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Stream Channels of the Northern Willamette Valley, Clackamas, Marion, Polk, Washington, and Yamhill Counties, Oregon

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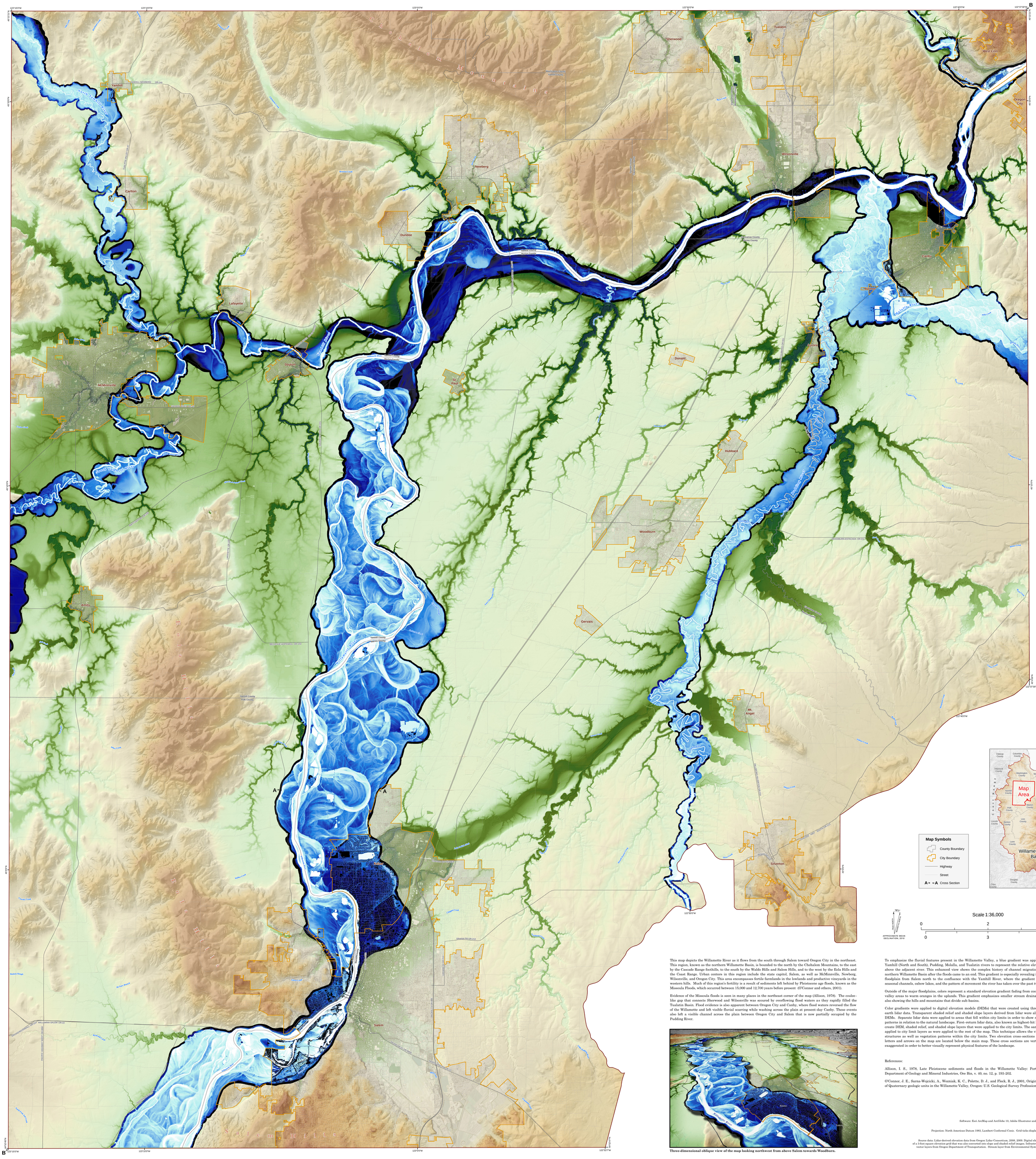
by Daniel Coe



This map depicts the Willamette River as it flows from the south through Salem toward Oregon City in the northeast. This region, known as the northern Willamette Basin, is bounded to the north by the Chehalem Mountains, to the east by the Cascade Range foothills, to the south by the Waldo Hills and Salem Hills, and to the west by the Eola Hills and the Coast Range. Urban centers in this region include the state capitol, Salem, as well as McMinnville, Newberg, Wilsonville, and Oregon City. This area encompasses fertile farmlands in the lowlands and productive vineyards in the western hills. Much of this region's fertility is a result of sediments left behind by Pleistocene age floods, known as the Missoula Floods, which occurred between 15,000 and 12,700 years before present (O'Connor and others, 2001).

