

# The Wenatchee River Delta

## A Brief History of the Land



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May 2020



North Central Washington  
**AUDUBON SOCIETY**

*“The most beautiful gift of nature is that it gives  
one pleasure to look around and try to comprehend  
what we see.”*

Albert Einstein

Cover Photo: Wenatchee, 1946  
Courtesy of William Layman

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*Welcome to the Wenatchee River delta and the  
Horan Natural Area. November 2017*



# Introduction

This paper compiles information about the confluence of the Wenatchee and Columbia Rivers in North Central Washington. Known to the N’P’squosa (Wenatchi) people as the “place of scattered rocks”, the Wenatchee River delta is a portion of their ancestral land. This paper tells the story of epic floods, massive valley-filling lakes, and the modern effects of man. The paper begins with the Missoula Ice Age floods. Effects on the Wenatchee River delta due to the sequential inundation of the area upstream from Rock Island Dam are described. Management recommendations for the area conclude the report.

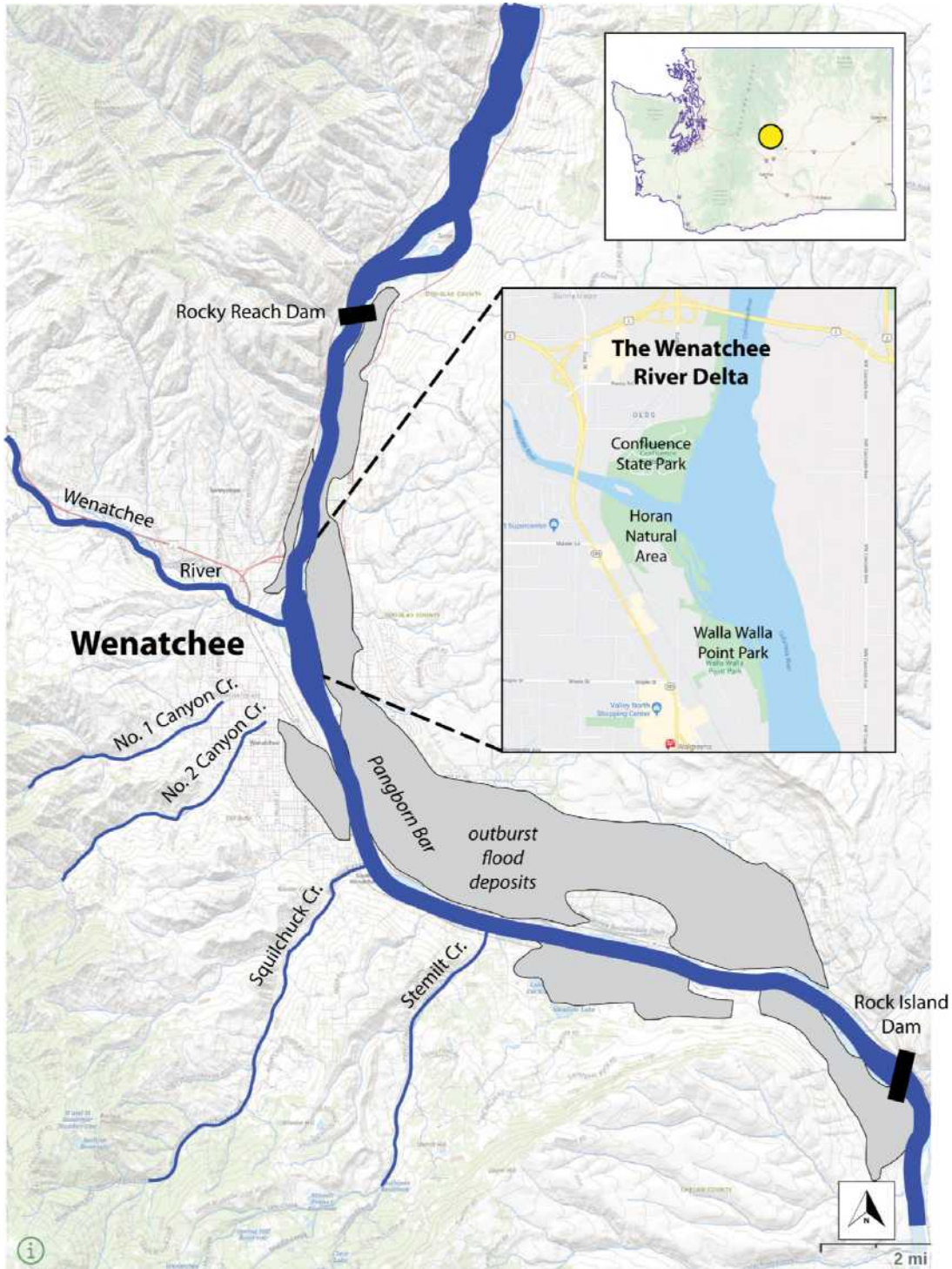


Figure 1. Location map of the area

## The Wenatchee River Delta

In this paper, commonly used references to informal feature names within the delta are shown in Figure 2. Administratively, Confluence State Park contains both the developed RV campsite on the north side of the Wenatchee River and the Horan Natural Area (HNA) on the south side. The HNA includes the area labeled “Horan Natural Area” and both the North Channel Islands and the East Channel Islands. The areas labeled Horan Natural Area and Confluence State Park are owned by the Public Utility District No.1 of Chelan County (Chelan PUD or PUD). The Channel Islands are owned by the Washington State Department of Natural Resources. Approximately six acres are in private ownership by three owners. The land around the KPQ radio towers is owned by the PUD, is part of Confluence State Park and is managed by agreement with KPQ. Both the Confluence State Park and the Horan Natural Area are managed by Washington State Parks using an agreement with the PUD.

For the purposes of this paper, the area at the confluence of the Wenatchee and Columbia Rivers will be referred to as the Wenatchee River delta or, simply, the delta. This is a distinction in terminology to differentiate the terms “alluvial fan” and “delta”. Alluvial fans form when flowing water deposits sediment on a land surface. Fans form at the base of steep canyons as the streams flow onto floodplain areas. Deltas, on the other hand, gradually form when a river deposits sediment into a still or slow-moving body of water. Classic deltas such as the Mississippi River delta, in the Gulf of Mexico, and the Colorado River delta in the Gulf of California formed over thousands of years. The same processes played out at the mouth of the Wenatchee River.

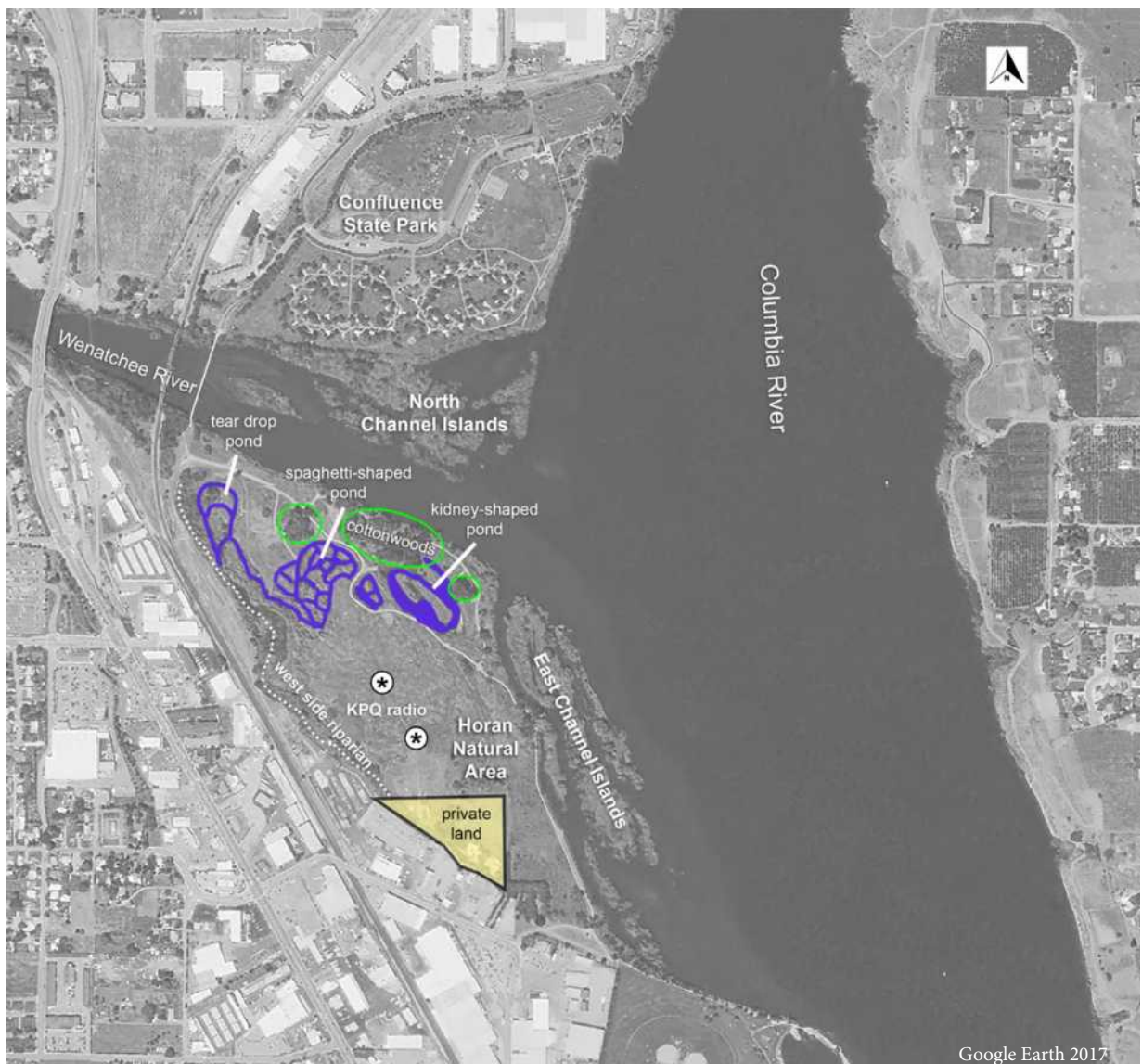
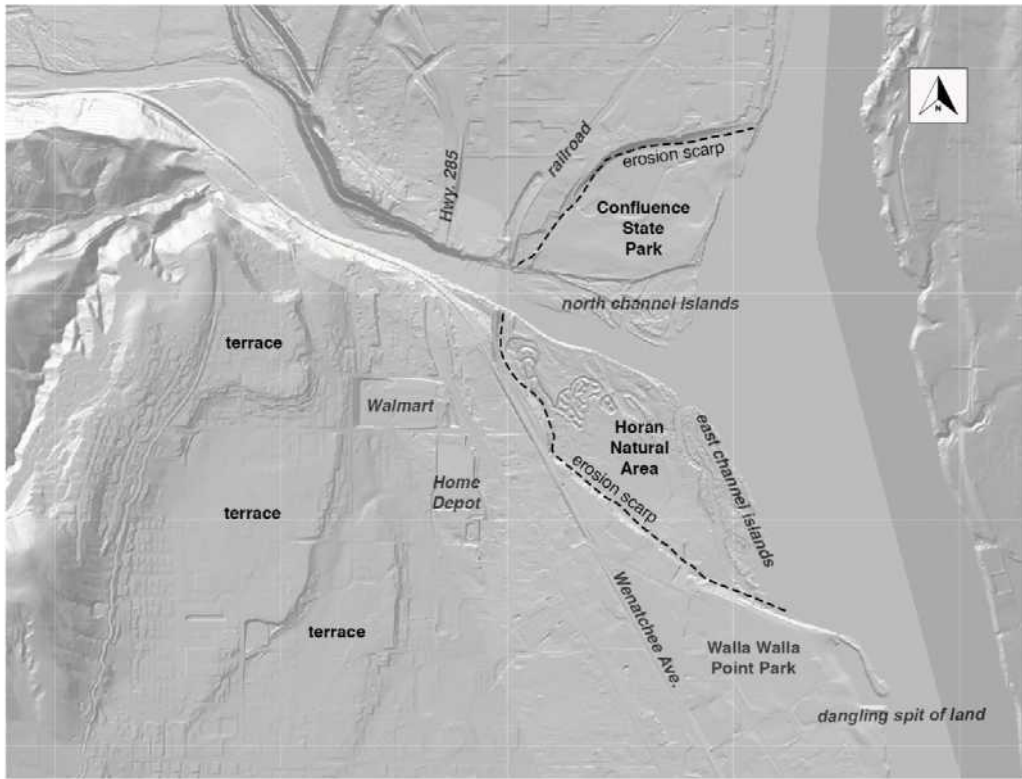


Figure 2. Commonly referred to features within the Wenatchee River delta



# The Geomorphic Setting

The Wenatchee River flows into the Columbia River near the geographic center of Washington state. This confluence of great rivers has taken shape over tens of thousands of years as the result of several geomorphic processes. If we are to attempt to manage the area to its ecological potential while providing for human use, it is important to understand the physical, land-forming processes that have created the area as it exists today.



The two images in Figure 3 offer a comparison of the land surface (lidar image, top) and a 2017 satellite photo. The right side of the lidar image looks darker due to data availability through the Washington DNR.

Lidar imagery uses laser reflectance to show land elevations as a digital image. Cutting through existing vegetation, the lidar image clearly shows the Wenatchee River separating the Confluence State RV Park from the Horan Natural Area. River terraces, formed as the Columbia River cut through Ice Age flood deposits, are evident on the west side of the image. A crescent-shaped erosion scarp (dashed line) was formed as the Wenatchee River lowered its valley level as the Ice Age lakes retreated. This erosion scarp is easily seen from the paved portion of the Apple Capital Loop trail. Both the RV park and the Horan Natural Area lie at elevations 10 to 30 feet lower than the City of Wenatchee.



Both the north and east channel islands are evident in both images. The dangling point of land in the lower right corner was formed when the swimming lagoon at Walla Walla Point Park was excavated between 1964-1967.

The ponds in the Horan Natural area were created in 1990.

