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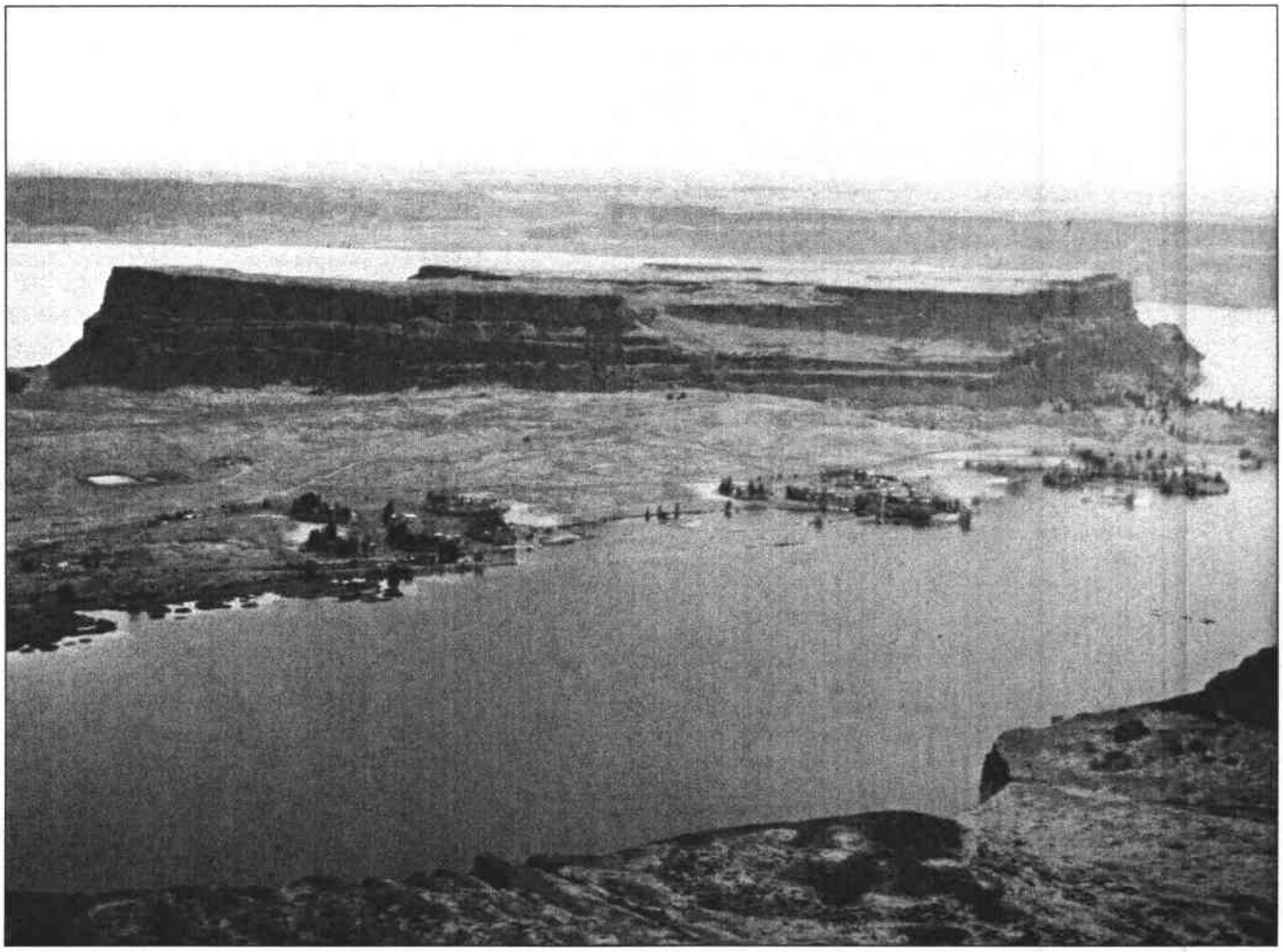

IN THIS ISSUE

WASHINGTON STATE DEPARTMENT OF
Natural Resources
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Some Notable Finds of Columbian Mammoths from Washington State

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On March 25, 1998, Governor Gary Locke signed House Bill 1088 into law establishing the Columbian mammoth (*Mammuthus columbi*) as the "official fossil [species] of the State of Washington". This legislation marked the culmination of a four-year effort on the part of students in Mrs. Sara Aebly's second grade class at Windsor Elementary School near Spokane (Barton, 1998). Because of the students' remarkable persistence, Washington now joins several other western states, including Alaska (woolly mammoth) and California (sabre-toothed cat), in having designated Ice Age (Pleistocene) mammals as their official state fossils.