Evidence of the Missoula floods is seen in many places in the northeast corner of the map (Allison, 1978). The coulee-like gap that connects Sherwood and Wilsonville was scoured by overflowing flood waters as they rapidly filled the Tualatin Basin. Flood evidence is also apparent between Oregon City and Canby, where flood waters reversed the flow of the Willamette and left visible fluvial scarring while washing across the plain at present-day Canby. These events also left a visible channel across the plain between Oregon City and Salem that is now partially occupied by the Pudding River.

Three-dimensional oblique view of the map looking northwest from above Salem towards Woodburn.

To emphasize the fluvial features present in the Willamette Valley, a blue gradient was applied to the Willamette, Yamhill (North and South), Pudding, Molalla, and Tualatin rivers to represent the relative elevation of the floodplain above the adjacent river. This enhanced view shows the complex history of channel migration that occurred in the northern Willamette Basin after the floods came to an end. This gradient is especially revealing in the Willamette River floodplain from Salem north to the confluence with the Yamhill River, where the gradient highlights lateral and seasonal channels, oxbow lakes, and the pattern of movement the river has taken over the past twelve millennia.

Outside of the major floodplains, colors represent a standard elevation gradient fading from cool greens in the lowland valley areas to warm oranges in the uplands. This gradient emphasizes smaller stream drainages in the valley while also showing the hills and mountains that divide sub-basins.

Color gradients were applied to digital elevation models (DEMs) that were created using three-foot resolution bare-earth lidar data. Transparent shaded relief and shaded slope layers derived from lidar were also draped on top of the DEMs. Separate lidar data were applied to areas that fell within city limits in order to show man-made development patterns in relation to the natural landscape. First–return lidar data, also known as highest-hit lidar data, were used to create DEM, shaded relief, and shaded slope layers that were applied to the city limits. The same color gradients were applied to city limit layers as were applied to the rest of the map. This technique allows the viewer to see man-made structures as well as vegetation patterns within the city limits. Two elevation cross-sections represented by labeled letters and arrows on the map are located below the main map. These cross sections are vertically and horizontally exaggerated in order to better visually represent physical features of the landscape.

References:

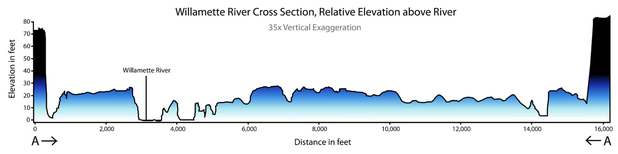
Allison, I. S., 1978, Late Pleistocene sediments and floods in the Willamette Valley: Portland, Oregon: Oregon Department of Geology and Mineral Industries, Ore Bin, v. 40, no. 12, p. 193-202.

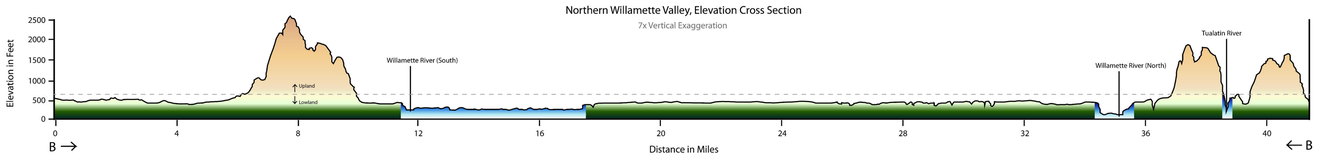
O'Connor, J. E., Sarna-Wojcicki, A., Wozniak, K. C., Polette, D. J., and Fleck, R. J., 2001, Origin, extent, and thickness of Quaternary geologic units in the Willamette Valley, Oregon: U.S. Geological Survey Professional Paper 1620, 51 p.

Software: Esri ArcMap and ArcGlobe 10, Adobe Illustrator and Photoshop Creative Suite 5.

Projection: North American Datum 1983, Lambert Conformal Conic. Grid ticks displayed in latitude and longitude.

Source data: Lidar-derived elevation data from Oregon Lidar Consortium, 2008, 2009. Digital elevation model (DEM) consists of a 3-foot square elevation grid that was also converted into slope and shaded relief images. Infrastructure and political boundary vector layers from Oregon Department of Transportation. Stream layer from Environmental Systems Research Institute (Esri).





NOTICE
This map cannot serve as a substitute for site-specific investigations by qualified practitioners. Site-specific data may give results that differ from those shown on the map. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. government.

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