3. Lidar and satellite images - Confluence of Wenatchee River and the Columbia River



## Ice Age Floods

Several of the famous Missoula Ice Age floods affected the Wenatchee valley either by scouring flows or back-water depositional floods. The known history of these floods has been recently summarized by Waitt who points to the possibility of more than one down-river, scouring flood in the main Columbia River channel (Waitt, 2016). Scheurman (2005) describes the first, scouring flood that came into the Wenatchee valley about 19,000 years ago –

*“Crashing toward the Wenatchee Valley at speeds perhaps fifty miles an hour, the thousand foot high torrent exploded over Turtle Rock and hurled great chunks of its muscovite gneiss along with other earthen accumulations across the Wenatchee Plain. The churning wall slammed halfway up the sediments of Wenatchee Heights and inundated the Wenatchee Valley with unconsolidated stony heaps for several miles while additional accumulations of mixed sediment settled (sic) pulsed and settled across Pangborn Bar”.*

Subsequent to the scouring flood(s) that raged down the Columbia River channel, the Wenatchee valley repeatedly filled with a series of back-flood lakes created when flood waters surging down Moses Coulee were restricted near the mouth of the coulee. These floods backed water up into the Wenatchee valley and then up the Wenatchee River valley to an elevation of about 1600 feet MSL (Figure 4) (Waitt, Long and Stanton, 2019). Recent literature presenting simulations of outburst floods from Lake Missoula suggests that the duration of inundation may have been a matter of weeks (Denlinger & O’Connell, 2010). Previous literature shows a much longer period of inundation (Gresens, 1983).

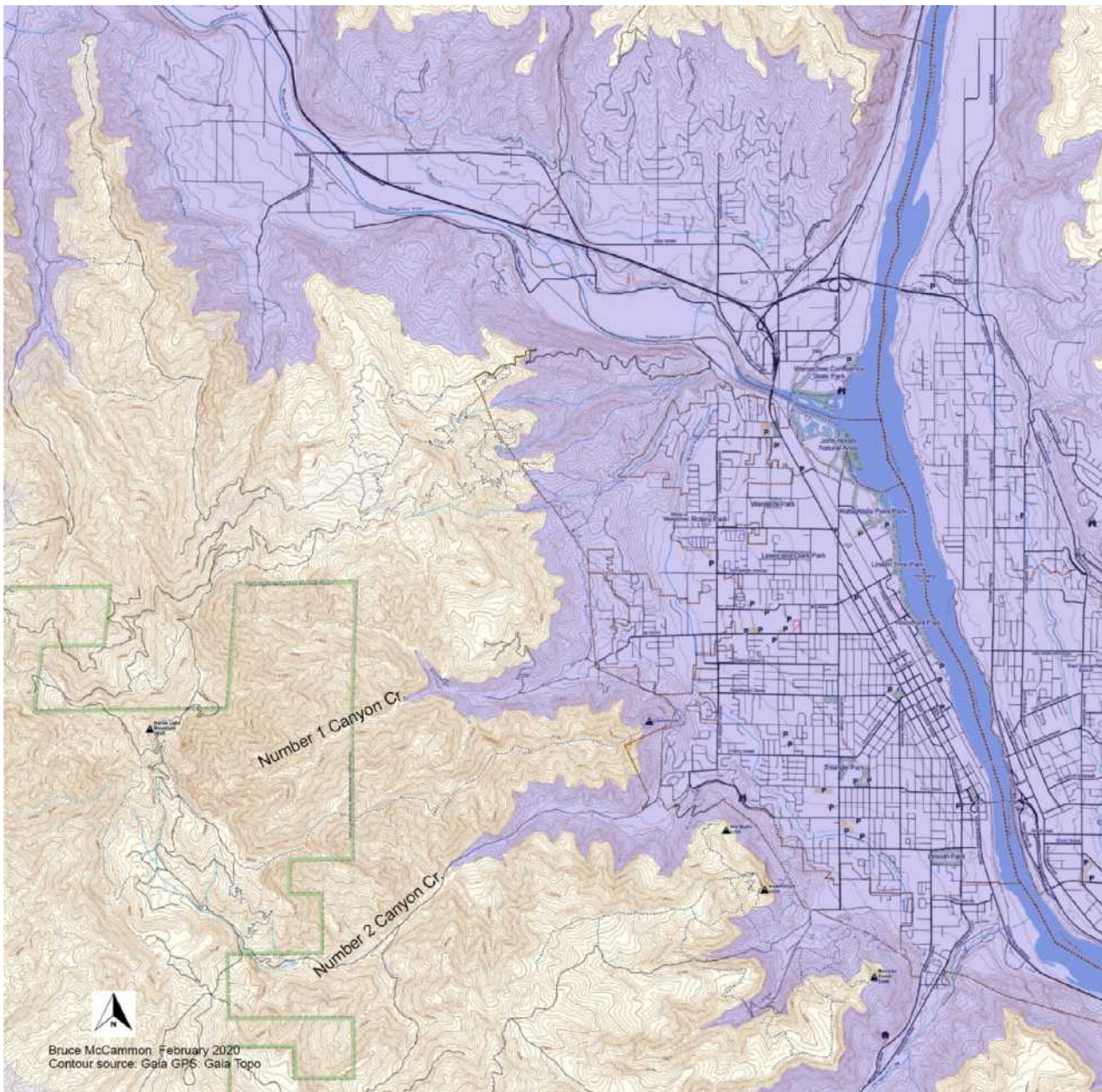


Figure 4 .Area below 1600 feet MSL showing the maximum area flooded during the Ice Age floods



The Wenatchee River, flowing from the high Cascades to the west, delivered sediment into the lakes, building deltas at the lake edge, just as major rivers do when they empty into the ocean. Over time, the great flood lakes receded and the Wenatchee River and the Columbia River responded by down-cutting through the thick sediment deposits. The valley floor along the Wenatchee River was lowered as the Columbia and Wenatchee Rivers excavated the lake deposits. The Wenatchee River continued to deliver sediment downstream to the mouth as it eroded through previously deposited sediments. The C- or crescent-shaped feature surrounding the Wenatchee-Columbia confluence today was the result of valley down-cutting and sediment removal from the area followed by fluvial deposition of cobbles and gravels. The river terraces seen in Figures 3 and 5 are products of sediment excavation as the lakes receded and a natural flow regime was re-established in the Columbia River.

Figure 5 is a map of surficial geology showing residual outburst flood deposits, terraced deposits and extensive alluvium and alluvial fan deposits within the area of the confluence of the Wenatchee and Columbia Rivers.

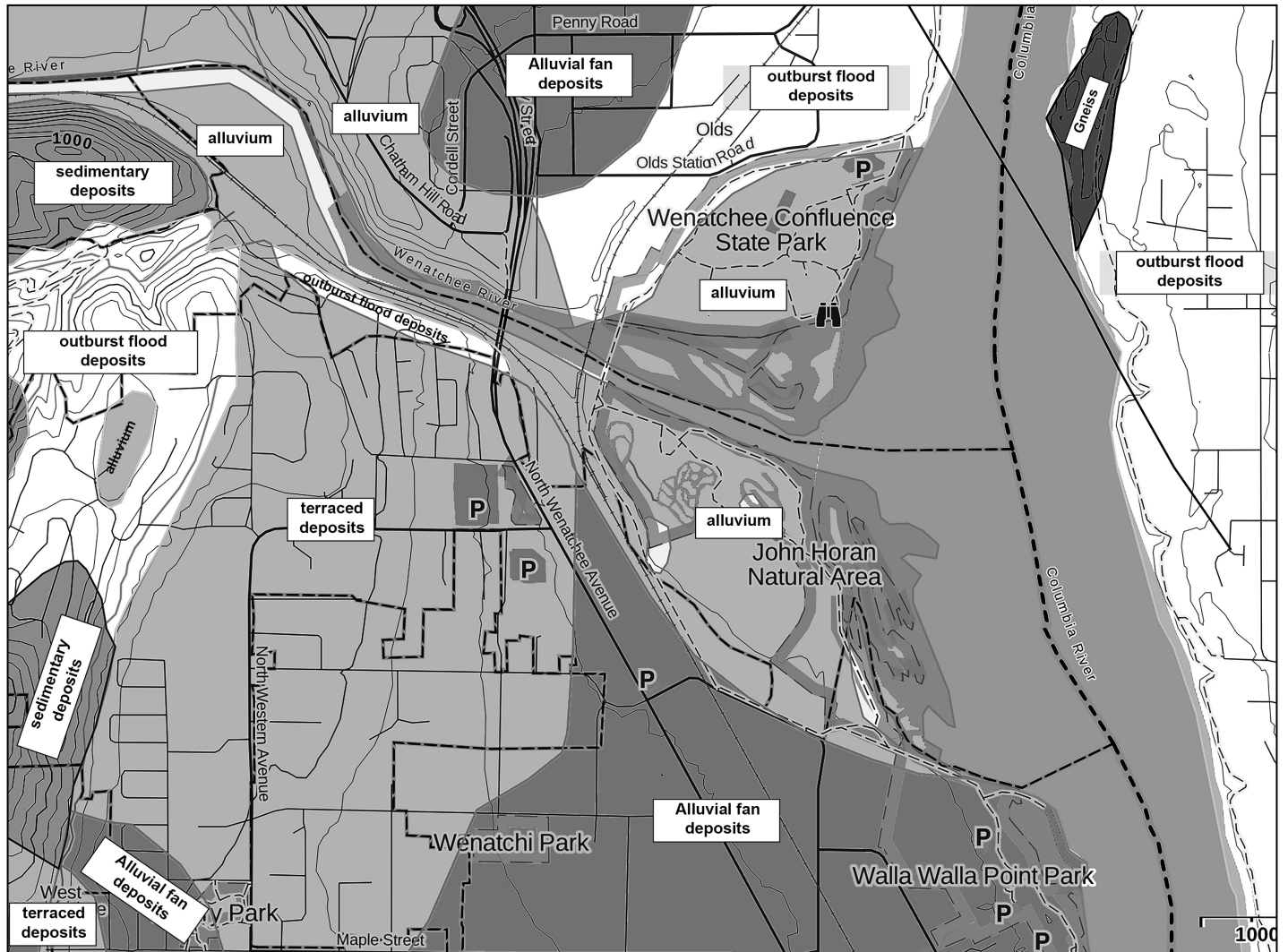


Figure 5. Geologic Units - lithology  
 graphics: <https://macrostrat.org>

Surface geology in the Wenatchee valley near the Wenatchee River is largely a mix of alluvial or lacustrine deposits. About 19,000 years ago, the Wenatchee valley filled with outburst flood deposits during the Missoula Ice Age flood period. The wide extent of alluvium, alluvial fan deposits and terraced deposits clarifies the thousands of years of work done by the Wenatchee and Columbia Rivers. The terraced landscape results from the river's excavation of these lake and flood deposits and deposition of alluvial materials over time. The inside of river bends and higher elevations near the rivers are still occupied by deposits from the Ice Age floods. Alluvium carried by both rivers fills the Confluence State Park and Horan Natural Area. The alluvial fan deposits on the south side of the Wenatchee River originated in Number One Canyon, Number Two Canyon and Squilchuck Creek (see Figure 1). Waitt, et al. (2019) describe and map erratics that were rafted into place on ice during the Ice Age floods.



## High Water and Flooding in the Delta

The river reach from the mouth of the Wenatchee River to the highway 285 bridge is characterized as “...the result of frequent flooding with dynamic distributary channels depositing LWD (large woody debris) and sediment, and likely considerable habitat modification due to beaver activity” (TetraTech, 2017). As is characteristic of deltas, channels flowing through the area migrate back and forth across the delta’s width, scouring and depositing material over time. Migration of the Wenatchee River across the delta resulted in excavation of material in the C-shaped area seen in Figure 1. Remnant channels continue to interact with groundwater as it fluctuates with the water levels in the Wenatchee and Columbia Rivers.

The Wenatchee River delta is subject to localized flooding. Before dams regulated flows in the Columbia River, both the Wenatchee and Columbia Rivers experienced frequent flooding. Even with dam regulation, very high flows in the Columbia River create localized flooding in the HNA. In May, 2018 snowmelt in Canada caused high flows in the Columbia River and flooding of much of the Wenatchee River delta (Figure 6). Water flowed from the Columbia River into the Horan Natural Area through a culvert placed in 1990. As the Columbia River continued to rise, water entered by over-topping the banks of the Columbia River. The Wenatchee River remained within its banks and was not a direct source of flood waters in this event. Flood waters reached depths of several feet around the radio towers in the center of the HNA (Figure 7). Much of the flood water had retreated by June 2, 2018.



Figure 6. Flooding of Horan Natural Area May 18, 2018. (Courtesy of Lisa Robinson)



Figure 7. May 15, 2018 Flooding near radio tower in the Horan Natural Area



*Figure 8. The north end of the kidney-shaped pond when full, ca. 2008. The view is to the E-SE. (courtesy of Mark Oswood)*

## **Ponds in the Horan Natural Area**

The Chelan PUD constructed the pond system in the Horan Natural Area in 1990 to mitigate for habitat loss due to inundation created by the operating pool behind Rock Island Dam. The ponds were meant to provide habitat for Wood Ducks. Due to a lack of Wood Duck nesting habitat, the PUD also installed several nesting boxes. The PUD monitors nesting and population success each year.

The pond network is a valuable addition to the recreational and aesthetic experiences people enjoy when in the HNA. Prior to 2012, water in the ponds originated from several sources: intermittent flows in Number One Canyon Creek, excess flow from Pioneer and Highline ditches, and runoff from the City of Wenatchee's Miller Street storm drain system. Groundwater in the area fluctuates in response to water levels in the Wenatchee River and Columbia River.

By 2012 the water from the City storm drains and Pioneer ditch had stopped flowing into the HNA. Water from Number One Canyon Creek is intermittent, flowing into the HNA only during snowmelt periods. The channel is plugged with sediment on private land in the southwest part of the HNA. The blockage results in water sheet flooding the area rather than flowing as concentrated flow. The shallow sheet flow rapidly infiltrates and during peak snowmelt causes localized flooding of the trail system.

The value of reliable surface water flowing into the ponds is captured quite nicely in Figures 8 and 9. Aesthetically and ecologically, water makes all the difference. When the last substantial surface water into the HNA was terminated in 2012, the ponds became reliant on groundwater which, in turn, is a function of the level of water flowing in the Wenatchee and Columbia Rivers.



With the loss of reliable surface water, pond water became stagnant, creating a breeding ground for mosquitos. Algae and aquatic plants choke the ponds during the late summer months. The kidney-shaped pond (Figure 2) has been overtaken by grasses and cattail and rarely exhibits any standing water. Red-winged Blackbird nesting has declined due to habitat loss. The tear-shaped pond in the northwest part of the HNA (Figure 2) is dry at the north end and contains shallow, stagnant water in the south portions.

