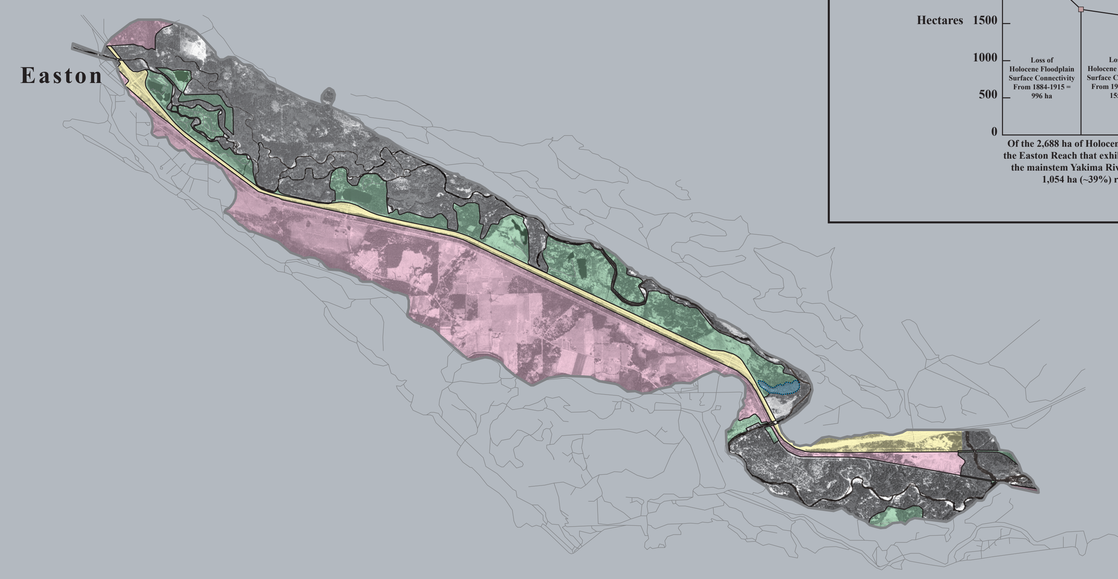
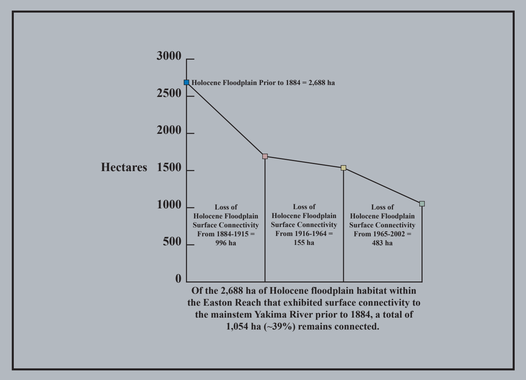
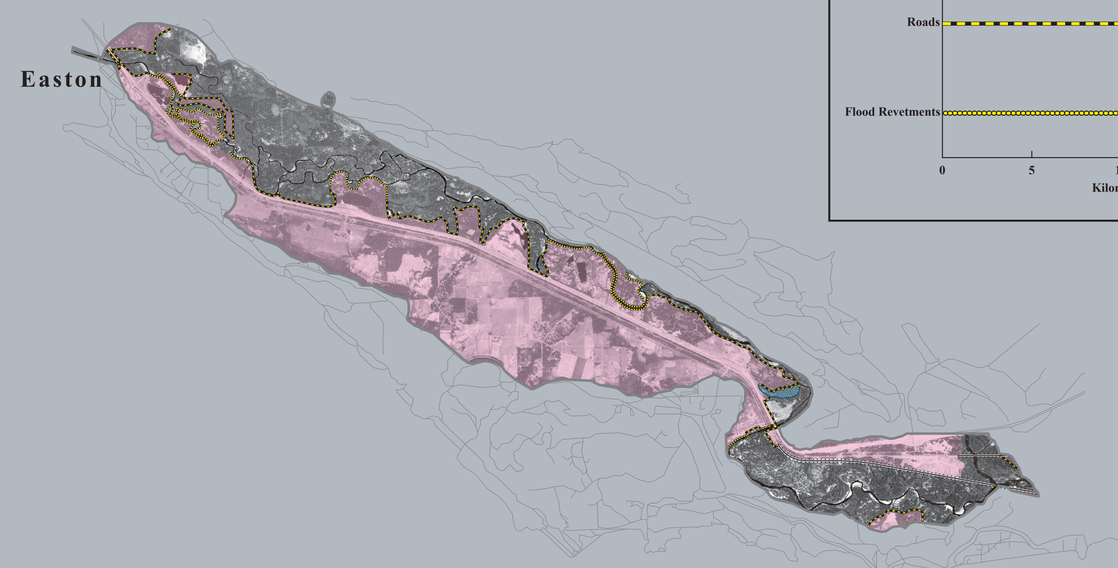
Loss Of Lateral Connectivity
To The Easton Holocene Floodplain
From 1884 To 2002

