LEG O: BUMPING LAKE ROAD

From State Route 410 to the Bumping Lake Area

by Wendy J. Gerstel, Paul E. Hammond, and Patrick T. Pringle*

Bumping Lake Road (Forest Road [FR] 18) extends about 11 mi (17.5 km) up the valley of the Bumping River from its confluence with American River to the Bumping Lake area (Fig. O-1). This broad glaciated valley cut into volcanic and intrusive rocks yields views of Cascade peaks to the south. Campgrounds and hiking trails are accessible, and rough gravel roads allow the adventurous to visit several areas of historic mining activity. (See the "Alteration and Mining North and East of Mount Rainier" sidebar on p. 117.) In winter, cross-county ski enthusiasts visit this area.

As along other roads through the heart of the Cascade Range, the geology visible here includes volcanic and intrusive rocks, glacial deposits, large landslides, and more. Deposits of the Bumping River tuff are exposed en route. This tuff was created in great eruptions that produced the Mount Aix caldera about 25 Ma. Hammond and others (1994) estimated the total volume of the caldera at as much as 100 km^3 (~24 mi^3), about 100 times the volume of the 1980 eruption of Mount St. Helens. (The approximate location of the caldera is shown in Fig. 16, p. 20.) Many of the descriptions of the geology along this leg are from Hammond and others (1994) and ongoing work by Hammond as part of an intensive mapping project in this area.

The highway is sometimes closed in winter, so it is wise to check on road conditions before traveling this leg. Contact the Washington State Dept. of Transportation via their website or by phone. (See "Websites and Phone Numbers", p. 176.)

Distances along the route are given in miles, followed by kilometers in italics. If you take any of the optional side trips, you'll have to keep track of and add those miles to all the remaining mileages in the leg. Having a pencil and paper handy, and even a calculator will be helpful.

Note: There are no mileposts on this road.

Mileage

0.0 *0.0* Junction of Bumping Lake Road (FR 18 or 1800) with State Route (SR) 410. Turn south onto FR 18.

Fifty feet (15 m) from the junction you cross the American River. Poorly sorted deposits on both sides of the river are of glacial and landslide origin. Large blocks of columnar-jointed basalt are exposed at the intersection. These likely originated in the landslide from the ridge of Miocene Grande Ronde Basalt to the southwest (see Fig. 20, p. 25).

0.5 *0.8* Cedar Springs Campground on the left.

0.7 *1.1* American Ridge Trail (#958) is on the right. The large blocks of columnar basalt here are similar to those exposed along SR 410 at the Bumping Lake Road turnoff. The basalt blocks are likely from the Grande Ronde Basalt of the Columbia River Basalt Group, which caps the ridge to the north and likely capped rocks of the Fifes Peak Formation (~27–22 Ma) to the southwest of here. These blocks are part of a large landslide complex southeast of the road that extends for nearly 3 mi (4.5 km) along Bumping Lake Road from SR 410 to Fifes Creek and for at least 2 mi (3 km) to the east along the south side of SR 410 to the east end of Indian Flat Campground. Given the large size of the landslide mass, more than 3. 5 mi (5.6 km) long from northeast to southwest and as much as 1.4 mi (2.2 km) wide, it may have temporarily dammed the Bumping and (or) American Rivers.

0.8 *1.3* A poorly sorted deposit, possibly till, is exposed in the terrace on the left. This debris may be part of the extensive landslide complex described above.

1.1 *1.8* An outcrop on the right (northwest) side of the road here is worth examining. There is a small pullout about 0.1 mi (0.2 km) farther on the left (south) side of the road for those returning northbound. The outcrop is mapped as Bumping River tuff (Schasse, 1987b). A reddish zone visible at the base of the tuff is a soil that was baked by the heat of the tuff when it was deposited. The entire exposure appears to be part of a landslide deposit (**Fig. O-2**). Nearby, the deranged orientation of trees ('drunken forest') is evidence of a history of landsliding.

1.4 *2.2* More blocks of columnar basalt.

