

Figure 14. Topographic setting and approximate distribution of Missoula flood deposits southeast of Arlington. The delta bars were mainly deposited by flow spilling into Alkali Canyon from the two upland channels to the east. There was substantial flow over the entire upland surface, however, as evidenced by the large gravel bar deposited on the upland surface that is depicted on the north part of the map. Topographic base from Arlington USGS 7.5' quadrangle. Land sections (numbered) are 1 mi (1.6 km) across.

n in the Gorge.
 / in exposures of eddy deposits northwest and
 kitat River from Lyle, near the 513-ft benchmark,
 veral floods achieved stages of 180 m (600 ft). In
 xposure in the gravel pit north of the bench mark
 st seven sets of east-dipping foresets of granule
 sand. These sets of foresets are capped by pebbly
 silty matrices. We interpret these silt-gravel hori-
 result of loess deposition between separate Missou-
 me of the foreset sets are unconformably overlain
 25 cm of steeply dipping loose
 l that may be scree deposited be-
 This gravel deposit is apparently
 slightly higher (to altitude of 195
 coarser unit to the north (Figure
 itly represents an older and larger
 mum discharge required to unin-
 of 180 m (590 ft) is about 4 mil-
 indicates that there have been a
 ls to surpass that discharge, with
 was perhaps substantially larger.
 on which we stand at an elevation
) has been stripped of its preflood
 such stripped basalt surfaces and
 ident to about 290±12 m (960±40
 about 25 m lower than maximum
 The Dalles.

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 est on the historic highway, pass-
 ll and dropping into the town of
 ies in a synclinal valley. Like the
 urg and Fairbanks, flow spilling
 between the Columbia River and
 deposited a large delta composed
 pping foresets of cobble-pebble
 . A discharge of at least 2.5 mil-
 equired for flow to overtop the di-
 the delta at Petersburg, several
 its are separated by erosional un-
 rhaps evidence of multiple flows.
 shows at least seven such units.
 from the top contained a piece of
 yielded a radiocarbon date of
 r B.P., indicating that at least two
 nt to this date were capable of
 vel over this divide.
 town of Mosier, a large eddy bar
 on the west flank of the Mosier
 it is composed of well-sorted sand
 deposited in east-dipping fore-
 hat this sediment was part of the
 of the flood, deposited in a large
 ne; that zone developed as a part
 diverted into the topographic low
 e southwest-trending axis of the
 e. Exposures in this bar do not

White Salmon is built upon a large pendant bar in the lee of the
 downstream end of Bingen Gap on the north side of the river. One
 of the larger bars in the Columbia River Gorge, White Salmon bar
 (Bretz, 1925) rests on a basalt platform, is about 2 km long, and
 ascends from 120 m (400 ft) at its apex to almost 240 m (800 ft)
 at its downstream end.

The Hood River valley was inundated by backwater from the
 Missoula floods. Newcomb (1969, p. 6) reported "fine-grained
 lacustrine deposits" as high as altitude 245 m (800 ft), probably
 slackwater deposits of Missoula floods. The highest ice-rafted er-

