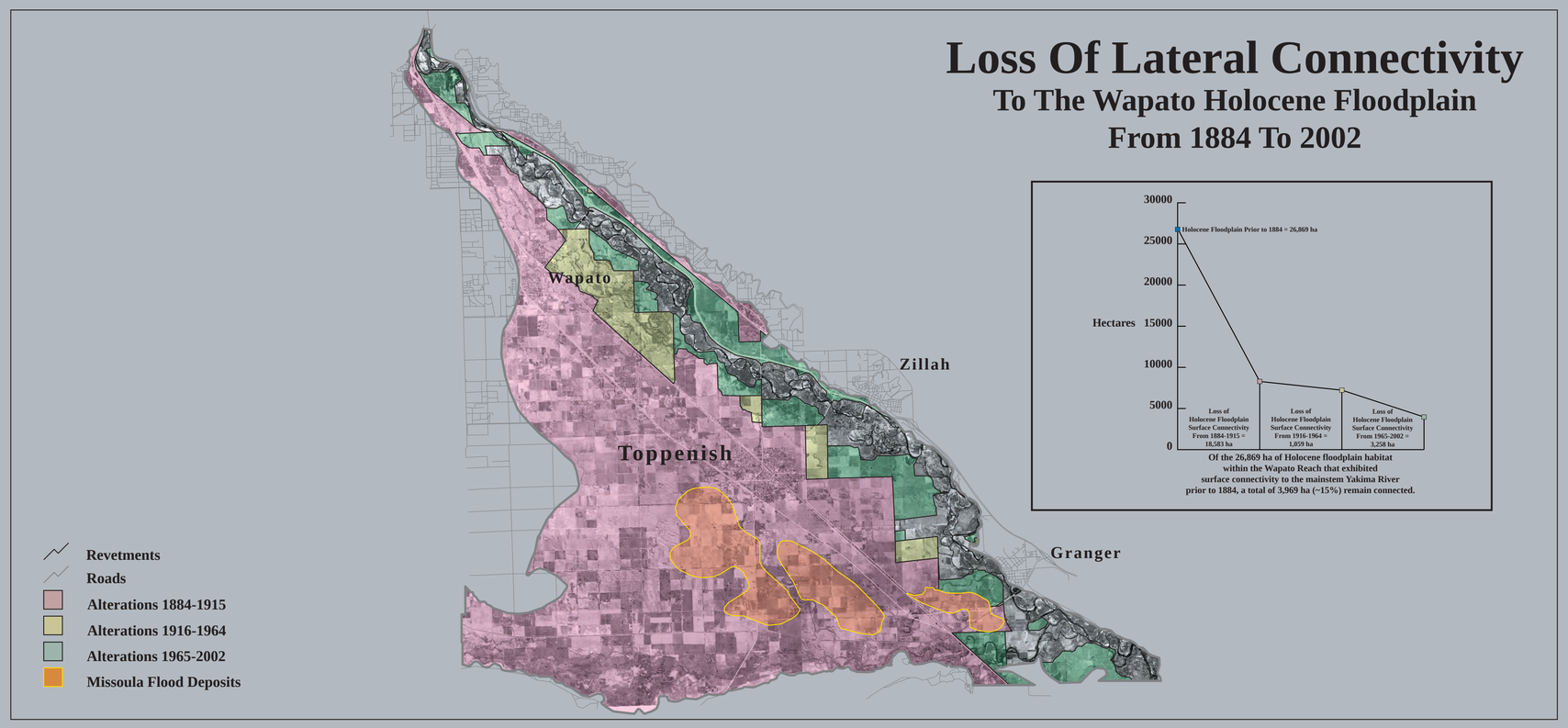

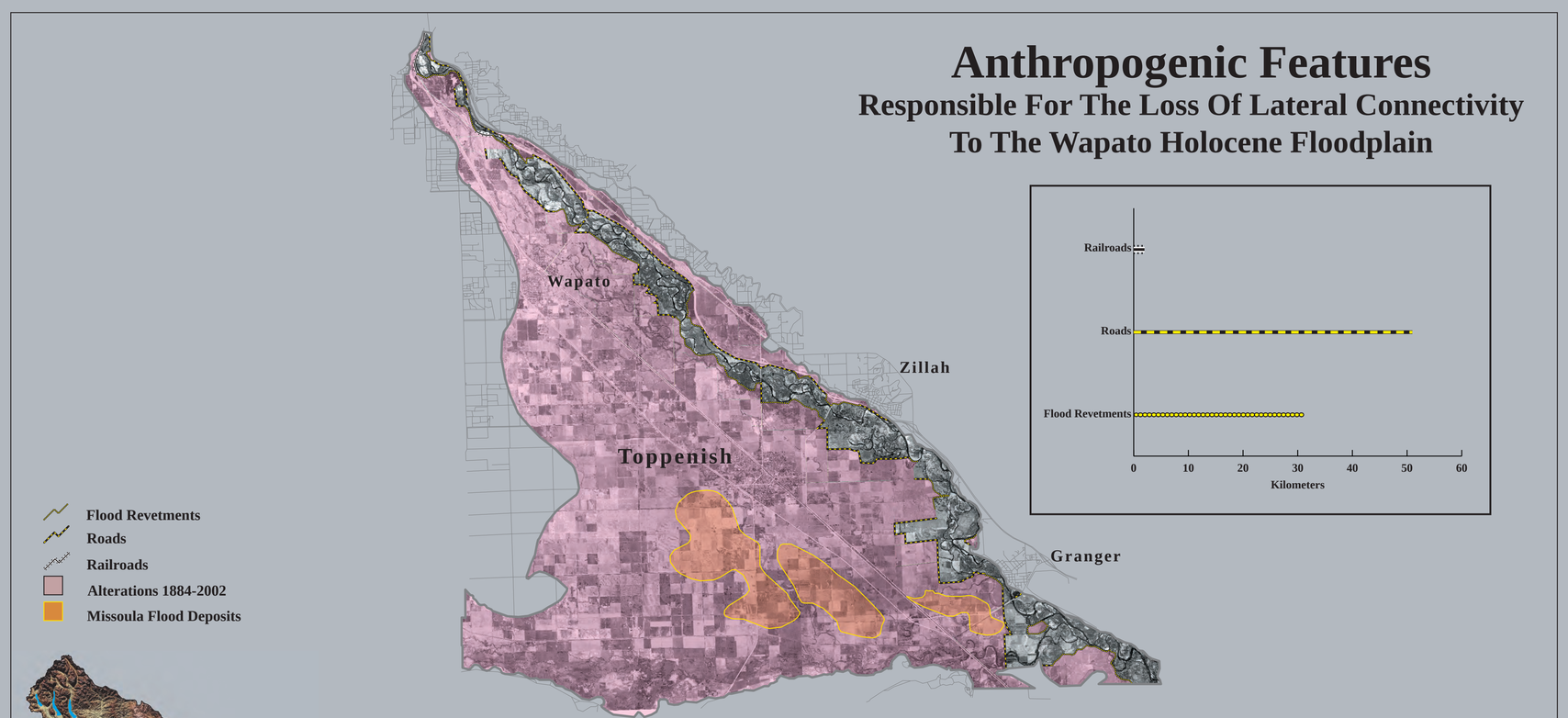

Position of the Wapato Reach within the Yakima Basin.

Conversion Constants

Multiply Hectares by 2.47 to obtain Acres

Multiply Kilometers by 0.621 to obtain Miles

N W E S

0 .8 1.6 km

0 1 mi

Cartography By
Douglas J. Eitemiller

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The Wapato 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 Wapato Holocene floodplain lies almost entirely within the political boundary of the Yakama Indian Reservation, and includes the lower end of Toppenish Creek and its flood prone areas. It encompasses 26,869 hectares and begins at the narrow water gap between the Ahtanum Ridge and Rattlesnake Hills anticline. From here the Yakima Valley basin syncline extends 25 km south, terminating in the rising anticline of Toppenish Ridge.