1.6 *2.6* Pullout to the left. More columnar basalt of the Grande Ronde formation is exposed on the right. Deposits across the river to the southeast show telltale evidence of landslide activity: tilted trees, large masses of out-of-place Fifes Peak volcanic rocks and Grande Ronde Basalt, and poorly sorted deposits exposed in the riverbank.

2.3 *3.7* FR 1802 to Upper Fifes and Cedar Creeks. The rubble exposed southeast of here is likely a part of the landslide complex described earlier. Ahead you get a fleeting glimpse of Old Scab Mountain and the cirque on its north face.

2.6 *4.2* Fifes Creek. The large landslide along whose northwest margin you have traveled since leaving SR 410 ends about here against a northwest-trending normal fault whose motion was down to the northeast.

2.7 *4.3* View of the cirque on Old Scab Mountain is straight ahead.

2.8 *4.5* Colluvium and an unconsolidated deposit, possibly that of a lahar associated with eruption of the Bumping River tuff, are exposed on the right.

3.4 *5.5* The Bumping River tuff is exposed on the northwest side of the road (Fig. O-3). There are some places to park about 0.1 mi (0.2 km) to the north, but be alert to traffic here. The following description for the site is paraphrased from Hammond and others (1994) and from an informal field guide written by Paul Hammond for the 1997 field trip sponsored by the Geological Society of the Oregon Country: An outcrop of Bumping River tuff is on the west side of the road, Bumping River along the

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east side of the road. This roadcut exposes about 100 m [381 ft] of the Bumping River tuff. The sequence approaches its greatest thickness (as much as 1000 m [3281 ft]) at this location. The source vent for this material lies approximately 20 km (12 mi) to the south at Bismarck Peak in the Mount Aix caldera. At least five separate flow units can be seen in this exposure, each representing a separate pyroclastic flow event. A 2- to 3-m- [6–10 ft] thick basalt sill separates a lower massive unit from thinner units above. While samples from this section have been fission-track dated at 26.6 ±3.6 Ma and 27.7 ±5.0 Ma (Vance and others, 1987), recent dates by Hammond (2005) indicate a K-Ar radiometric age of 24.7 Ma for the tuff.

The sequence of pyroclastic flows suggests a period of caldera collapse during eruption. These deposits are overlain by lahar and pyroclastic surge deposits. Exposed at road level, underlying the deposits of the Bumping River tuff, are deposits of older, weathered volcaniclastic strata known informally as the Wildcat Creek beds.

A sill is exposed at the south end of the outcrop. In the winter of 1995-96, a large chunk of the sill slid down along a fracture plane onto the slopes below.

4.0 6.4 On the right is an olivine basalt feeder dike for the sill in Bumping River tuff mentioned above.

4.1 6.6 The Bumping River welded tuff is exposed in a quarry on the right. Thick hot ash flows commonly cooled as one or more flow units and became welded. Note that the rocks in individual flow units display little, if any, bedding because the hot volcanic debris flowed into place essentially en masse (Fig. O-4). Cooling joints can develop as thick layers of welded fragmental material cool from above and below, just as similar jointing develops in a cooling thick basalt flow (see Fig. A-11, p. 60).

