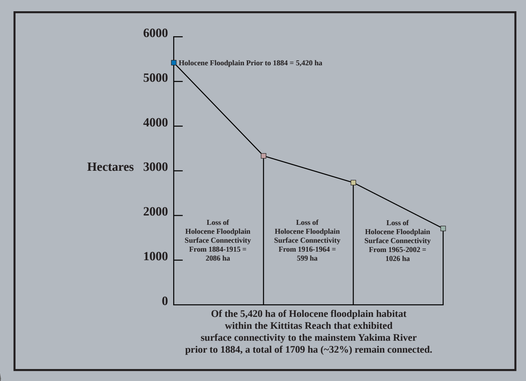
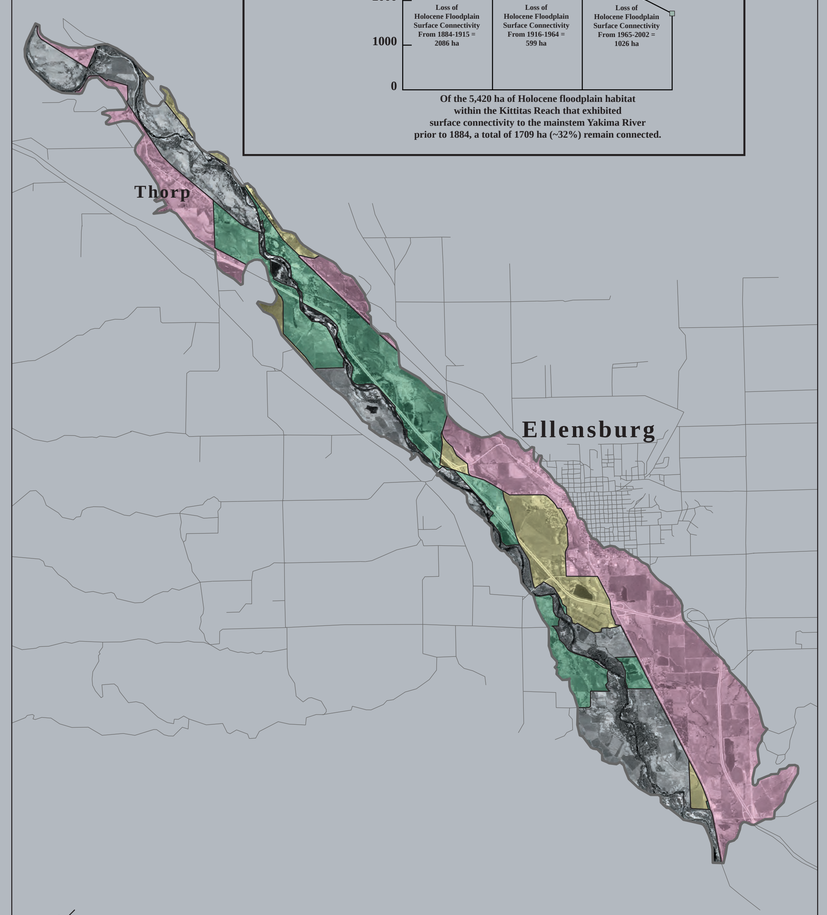
Loss Of Lateral Connectivity
To The Kittitas Holocene Floodplain From 1884 To 2002