This floodplain, the largest in the Yakima River basin, has a distinct geomorphic history relative to all up-river floodplains. Catastrophic floods originating from the repeated failure of an ice dam in the Idaho Panhandle flowed across much of eastern and south-central Washington 18,000 to 20,000 years ago. Known in the scientific and popular literature as the Missoula Floods (Bretz 1923), the backwash from these expansive events moved upstream along the course of the Yakima River from near Wallula Gap on the Columbia River. Over several thousand years the Wapato floodplain was blanketed with silt-laden deposits from repeated episodes of such proportions (Waitt 1980). The stratigraphic record of Missoula Flood deposits is recorded in the bluffs along the eastern margins of the Wapato Holocene floodplain near Zillah and on its western margins near Harrah. Wind deposited loess and dune fields further reflect this active geomorphic history. Since the last of these floods, the Yakima River and Toppenish Creek have reworked the flood deposits, excavating a nearly leveled floodplain. The structure of the Wapato floodplain before the Missoula Floods remains vague, as do the processes of repeated deposition and removal of flood silts by the Yakima River and recessional Missoula floodwaters. Within this geologic context, the Yakima River has created an immense floodplain unique to most other floodplains within the interior Columbia River basin. A gently sloping, complex and diverse matrix of interlaced fluvial channels and fine textured soils provided early floodplain farmers with ideal conditions for developing a vibrant agricultural economy.

In 1884, the construction of the NPRR through the Yakama Indian Reservation created the first major lateral disconnection across the Wapato floodplain. Consequently, the railroad nodes of Parker, Wapato, Toppenish, and Alfalfa gained some protection from large flood events. The settlement of the floodplain was focused along this transportation corridor. In the early 1900s, water diverted from the top of the floodplain was being delivered to areas beyond its margins (USDA 1901). The Sunnyside irrigation system was unprecedented in scale throughout the western United States at that time (Tuck 1995). Diversion structures were not easy to maintain in the face of the Yakima River's unknown flood potential, and consequently were rebuilt and repositioned numerous times (i.e. Wapato and Sunnyside diversions). Existing side stream channels played an important role in determining the location of diversion points, conveyance routes, and drains across the floodplain. Wanity Slough is an excellent example of such a channel. Running almost the entire length of the Wapato floodplain, it still conveys water for irrigated agriculture. During the first period of analysis, irrigated agriculture and the domestic livestock industry altered the ecological legacy of this broad floodplain. The cutting of cottonwood and alder for firewood was an early and persistent pattern during this period. The railroad network, including spur lines west and east of the river, combined with early roads and flood revetments, restricted cut and fill alluvial processes to 8,286 hectares of the Holocene floodplain by 1915.

From 1916 through 1964, small portions of the floodplain were disconnected by road and revetment construction. These structures spread internally from the NPRR bed toward the river and expedited settlement within these areas. The construction of irrigation ditches and drains crosscut side channel networks, reorganizing how water flowed through and across the floodplain. The lower reaches of the Wapato floodplain exemplify the cumulative effects of irrigation structures on the ecological legacy of the Yakima River basin. Here, an extensive network of drains carries irrigation return flows of greater volume than the flow of the Yakima during the summer irrigation season. Bowers (1990) provides an excellent analysis of the Wapato Holocene floodplain's hydrogeography. By 1964, the total area of the floodplain surficially connected to the Yakima River was 7,227 hectares.