DAY 7 ROWENA CREST - LYLE, WA

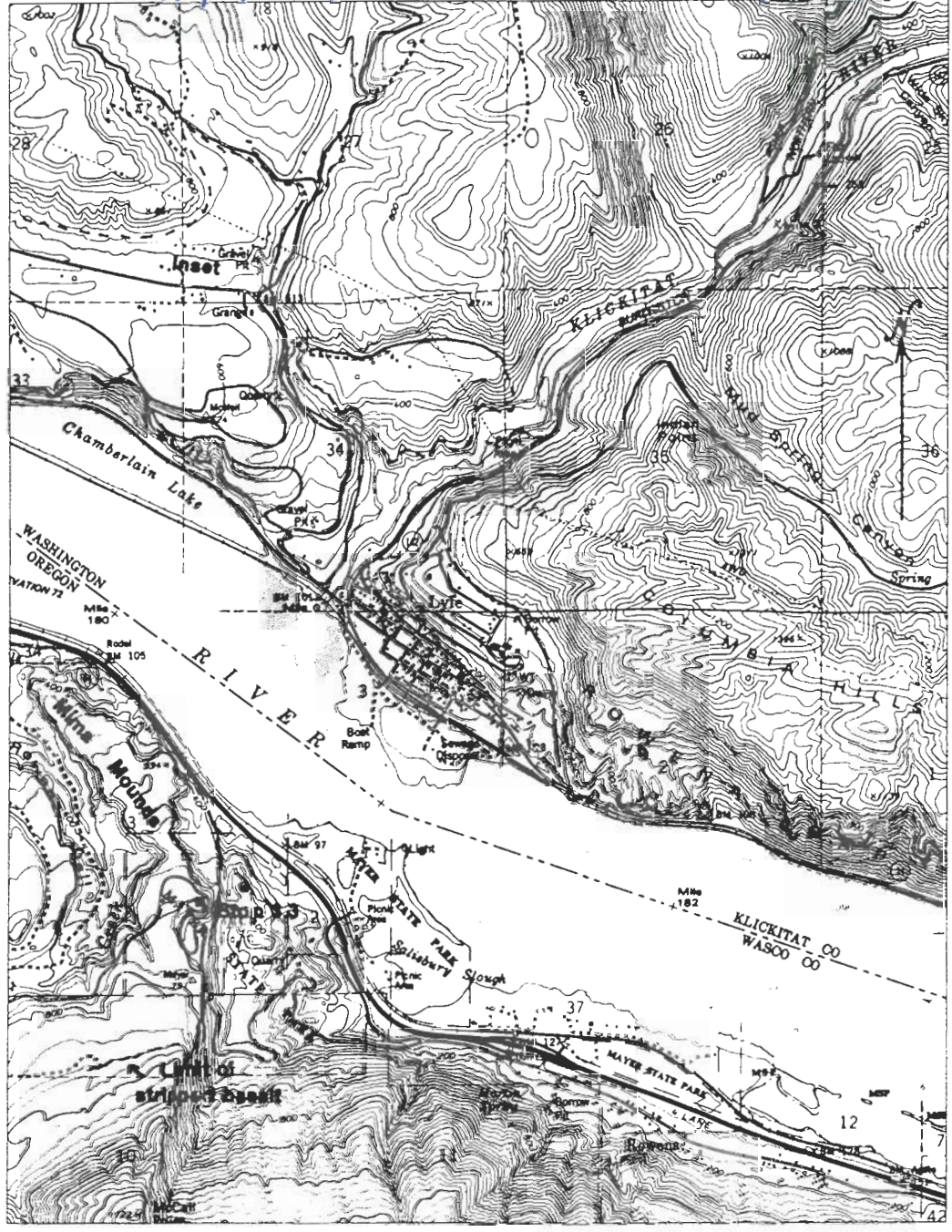


Figure 28. Topographic setting, geomorphic features, and approximate distribu-
 tion of Missoula flood deposits (outlined by heavy lines) near Lyle. Topographic base
 from Lyle USGS 7.5' quadrangle. Land sections (numbered) are 1 mile (1.6 km)
 across.

DAY 7 - BONNEVILLE LANDSLIDE (BRIDGE OF THE GODS)