Designing and building an effective pond system in the HNA in the future will necessarily rely on reliable surface water flow through a series of ponds and channels. The key to the success of future ponds is flowing water, not intermittent surges at random time periods. Flowing water will minimize mosquito problems and provide a high level of ecological sustainability. It is estimated that 1.5-2 cubic feet per second would result in a system that is robust and vital. Both the Chelan PUD and the City of Wenatchee are currently exploring possible sources of water to introduce into the Horan Natural Area.



*Figure 9. Full pond in the Horan Natural Area, 2003. (Courtesy of Mark Oswood)*

## Indigenous Peoples and Early Pioneers

Indigenous Peoples lived in in this area for tens of thousands of years before European pioneers arrived. The Clovis people are viewed as the “first comers” and a cache of Clovis points found in East Wenatchee in 1987 shows their presence in North Central Washington about 13,000 years ago (Waitt, 2016). It is not certain that Indigenous Peoples were present during the Ice Age floods but the possibility is real.

Early mapping expeditions faced unknown dangers and challenges to create remarkable documentation of an area that was largely unknown. An exploration led by David Thompson entered the Wenatchee River delta area in 1811. His journals are not specific to the area around the Wenatchee River but he would probably have been confronted with a prominent landform or islands extending far into the Columbia River at the mouth of the Wenatchee River. Tyrrell (1916) notes that Thompson descended faster moving flows north of the Wenatchee River and camped near the Entiat River. He then moved through the Wenatchee River delta area as he paddled downriver to Rock Island before camping. Thompson’s exploration was heroic. In April 1813, Thompson sketched a “hasty, rough map” of the territory he had explored west of the Continental Divide (Nisbit, 2010). This is likely the first known map of the Wenatchee River as it flows into the Columbia. An excerpt from his 1814 map is shown as Figure 10. An arrow points to the Wenatchee River. Thompson’s map is remarkable in the detail it contains. Conspicuous bends in the mainstem of the Columbia River and major tributaries are all clearly shown.

Thirty years later, in 1841, Charles Wilkes produced a map of the Oregon Territory. Figure 11 shows an excerpt from his map. An arrow points to the Wenatchee River.

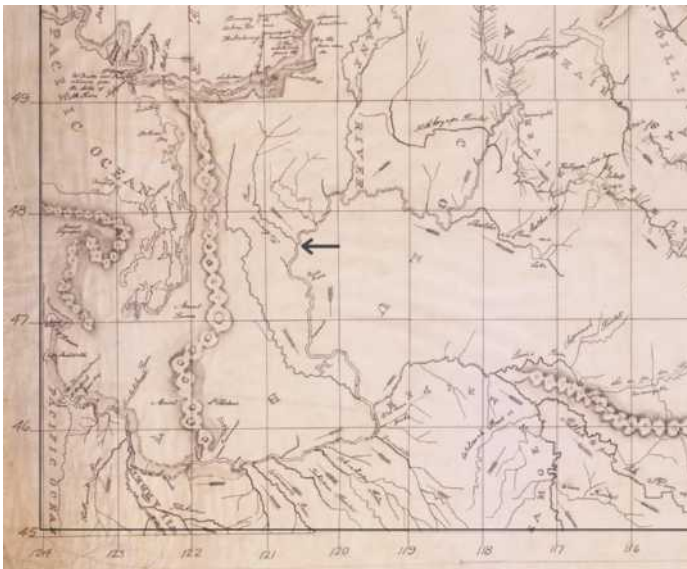


Figure 10. Excerpt from 1814 map created by David Thompson



Figure 11. Excerpt from 1841 map created by Charles Wilkes

Seventy years after Thompson’s exploration, Lieutenant Thomas W. Symons, chief engineer of the Department of the Columbia, U.S. Army, Corps of Engineers, conducted a mapping expedition of the Columbia River during the low-flow period between September and October, 1881. His report was published in 1882.

His journal notes, published in 1882, mention Sam Miller and describe the Wenatchee River confluence area:

*“There is one settler at the mouth of the Wenatchee, a man named Miller, who has a store and a ranch, with a very pleasing orchard. The Columbia here widens considerably, and the Wenatchee has deposited in it an enormous amount of debris, forming at the present stage a number of flat bar islands, and causing decided shallowing of the river, there being not more than three or four feet of water in what appeared to be the main channel.”*

Alfred Downing was the cartographic assistant to Symons. Thompson’s map shows the area in broad terms, but Downing’s drawing (Figure 12) is the first known map of the area to show mapped details of the delta. Downing’s map shows the “...number of flat island bars”. The map also shows the Miller trading post, established in 1872, on the south side of the Wenatchee River. The number “484” is the river-mile designation for the location relative to the mouth of the Columbia River.



Downing's 1881 map labels an area "Wenatchee Flats". It was here that a traditional horse race took place during one of many councils that Indigenous Peoples held in the area (Wood, 1886-1887):

*"The great Columbia tore through the mountain pass in a grand sweep, tossing and foaming. This bend in the river enclosed a level plain some mile or so broad, and just opposite the blue Wenatchee came from the mountain glens to join the Columbia. This plain was the council-ground."*

The "...level plain some mile or so broad..." on the east side of the Columbia River is a giant flood bar from the Ice Age flood period referred to as the Pangborn Bar (see Figures 1 and 15). This was a place of peace and holds special significance to native N'Psquosa (Wenatchi) people and other tribes. It is said that many thousands of Native Americans would arrive in the area to trade, discuss, solve problems and conduct sport. They would use both sides of the Columbia River, including the Wenatchee River delta which they referred to as "the otter paw" (Randy Lewis, personal communication).

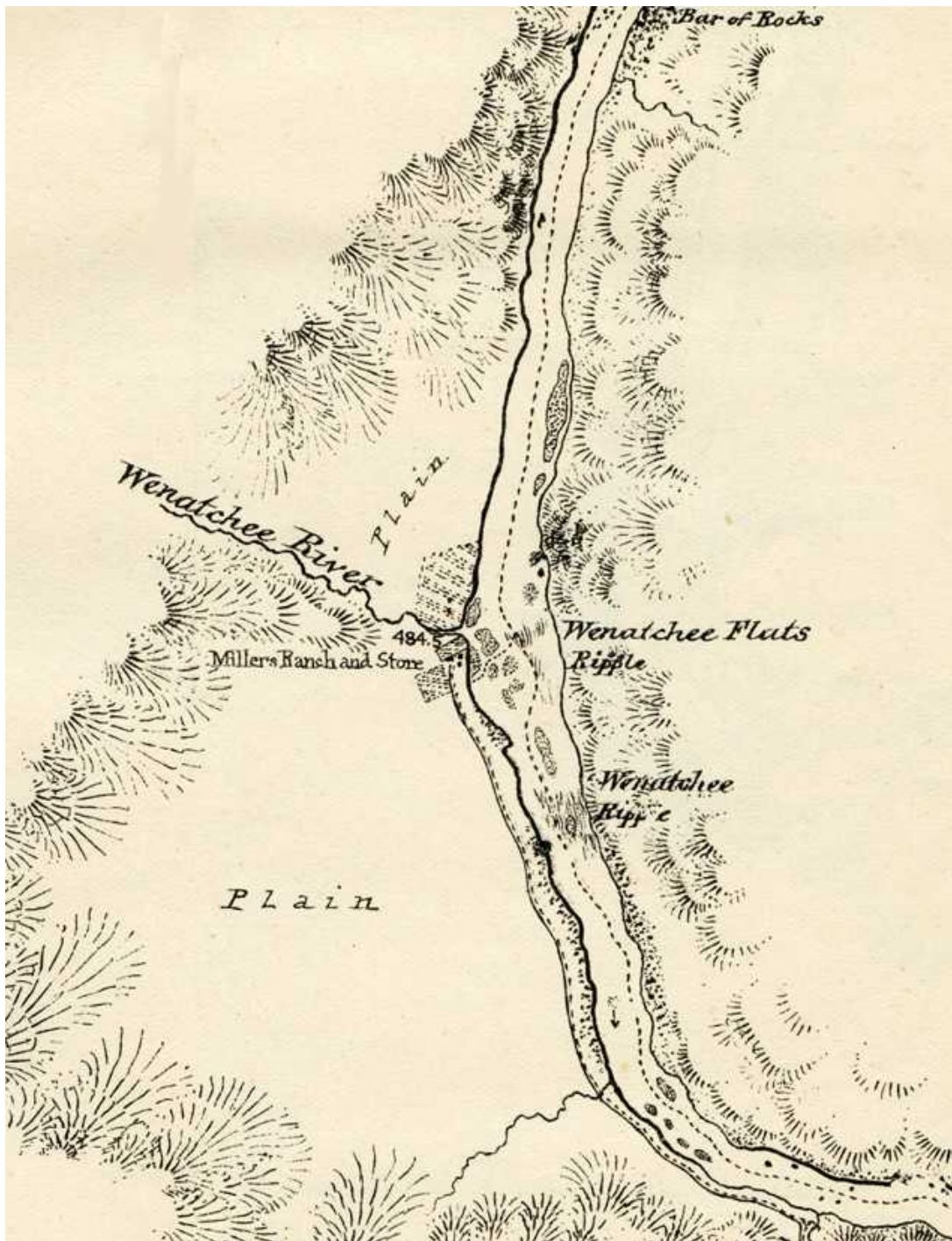


Figure 12. 1881 map from the Symons/Downing expedition



## Early mapping & photographic history of the Wenatchee River Delta

A portion of the survey map prepared by Charles Holcomb in 1884 is shown in Figure 13. The map shows the location of the Miller trading post on the south side of the Wenatchee River and along the east side of section 33. Examination of the map shows a ditch running from Number One Canyon Creek to the trading post.

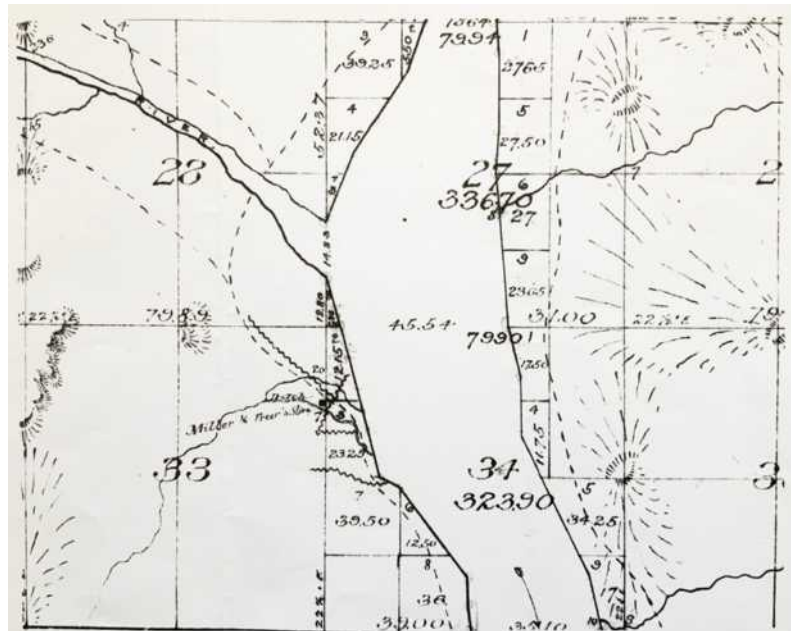


Figure 13. 1884 survey map of the Wenatchee River delta area. Courtesy of Ron Molzahn

Captain Symons organized a second survey of the Columbia River from the Canadian border to Rock Island in 1894. This survey was conducted by C.F.B. Haskell and Alfred Downing was, once again, the cartographer for the excursion. The 1894 expedition resulted in a set of maps that provide early information about the character of the land at the mouth of the Wenatchee River (Figure 14).

Several features in the 1894 map deserve discussion.

- The Wenatchee River is shown entering the Columbia River and veering slightly to the north.
- Two other nearby tributary streams are shown – one entering the Columbia from the east near the label “Wenatchee River Rapid” and another from the southwest. The stream on the east side of the Columbia is most likely the unnamed canyon that Eastmont Avenue spans by bridge today. The stream entering the Columbia River from the southwest is likely Number One Canyon Creek.
- Note the designation of “meadow” along both sides of the Wenatchee River. These areas form a similar C-shaped crescent seen in the lidar image in Figure 1.
- The two finger-like extensions of the Columbia River south of the Wenatchee River illustrate what may be remnant channels of the Wenatchee River, both of which extend up and to the west from the bank of the Columbia River.
- The illegible markings near the west bank of the Columbia River at the bottom of the diagram are depth sounding records documented by Haskell and Downing.

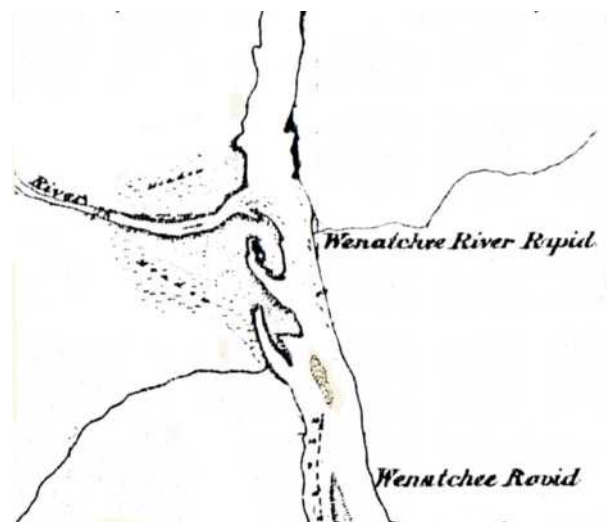


Figure 14. Excerpt from Alfred Downing's map of the Wenatchee River confluence, 1894

The photo below (Figure 15) was taken circa 1900. The view is looking southwest from Burch Mountain. It shows the Wenatchee River flowing into the Columbia River from the west. The photo clearly shows the “...level plain some mile or so broad, and just opposite the blue Wenatchee...” (Wood, 1886-1887). This photo allows us to easily imagine thousands of Indigenous Peoples camping in the area and conducting a horse race along the bank of the Columbia where East Wenatchee sits today.