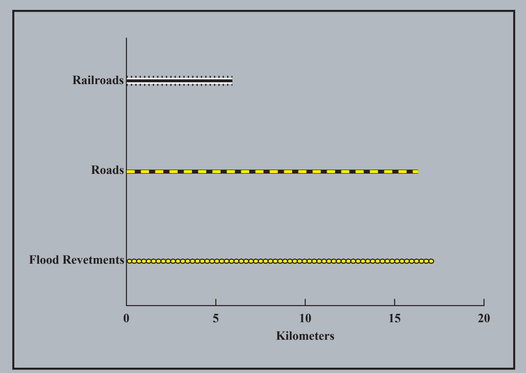


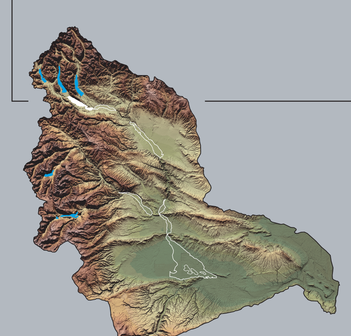


Of the 2,688 ha of Holocene floodplain habitat within the Easton Reach that exhibited surface connectivity to the mainstem Yakima River prior to 1884, a total of 1,054 ha (~39%) remains connected.

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





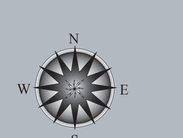


Position of the Easton Reach within the Yakima Basin.

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

©2002 Not to be reproduced without permission

The Easton Reach

By

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

Located within the Glacial Landscape of the Yakima Basin (plate II), the Easton Holocene floodplain encompasses an area of 2,688 hectares. Numerous faults determine the overall orientation of this U-shaped glacial valley and its floodplain, which trends from the northwest to the southeast (Frizzel et al. 1984). Four somewhat distinct glacial drift sequences reflect repeated Pleistocene glaciations. These glaciers have excavated the soft metamorphic rock of the valley bottom and South Cle Elum Ridge on the floodplain's southern margin, and at the same time, scoured the more resistant and younger basalt complex of Easton Ridge into a steep valley wall along its northern boundary. Internal to the floodplain itself, lacustrine sediments associated with drift-barrier lakes have been identified, as have glacial, fluvial, and colluvial deposits (Porter 1976). The tributaries of Tucker Creek, Big Creek, and Little Creek drain South Cle Elum Ridge and flow onto the Holocene floodplain from the southwest. Silver Creek enters from the northeast near the western end of the floodplain. These tributaries extend the attributes of ecological connectivity into a larger watershed network.

