo Tuff indicates that pyroclastic debris flowed northeastward into Bend area (Mimura and MacLeod, 1978; Mimura, 1984). Flows, thought to have erupted from uplands east of Broken Top volcano, have been channeled by northeast-trending drainages (Hill, 1985; Hill and Taylor, 1990). Normal-polarity magnetization in ash-flow tuff.

The Bend Pumice has been geochemically correlated with the Loleta ash bed (Sarna-Wojcicki and others, 1987), whose age is probably about 0.4 to 0.3 Ma. Several K-Ar ages ranging from 0.19±0.08 to 0.44±0.01 Ma have been obtained from (1) plagioclase separated from pumice in the Tumalo Tuff and (2) whole rock obtained from obsidian clasts in epiclastic strata that immediately underlie the Tumalo Tuff (Sarna-Wojcicki and others, 1989). A weighted mean of four ages from plagioclase in the Tumalo Tuff is 0.3±0.1 Ma and is the preferred age (Sarna-Wojcicki and others, 1989). In contrast, hornblende separated from dacitic pumice of the Tumalo Tuff has ages of 1.30±0.23 and 1.04±0.20 Ma (Sarna- Wojcicki and others, 1989). These older ages are explained as a consequence of inherited radiogenic argon or xenocrysts (nonmagmatic crystals incorporated into the magma before or during eruption). Previously determined plagioclase ages of 3.98±1.9 Ma from the Tumalo Tuff and 2.50±2.0 Ma from the Bend Pumice had large analytical errors (Fiebelkorn and others, 1983). An equally ambiguous glass age of 0.83±1.5 Ma was obtained from the fresh core of a dacitic pumice bomb (Armstrong and others, 1975).

Shevlin Park Tuff (Figures 7, 8 & 9)

Dark-gray to black, fresh pyroclastic-flow deposits. Pumice lapilli are mostly porphyritic andesite with phenocrysts of plagioclase, hypersthene, augite, and opaque oxides (Mimura, 1992), but some lapilli are rhyodacite. Whole-pumice and glass analyses show a silica content chiefly ranging from 57 to 62 percent (Hill and Taylor, 1989; Sarna-Wojcicki and others, 1989; Mimura, 1992), with a few analyses of silica content as high as 67.5 percent (Sherrod and others, 2004 unpub. data). Deposit contains lithic fragments of basalt, andesite, and rhyolite. Forms single cooling unit that originated as two pyroclastic flows. Lower pyroclastic-flow deposit is rich in fine ash; upper deposit is pumice rich. Dense welding in lower part and vapor-phase crystallization in upper part are ubiquitous in thicker parts of unit. Imbrication, which is well developed in lower part of each pyroclastic-flow deposit, indicates that unit was erupted perhaps from now-buried vent in highlands near Broken Top volcano, 15 to 25 km west of Bend (Mimura and MacLeod, 1978; Mimura, 1984; Hill and Taylor, 1990). Distribution varies from surface mantling to valley filling. Maximum thickness 45 m. Normal-polarity magnetization.

The Shevlin Park Tuff is the youngest of the Bend pyroclastic deposits. Associated proximal or medial fallout deposits are unknown. The Shevlin Park Tuff is thought to be slightly younger than about 0.17 Ma on the basis of several correlations of stratigraphic position occupied by distal fallout tephra in ancient lakebeds of the northern Great Basin. (1) The unit has a distal fallout tephra thought to be the Summer Lake JJ ash bed on the basis of geochemical and paleomagnetic correlations (Gardner and others, 1992). (2) The Summer Lake JJ ash bed is underlain by the Summer Lake KK ash bed, which is the distal fallout of an andesitic ash-flow tuff at Medicine Lake volcano, Calif. Stratigraphic separation between these two units is 30 to 40 cm (Davis, 1985, fig. 4). (3) The Medicine Lake-derived andesitic ash-flow tuff has a newly determined $^{40}Ar/^{39}Ar$ age of 0.171±0.043 Ma (Herrero-Bervera and others, 1994); its age was previously known as 0.160±0.025 Ma on the basis of conventional K-Ar ages from stratigraphically bracketing units at Medicine Lake volcano (J.M. Donnelly-Nolan and L.B. Gray, in Rieck and others, 1992).

NOTE: Additional work on the Shevlin Park Tuff (Mandler and others, 2014) reported a silica content range of about 57-68% with a gap at about 63-65%

Eruptive Sources

The following information about the eruptive sources for the ash-flow tuffs in Shevlin Park comes from Sherrod and others, 2004.

The Desert Spring, Tumalo, and Shevlin Park Tuffs were erupted from volcanic centers west of Bend, on the basis of their distribution and diminished welding outward from the proposed source area. The two major fallout deposits, Bend Pumice and pumice of Columbia Canal, become coarser grained westward toward the same general area. This area has been called the Tumalo volcanic center and defined to include a 25-km-long, south-trending belt of rhyolite domes extending from Melvin Butte to Edison Butte (fig. 1; Hill, 1988; Hill and Taylor, 1990). We prefer a more restricted definition that encompasses the volcanic highland from Melvin Butte south to Tumalo Creek valley, an area about 15 km across.

Neither the precise location nor the size and structure has been determined for the volcanoes that erupted the major pyroclastic deposits. The largest buildup of middle and late Pleistocene rhyolite and rhyodacite domes, however, underlies the area surrounding Triangle Hill and includes domes compositionally similar to the Bend Pumice and Tumalo Tuff (Hill, 1992a). Silicic vent deposits are exposed locally adjacent to the domes and have been penetrated by drill hole CEBH–7, 1 km southwest of Triangle Hill. The Triangle Hill area is also remarkable for its abundance of andesitic cinder cones, similar in composition to the Shevlin Park Tuff. Elsewhere, most Quaternary cinder cones shown on the geologic map are basaltic andesite or basalt in composition, and nowhere do they form such a broadly coalesced field as in the Triangle Hill area. A 10-mGal negative gravity anomaly about 5 km across coincides with the cluster of rhyolite domes and andesitic cinder cones in the Triangle Hill area.