*Figure 15. View from Burch Mountain ca. 1900  
(courtesy of the University of Washington Libraries and William Layman). Annotations added by the author*



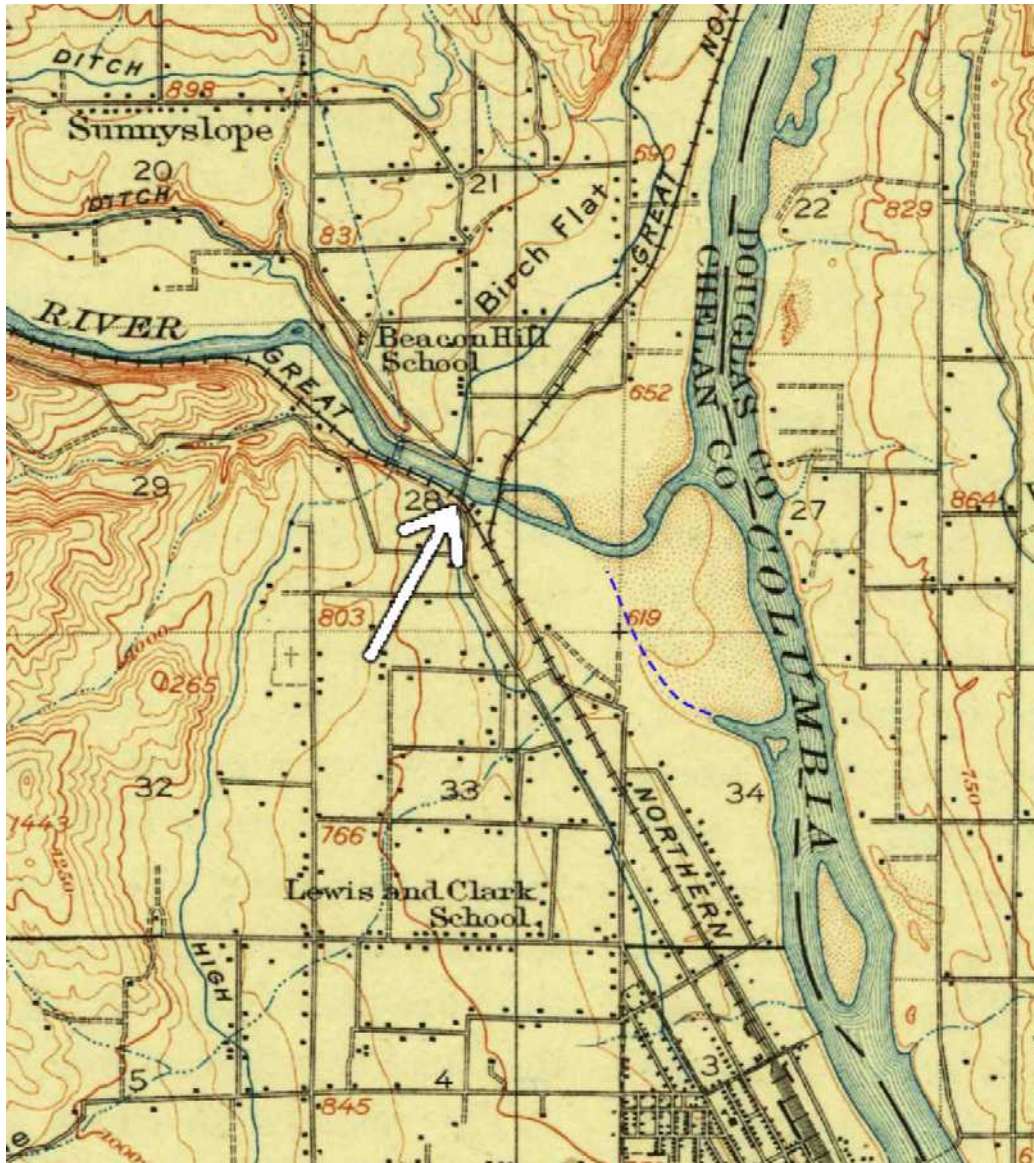


Figure 16. Excerpt from 1915 USGS 1:62500 map, Wenatchee quadrangle

Figure 16 shows a portion of the 1:62500 scale map published by the USGS in 1915. The 1915 USGS map shows the extent of the delta on both the north and south sides of the Wenatchee River. Features of interest are:

- The Wenatchee River flows decisively to the north before entering the Columbia.
- The globular landform extending into the Columbia can easily be translated into the Native American reference as “the otter paw”. Moat of the material washed in during the 1894 flood. (Randy Lewis, personal communication, 2020).
- An inlet of the Columbia River is seen jutting into the delta above the label of Section 34. This is the same channel extension shown as the southern-most channel in the sketch map made by Downing in 1894. A single contour crenulation aligns with the surface water feature and clearly suggests a remnant channel of the Wenatchee River (blue dashed line) that would have flowed near, or through, the elevation mark “619” at the northeast corner of Section 33.
- The arrow points to a bridge just west of the railroad crossing. This bridge was built in 1895 (Rader and Behler, 2012). Figure 17 is a photo of the bridge. The bridge served people on the north side of the Wenatchee River, including Sam Miller and the Burch family residing in the Olds Station area.

What had to be the first bridge to span the Wenatchee River (Figure 17) was built by Isaac Bailey in 1892 (Rader, 2018). The bridge washed out during the great flood of 1894 and was rebuilt in 1895 (Rader and Behler, 2012). This is the bridge that is pointed to in Figure 16. The bridge began at the northern end of what is Duncan Road today and extended north across the river to Horan Road in the vicinity of Sam Miller's cabin and farm. The north end of the bridge was adjacent to the Horan House when it was built in 1900. A support footing for the bridge is still evident in the center of the Wenatchee River during low flows.

As of 2020, there are five crossings of the Wenatchee River near its mouth. By construction date, they are:

- The irrigation pipeline bridge serving the Highline Canal and Pioneer Ditch (ca.1904)
- The railroad bridge (1912)
- The north-bound Highway 285 bridge (1932)
- The south-bound Highway 285 bridge (1954)
- A pedestrian bridge connecting Confluence State Park to the Horan Natural area (1988). A future, low-speed, 2-lane bridge is being considered as part of the City of Wenatchee's Confluence Parkway project. If this project is implemented, it will create a two-lane road along the west edge of the HNA and a new bridge crossing of the Wenatchee River.

Today, two important pieces of Wenatchee history are physically gone - the Horan house, built by Mike Horan in 1900 (demolished in 2019) and the 1895 bridge that served the area north of the Wenatchee River until the highway bridge was built in 1932.

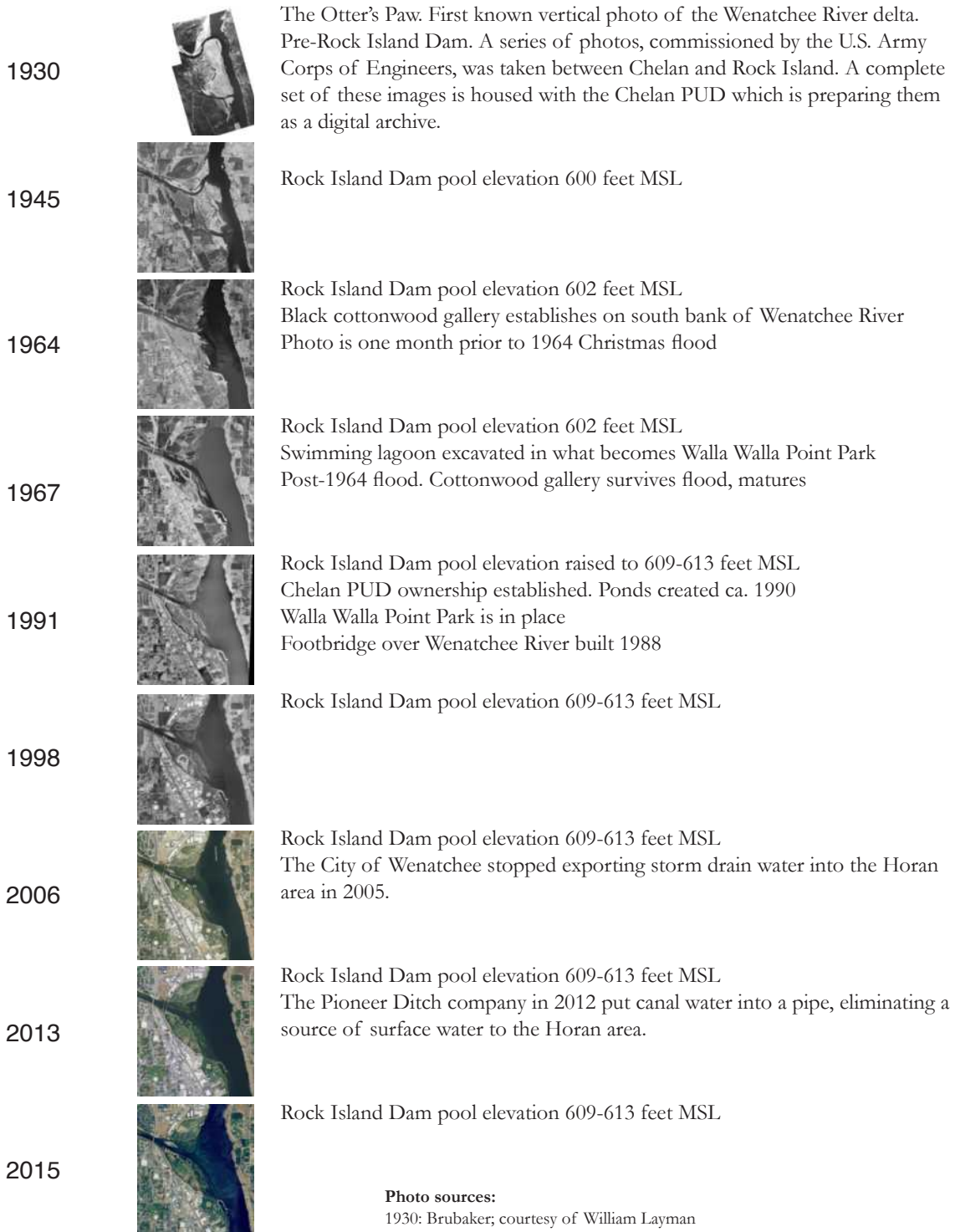


*Figure 17. 1895 bridge over the Wenatchee River (WVMCC 85-0-87)*



# A Photo History of the Wenatchee River Delta

The following sequence of nine aerial photos shows the evolution of the Wenatchee River delta between 1930 and 2015. These aerial photos will be individually discussed in the remainder of this paper.



**Photo sources:**  
 1930: Brubaker; courtesy of William Layman  
 1945: City of Wenatchee, courtesy of Steve King  
 other photos: www.historicaerials.com; Bruce McCammon

Figure 18. Thumbnail photos of aerial photo sequence. 1930-2015



Raising the elevation of the operating pool behind Rock Island Dam created the most striking changes to the Wenatchee River delta. The dam changed the natural flows in the Columbia River forever. Today, there are fourteen dams on the mainstem of the Columbia River, three in Canada and eleven in the United States.

Built in 1933, the Rock Island Dam was the first dam to span the Columbia River. In 1933, the operating pool level was 600 feet MSL (W. Graevell, personal communication). Rock Island Dam was expanded in 1953, creating an operating pool elevation of 602 feet MSL. A second powerhouse was added to the Rock Island Dam in 1979 and the operating pool is permitted to fluctuate between 609 to 613 feet MSL. Today, fluctuations in the level of the Columbia River of several feet a day are not uncommon.

Figure 18 shows the incremental inundation of the delta due to changes of the operating pool over time. The delta perimeter lines shown are from available photos that are closest to the date of changes in the elevation of the operating pool at Rock Island Dam.

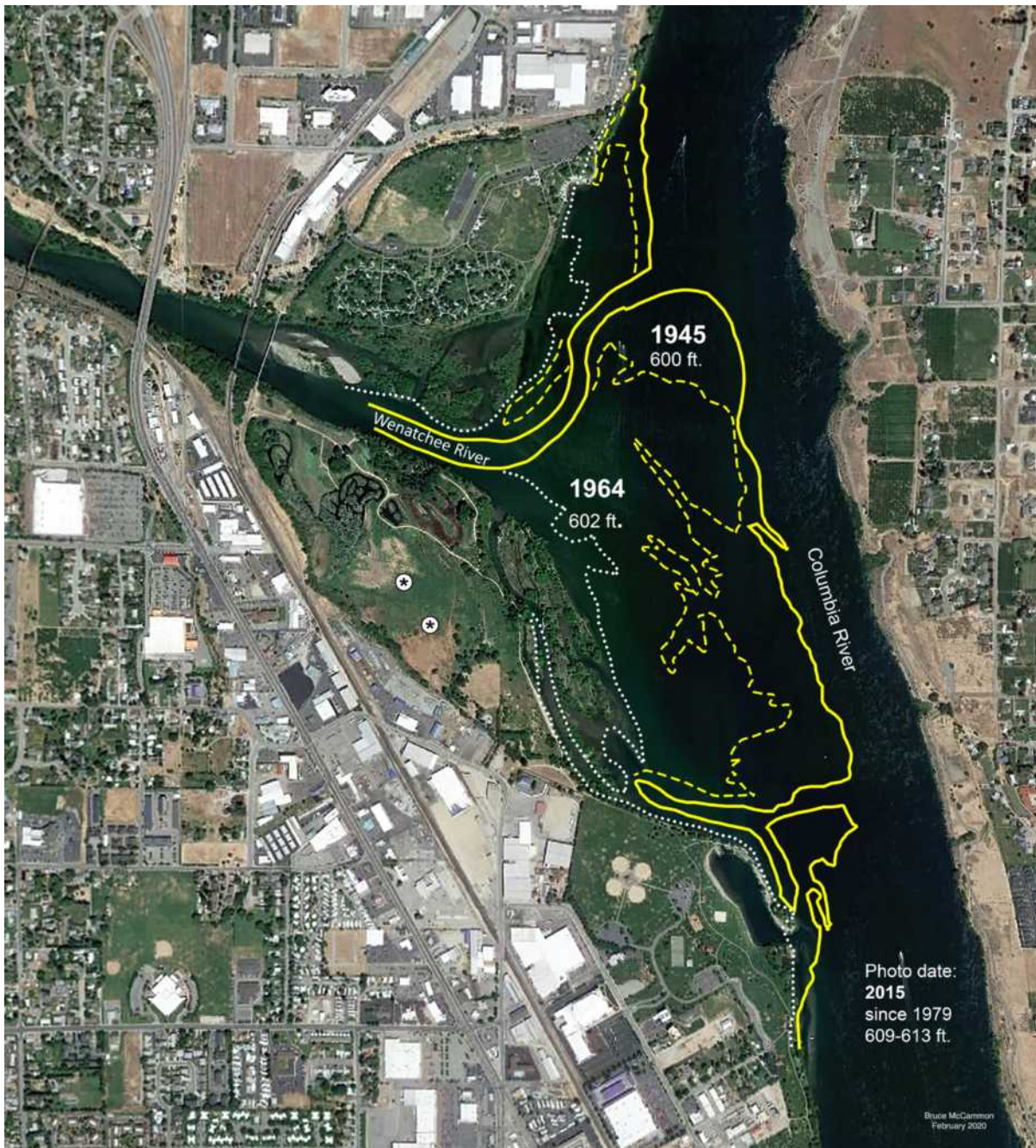


Figure 19. Areas of the delta inundated over time 1930-2015



The first vertical aerial photo of the Wenatchee River delta (Figure 19) was prepared by Brubaker Aerial Surveys in 1930 for the U.S. Army Corps of Engineers. Street names and the location of the KPQ radio towers have been added for orientation. A dashed line highlights a historic Wenatchee River channel that ran along what becomes the eastern edge of the Horan Natural Area as we know it today.