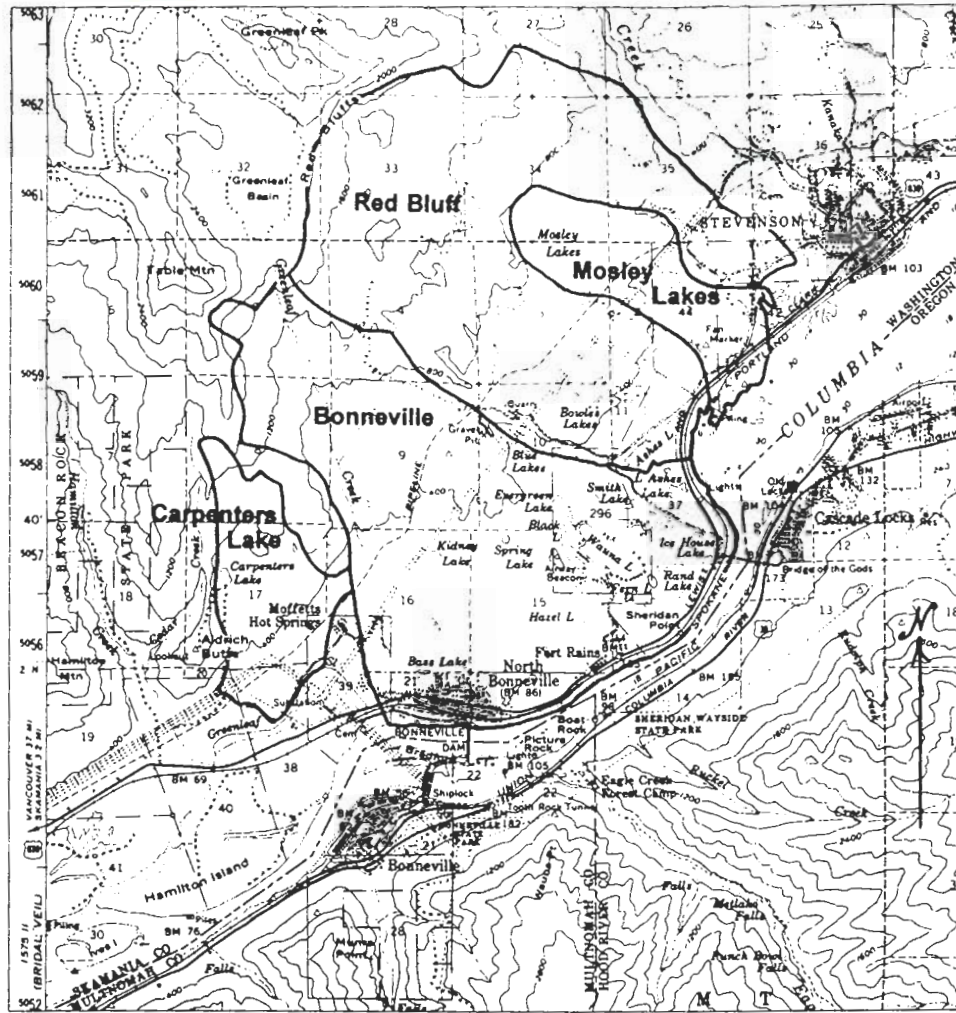


Figure 30. Landslide complex near Cascade Locks. The Bonneville landslide was the most recent one and may have temporarily dammed the Columbia River about 500 years ago. Topographic base is the Bonneville 15' quadrangle. Land sections (numbered) are 1 mi (1.6 km) across. After Minor, 1984.

flood stage. The combination of dense vegetation and abundant mass wasting hinder the search. It is clear that by Portland, however, the maximum water surface descended to 120 m (400 ft) (Allison, 1935), indicating an average gradient of 0.003. Most of the drop probably occurred near Crown Point, at the downstream end of the Columbia River Gorge.

For several kilometers downstream of Hood River, the valley of the Columbia River is particularly constricted, generally narrower than 2 km. About 5 km downstream of Viento State Park, the Columbia River is encroached upon by the Wind River landslide, one of several recent or presently active landslides in the Columbia River Gorge (Figure 29). The upper part of the Wind River landslide moves as fast as 15 m/yr (Allen, 1984).

Downstream of the Wind River landslide, the Columbia River valley funnels between the twin granodiorite intrusions of Shellrock and Wind Mountains. Shellrock Mountain, with its constant raveling of platy rubble at a repose angle of 42°, was a major obstacle to early road building through the Gorge. On the north side of the river, between Wind Mountain and Wind River, a large pendant bar was deposited in the lee of Wind Mountain as flow expanded out of the constriction. This bar is about 2 km long and 125 m high.

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Ohanapecosh Formation sl
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The Bonneville landslide g
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marized by Lawrence and La
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feet wet” and that “the falls a
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The Natives also said “that the
which caused the waters to ri
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present bed these rapids first r

Early explorers noted large
stumps between Cascade Rap
this “submerged forest” was c
tlers, and geologists (Lawrenc
ally it became clear that they

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DAY 7 - BONNEVILLE LANDSLIDE

in the Hood River valley are between altitudes of 255 and 800 m (840-880 ft). If this was the maximum stage achieved by the largest flood, the water surface dropped substantially through Bingen Gap.

The best examples of polished, fluted, and scoured basalt sur-

faces known in the Columbia River Gorge are in the gardens of the Columbia River Gorge Hotel, a 1921 structure listed on the National Historic Register.