NOTE: Although Sherrod and others (2004) suggest a buried source in the vicinity of Triangle Hill, Conrey and others (2002) suggested a location 6 km farther west (near Tam MacArthur Rim) and Hildreth (2007) believes that establishing the location of the source vents for these three ash-flow tuffs is one of the more challenging unresolved problems in Cascades volcanology.

The following additional information about the source area for the ash-flow tuffs in Shevlin Park comes from Deligne and others (2017).

The Bend highland (also known as the "Tumalo Volcanic Center" or the "Silicic Highland;" Taylor, 1987; Hill, 1988) is a prominent, broad, west-northwest-trending ridge that extends southeast of the Three Sisters volcanic cluster about 20 km, toward Bend. All surface exposures on the highland are of normal-polarity, mafic, intermediate-composition, and silicic rocks (Sherrod and others,

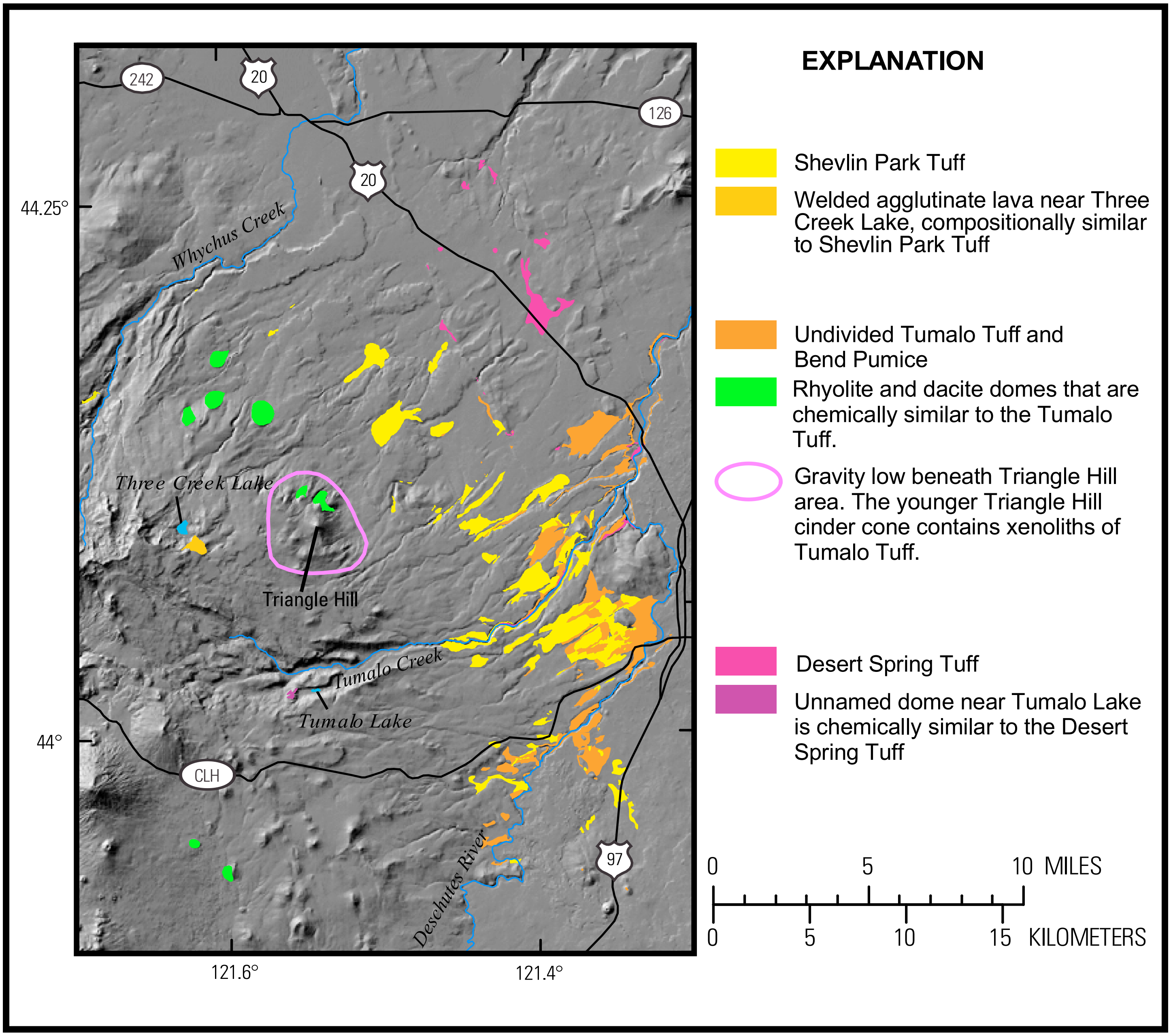

Figure 9 - Distribution of Shevlin Park Tuff, Tumalo Tuff/Bend Pumice, and Desert Spring Tuff. Modified from figure 40 of Deligne and others (2017).