The development of effective flood revetments, an expanding county road system, and the construction of I-82 east of the Yakima River were the dominant features contributing to the loss of lateral connectivity during the last period of analysis. West of the river, agricultural land use internal to the area disconnected by the NPRR and the reduction of peak flow events by the upstream storage reservoirs contributed to much of this loss. Interstate 82 and consequent bank armoring, floodplain gravel mining, and levees further disconnected portions of the floodplain east of the river. Although the top of the floodplain is restricted and controlled, the middle and lower portions are wider on average than all other floodplains within the Yakima Basin. This results from the cumulative power of pre-regulation flood pulses, but it also relates to differences in the rate of land capitalization and development on the Yakama Indian Reservation versus non-reservation lands. It is ironic, given the spatial extent and cumulative alterations occurring here, that so much potential remains. Today only 15% (3,969 hectares) of the Wapato Holocene floodplain remains surficially connected to cut and fill alluvial processes.

Results from the GIS analysis of the hydrologically active portion of the Wapato Holocene floodplain show a reduction from 2,951 hectares in 1942 to 2,733 hectares within the present period. At this time, 7% of the active floodplain habitat present in 1942 has been lost (plate XXIV).

Given the disparity in discharge of the mainstem Yakima River at the Parker (PARW) gauging station between 1947 and 1992 aerial photography, a comparison of changes that have occurred to all channel types and lengths across the Holocene floodplain cannot be made (appendix I). However, the length of the mainstem Yakima River decreased by less than 1% during this time. Because it is located near the bottom end of the basin, the Wapato floodplain has been subject to the effects of flow abstraction and low flows longer than any other floodplain reach. Accordingly, the lack of a springtime flood pulse has likely stabilized channel formation processes via terrestrialization. By 1947, the river may already have achieved equilibrium with the highly modified flow regime. Despite the disparity between pre-regulation flows and the inability to compare specific lengths of channel types, habitat simplification has occurred across disconnected portions of the Wapato Holocene floodplain, and is demonstrated in 1947 aerial photography.

References

Bowers, J. A. 1990. The Hydrogeography of the Yakima Indian Nation Resource Use. Ph.D. Dissertation, University of Washington.

Bretz, J. H. 1923. The Channeled Scablands of the Columbia Plateau. *Journal of Geology,* 31: 617-649.