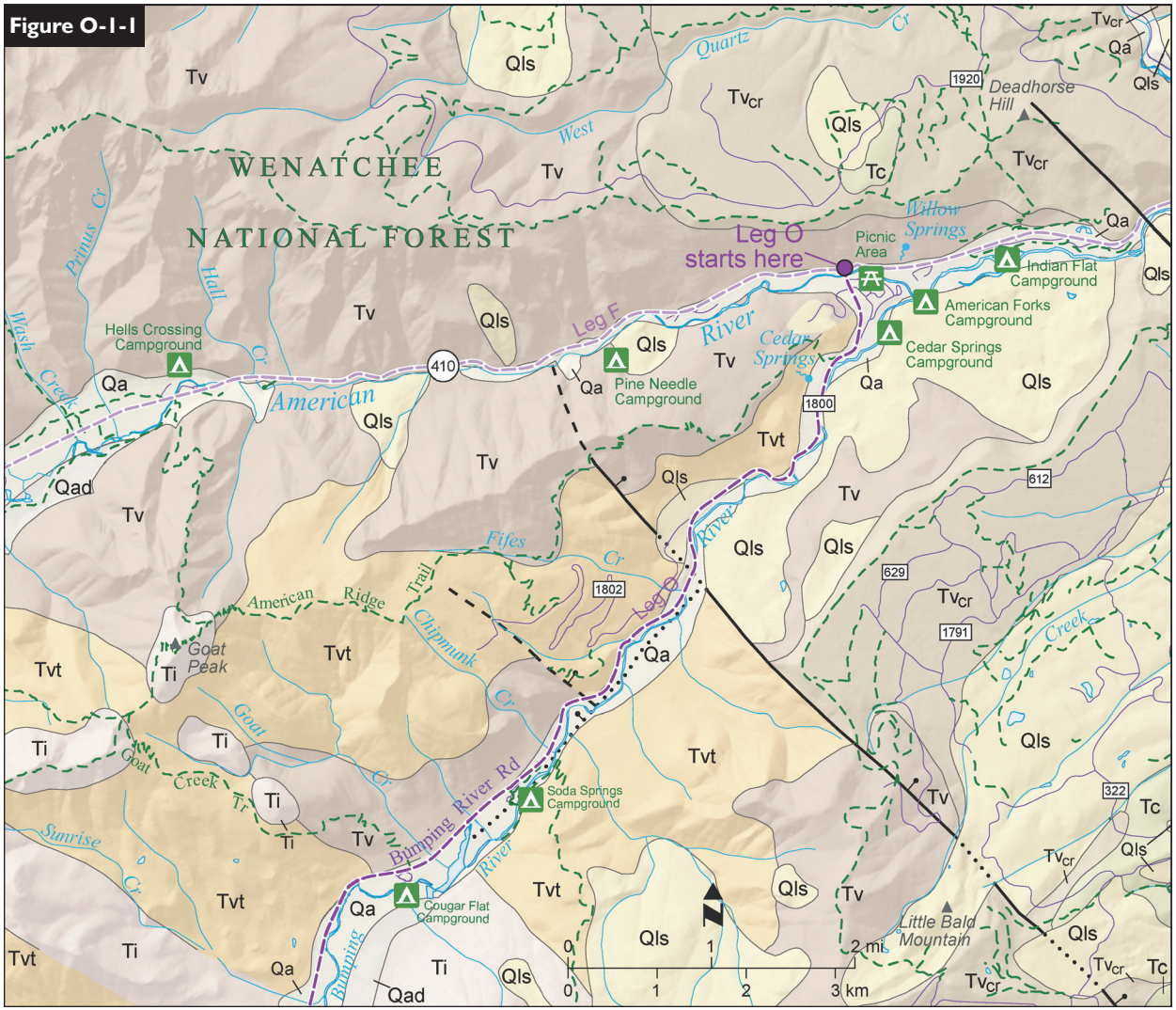


Figure O-1. *(left)* Geologic map for Leg O (two consecutive panels). The geology was adapted from 1:100,000- and 1:500,000-scale digital versions of Schasse (1987b), Walsh (1986), and Schuster (2005) and has been draped over a shaded relief image generated from 10-m elevation data. The leg maps were constructed using source-map data whose scale is smaller than the leg map scale, thus minor exposures may not appear on leg maps. The map explanation is on the inside back cover.