2004). One geothermal exploration drill hole penetrated 1,200 ft (366 m) of normal-polarity, chiefly silicic rocks. Beneath the presumed Brunhes-age (younger than about 0.8 Ma) cap, a diverse series of mafic, intermediate- composition, and silicic pyroclastic rocks were cored to a total depth of 3,430 ft (1,045 m). Because the Bend highland trends west- northwest, the Brunhes-age lavas likely were channeled into northeastward-flowing drainages on its north flank. In addition, lavas of the about-5-Ma Deschutes Formation northeast of the highland, as well as ash-flow tuffs in the southern Deschutes Basin, were channeled along northeastward-flowing paleodrainages (see Sherrod and others, 2004, and references contained therein). The Brunhes-age ash-flow tuffs (Figure 9) whose sources are on or near the highland have counterparts in the petrologically similar, and even more numerous and voluminous, ash-flow tuffs of the Deschutes Formation. Several of the older tuffs can be traced from the Deschutes Basin upstream along the Deschutes River and its tributary creeks a considerable distance to the southwest where they are truncated by the Tumalo Fault. The map distribution, therefore, suggests that the tuffs had sources in or near the Bend highland (Smith and Taylor, 1983; Smith, 1986; Conrey and others, 2004), which further suggests that the Bend highland has long been a feature of the central Cascade Range.

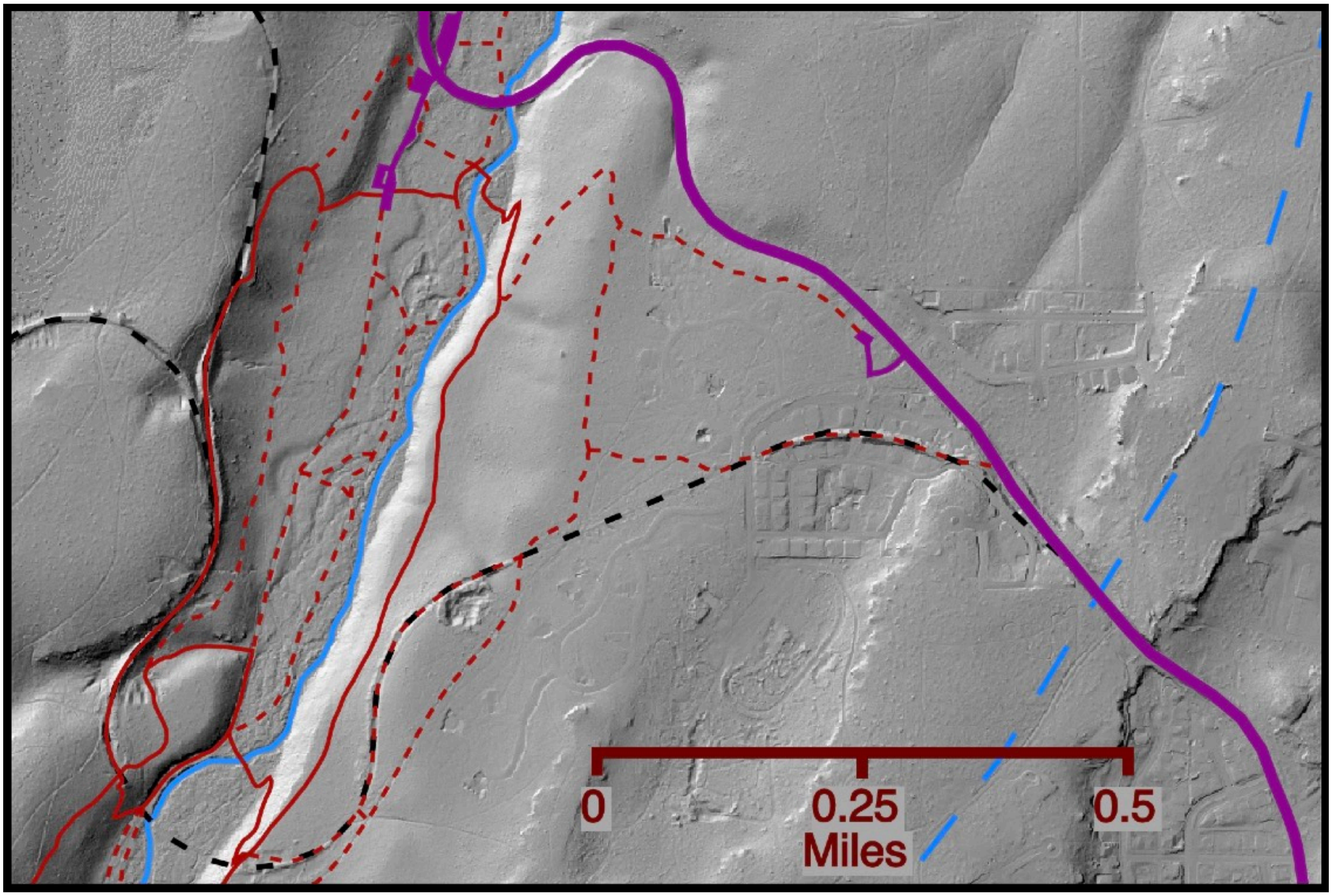

Figure 10 - Lidar image of part of Shevlin Park. Trailhead and Shevlin Park Road in magenta. Field guide route in solid red, other trails in dashed red, Tumalo Creek in solid blue, paleo route of Tumalo Creek dashed blue, and old Brooks-Scanlon grade in dashed black.

Trail Log

Miles

0.00—[Elev. ~3620 ft. N 44° 04.896' W 121° 22.718'] **Shevlin Park Trailhead.** ***—Head west on Shevlin Loop Trail.*** Figure 10 shows the location of the trailhead and route followed by field guide.

0.02—Begin short ascent.

0.04—Top of ascent. An early basalt forms the topographic bench to right.

0.06—[Elev. ~3640 ft. N 44° 04.887' W 121° 22.782'] **Trail Junction.** ***—Turn right on tie trail to Railroad Trail.***

0.12—[Elev. ~3680 ft. N 44° 04.917' W 121° 22.805'] **Trail Junction.** Park boundary fence to right. ***—Turn left on Railroad Trail.***

0.20—[Elev. ~3700 ft] Trail starts climb up to old logging railroad grade.

0.25—[Elev. ~3730 ft. N 44° 04.832' W 121° 22.875'] High point and then trail begins drop to railroad grade. Ledge of Tumalo Tuff outcrops down slope to left.