Between Hood River and the downstream end of the Gorge below Crown Point, we find little conclusive evidence of maximum

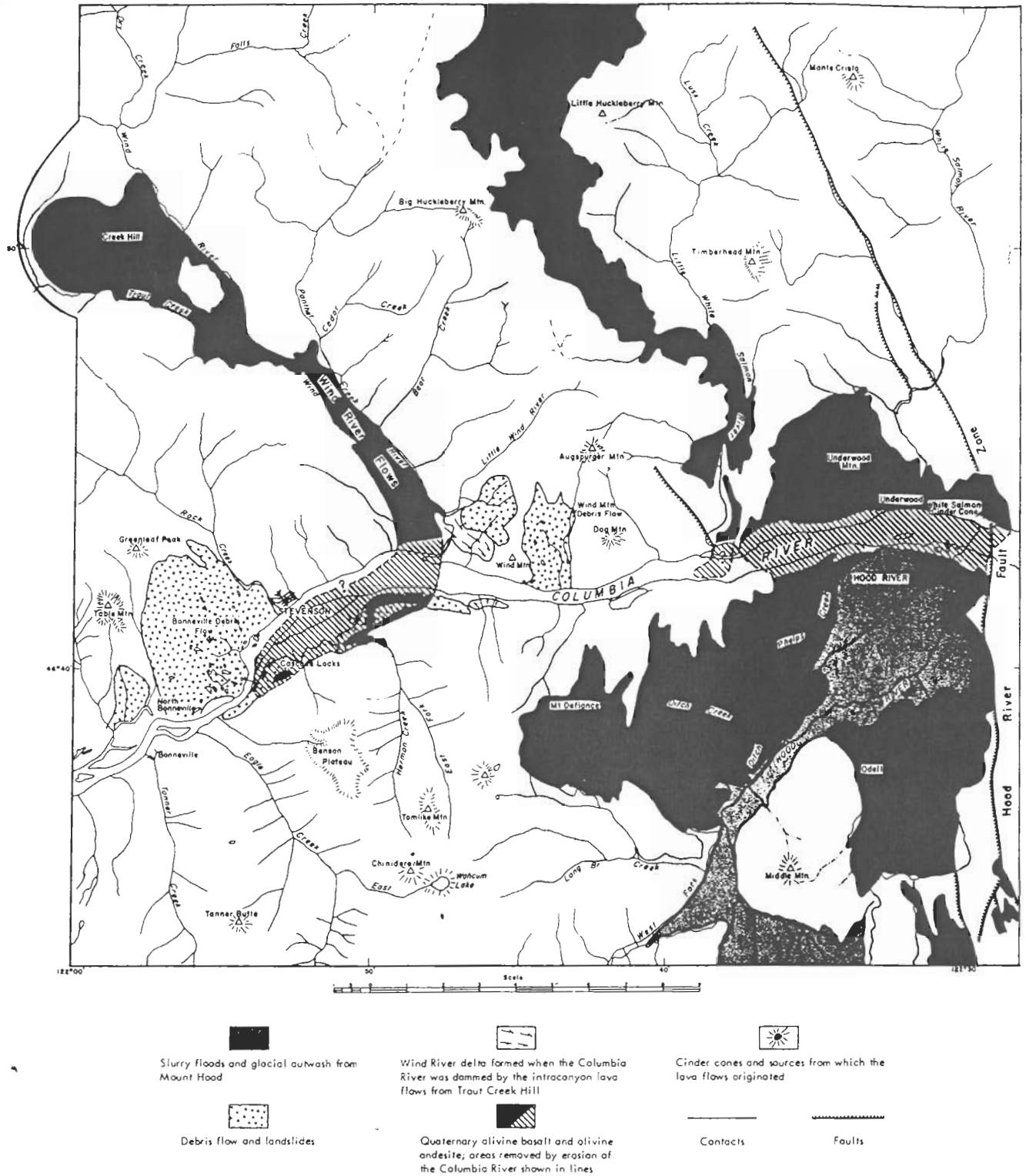


Figure 29. Lava flows and landslides in the Columbia River Gorge, emphasizing flows that may have dammed the Columbia River. From Waters (1973).

184C