The Easton reach is a component of a larger glacial valley system that extends from Snoqualmie pass to just east of the Teanaway River's confluence with the Yakima River. First utilized by indigenous peoples, this valley was explored by George McClellan and others in search of a railroad route over the Cascade Mountains in 1853 (Stevens 1855). This route quickly developed into a recognizable and maintained wagon trail by 1869 (Splawn 1917). For over thirty years, settlers and their domestic livestock and agricultural products moved across the Cascades through this valley by foot, horse, and wagon. The completion of the Northern Pacific Railroad (NPRR) in 1886 opened the first primary connection between population centers on the east and west sides of the Cascades, and intensified travel, settlement, and commerce across the Easton floodplain. By 1909, the completed Chicago, Milwaukee, St. Paul, and Pacific Railroad (CMStP&PRR) paralleled the NPRR line through the floodplain. Mills at Easton, Big Creek, and East Nelson were supplied with timber extracted over large areas of the floodplain (Plummer 1900; Johnson 1994). Beginning in 1902 and continuing through 1913, organized log drives flowed through the Easton, Cle Elum, Kittitas, and Selah floodplains to the Cascade Mill located near the top end of the Union Gap floodplain (historic photography, Yakima Valley Museum). The railroads marked the first major lateral confinement of the Easton floodplain and effectively eliminated cut and fill alluvial processes on over 900 hectares of Holocene floodplain habitat. Railroad crossings across Big Creek, Little Creek, and Tucker Creek constricted channel movement and helped lock their positions on the landscape. Together, railroads and early road systems had reduced surficial connectivity across the Easton Holocene floodplain to 1,692 hectares by 1915.

The construction of Lake Kachess Reservoir in 1912, Lake Keechelus Reservoir in 1917, and the diversion dam at Lake Easton in 1928 marked the beginning of an elaborate water storage and delivery system for irrigated agriculture within the upper Yakima Basin. The diversion of springtime peak flows, through water storage projects, further promoted the expansion of settlement and the extraction of resources on the potentially active portions of the Easton floodplain. The emergence of the first state highways, and the expansion of county roads and rudimentary flood revetments further reduced surficial connectivity on the Holocene floodplain to 1,537 hectares from 1916 through 1964.

Interstate 90 (I-90) emerged as the dominant cross-state transportation corridor during the last period of analysis (1965 to the present). Its construction encouraged gravel mining and the appearance of the first large levees within the Holocene floodplain. The Interstate opened the floodplain to the expanding urban fabric of the Puget Sound Region by encouraging the development of primary and secondary home sites. Subdivisions are now a dominant land use feature on the Easton floodplain and have dramatically increased the degree of lateral confinement. Roads, flood revetments, and bank armoring have replaced rudimentary structures from the previous period along significant portions of the mainstem Yakima River and its side channels. The subdivisions of Pine Glen, Ensign Ranch Camp, Elk Meadows, Pine Valley, and Sun Country Estates merge to form a nearly continuous corridor of confinement. The Kittitas County Planning Department approved these developments despite the fact that portions occur within the projected Federal Emergency Management Act (FEMA) 100-year floodplain. Johnson (1994) provides an extensive and detailed treatment of the relationship between these developments and the ecological systems found there. Today, just 39% (1,054 hectares) of the Easton Holocene floodplain remains surficially connected to the Yakima River.

Results from the GIS analysis of the hydrologically active portion of the Easton Holocene floodplain show a reduction from 749 hectares in 1945 to 468 hectares today. Currently, 38% of the active floodplain habitat present in 1945 has been lost (plate XII).