0.26—[Elev. ~3720 ft] Trail begins following the old Brooks-Scanlon logging railroad grade to Sisters and in 1946 the Bull Springs logging camp was moved to Sisters. Above the top of the slope is an old irrigation ditch (Tumalo Ditch built before 1919). The field trip route roughly parallels the ditch for a third of a mile.

Here the grade cuts through an non-welded portion of the Shevlin Park Tuff (Figure 11) which overlies Tumalo Tuff. Note the slope is largely fine ash and pumice but also contains some large dark pumice bombs and blocks.

0.31—User trail to right, leads up to a higher Brooks-Scanlon railroad grade which was the first grade beyond the Tumalo Creek trestle and extended west to near Bull Springs where the Brooks-Scanlon logging camp was established in 1941 following the completion of the trestle.

0.32—[Elev. ~3720 ft] Trail starts across railroad grade fill.

0.35—To the right the higher railroad grade is now visible.

0.37—End fill section, begin thru cut.

Figure 11 - Non-welded Shevlin Park Tuff

0.42—[Elev. ~3720 ft] End of through cut. Begin cuts with exposures of the welded Tumalo Tuff on right. Note the typical appearance of a pinkish tan matrix with orange pumices (up to 3 to 4 inches) and dark lithics to 1 inch.

The wide fill section on left to south of here was built to allow operations on both grades while the Sisters grade was being constructed. Later the connecting Bull Springs grade segment was removed when operations in the Bull Springs area ended.

0.46--A remnant of the older Bull Springs railroad grade forms a ledge about 6 ft up on right.

0.50—[Elev. ~3720 ft. N 44° 04.634' W 121° 22.901'] The Bull Springs and Sisters grades joined at approximately this point. End of wide grade.

0.52—Begin natural exposures of Tumalo Tuff on right.

0.59—[Elev. ~3710 ft] Shevlin Loop Trail is visible down slope to left.

0.61—[Elev. ~3710 ft] About 17 feet of welded Tumalo Tuff are exposed to left (Figure 12).

0.62—[Elev. ~3710 ft] Start across high fill across draw. To the right there is a rim of Tumalo Tuff with slope below covered by large blocks of tuff from the rim. This is a typical erosional pattern in welded tuffs. The welded portion of the ash-flow is overlain and underlain by unwelded which is much easier to erode. As a drainage is cut through the deposit erosion undercuts the resistant welded tuff until a large block breaks loose. Over time the slope becomes mantled with large blocks slowing the undercutting of the welded rim.

To the left, the Desert Spring Tuff is exposed at lower end of draw (see mile 0.98).

0.70—[Elev. ~3710 ft] End of fill section.

0.72—Begin short through cut in lightly welded Shevlin Park Tuff (Figure 13). Note appearance of the Shevlin here: dark matrix with abundant dark pumice (to 5 inches) and small dark lithics.

0.74—Note blocks of Tumalo Tuff to left. It appears that these blocks were dumped here following the abandonment of the railroad.

0.76—End of though cut.

0.78—[Elev. ~3715 ft. N 44° 04.426' W 121° 23.004'] Trail Junction.

—Turn left on Shevlin Loop Trail.

0.80—Start across gravel terrace.

0.86—[Elev. ~3700 ft.] Begin decent off gravel terrace. The exposure of gravels to the left and right are the result of excavations to build the large railroad fill crossed at log mile 0.62 to 0.70.

0.91—[Elev. ~3675 ft. N 44° 04.515' W 121° 22.971'] Trail Junction. Bottom of draw.

—Turn right down Red Tuff Gulch.

0.96—High to rear are exposures of Tumalo Tuff you passed earlier and ahead are exposures of Desert Springs Tuff.

0.97 to 0.99—To left is a 10-ft-thick section of Desert Springs Tuff (Figure 14). Note appearance: light tan matrix, abundant varied lithics (to 2 inches) and dark pumice (to 8 inches).

1.02—[Elev. ~3640 ft. N 44° 04.527' W 121° 22.867'] Trail Junction.

Figure 12 - Tumalo Tuff

Figure 13 - Lightly welded Shevlin Park Tuff.

Figure 14 - Desert Spring Tuff

—Turn right on Fremont Road Trail (paved road).

1.08—Begin more exposures of Desert Spring Tuff in old vegetated road cut slope—Rt.

1.10—[Elev. ~3650 ft. N 44° 04.460' W 121° 22.881']
Trail Junction. Tumalo Creek Trail to left.
—Continue south along Fremont Road Trail.

1.13 to 1.20—Road cut exposing alluvial terrace deposits to right (Figure 15).

1.13—Exposures of Desert Spring Tuff end at beginning of the open cut.

1.14—A portion of the 2-m-thick basal zone of the Bend Pumice is visible here and consists of pumice lapilli, ash, and perlitic obsidian that has been locally reworked and mixed with gravel and sand. The basal zone is thought to represent the preliminary stage of a climactic eruption.

1.16—Large block of Tumalo Tuff in alluvial deposits overlying basal Bend Pumice. Note the dimensions of this block. Note details of the gravels surrounding the block.

1.17—Basal Bend Pumice covered by ravel from overlying alluvial deposits. Note details of gravel deposits.

1.18—Three large blocks of Tumalo Tuff in alluvial deposits overlying basal Bend Pumice. Note the dimensions of these blocks. Which dimension of these blocks represent the thickness of the welded tuff these blocks came from? Note details of the gravels surrounding the blocks.

1.19—Aluvial gravel deposits. Note details of gravel deposits.

1.20—End cut on right.

1.21—[Elev. ~3660 ft. N 44° 04.405' W 121° 22.982']
Trail Junction. The shorter alternative route begins here (See Alternate Route).