Figure O-2. Geologist Wendy Gerstel examines a reddish baked zone under Bumping River tuff along Bumping Lake Road about 1.1 mi (1.75 km) from SR 410. The entire outcrop is part of a landslide mass. Note the crude columnar jointing in the tuff deposit (top center). View is to the north.

photo by Beth Norman

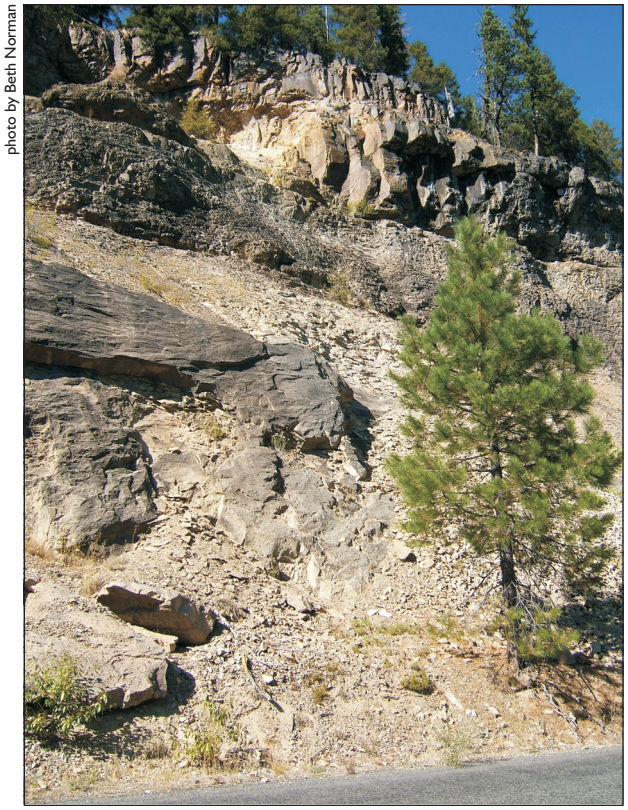
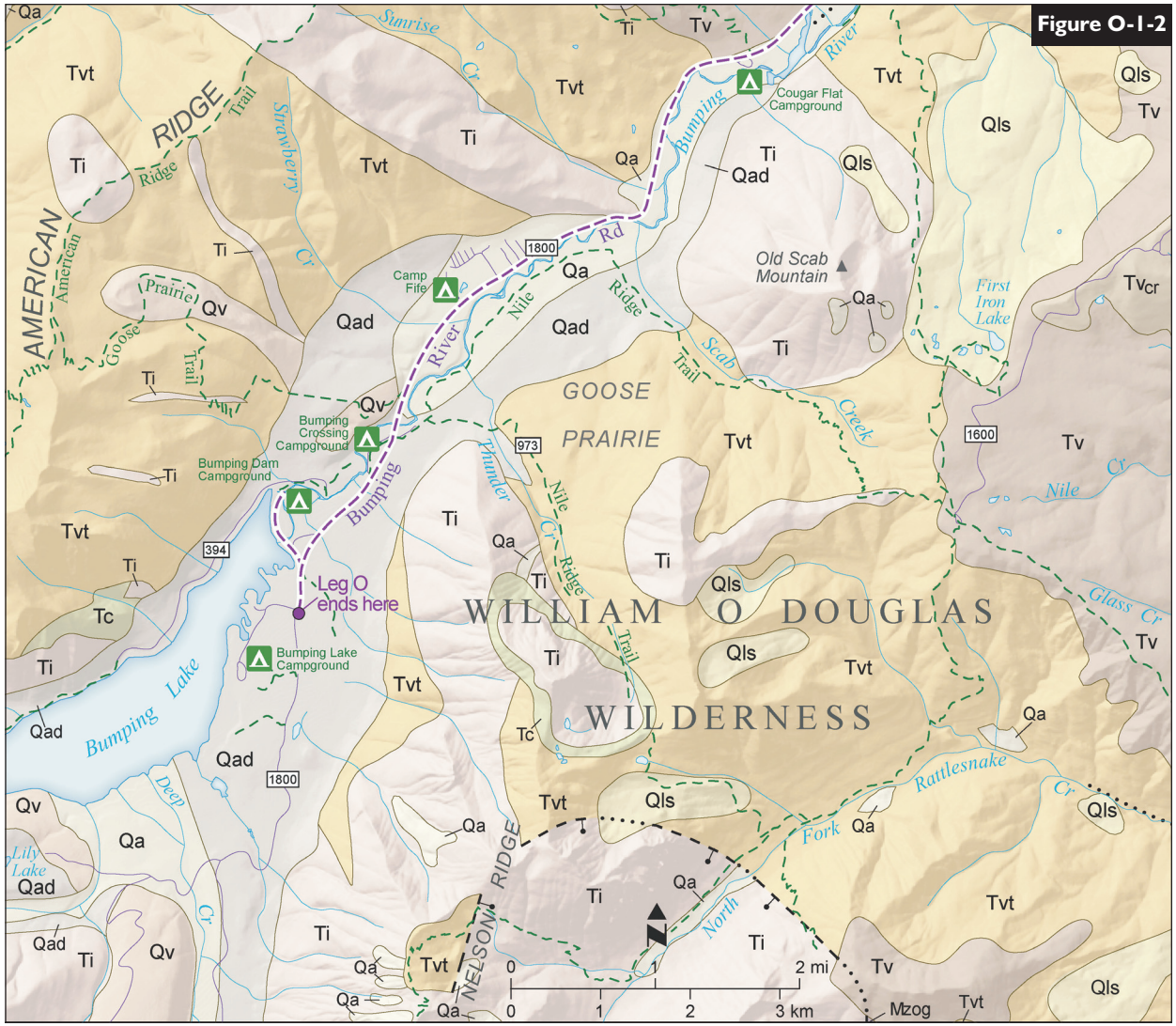