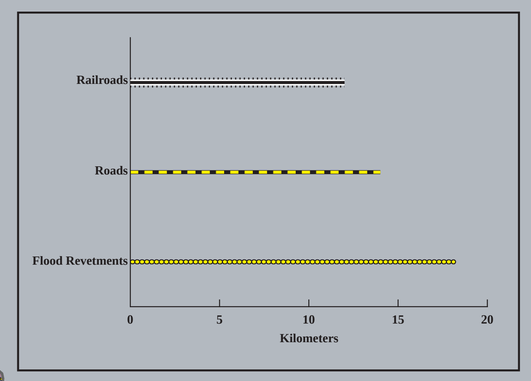


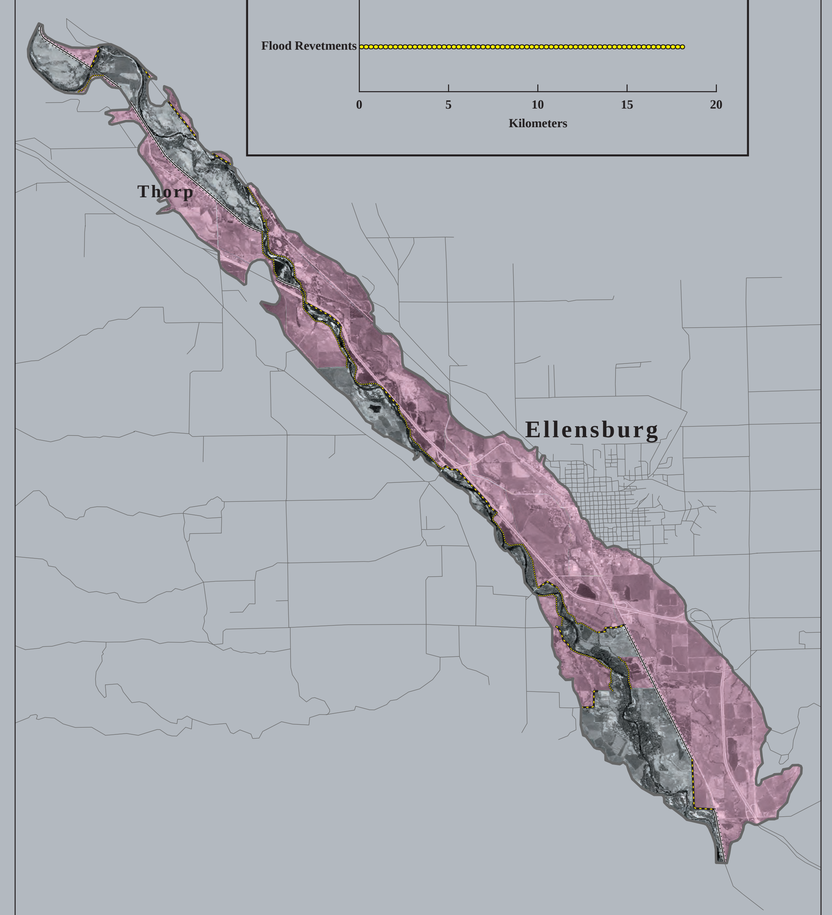
Of the 5,420 ha of Holocene floodplain habitat within the Kittitas Reach that exhibited surface connectivity to the mainstem Yakima River prior to 1884, a total of 1709 ha (~32%) remain connected.



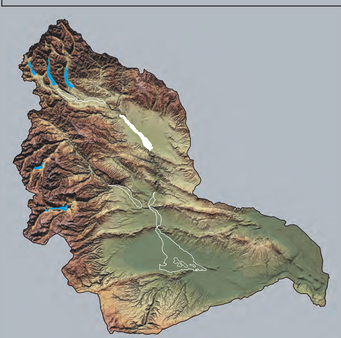
Revetments
Roads
Alterations 1884-1915
Alterations 1916-1964
Alterations 1965-2001

Anthropogenic Features
Responsible For The Loss Of Lateral Connectivity To The Kittitas Holocene Floodplain





Flood Revetments
Roads
Railroads
Alterations 1884-2002

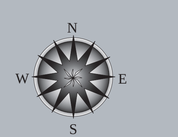


Position of the Kittitas Reach within the Yakima Basin.