The site of the old Hixon Crossing bridge (Figure 2) was to the left. The bridge was built on the footings of the Brooks-Scanlon trestle (Figure 16) across Tumalo Creek. The bridge and trestle footings will be removed in 2019).

Alternate Route.

This alternate route shortens the field trip from 5.24 miles to 2.36 miles.

0.00—[Elev. ~3660 ft. N 44° 04.405' W 121° 22.982']
Trail Junction. Turn around and retrace route to previous junction at field guide mile 1.10.

0.11—[Elev. ~3650 ft. N 44° 04.460' W 121° 22.881']
Trail Junction. Turn right toward Tumalo Creek.

0.14—[Elev. = 3645 ft. N 44° 04.441' W 121° 22.872']
Footbridge across Tumalo Creek.

0.15—[Elev. = 3645 ft. N 44° 04.426' W 121° 22.871']
Trail Junction. Continue straight.

0.17—Trail turns left.

0.19—Trail switchbacks to Rt as trail begins climb up canyon wall which is littered with blocks of Shevlin Park Tuff.

0.25—Rim of densely welded Shevlin Park Tuff visible up to left.

0.28—Trail switchbacks to left at base of the densely welded Shevlin Park Tuff rim. Approximately 8 feet of densely welded tuff.
—Walk south along base of rim

Good exposure of fiamme (collapsed pumice) in densely welded block of Shevlin Park Tuff below rim.

An erosional scar exposes the Shevlin Park Tuff from the densely welded rim down to the uwelded base.
—Return to trail and continue.

0.29—Elev. = 3680 ft. N 44° 04.360' W 121° 22.866']
Trail Junction. Junction with Shevlin Loop Trail and rejoin field guide at mile 4.37, turn left.

Figure 15 - Alluvial terrace deposits.

Figure 16 - View of old Brooks-Scanlon trestle from near Tumalo Creek.

—Turn right on trail up to Shevlin Loop Trail.

1.25—[Elev. ~3690 ft] Trail switchbacks to right.

1.28—View Point at west end of former Brooks-Scanlon railroad trestle. Construction of the high trestle across Tumalo Creek was nearing completion in March 1941. The curved trestle was about 675 feet long and rose 60 feet above Tumalo Creek (Figure 1). The first area to be logged was in the Bull Springs area. Sixteen years later the rails were removed from the trestle and later the trestle was removed.

1.29—[Elev. ~3715 ft. N 44° 04.426' W 121° 23.004'] Trail Junction.

—Turn left on Shevlin Loop Trail. Begin ascent.

1.42—View to left across Tumalo Creek canyon to basalt rim to east. This rim is the basalt of Skyline Ranch Road which apparently followed a paleo channel for Tumalo Creek about 300,000 years ago. Location of channel is shown on Figure 10.

1.43—[Elev. ~3775 ft. N 44° 04.340' W 121° 23.105'] Top of climb. The trail now begins following the route of the old Tumalo Ditch (built before 1919). Note that over the next 1.29 miles the trail climbs