The Brubaker photo is the only known vertical image of the Wenatchee River delta prior to the completion of the Rock Island Dam in 1933. The photo provides significant information about the area that is not seen in the USGS topo map. Unfortunately, the photo does not show any of the bridges crossing the Wenatchee River.



Figure 20. 1930 Brubaker Aerial Survey photo composite (courtesy of William Layman)

Key features of the 1930 photo include:

- An historic Wenatchee River channel (dashed line) that extends from the Wenatchee River, south to the Columbia River. This is the same channel shown in the 1894 Downing sketch (Figure 14) and in the 1915 USGS topographic map (Figure 16). The channel forms a separation between lower elevation alluvial deposits and higher elevation lands to the west. This channel evolves into the east side of today's Horan Natural Area after Rock Island Dam is raised to today's normal pool level (609-613 feet MSL).
- About half of the delta is apparently devoid of vegetation. This is likely due to the area being lower elevation than the portion to the west and, therefore, subject to regular high flows in the Columbia River. The area immediately to the east of the dashed line is sparsely vegetated indicating infrequent flooding.
- Two lower elevation ponds form a gentle arc on the east side of the vegetated portion of the delta. These ponds may be remnants of another historic Wenatchee River channel. It may, in fact, be possible to envision this channel being the northern water spur into the delta that is seen on Downing's 1894 sketch map (Figure 14).

## **Aerial Photo sequence: 1945 to 2015**

The following pages provide interpretations of a series of nine aerial photos taken between 1945 and 2015. The 1945 photo was provided by the City of Wenatchee (Steve King). The 1967-2015 photos were purchased from [www.historicaerials.com](http://www.historicaerials.com). Each of the photos from 1964-2015 is composed of several images taken when weather allowed flights to be made. The period in which each photos were taken is noted in the heading for each photo.

A line showing the extent of the delta in the 1930 Brubaker photo has been added to each of the photos. The two radio towers (1928) in the center of today's HNA are also shown.

Several fixed points are labeled on each photo to track changes over time.

- A: Northern extent of erosion scarp created by the Wenatchee River and the head of a channel along the west side of the HNA
- B: Northern extent of channel area separating today's HNA from the Columbia River channel islands
- C: Location of the 1912 culvert under the railroad tracks. Provided for reference only.
- D: Current location of major cottonwood grove
- E. General location of connected ponds created in 1990
- F. Channel-islands in the Columbia River
- G. Orchard within the Horan Natural Area
- H. Location of the constructed swimming lagoon in Walla Walla Point Park
- I. Location of constructed kidney-shaped pond



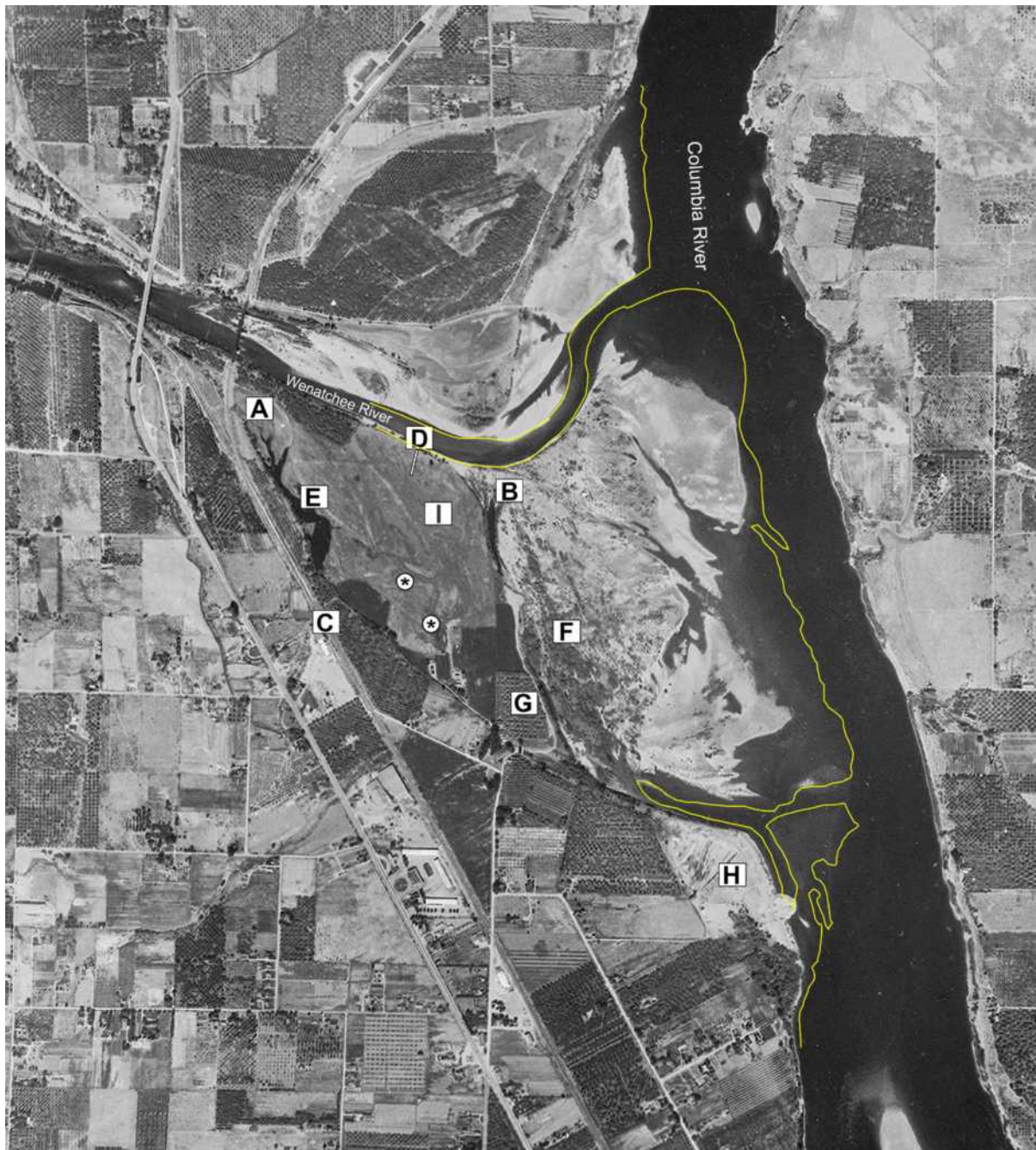


Figure 21. September 9, 1945 aerial photo (courtesy of Steve King, City of Wenatchee)

In 1945, the pool elevation behind Rock Island Dam was 600 feet MSL. Approximately 16% of the historic delta is now under water (Figure 20).

**A** and **B**. Note the fingered extension at the north ends of both channel areas. These channels are sustained by water gradually flowing into the HNA from the south. The channel labeled “A” is fed by water entering under the railroad at “C” and then backing into higher elevations to the north. The next photo, Figure 21, shows an oblique view of these channels. It also shows that there is no culvert passage under the railroad track, meaning that no water is coming from the Wenatchee River into the channel at “A”. The water in the channel area labeled “B” is flowing in from the Columbia River and backing into the northern portion of the HNA.

**C.** Notice the orchard by the letter C. This area becomes the Chelan PUD Hawley St. yard. There is also an orchard along the south bank of the Wenatchee River near the label “A”.

**D.** There are no cottonwood trees evident at letter **D**. The large block of trees along the south bank of the Wenatchee River is difficult to characterize from this 1945 aerial image. The straight edges imply an orchard. Figure 21 (below) shows the area to be a line of cottonwoods along the edge of the river with an orchard to the south. This is true in the area between the railroad bridge and the highway bridge.

**E.** The width of the riparian vegetation band in this area indicates a large area of relatively low elevation. An orchard is evident between the railroad tracks and wet drainage.

**F.** The area that evolves into the present day channel-islands in the Columbia River is still connected to the major delta area.

**G.** The orchard is thriving. This is the area that is behind a chain link fence as you enter the Horan Natural Area from Walla Walla Point Park. The orchard has mostly disappeared today.

Figure 21 is an aerial oblique press photo taken in 1949. The view is to the west, up the Wenatchee River. The Highline Canal and Gunn Ditch pipeline bridge (1), 1932 Highway 285 bridge (2), and the 1912 railroad bridge (3), and are clearly seen. The only evidence of the historic bridge that ran to the Horan House is the footing for the center support (4). The Horan House (5) is seen on the north bank of the Wenatchee River.

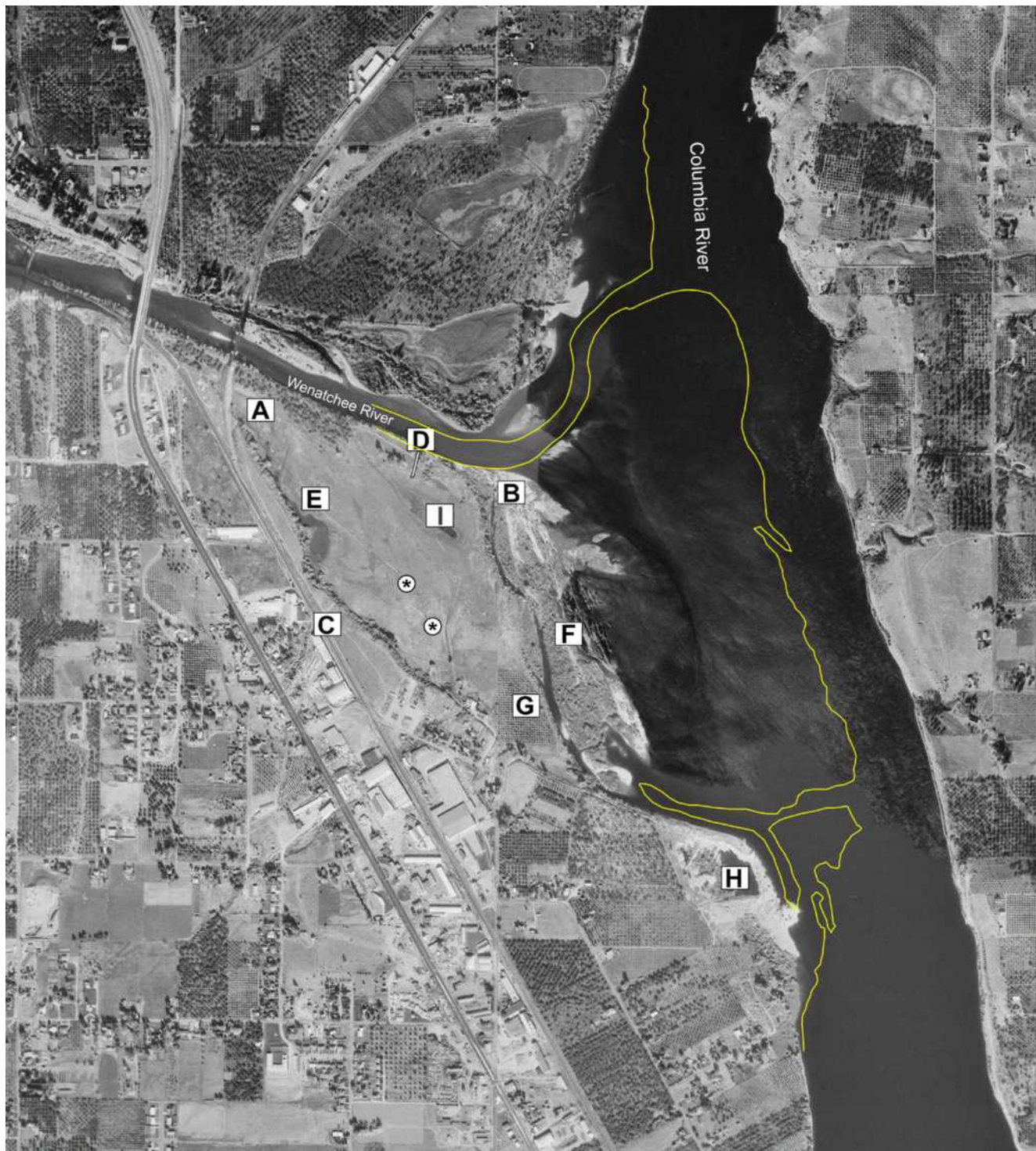


Figure 22. 1949 view of the Wenatchee River above the Columbia River. (courtesy of William Layman)

The source of water in the prominent fingered channels (A) extending to the north is unverified but is, most likely, the inflow of the Pioneer Ditch and City of Wenatchee storm drain system through the 1912 culvert at the point labeled “C” in Figure 20. This is the location where water from the Pioneer Ditch and the Miller Street storm drain entered the delta from 1896 to 2012. The Pioneer Ditch canal was put into a pipe in 2012. Close inspection of the image shows that the water in the pond areas appears to be still and is not flowing. This water backed up to the north following a historic Wenatchee River channel until it reached the railroad fill. It is highly unlikely that the railroad would allow water to seep under the fill from the west without a culvert to pass the water and to protect the fill. It appears that Black Cottonwood trees are lining the edge of the Wenatchee River next to the orchard. An access road is visible between the fingered-channel area and the orchard.