Conversion Constants

Multiply Hectares by 2.47 to obtain Acres

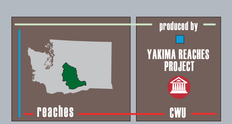
Multiply Kilometers by 0.621 to obtain Miles



0 .4 .8 1.2 1.6 km

0 1 mi

Cartography By
Douglas J. Eitemiller



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The Kittitas Reach

By

Morris L. Uebelacker, Clay P. Arango, and Douglas J. Eitemiller

Located on the mainstem Yakima River within the Ridge and Canyon Landscape (plate II), the Kittitas Holocene floodplain encompasses an area of 5,420 hectares. This floodplain lies in the much larger Kittitas Valley, a deep synclinal basin bounded by the Manastash anticline on the south, and Naneum anticline on the north. An extensive system of faults orients this complex stratigraphic sequence of Columbia Flow Basalts along a northwest to southeast trending axis (Tabor et al. 1982). The valley and its associated ridges lie at the northwestern edge of the more extensive and regionally pervasive Yakima Folds Belt.

Defining the upstream end of the floodplain is an array of various geomorphic features that include the Thorp Prairie Moraine, outwash plains, mainstem river and side stream terraces, and alluvial fans. The downstream end of the floodplain is laterally defined by the floodplains of tributary streams, side stream terraces, and alluvial fans (Tabor et al. 1982). An admixture of glacial, fluvial, mass-wasting, and aeolian processes determines the longitudinal, lateral, and vertical, structure of the Kittitas Holocene floodplain (Tabor et al. 1982). Unlike the glacially formed valleys of Easton and Cle Elum, the structure of the Kittitas Valley was not determined by flowing ice; however, the outflow of glacial melt-water has deposited and reworked large volumes of sediment across the valley floor and its floodplain for at least the past 700,000 years (Waitt 1977).

Prior to construction of the NPRR, farming and ranching were the dominant land use activities on the Kittitas Holocene floodplain, and settlers typically built their homesteads on river terraces just above this feature. In fact, the first settlement in the Kittitas Valley, Robber's Roost, was situated on the edge of a terrace bounding the geomorphic floodplain. As with both the Easton and Cle Elum floodplains, the first reduction of lateral connectivity occurred with the entry of the NPRR onto the floodplain in 1886. The railroad essentially divided the lower portion of the floodplain in half, and established fixed locations for tributary streams that once intermingled with the mainstem Yakima River to form a broad and complex riverine habitat. Still, many disconnected areas remained open to flood events from the many tributary streams draining the surrounding landscape. These floodwaters were impounded by the NPRR bed, and when combined with mainstem floodwaters, resulted in large areas of ponding on the lower end of the floodplain (Kaatz 1996). The railroad accelerated and intensified settlement and land use across the disconnected portion of the floodplain. Additionally, expansion of irrigated agriculture rerouted and seasonally dewatered many of the tributary streams throughout this reach. The loss of ecological connectivity between the watersheds drained by these tributaries and the mainstem Yakima River continues to inhibit the ecological potential of the Kittitas floodplain and the surrounding landscape. The construction of both the NPRR and CMStP&PRR, and an expanding county road system reduced the surficially connected area of the Kittitas Holocene floodplain to 3,334 hectares by 1915.

Between 1916 and 1964, the diversion of springtime peak flows through water storage projects supported the continued expansion of irrigated agriculture within large parts of the floodplain and adjacent lands. This fact, when coupled with the emergence of the state highway system and the continued growth of the county roads, resulted in the reduction of surficially connected Holocene floodplain area to 2,735 hectares.

The construction of I-90 through the middle of the floodplain during the most recent period required several realignments of the mainstem river and effectively forced it to flow between a river terrace and the interstate for a distance of 3 km. Collectively, I-90, floodplain mining, and flood revetments dropped the total portion of the surficially connected Kittitas Holocene floodplain to just 32% (1,709 hectares) of its original size during the last period of analysis.

Results from the GIS analysis of the hydrologically active portion of the Kittitas Holocene floodplain show a reduction from 1,024 hectares in 1942 to 685 hectares today. Currently, 33% of the active floodplain habitat present in 1942 has been lost (plate XVI).