Figure O-3. Cooling joints in the Bumping River tuff. There are at least five separate flow units of the tuff in this exposure (top of section) in this photo. The bottom of the basal breccia is just above the center of the photo, and its contact dips to the right. A large area of unweathered (yellowish brown) rock near bottom of photo was exposed when a large chunk of the bedrock slid down along a fracture plane (not visible in this photo) during the winter of 1995-96. This outcrop is almost 400 ft (122 m) high.

4.9 *7.9* Soda Springs Campground.

5.0 *8.0* Glacial drift exposed here may be ablation till or outwash. On the right (west) side of the road (to mile 5.3 and farther) is a pre–Evans Creek drift (older than 22,000 cal yr B.P.).

5.3 *8.5* The debris-flow deposit on the right (west) is probably from a 1996 flood event in Goat Creek.



5.7 *9.2* Goat Creek Trail (#959) on the right. The gully exposes fragmental rock debris as the road ascends and crosses an alluvial fan.

5.8 *9.3* Cougar Flat Campground on the left.

6.1 *9.8* West of the road, the poorly sorted deposit, or diamicton, that is only slightly weathered and contains rounded clasts may be glacial drift of Evans Creek age (22 to 15 cal yr ka).

6.4 *10.3* Another view of Old Scab Mountain, an intrusive complex that is a likely source for the rock in the upper Ellensburg Formation in this area (Humphrey, 1996). (See Leg F for a discussion of the Ellensburg Formation.)

7.4 *11.9* Dacite sill. Smith and others' (1989) radiometric age of about 8.8 Ma for this 20-m (66 ft)-thick sill closely matches that of the top of Old Scab Mountain obtained by R. A. Duncan (Oregon State Univ., written commun., 2003). Note the hexago-

nal biotite crystals. Overlying the dacite sill is glacial drift of Evans Creek age containing rounded cobbles.