**1964** Photographed between Oct. 26 and Nov. 5, 1964, just prior to the 1964 Christmas flood.



*Figure 23. 1964, prior to 1964 Christmas flood*

The pool level behind the Rock Island Dam was raised to 602 feet MSL in 1953. This increase resulted in an additional 21% inundation of the delta. 37% of the 1930 delta is now under water (Figure 23).

At this point in time, the Horan Natural Area is a fairly simple landscape with little vegetation.

**A.** The channel is well defined and the finger-like channels seen in the 1945 photo are less evident. This could be due to there being less water overall at the time of the photo. It is doubtful that the channels would be lost due to fill. The orchard near the bank of the Wenatchee River appears to be declining. A line of cottonwood trees is still visible extending along the length of the south bank of the Wenatchee River.

**B.** The channel extending south from the label “B” continues to be disconnected from the Wenatchee River. Water in this area is a combination of Columbia River water backing into the channel and groundwater. The finger-like channels are less evident. An interesting set of bright strips extend south from the letter B. This is the area that evolves into channels after the 1964 flood and which are seen on the next page in the 1967 photo. The bright stripes may be sediments that have washed onto the area during high flows. Since these areas evolve into channels by 1967, it is likely that the stripes are lower elevation areas that have scoured in high flows and filled, at least partially, with sediment. It appears that cottonwood trees have become established in the area.

**C.** The orchard in the 1945 photo at this location has been removed.

**D.** A new grove of cottonwoods is present. As of 2020, these are the largest remaining Black cottonwood groves along the Columbia River between Canada and the river’s mouth (Dan Stephens, 2020). Even if other large stands of Black cottonwood are documented, this area takes on special significance due to its rarity. The area is very important habitat for birds and mammals.

**E.** The riparian area that parallels the railroad tracks shows better definition than in 1945. This is most likely due to photo quality rather than physical development.

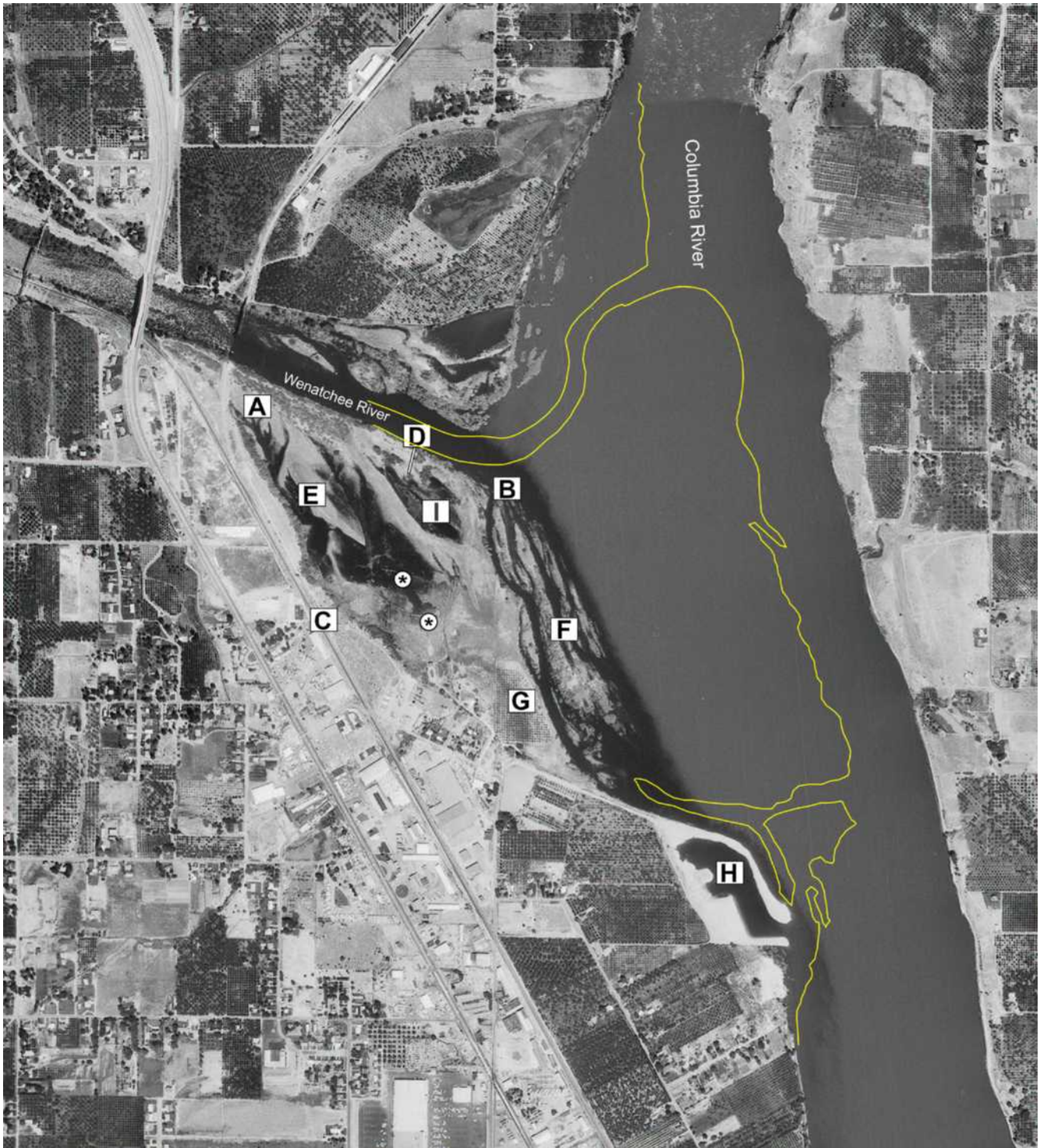
**F.** The addition of two feet to the pool level behind Rock Island Dam resulted in increased inundation of the area that becomes a series of channel-islands.

**G.** The orchard was thriving in 1945 and shows distinct decline in this 1964 photo.

**H.** It appears that excavation of the swimming lagoon has begun.

**I.** A small pond area has formed in a natural depression. This area becomes a kidney-shaped pond (see Figure 2) in 1990 when the Chelan PUD constructs a series of steep-sided, connected ponds in the area.





*Figure 24. 1967. After the 1864 flood and peak flows in 1967*

The photo in Figure 24 was taken about 2.5 years after the major regional flood that occurred around Christmas, 1964. The USGS Wenatchee River at Monitor gage peaked at 19,400 cubic feet per second (cfs) on June 21, 1967, just prior to this photo's creation. This peak flow is larger than that experienced in 1964 (18,200 cfs). Based on USGS streamflow data for the Wenatchee River at Monitor, there have been twenty-five years, including 1967, with higher peak flows than that which occurred in 1964.

It is highly likely that the large ponded areas are filled with a combination of surface flood water and elevated groundwater levels. The dark, ponded areas certainly highlight the low elevation areas in the remaining delta.

- A.** Surface water extends to the railroad track fill near the Wenatchee River. Groundwater levels are very high. It appears that that the orchard along the river is continuing to decline. The river-edge cottonwoods show apparant growth.
- B.** The historic Wenatchee River channel now connects to live water at the north end, completing the separation of the original delta mass from what is now the Horan Natural Area. The area of channel-islands is now fully within the Columbia River.
- C.** No evident changes in this area
- D.** The cottonwood groves show growth
- E.** This label sits on a natural higher elevation area adjacent to a ponded area that is part of the line of westside riparian vegetation (Figure 2) that is evident in all the photos in this sequence. This ponded area grows and shrinks in response to changes in groundwater levels except during localized flooding when it becomes part of the area of inundation.
- F.** The channel-islands are fully a part of the Columbia River
- G.** The historic orchard continues to decline
- H.** The Chelan PUD has constructed a swimming lagoon in preparation for the development of Walla Walla Point Park (Figure 25). The spit of land dangling into the Columbia River is a remnant of the delta after excavation removed material from the swimming area. Water in the lagoon does not refresh easily since water in the lagoon is connected to the Columbia River at the south end but not at the north end.
- I.** There is a natural depression filled with water. This area is excavated in 1990 to become the kidney-shaped pond (Figure 2).



*Figure 25. Swimming lagoon at Walla Walla Point Park. The Columbia River is beyond the spit of land. February 2020*



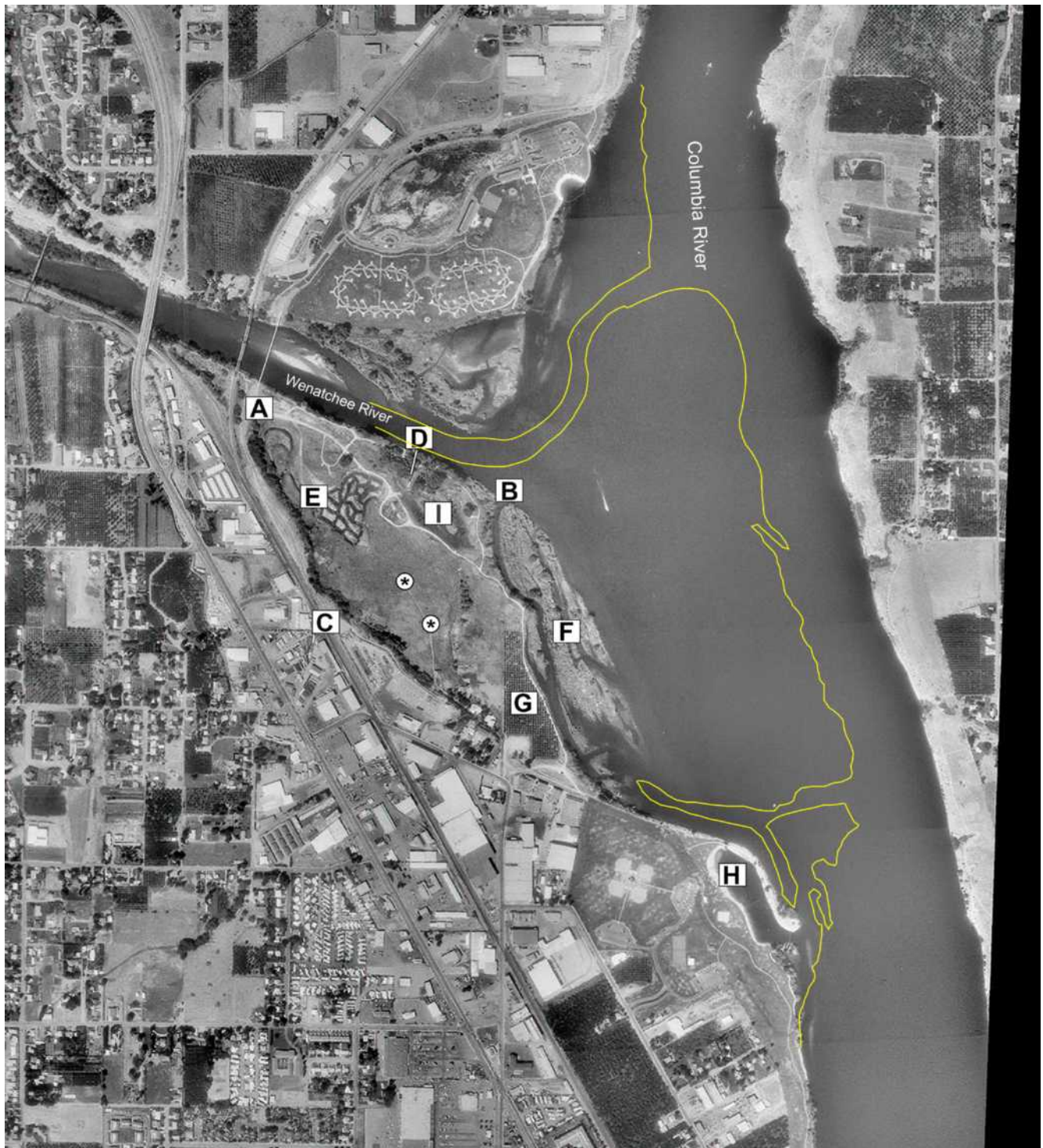


Figure 26. 1991 - many changes are evident

Figure 26 shows many substantial changes affecting the delta:

- A second powerhouse was added to Rock Island Dam in 1979. The new operating pool behind the dam is 609-613 feet MSL. When at 613 feet elevation, the dam impounds water to an elevation 11 feet higher than before. The loss of the 1930 delta, the “Otter Paw”, is substantial. The photo shows a 42 percent reduction in the delta seen in the 1930, pre-dam, photo (Figure 17). Reports from people who row or paddle through the area confirm that the river is shallow as they paddle across the remains of the delta.
- Between 1986-1987, the Chelan PUD purchased most of the land in the HNA. A small portion of the area is in private ownership (Figure 2). In the early 2000’s a statewide court order conveyed lands below the High Water Mark to the Washington Dept. of Natural Resources (DNR). This resulted in a transfer of ownership of the North and East Channel Island areas to the DNR.
- As mitigation for habitat loss, the PUD constructed a series of connected, steep-sided ponds in the area in 1990. The intent was to provide habitat for Wood Ducks, as required by the Rock Island Dam FERC license. The ponds were dug without removing from, or importing material to, the area. Siting of the ponds was done to take advantage of areas known to be lower elevations. Dredge materials were piled alongside the ponds and, in some situations, graded back to natural terrain levels. In other instances, the dredge material formed hummocks along pond edges.
- A series of culverts (Figure 27) was installed to allow water to move between the ponds. The culverts were installed to retain water in the interior of the HNA. That is, culverts were sloped toward the center of the area. The goal was to keep water in the HNA. Arrows show the flow direction based on elevations of the inlets and outlets.
- In addition to the ponds, a trail system was built to provide access throughout the HNA. A footbridge was built across the Wenatchee River in 1988 to connect the HNA with the Confluence State Park RV camp on the north side of the Wenatchee River.
- Confluence State Park RV camp is present on the north side of the Wenatchee River.