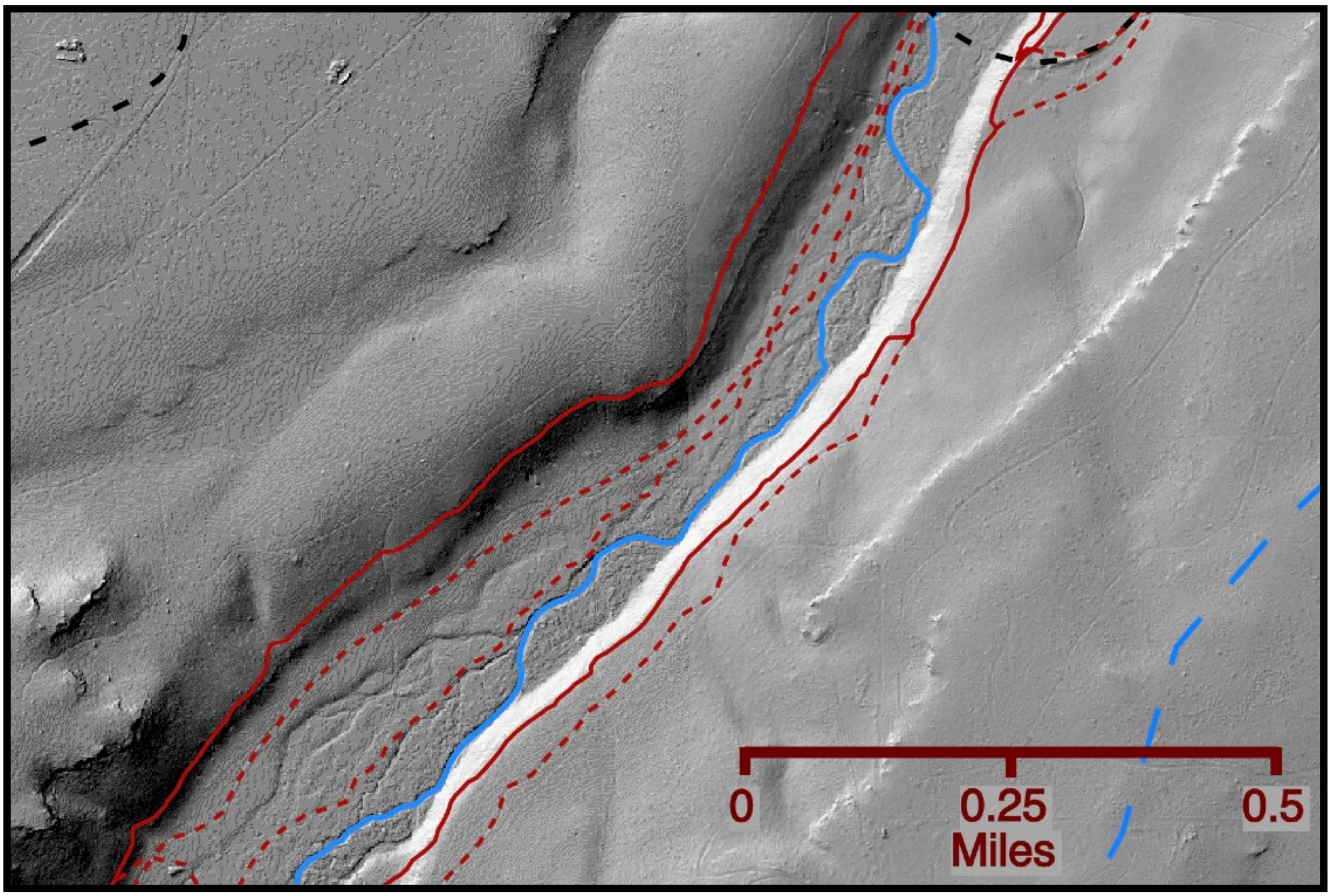

Figure 17 - Lidar image of part of Shevlin Park. Field guide route in solid red, other trails in dashed red, Tumalo Creek in solid blue, paleo route of Tumalo Creek dashed blue, and old Brooks-Scanlon grade in dashed black.

very gradually while the canyon floor rises much more rapidly. Large outcrop of densely welded Shevlin Tuff down slope to left.
Field trip route now on Figure 17.

1.52—Down slope to left is erosion scar from a failure of the Tumalo Ditch.

1.54—Outcrop to right. This outcrop has the appearance of a lava flow margin but interior samples show a granular lithic rich texture which suggest it is a version of Shevlin Park Tuff. The primary rim of densely welded Shevlin Park Tuff (about 3 feet thick) outcrops down slope to left (about 35 feet vertically). This location is similar to exposures at log miles 3.00 and 4.94. The top of Tumalo Tuff is about another 15 feet down slope below the Shevlin Park Tuff.

1.56 to 1.66—Park boundary fence to right

1.60—Unwelded Shevlin Park Tuff in slope above trail to right and a rim of welded Shevlin Tuff Rim down slope to left.

1.60 to 1.79—Rim of Shevlin Park Tuff below trail to left.

1.73 to 1.76—Shevlin Park Tuff rim just to left. Rim exposes at least 12 feet of densely welded tuff.

1.75—[Elev. ~3780 ft. N 44° 04.101' W 121° 23.254'] Trail at top of rim of Shevlin Park Tuff and begins significant turn to Rt. The talus blocks of welded Shevlin Park Tuff litter the slope. Hidden in the talus are small exposures of in place Tumalo Tuff (Figure 18).

1.82—Bouldery gravels, trail turns back to left.

1.97 to 2.01—Tumalo Tuff outcrop left.

2.19 to 2.35—Tumalo Tuff outcrops below trail. The trail is on alluvial gravels.

2.30—A thick flow of basalt ends high to right. This flow forms the canyon wall for more than a mile to the south before being covered by another flow. Both of these flows are older than the Shevlin Park Tuff. The Shevlin Park Tuff originally covered these flows but was not thick enough to weld and has been removed by erosion in most areas.

2.31—Outcrop of Tumalo Tuff to left is at least 14 feet thick here.

Figure 18 - Shevlin (S) and Tumalo (T) Tuffs.

2.34 to 2.37—Basalt boulders from capping basalt flow litter the slope.

2.40 to 2.44—Tumalo Tuff outcrop to left. Gravels on slope to right overlie the tuff and were deposited during the cutting of the canyon.

2.43—Two large blocks of basalt from up canyon wall.

2.45—Tumalo Tuff at trail level to left.

2.49—[Elev. ~3785 ft. N 44° 03.680' W 121° 23.887'] **Trail Junction.** Tumalo Tuff at trail level to right. Trail to left goes down to Fremont Meadows area where the John C. Fremont expedition camped on the night of Dec. 4, 1843.
—Continue on Shevlin Loop Trail. Field trip route now on Figure 19.

2.51 to 2.57—Tumalo Tuff outcrops at trail level.

2.54—Outcrop of Tumalo Tuff to left is at least 11 feet thick here.

2.63—Tumalo Tuff block to right.

2.64-—Tumalo Tuff to right.

2.68—Tumalo Tuff to right.

2.71-—Tumalo Tuff to right.

2.72—[Elev. ~3785 ft. N 44° 03.518' W 121° 24.025'] **Trail Junction.** Shevlin Loop Trail leaves the Tumalo Ditch grade. An old interpretive trail continues along grade for 0.04 miles before climbing above the grade which continues and joins the Mrazek Trail.
—Turn to left and continue on Shevlin Loop Trail.

2.76—[Elev. ~3770 ft. N 44° 03.493' W 121° 24.017'] **Major Trail Junction.** Three trails intersect with the Shevlin Loop Trail here.
The Tumalo Creek Trail and Fremont Road Trail to the left go back downstream to the trailhead.
The Mrazek Trail (primarily a bike trail) to right continues 0.4 miles upstream along the Tumalo Ditch route, then climbs up out of Tumalo Creek canyon and continues another 13 miles to the west. At about 0.1 miles there is an exposure of Tumalo Tuff in cut slope with Shevlin Park Tuff higher on slope. At about 0.3 miles there is Bend Pumice coming out on the slope.
—Continue on Shevlin Loop Trail.

2.79—[Elev. ~3765 ft. N 44° 03.470' W 121° 24.028'] **Trail Junction.** Former interpretive trail—Rt. Large block of basalt at junction comes from thick basaltic flow over 100 feet up slope to west.
—Continue on Shevlin Loop Trail.