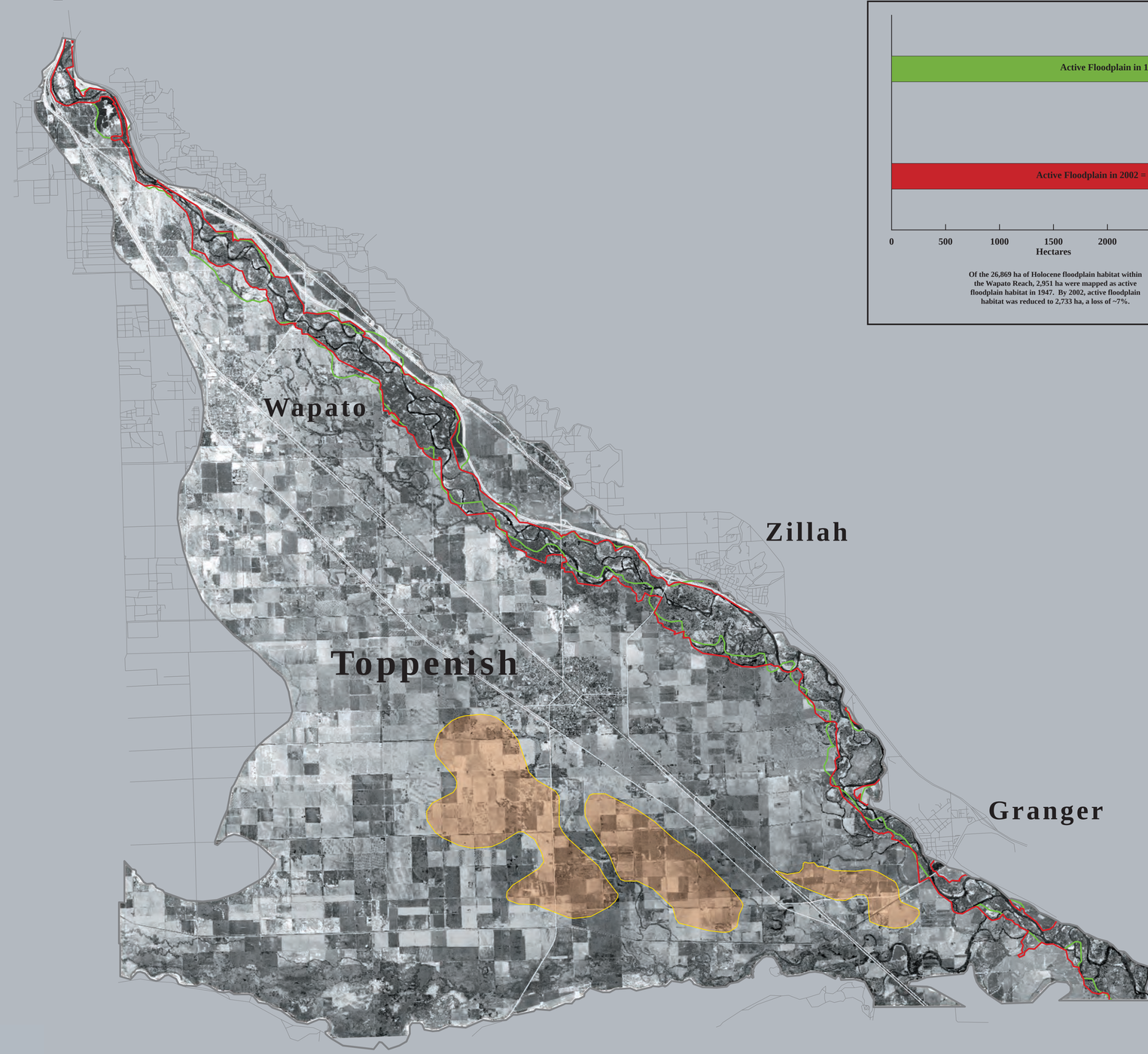
Tuck, R. L. 1995. Impacts of irrigation development on anadromous fish in the Yakima River Basin, Washington. Masters Thesis, Central Washington University.

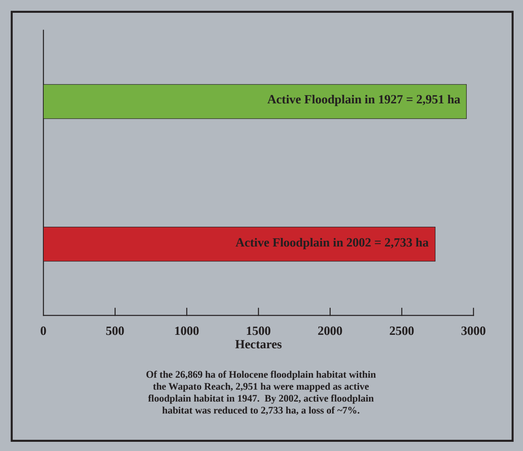
United States Department of Agriculture. 1901. Map #17, Soils Map, Sunnyside Sheet, Washington. Field Operations of the Bureau of Soils.

Waitt, R. B. Jr. 1980. About forty last-glacial lake Missoula jokulhlaups through southern Washington. *Journal of Geology,* 88: 653-679.

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

Loss Of Active Floodplain
Within The Wapato Reach From 1947 To 2002





Of the 26,869 ha of Holocene floodplain habitat within the Wapato Reach, 2,951 ha were mapped as active floodplain habitat in 1947. By 2002, active floodplain habitat was reduced to 2,733 ha, a loss of ~7%.

Position of the Wapato 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

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Plate XXIV. Loss of active floodplain within the Wapato reach from 1947 to 2002.