### Changes at or near the photo reference points

- A. The letter **A** sits on top of a junction in the trail system serving the HNA and connecting to the Apple Capital Loop Trail that provides a 10-mile long loop trail serving both Wenatchee and East Wenatchee. A paved trail runs south from label A and a native surface trail extends through the HNA. The pedestrian bridge across the Wenatchee River north of the letter **A** was constructed in 1988. Constructed ponds occupy the area south of label A. The ponds incorporate the east edge of the what is labeled “west side riparian” in Figure 2. All orchard areas have been cleared along the length of the Wenatchee River. Cottonwood trees are evident between the pedestrian bridge and the railroad bridge. Cottonwoods are also evident west of the railroad bridge.
- B. The north end of the channel separating the channel-islands from the HNA is distinctly present. Water flows freely through the channel.
- C. The Chelan PUD has begun to occupy the old orchard area. The 1912 box culvert still sits under the railroad grade.
- D. The cottonwood groves are apparently thriving with evident growth and expansion of the area. What appears to be one cottonwood tree is visible next to a trail and to the north of the spaghetti-shaped pond (Figure 2)
- E. A spaghetti-like network of ponds occupies the area (Figure 2). These steep-sided ponds connect to a smaller pond that lies to the southeast. Both of these pond areas are deeper than most other areas and today usually contain groundwater that responds to the streamflow elevations in the Wenatchee and Columbia Rivers.
- F. The channel-islands are smaller due to increased pool levels behind Rock Island Dam.
- G. The orchard appears to be more vital than it was in 1967. The area is now owned by the Chelan PUD so the orchard is likely managed under an agreement with the PUD in 1991.
- H. On its north end, a channel has been created to allow water to flow into the swimming lagoon from the Columbia River. A footbridge spans this small inlet area. Four softball fields occupy an area to the west of label H.
- I. The kidney-shaped pond (Figure 2) shows signs of vegetative encroachment. This shallow pond is totally consumed by cattails and grasses by 2019.



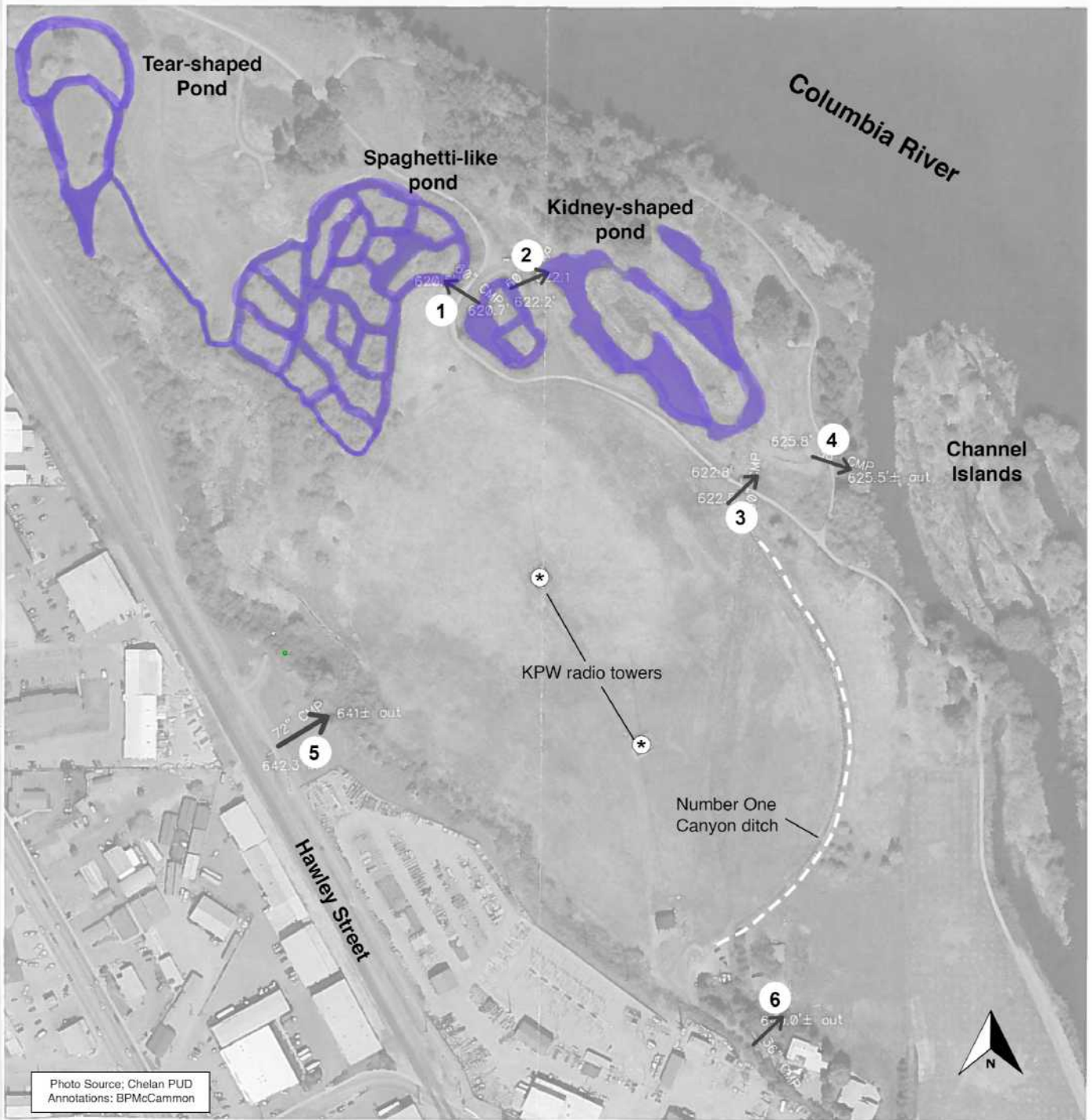


Figure 27. Culvert locations. Arrows show flow direction based on inlet and outlet elevations. Chelan PUD, 2006

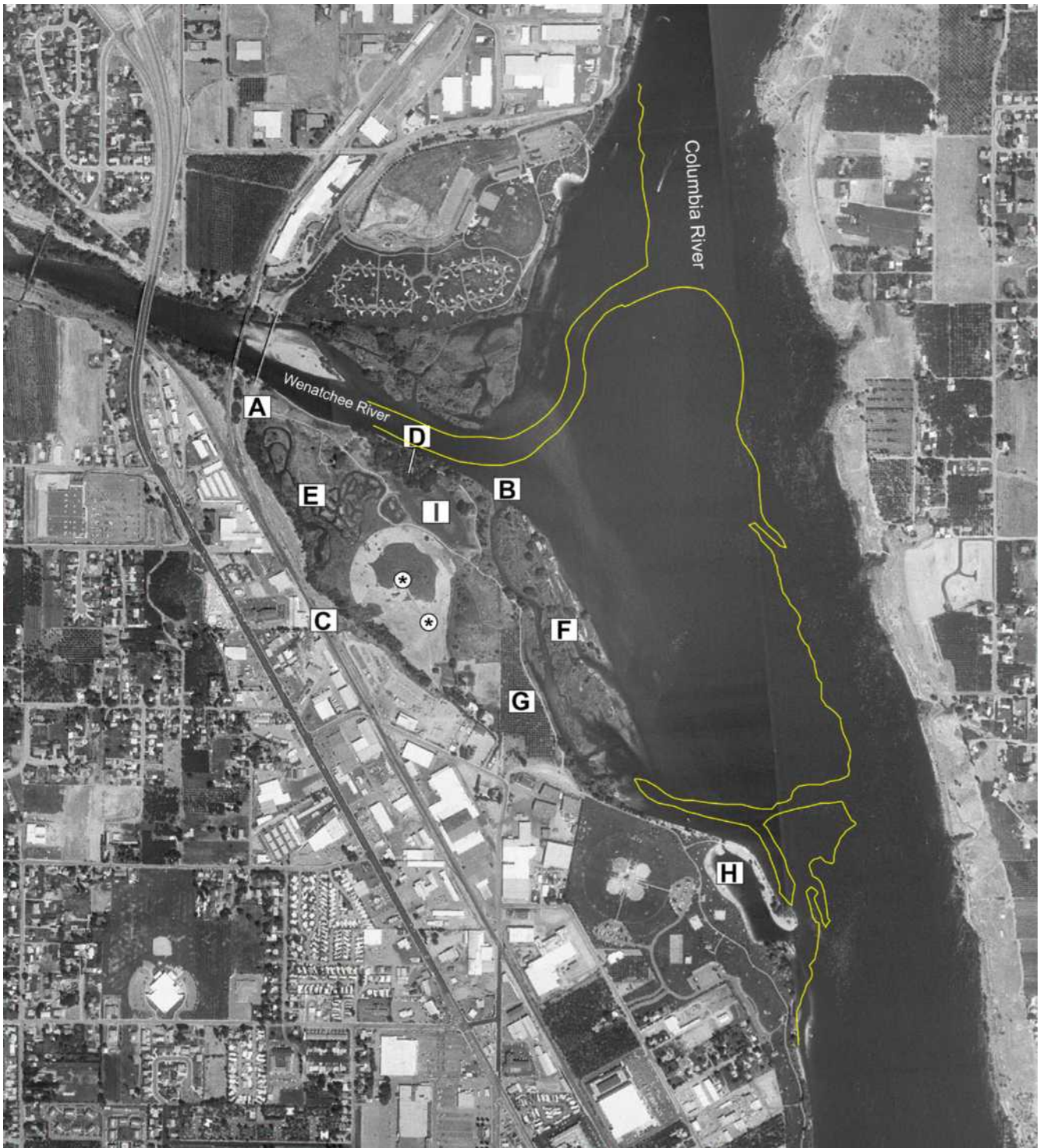


Figure 28. 1998

The kidney-shaped pond (Figure 2) at I appears to be dry. Very little change is evident at any of the other labeled sites in the HNA. The most notable area in Figure 28 is the area that is scalped or mowed around the 1928 KPQ radio towers. There is a circular array of wires at the base of each tower that is designed to amplify the radio signal transmission (Battison, 2008). The scalped, bright area roughly bounds the area that is currently restricted from public access by a fence and signs. All of the cottonwood groves have expanded, including the ones to the west of letter **A**.



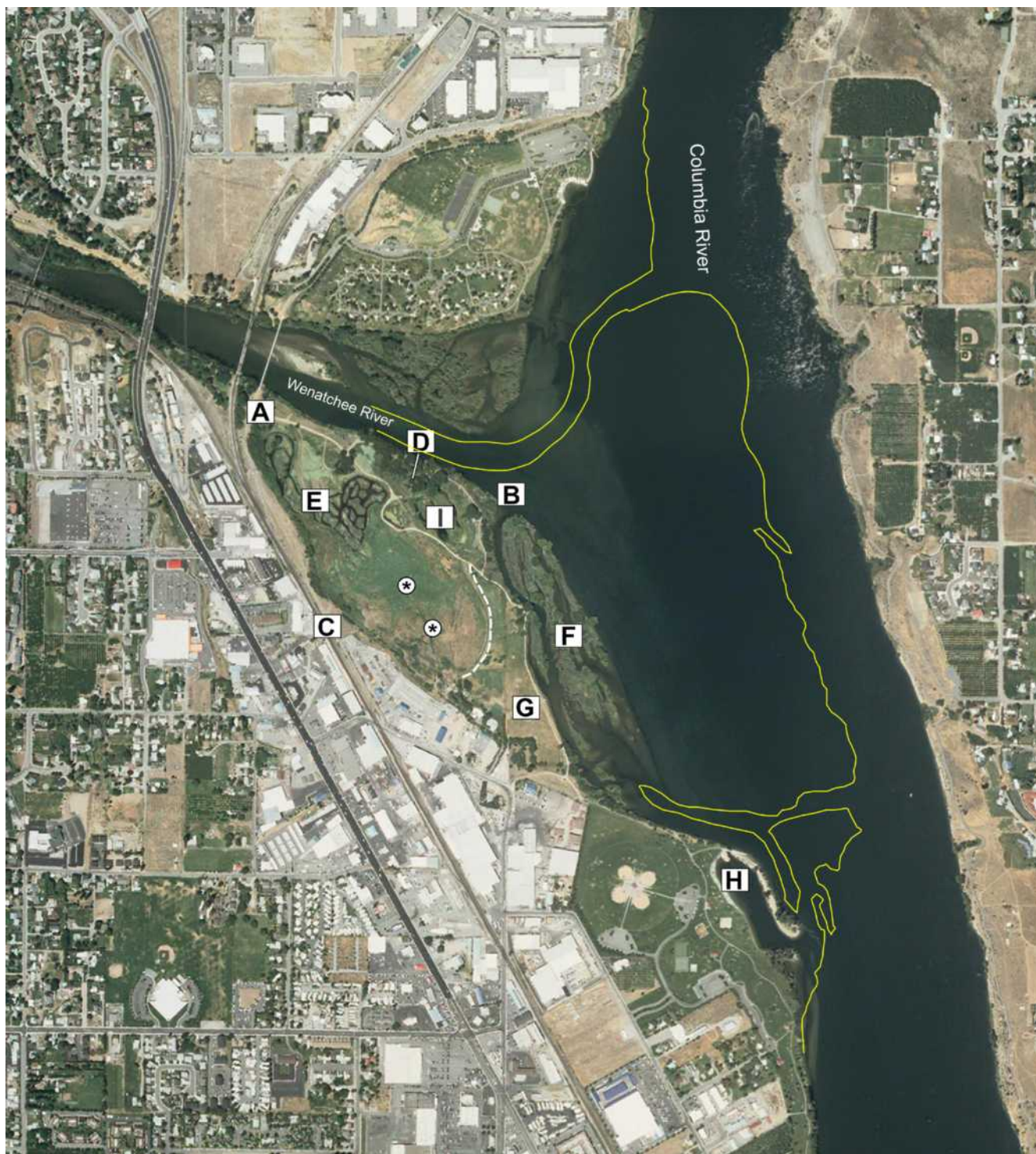
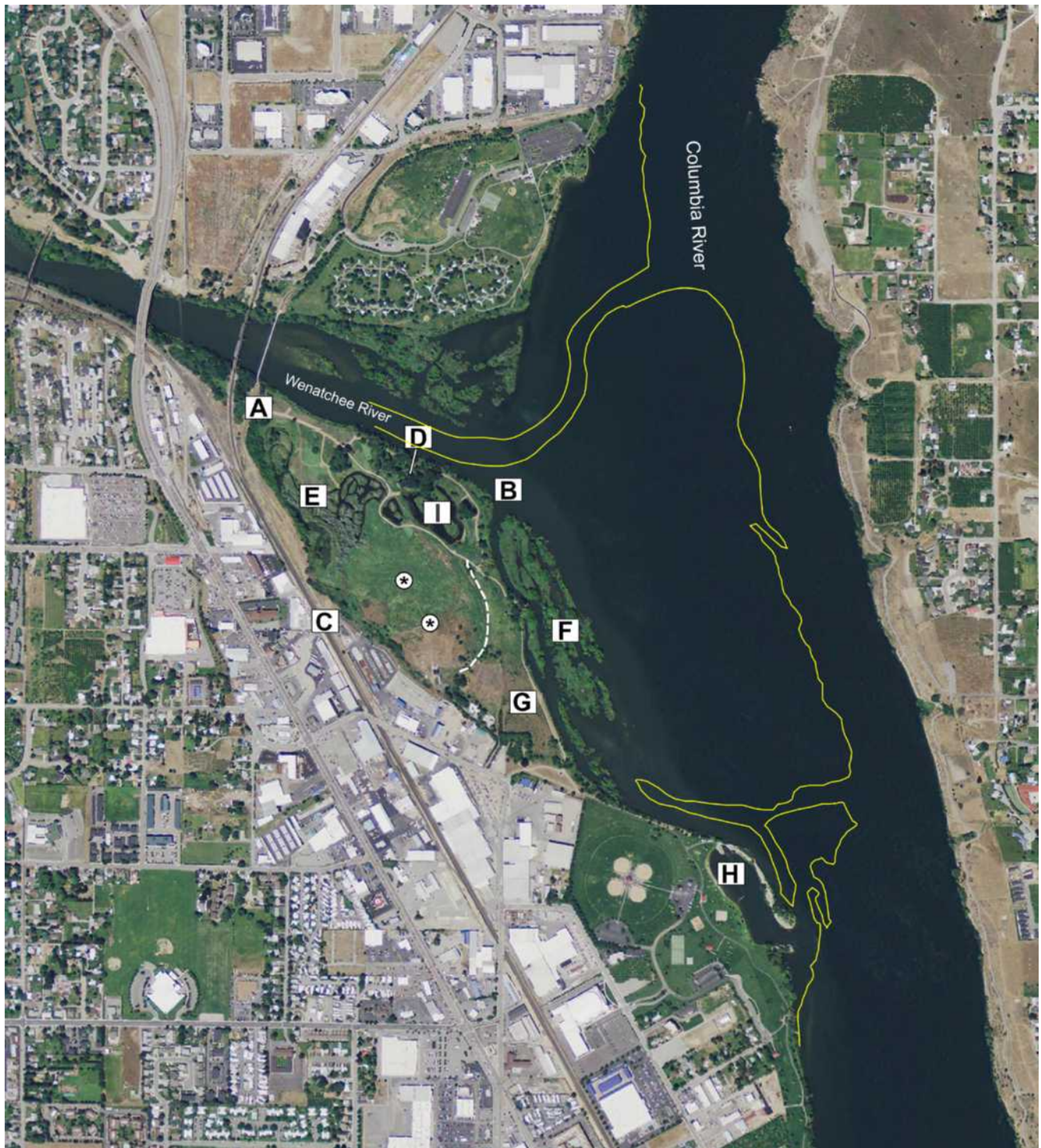