2.83—[Elev. ~3770 ft. N 44° 03.458' W 121° 24.001'] **Bridge over Tumalo Creek.**

2.86—[Elev. ~3765 ft.] Begin ascent up slope littered with large welded blocks of Shevlin Park Tuff.

2.91—Welded rim of Shevlin Park Tuff above trail to right. The welded rim is about 15 feet thick.

2.95—Good exposure of fiamme (collapsed pumice) in densely welded block of Shevlin Park Tuff in trail edge (left) at base of large Ponderosa Pine (right). Figure 20.

2.98—Trail crosses through rim of Shevlin Park Tuff.

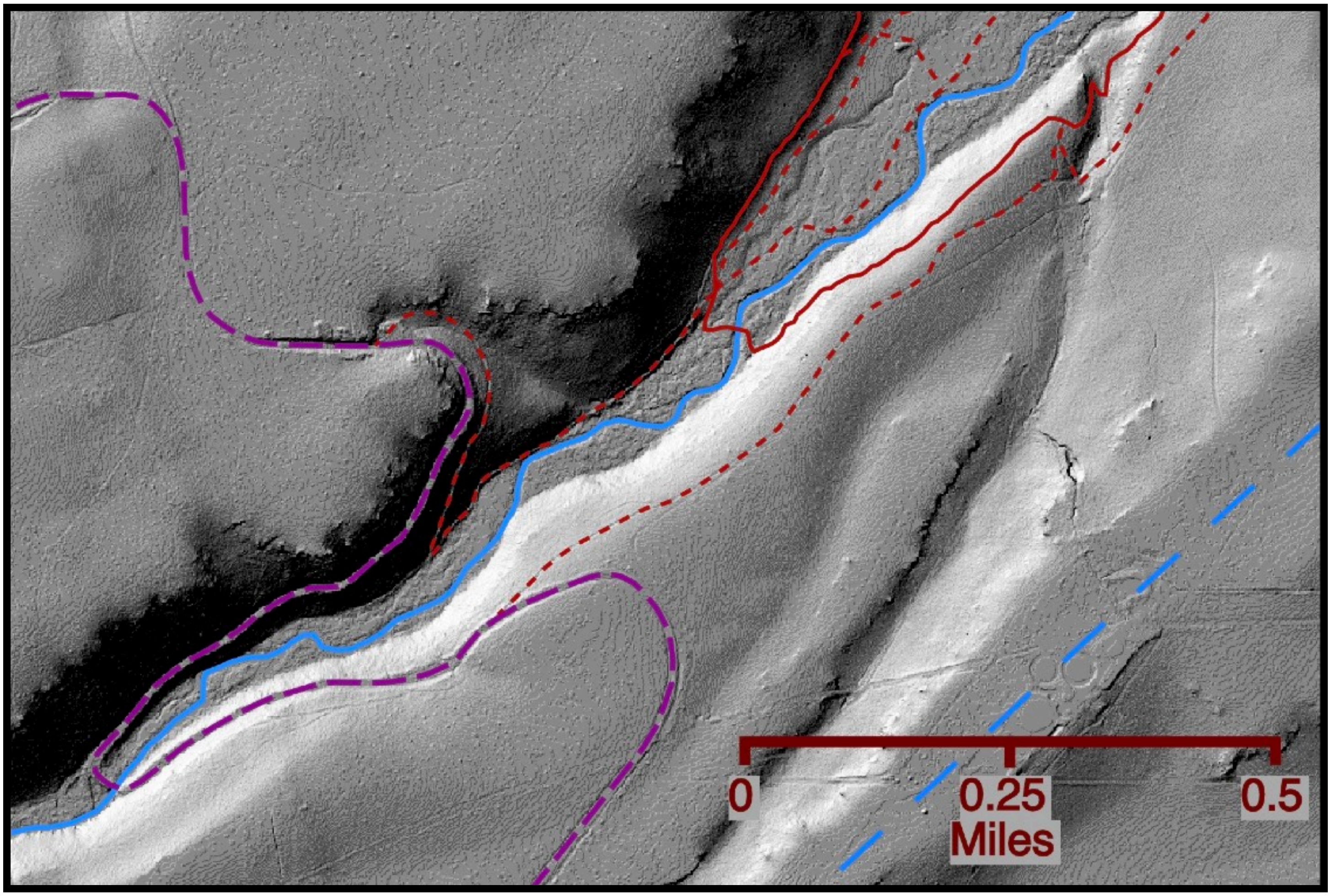

Figure 19 - Lidar image of part of Shevlin Park. Field guide route in solid red, other trails in dashed red, road in dashed magenta, Tumalo Creek in solid blue, and paleo route of Tumalo Creek dashed blue.

3.00—A climb (about 40 feet vertically) up the slope to the right leads to several outcrops which have the appearance of a lava flow margin but interior samples show a granular lithic rich texture which suggest these are a version of Shevlin Park Tuff. Similar to outcrops at log miles 1.54 and 4.94.

Figure 20 - Shevlin Park Tuff showing fiamme.

3.09—[Elev. ~3840 ft. N 44° 03.560' W 121° 23.755'] Trail reaches high point and then begin descent.

3.17—Unwelded Shevlin Park Tuff in trail cut to right.

3.23—[Elev. ~3805 ft. N 44° 03.637' W 121° 23.631'] Trail Junction and trail information sign. The Miller Trail (old road) to right connects to East Shevlin Trail.

—Continue on Shevlin Loop Trail. Begin descent.

3.27—[Elev. ~3780 ft.] Trail crosses through rim of welded Shevlin Park Tuff. Rim is also visible across draw.

3.29—[Elev. ~3760 ft.] Trail switchbacks to right. Rim of Shevlin Park Tuff to left is at least 8 feet thick here (Figure 21).

3.31—[Elev. ~3755 ft.] Trail crosses draw bottom.

3.35—[Elev. ~3750 ft.] Begin ascent. Large blocks of welded Shevlin Park Tuff to right.