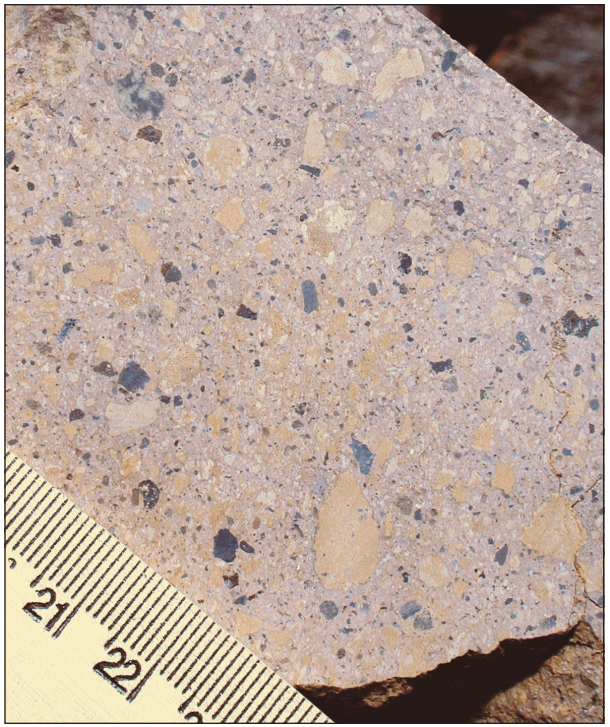
8.3 *13.3* Goose Prairie area, elevation 3266 ft (996 m); store, homes, cabins for rent. This is the former summer home of Chief Justice William O. Douglas, whose 1950 book "Of Men and Mountains" includes descriptions of his adventures in this area as a youth. Note the broad valley bottom here; bedrock constriction downstream and probable damming by moraines caused glacial outwash infilling of a valley.

8.4 *13.5* Camp Fife, a Boy Scout facility.

9.4 *15.1* Goose Prairie Trail (#972).

9.5 *15.3* The columnar-jointed outcrop on the right is hornblende andesite of Bumping Crossing, which was erupted from a large cinder cone north of here. Its age is roughly 300 to 25 ka, making it one of the few exposures of Quaternary-age volcanic rocks near here (Hammond, unpub. mapping, 2004).

Figure O-4. Close-up of the texture of a sample of Bumping River tuff that has been cut with a diamond saw. The scale is in centimeters. The light tan shapes are pumice fragments that have been somewhat flattened. Also visible are lithic fragments (dark clasts) and crystals, all in a welded ashy matrix.



9.6 *15.4* Cross the Bumping River. The Evans Creek terminal moraine here has nested recessional moraines and ground moraine upstream of it.

9.7 *15.6* Bumping Crossing Campground. Trails #973 and #974 are within 300 ft (90 m) of the river. More till and possible outwash deposits are exposed on both sides of the road.

10.8 *17.4* Junction of the road to Bumping Lake Dam and to Bumping Lake Marina. The latter road extends about 1.4 mi (2.2 km) to the northwest and then for about 1.5 mi (2.4 km) along the west side of the lake. The paved road ends near here. Those who want to explore further can drive up to Deep Creek, although road conditions are not suitable for trailers.

There is an excellent vista from the top of the dam, a great location for a geological overview (Fig. O-5). At the dam, you are standing about 1 mi