Figure 29. 2006.

May 19, 2006 was the date of the 2006 peak flow (24,200 cfs) in the Wenatchee River at Monitor. The flow was substantially higher than in 1967 (19,400 cfs). This photo (Fig. 29), taken two months later, shows little effect of the high flows that would have been present in the HNA. Unlike in 1967 (Figure 22), when large areas in the center of the HNA were inundated, this image shows no large standing water areas other than the created ponds. Number One Canyon Creek (white dashed line) has, between 1998 and 2006, been channelized to avoid the KPQ radio tower ground array area. Flow in Number One Canyon Cr. is routed under the path and then out of the HNA into the Columbia River. Vegetation is reestablished on the KPQ tower site. The cottonwood groves at label D are mature. City storm water does not enter the Horan Natural Area as of 2005.





*Figure 30. 2013*

The kidney-shaped pond (I) is full in the 2013 photo (Figure 30). All surface water sources flowing into the HNA have ceased with the exception of the intermittent flows of Number One Canyon Creek. Surface water in the HNA is supported by, and responds to, fluctuations in groundwater levels resulting from changes in streamflow levels in the Wenatchee and Columbia Rivers. Pioneer Ditch water was placed in a pipe and no longer enters the Horan Natural Area as of 2012.





*Figure 31. The Wenatchee River delta in 2015*

This 2015 photo (Figure 31) is a good representation of the Horan Natural Area in 2020. Roughly 42% of the delta seen in the 1930 pre-dam photo (Figure 19) is now under water. The historic “otter paw” portion of the delta is invisible. Newcomers to the valley and visitors to the Horan Natural Area would never know the rich history of Indigenous Peoples in the area. The cottonwood groves are mature with little sign of new trees except on sites where tailings were piled during pond construction.



## Status report and suggested actions, 2020

The Horan Natural Area is a unique community area within the City of Wenatchee. Its social value is increasing rapidly as development of the valley continues and the population expands. It has been heavily altered by man but it presents unique values to those who use it. The adjacent Apple Capital Loop Trail allows easy access to the area by runners, walkers, bird watchers and people seeking a bit of solitude. Already used heavily, the HNA is experiencing increased recreational activity. People are drawn in to see rarities like the first-known nesting pair of Bald Eagles or moose in the area, both of which are testimony to suitable habitat within the Horan area. The HNA is also used as an outdoor classroom and hosts organized tours for birdwatching and nature study. **Action: prepare an access management plan that describes a trail network that allows for critical vehicle (fire) access, provides an accessible trail system throughout the area, and minimizes interruptions during high water events.**

The Chelan PUD annual nesting survey report documents that surface water conveyance to the wetland ponds has diminished completely (Cordell and Pope, 2019). The pond system is dying, demonstrating that reliance on groundwater alone is insufficient to support vital aquatic and riparian habitats for the wide variety of birds and mammals that use the area. Number One Canyon Creek passes over private land in the southwest portion of the HNA and access to the area is restricted. The channel is plugged by sediment that creates over-bank flows and sheet flooding of the area. This flooding frequently causes trail closure. **Action: introduce 1-3 cubic feet per second of flowing water into a network of connected ponds and streams. Ponds should be designed with shallow banks to support shore birds and waterfowl. Flowing water is key to low levels of mosquitos and to overall aquatic ecology within the HNA. Water should enter the HNA through a created wetland area to ensure that water quality issues are remediated. Water should then flow through the pond-stream system and exit to the Columbia River.**

There is no known vegetation management plan for the Horan Natural Area. Plant succession is allowed to proceed with limited intervention to prevent weeds or encourage native plants. While native vegetation in the area is being over-run by non-native plants, the HNA still supports several Black Cottonwood (*Populus trichocarpa*) galleries – the largest remaining galleries along the Columbia River from Canada to the mouth (D. Stephens, Wenatchee Valley College, personal communication). This unique status deserves to be recognized and appreciated. Efforts should be made to culture and expand these isolated, high value trees. Non-native plants are a problem. Russian Olive (*Elaeagnus angustifolia*) trees are established on pond perimeters and area expanding to other areas in the HNA. Reed Canary Grass (*Phalaris arundinacea*), a tall, perennial bunchgrass was introduced and is thriving. Other non-native plants, such as Purple Loosestrife (*Lythrum salicaria*) or Yellow Salsify (*Tragopogon dubius*), are expanding. Historic orchards in the area have disappeared or have been abandoned. Residual fruit trees are monitored and fruiting limbs are removed to control disease. The Chelan PUD attempts to control truly noxious weeds and plants in the area. **Action: develop a comprehensive vegetation management plan that emphasizes enhancement of native species and reduction of invasive species. The plan should allow harvesting of Dogbane in select areas by Native Americans and others from November through February. Black Cottonwood shoots should be stockpiled as appropriate to plant in disturbed areas or existing stands. The plan should identify the timing and extent of any active vegetation management (weed treatment, mowing, propagation)**

Interpretations or exhibits describing the rich cultural history of the area and its value to Native Americans are absent. Culturally important native plants in the area include Showy Milkweed (*Asclepias speciosa*) and Dogbane or Indian Hemp (*Apocynum cannabinum*). It has been documented that the Dogbane in the HNA is the largest known population in Washington. Native Americans used Dogbane fibers for many purposes. Harvesting Dogbane stems after the first, hard frost is beneficial to the plants. The Chelan PUD and Washington State Parks do not actively manage the plants to maintain or expand population size or vigor. **Action: develop a site that describes the history of Native American use in the area. The site should be designed and constructed using Native American recommendations. The site at the mouth of the Methow River in Pateros is an example. Plants that Native Americans cultured and used should be established in a garden for their use today.**

The core of the HNA, approximately half of the 100-acre total, is reserved and managed for the protection and use of the radio towers that date back to 1928. Grasses and shrubs in the area are occasionally mowed. **Action: consider moving the existing towers to a site that provides an equivalent or better broadcast transmission using modern facilities and technology.**

## Going Forward

The Horan Natural Area is recognized as a unique and highly valuable place in the Wenatchee valley. The Chelan PUD and the City of Wenatchee are both committed to improving ecological and social conditions in the area. Many of the “desired conditions” that the North Central Washington Audubon Society identified are strongly supported by public input to the PUD. The PUD and the City provide mechanism for implementing any needed changes. Over time, the HNA will change to become an even more valuable resource for valley residents and visitors. The future is bright.



## Acknowledgements

Over the last four years I have had the good fortune to interview many people with varied and extensive knowledge about the history of the Wenatchee River delta area. I did not hesitate to lean on them for help gathering information and making sense of it. My sincere thanks for help is extend to the *City of Wenatchee* (Steve King and Allison Williams), *the Chelan PUD* (Michelle Smith, Von Pope, Ryan Baker), *North Central Washington Audubon* (Mark Oswood, Art Campbell), *Trout Unlimited* (Cody Gillin, Dan Jaspers), *Washington State Parks* (Matt Morrison), and *Our Valley Our Future* (Steve Maher). Other individuals who provided valued insight, advice and, information include: Bill Layman, Randy Lewis, Susan Ballinger, Jim Pope, John Barta, Mike Bailey, Ralph Haugerud, Wayne Graevell, Matt Dahlgreen, Steve Howes, Rick Edwards, Beth Horan Dobbs, Terry Lilybridge, and Rod Molzahn. I should also mention the dozens of trail-side conversations with people I encountered in the Horan Natural Area. Your comments about the place, and your experience in it, helped inform me.

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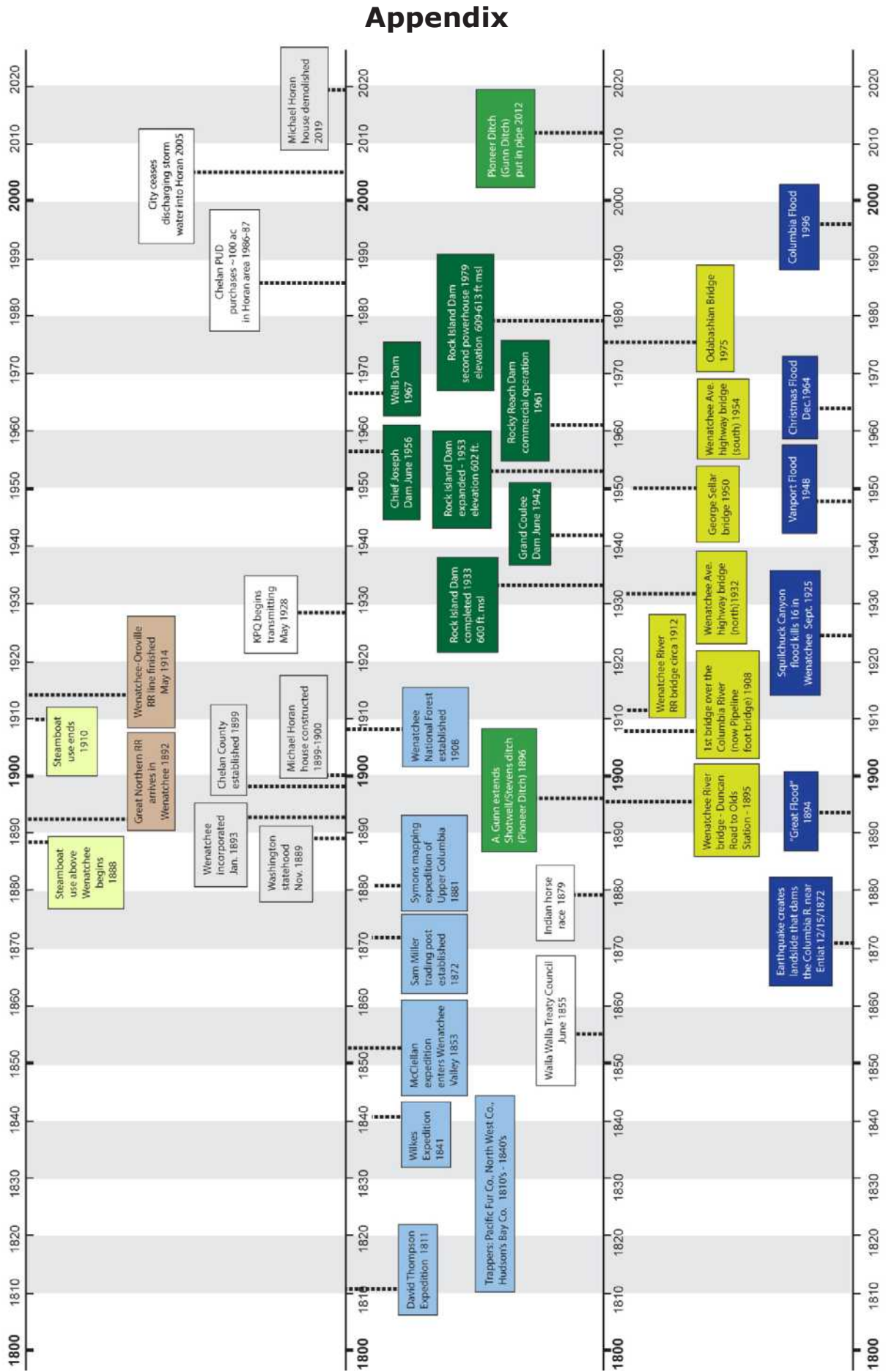
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# Contemporary Human Activities in the Wenatchee River Valley





# The Horan Natural Area

If you were standing here...

