

Hypsology

Hypsology is the study of the relative altitude of places. Map 3 on the facing page is a hypsometric “hill-tint” in which elevation is depicted through variations in color and brightness. The shading is rendered as if the image were a topographic relief map illuminated by a source of light at 45 degrees above the map in the northwest corner, 315 degrees azimuth. It differs from true illumination in that higher features closer to the light source do not cast shadows on those behind. No vertical exaggeration is applied.

Based on U.S. Geological Survey,<sup>32</sup> U.S. Forest Service, and U.S. Bureau of Land Management digital sources contained in an archive managed by the Oregon Geospatial Data Clearinghouse,<sup>33</sup> Map 3 was constructed from a digital elevation model made by joining approximately 300 individual 7.5 minute quadrangle digital elevation models. Each of these is a rectangular matrix of elevation values spaced 98.4 ft apart (30 m). Vertical accuracy varies from +/- 24.6 ft (7.5 m) to +/- 49.2 ft (15 m) and horizontal accuracy conforms to U.S. Geological Survey national map accuracy standards, which at this scale means that 90% of values lie within 39.4 ft (12 m) of actual location.

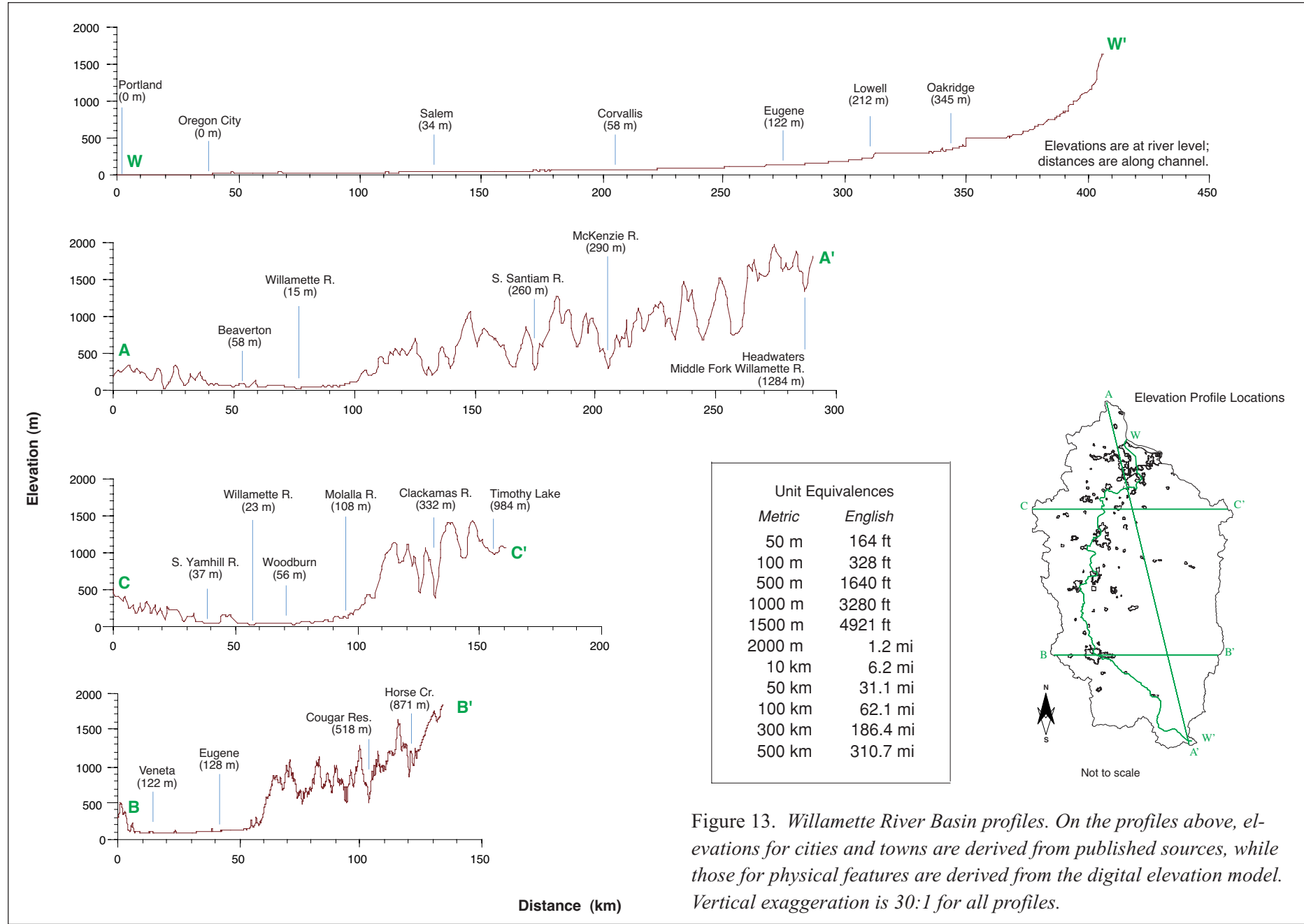


Figure 13. Willamette River Basin profiles. On the profiles above, elevations for cities and towns are derived from published sources, while those for physical features are derived from the digital elevation model. Vertical exaggeration is 30:1 for all profiles.

Figure 14. Calculating slope:

In the maps below, topographic slope is determined individually for each 1/4 acre (30 meter x 30 meter) cell in the digital elevation model. The slope is computed by reference to cells in a 3x3 matrix surrounding the target cell. With the elevation of edge-touching cells given twice the weight as that of corner-touching cells, the maximum rate of change in elevation from the target to its neighbors, and its direction, are calculated. The compass direction of this line is the topographic aspect of the target cell.

Slope is represented in two forms, percentage and degrees. Degrees measure the interior angle of a triangle in which the base is the “run” and the height is the “rise” along the direction of maximum elevation change for the cell. Percentage slope multiplies the rise/run ratio by 100. An increasingly vertical line has degrees slope approaching 90, but a percentage slope approaching infinity as the “run” denominator goes to zero. A 45 degree slope is a 100% slope.