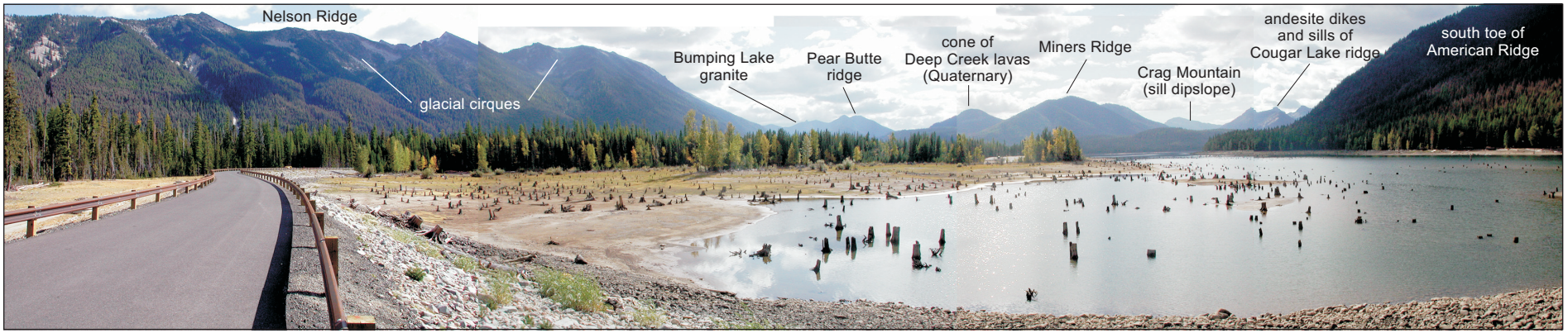


Figure O-5. Photo montage of the broad glacial valley of the Bumping River from Bumping Lake's north shore. This photo was taken in summer from the old earth-fill dam holding Bumping Lake. The stumps are remnants of trees killed by the filling of the reservoir. Excavations during maintenance revealed that the dam sits on pumiceous debris-flow deposits that contain charred logs (Newell Campbell, Yakima Valley Comm. College, oral commun., 1997, 2007); under the valley fill is the Bumping Lake granite (23.76 Ma). The view is toward the northern rim of the caldera of Mount Aix, about 1 mi (1.6 km) from this vantage point. Most of Nelson Ridge (left) is within the caldera. Miners Ridge is composed of granite of the Bumping Lake pluton. The sandstones of the Summit Creek rocks of Vance and others (1987) crop out at Crag Mountain and dip steeply to the west. The basal Summit Creek basalt, which sits underneath the sandstones, lies unconformably on the deformed rocks of the pre-Tertiary Rimrock Lake inlier. Pear Butte ridge (dacite, 6.29 Ma) is a local name. View is to the south-southwest.

(1.6 km) outside the north rim of the Mount Aix caldera (~25 Ma). Nelson Ridge, to the southeast, provides a cut through the caldera. A young dacite (4.7 Ma) is exposed to the north (left edge of Fig. O-5); roof pendants of older (Eocene) Puget Group sedimentary rocks are perched on the dacite. Most of the ridge to the south is capped by the Bumping River tuff, which is as much as 2600 ft (800 m) thick near here. Late Eocene to middle Oligocene Ohanapecosh Formation and coeval Wildcat Creek rocks crop out mid-slope, under the tuff, as a collapse breccia, whereas the lower, steeper parts of the ridge, are composed of the Bumping Lake granite (24.7 Ma), which fed the caldera. The northern part of Miners Ridge is entirely this granite.

The Bumping Lake Dam was constructed in 1910 and 1911 by the U.S. Bureau of Reclamation (USBR) in order to raise the water level and control the outflow of water for irrigation in the lower Naches River valley. The original (pre-reservoir) lake was dammed by a moraine of the last major (Evans Creek) alpine glaciation (Buehler, 1989). The current reservoir level is about 45 ft (14 m) higher than the original lake. Pumiceous debris-flow deposits and buried trees were exposed during excavations for the dam. The wood yielded radiocarbon ages of 340 and 500 yr B.P. The debris flow may have originated from Deep Creek (Newell Campbell, Yakima Valley Comm. College, oral commun., 1997). A USBR website (http://www.usbr.gov/dataweb/dams/wa00263.htm) notes that the pumiceous "lahar" deposit "mantles the glacial drift to a depth of up to 13 feet near the center of the valley floor and decrease to a thickness of approximately 4 feet at the ends of the dam".

11.2
18.0 Pavement ends near the turnoff for Bumping Lake Recreation Area and campgrounds. Turn right into the campgrounds. There is a good exposure of glacial drift of Evans Creek age in a road cut just before the pavement ends.

11.4
18.3 Nested Evans Creek age moraines are visible at nearby Bumping Lake campground, as well as glacial erratic boulders of various rock types.

This concludes the road log for this leg. The forest roads and trails that continue or that begin to the east, south, and west of Bumping Lake allow access to many worthwhile destinations including Mount Aix, Pear Butte, Tumac Mountain, Lily and Swamp Lakes, and Copper City, an old mining area.

Return north on this road to reach Yakima or Mount Rainier via SR 410. ■