Recorded discharge for the Yakima River at the Umtanum gauging station (UMTW) during the time the 1942 aerial photography was made measured 2,380 cfs. Discharge records at the same station during the time the 1993 aerial photography was made measured 2,365 cfs. Therefore, a comparison of all channel types within this reach can be made between the last two periods (appendix I). The length of the eupotamon decreased by 6% between 1942 and 1993. Much of this loss is directly attributable to the realignment and simplification of the mainstem river during the construction of I-90. Eupotamon side channels decreased in length by 34%. This loss was mostly due to the disconnection of a side channel system north of Thorp. The overall length of parapotamon channels remained virtually the same (< 1%). Springbrook channels increased in length by 31% as formerly active side channels were disconnected at their top end from the mainstem river. Plesiopotamon channel lengths decreased by 26%, probably the result of terrestrialization from a lack of overbank scouring flows. No paleopotamon channels were identified on the floodplain during either period. Outflow channel length increased by 319% because of the many gravel pit ponds excavated on the floodplain during interstate construction. The overall length of tributary streams within the Kittitas Holocene floodplain decreased by 6% from straightening by agricultural practices.

References

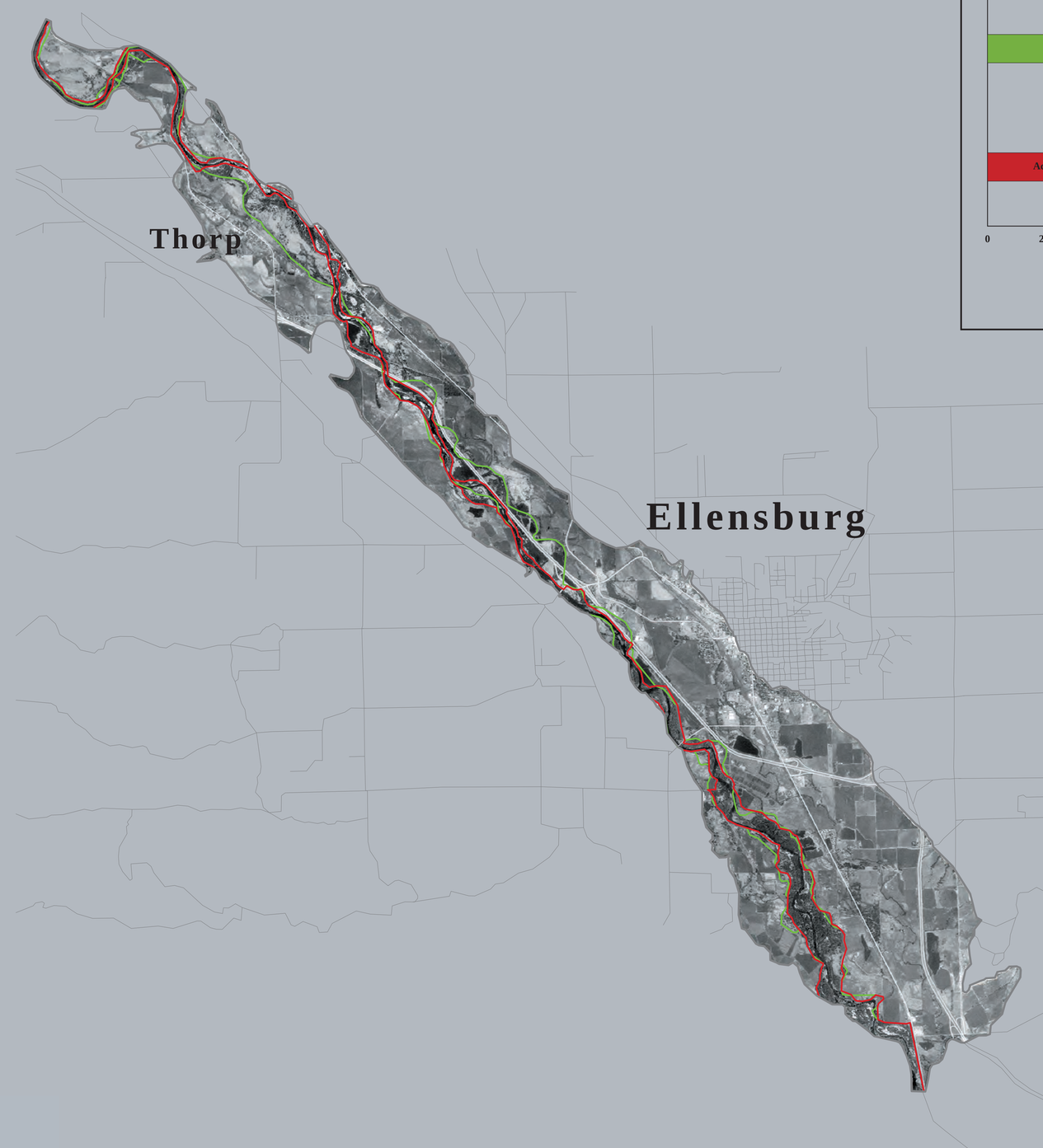
Kaatz, M. 1996. Ellensburg and Vicinity Floods. Ellensburg Daily Record 2.12.96.