Recorded discharge for the Yakima River at the Easton gauging station (EASW) during the time the 1945 aerial photography was made measured 120 cfs. Discharge records at the same station during the time the 1994 aerial photography was made measured 146 cfs. Therefore, a comparison of all channel types within this reach can be made between the last two periods (appendix I). The eupotamon increased in length by approximately 8% from 1945 to 1994. This is most likely the result of parapotamon and plesiopotamon channel types avulsing to become part of the eupotamon during large flood events. Conversely, eupotamon side channels decreased by 54%. The same processes that led to an increase in the length of the eupotamon most likely caused the decrease of eupotamon side channel lengths. Flow regulation, coupled with flood revetments and bank armoring, limit the effects of cut and fill alluviation, and therefore, are the likely causes for the 33% reduction in length of parapotamon channel types. The result of channel stabilization near the Pine Glen development, reduced the length of springbrooks by 23%. Flow regulation and channel stabilization also played a significant role in reducing plesiopotamon channel lengths; they have been reduced by 96%. Plesiopotamon channels collect large amounts of organic material and terrestrialize quickly when the frequency of overbank scouring is lowered. Paleopotamon channels, which did not exist in the second period, now occupy formerly active channels that were disconnected by an anthropogenic feature, and are now slowly terrestrializing. The emergence of outflow channels from gravel pit ponds during the present period coincides with floodplain mining activities during the construction of I-90. Tributary stream length increased by 9% as the meandering main channel shifted and reset the location of tributary confluences with the mainstem Yakima River.

References

Frizell, Jr., V. A., R. W. Tabor, D. B. Booth, K. M. Ort, and R. B. Waitt Jr. 1984. Preliminary Geologic Map of the Snoqualmie Pass 1:100,000 Quadrangle, Washington. USGS Open-File Map OF-84-693.

Johnson, W. J. 1994. The Yakima River Corridor: Habitat Potential and Land Use. Masters Thesis, Central Washington University.

Plummer, F. G. 1900. Mount Rainier Forest Reserve, Washington. Twenty-first Annual Report of the United States Geological Survey, Part V, Forest Reserves.

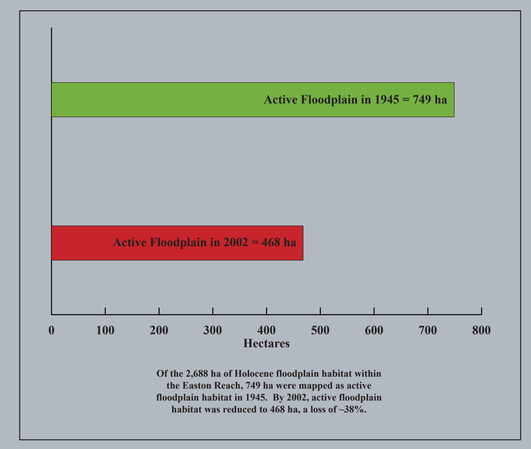
Porter, S. C. 1976. Pleistocene Glaciation in the Southern Part of the North Cascade Range. *Geologic Society of America Bulletin,* 87: 61-75.

Splawn, A. J. 1917. *Ka-mi-akin: The Last Hero of the Yakimas.* Caldwell: Caxton Printers, Ltd.