3.46—Rim of Shevlin Park Tuff to right is at least 9 feet thick here.

3.38—[Elev. ~3775 ft.] The trail crosses through rim of welded Shevlin Park Tuff and climbs on to overlying gravels.

3.41—[Elev. ~3790 ft. N 44° 03.721' W 121° 23.521'] Trail Junction. Junction is on gravels which

Figure 21 - Shevlin Park Tuff

overlie Shevlin Park Tuff. The Outback Trail to right ties through to the Western Larch Trail. ***—Continue on Shevlin Loop Trail.*** Field trip route now back on Figure 17.

3.46—Rim of Shevlin Park Tuff to left is at least 7 feet thick here.

3.53—View down to Tumalo Creek Trail.

3.61—Rim of Shevlin Park Tuff to left is at least 9 feet thick here.

3.72—Trail on gravels which overlie Shevlin Park Tuff. Also a view down to a creek access point along the Tumalo Creek Trail.

3.77—To left is view point on rim of Shevlin Park Tuff.

3.80—[Elev. ~3755 ft. N 44° 03.965' W 121° 23.222'] **Fault.** The rim of welded Shevlin Park Tuff is offset by about 5 feet where the trail steps down between two exposures (Figure 22). At least 8 feet of densely welded tuff is exposed here.

3.81—Trail climbs back on top of Shevlin Park Tuff.

3.87—Trail drops down onto top of welded Shevlin Tuff., with non welded in slope to right.

4.06—[Elev. ~3750 ft.] Trail turns right away from rim of Shevlin Park Tuff.

4.08—[Elev. ~3760 ft. N 44° 04.130' W 121° 22.997'] **Trail Junction** with Western Larch Trail (old road). View to right of lava topped ridge, capping flow is the basalt of Skyline Ranch Road which follows a paleo channel of Tumalo Creek. ***—Turn left and continue on Shevlin Loop Trail.***

4.16—Rim of Shevlin Park Tuff to left, also a view of down to Tumalo Creek. Rim of Shevlin Park Tuff is at least 10 feet thick.

4.21 to 4.48—Views to right of ridge capped by the Skyline Ranch Road.

4.23—Rim of Shevlin Park Tuff to left, also a view of down to Tumalo Creek.

4.29—[Elev. ~3725 ft. N 44° 04.299' W 121° 22.900'] **Trail Junction** with Western Larch Trail (old road). View east to rim of basalt of Skyline Ranch Road which apparently followed a paleo channel for Tumalo Creek about 300,000 years ago. Location of channel is shown on Figure 11. ***—Turn left and continue on Shevlin Loop Trail.***

4.30—Right turn near rim of Shevlin Park Tuff. The trail is following a gravel surface which is probably underlain by the Shevlin Park Tuff.

4.34—The welded Shevlin Park Tuff rim down to left is at least 8 feet thick (Figure 23).

4.36—East end of former Brooks-Scanlon railroad trestle (Figure 24).

4.37—[Elev. ~3715 ft. N 44° 04.360' W 121° 22.866'] **Trail Junction.** Cross Railroad Trail. The shorter alternative route ends here. A short detour down alternate route to mile 0.28 will reveal about 8 feet of densely welded Shevlin Park Tuff. (See Alternate Route for more information). ***—Continue on Shevlin Loop Trail.*** Field trip route now on Figure 9. Trail continues on gravel covered bench overlying Shevlin Park Tuff.

Figure 22 - Fault

Figure 23 - Shevlin Park Tuff.

Figure 24 - Brooks-Scanlon trestle (near eastern end) across Tumalo Creek canyon.

4.57—The bench the trail is following begins to narrow and trail begins gradual ascent. To the left in the slope down to Tumalo Creek exposures show the end of the welded Shevlin Park Tuff (about 3 feet thick here). North of here the slope above the creek is entirely gravels with one exception (mile 5.02).

4.61—High point as trail across gravel slope which extends from creek to about 30 feet above the trail. The old Brooks-Scanlon railroad grade near the top of slope to right exposes gravels along its climb from the trestle site. There is also an old gravel borrow site at the top of the slope.

4.72—Trail begins following another widening bench but there is no evidence of the Shevlin Park Tuff in the slope below the bench but there is a zone of coarse basaltic boulders up to 5 feet in diameter.

4.89—View to right of outcrop on skyline.

4.94—View to right of two outcrops. These outcrops have the appearance of a spatter rich lava flow margin but interior samples (Figure 25) show a granular lithic rich texture which suggest they are another version of Shevlin Park Tuff similar to the log miles 1.54 and 3.00. The outcrops at this location are well above the typical welded Shevlin Park Tuff about 0.35 miles to south.

4.95—[Elev. ~3665 ft. N 44° 04.818' W 121° 22.585']
Trail Junction. The Discovery Trail to right goes to the Shevlin Commons parking area.
—Continue on Shevlin Loop Trail. Begin descent to Tumalo Creek.

Figure 25 - Shevlin Park Tuff.

5.02—Limited exposure of typical densely welded Shevlin Park Tuff to right.

5.05—[Elev. ~3630 ft.] Trail switchbacks to left.

5.07—[Elev. ~3615 ft.] Trail switchbacks to right.

5.08—[Elev. ~3605 ft.] Bottom of descent.

5.13—[Elev. ~3610 ft. N 44° 04.917' W 121° 22.607']
Bridge over Tumalo Creek

5.14—[Elev. ~3605 ft. N 44° 04.922' W 121° 22.616']
Trail Junction. Tumalo Creek Trail.
—Turn left on Tumalo Creek Trail.

5.18—Trail Junction.
—Turn right toward parking lot.

5.24—[Elev. ~3620 ft. N 44° 04.896' W 121° 22.718']
Trailhead. Trail ends at park road.

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