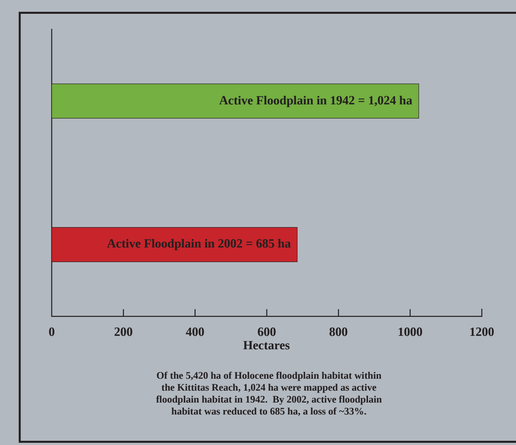
Tabor, R. W., R. B. Waitt, Jr., V. A. Frizel, Jr., D. A. Swanson, G. R. Byerly, and R. D. Bentley. 1982. Geologic Map of the Wenatchee 1:100,000 Quadrangle, Central Washington. USGS Miscellaneous Investigations Series. Map 1-1311.

Waitt, R. B. Jr. 1979. Late Cenozoic Deposits, Landforms, Stratrigraphy, and Techtonism in Kittitas Valley, Washington. USGS Geologic Survey Professional Paper, 1127.

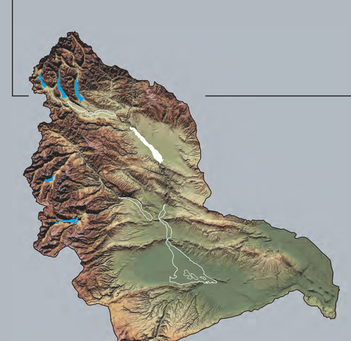
Plate XV. Loss of lateral connectivity to the Kittitas Holocene floodplain and the anthropogenic features responsible for that loss.

Loss Of Active Floodplain
Within The Kittitas Reach From 1942 To 2002





Of the 5,420 ha of Holocene floodplain habitat within the Kittitas Reach, 1,024 ha were mapped as active floodplain habitat in 1942. By 2002, active floodplain habitat was reduced to 685 ha, a loss of ~33%.



Position of the Kittitas Reach within the Yakima Basin.

Conversion Constants

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N
W E
S

0 .4 .8 1.2 1.6 km

0 1 mi

Cartography By
Douglas J. Eitemiller

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Plate XVI. Loss of active floodplain within the Kittitas reach from 1942 to 2002.