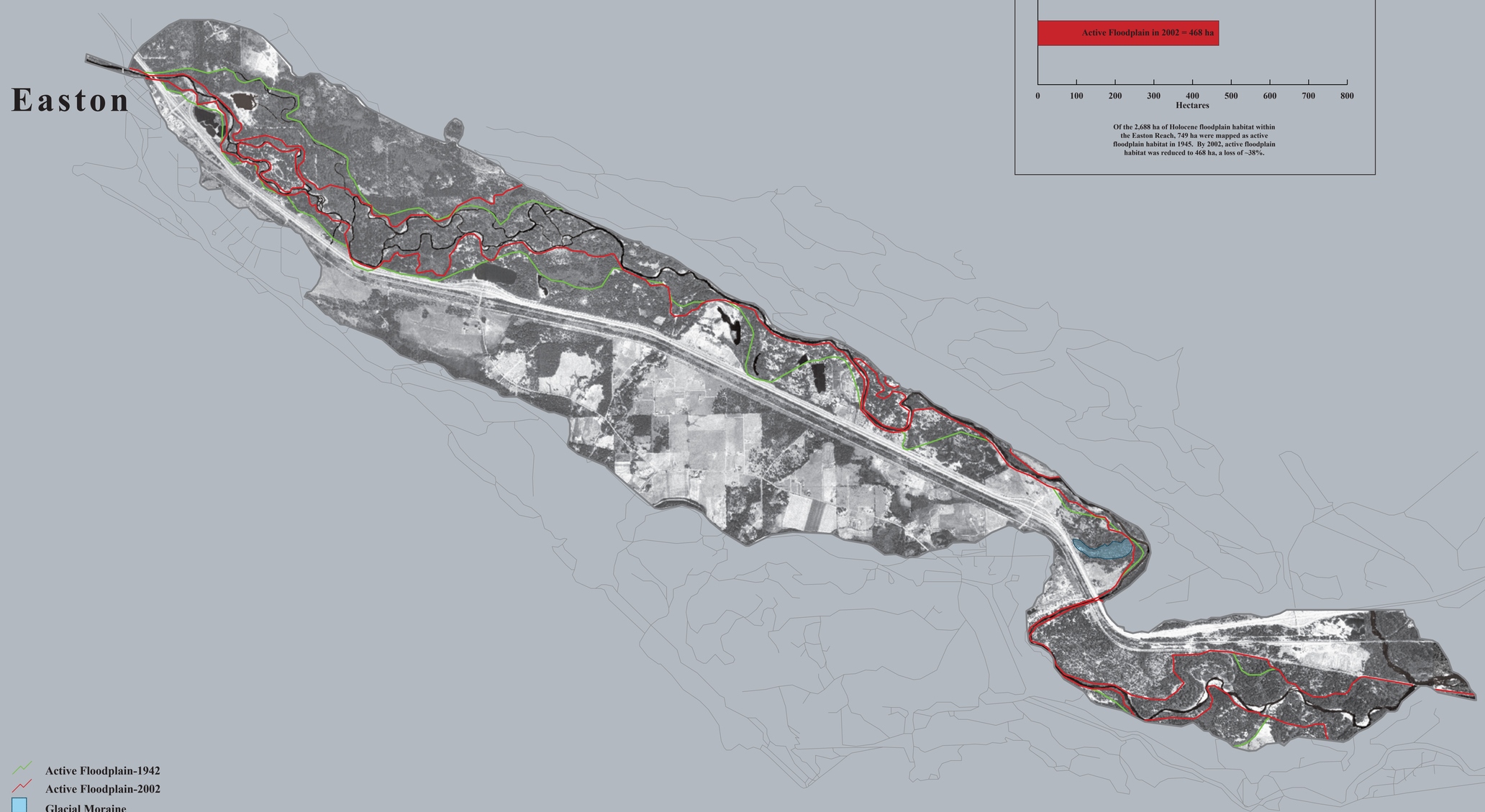
Stevens, I. I. 1855. *Narrative and Final Report of Exploration for a Route for a Pacific Railroad, near The Forty-Seventh and Forty-Ninth Parallels of North Latitude, from St. Paul to Puget Sound.* Thomas H. Ford, Printer, Washington.

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

Loss Of Active Floodplain
Within The Easton Reach From 1945 To 2002



Of the 2,688 ha of Holocene floodplain habitat within the Easton Reach, 749 ha were mapped as active floodplain habitat in 1945. By 2002, active floodplain habitat was reduced to 468 ha, a loss of ~38%.



Position of the Easton Reach within the Yakima Basin.

Conversion Constants

Multiply Hectares by 2.47 to obtain Acres

Multiply Kilometers by 0.621 to obtain Miles

N
W E
S

0 .4 .8 1.2 1.6 km

0 1 mi

Cartography By
Douglas J. Eitemiller

produced by
YAKIMA REACHES PROJECT
reaches
CWU

©2002 Not to be reproduced without permission

Plate XII. Loss of active floodplain within the Easton reach from 1945 to 2002.