Mammoth fossils are particularly common in Washington, with several hundred finds having been reported in various publications or donated to local, regional, and national museums or collections. Where sufficient data exist to assign them to species, the vast majority have proven to be Columbian mammoths (Barton, 1998). Of the 39 counties in Washington, only heavily forested counties on the west side of the Cascade mountains (for example, Skamania and Wahkiakum) and less populated counties on the east side (for example, Ferry and Pend Oreille) have thus far failed to produce mammoth fossils.

Most of the reported remains from Washington are of single skeletal elements, with molars by far the most common. Tusks are also quite common, though rarely well preserved. More notable or significant mammoth finds are less common. These include sites with multiple skeletal elements (bones and/or teeth) found in direct association with one another, sites that can be well dated (either absolutely as in radiocarbon dating or relatively through stratigraphic association), and sites that represent geographic range extremes for this genus within the state (Barton, 1999).

Columbian Mammoths in North America

Columbian mammoths are one of two species endemic to North America, the other being the imperial mammoth (*M. imperator*). The remaining two species of mammoth found in North America, *M. meridionalis* (*M. hayi*) (southern mammoth) and *M. primigenius* (woolly mammoth), both evolved in the Old World and migrated into North America from Asia by way of the Bering land bridge. Columbian mammoths speciated from imperial mammoths roughly 300,000 to 500,000 years ago and quickly became the dominant mammoth throughout North America. Columbian mammoth remains have been found from Alaska to Florida, and from northern Canada to southern Mexico. In Utah and Colorado, *M. columbi* has been found at elevations greater than 2700 m (8858 ft) (Gillette, 1989), while on the continental shelf off the Atlantic coasts of Canada and the U.S., molars from this species have been recovered from depths of at least 120 m (393 ft) (Cooke and others, 1993; Whitmore and others, 1967).

Columbian mammoths were moderate in size, standing roughly 3.4 m (11 ft) at the shoulders. This made them taller than their contemporary cousins, the woolly mammoth, but shorter than their immediate predecessors, the imperial mammoth (Madden, 1981). Based on their more southerly geographic distribution, they seem to have been adapted to warmer temperatures than the woolly mammoth and were probably therefore less hairy than *M. primigenius*. They most likely resembled an overly large Asian elephant (*Elephas maximus*) that we see today, only with smaller ears and carrying more massive tusks.

First and Last Mammoths in Washington

The imperial mammoth teeth that have been found in Washington suggest a long presence for mammoths in this state, exceeding at least 300,000 to 400,000 years (Hay, 1927). Additionally, a *M. meridionalis* was found in southeastern Idaho that would allow for the possibility of mammoths in the Pacific Northwest as far back as 1,700,000 yr B.P. (Malde and Powers, 1962). Unfortunately, most Washington mammoth fossils have been recovered without due consideration of their stratigraphic context, so it is difficult to know precisely when *M. columbi* first arrived in the state.

In eastern Washington, the oldest mammoth fossil may be the one recovered from loess of the Palouse Formation near St. John, Whitman County, in 1962 (see site 14 below; Fryxell, 1962). Other early mammoth remains that were found in pre-Wisconsinan-age loess deposits are from Burr Canyon (site 02) and Cheney (site 03). They could be as old or older than the St. John mammoth. In western Washington, Columbian mammoth molars have reportedly been recovered from Whidbey Formation sediments at Scatchet Head on Whidbey Island (Barton, 1992). All of these finds were in stratigraphic contexts that pre-date the last (Wisconsinan) glaciation and therefore suggest a late middle Pleistocene or early late Pleistocene age if not earlier.

We know more precisely when the last Columbian mammoths roamed Washington because their remains, or associated botanical finds, have been dated by radiocarbon analysis. Based on current data from the Puget Lowland, the last mammoths were gone by 15,000 to 17,000 yr B.P., although most of our well-dated sites from this subprovince date to between 20,000 and 22,000 yr B.P. (see sites 11 and 12 below; Barton, 1992). In eastern Washington, Columbian mammoths were still present as late as 11,000 to 13,000 yr B.P. (see sites 01, 16, 17, and 18 below; Waitt, 1980).

As far as we know, Columbian mammoths were obligate herbivores with a dietary preference for grasses, sedges, sages, mosses, ferns, and aquatic plants (Barton, 1998). In both eastern and western Washington, they seem to have been driven from the state by rapidly changing climatic conditions and deteriorating habitat, rather than having been hunted out by Paleoindians, as was once believed. In the Puget Lowland, mammoths were physically blocked from what had previously been their seasonal grasslands range by rapidly advancing lobes of the Vashon glaciation by 15,000 yr B.P. In eastern Washington,

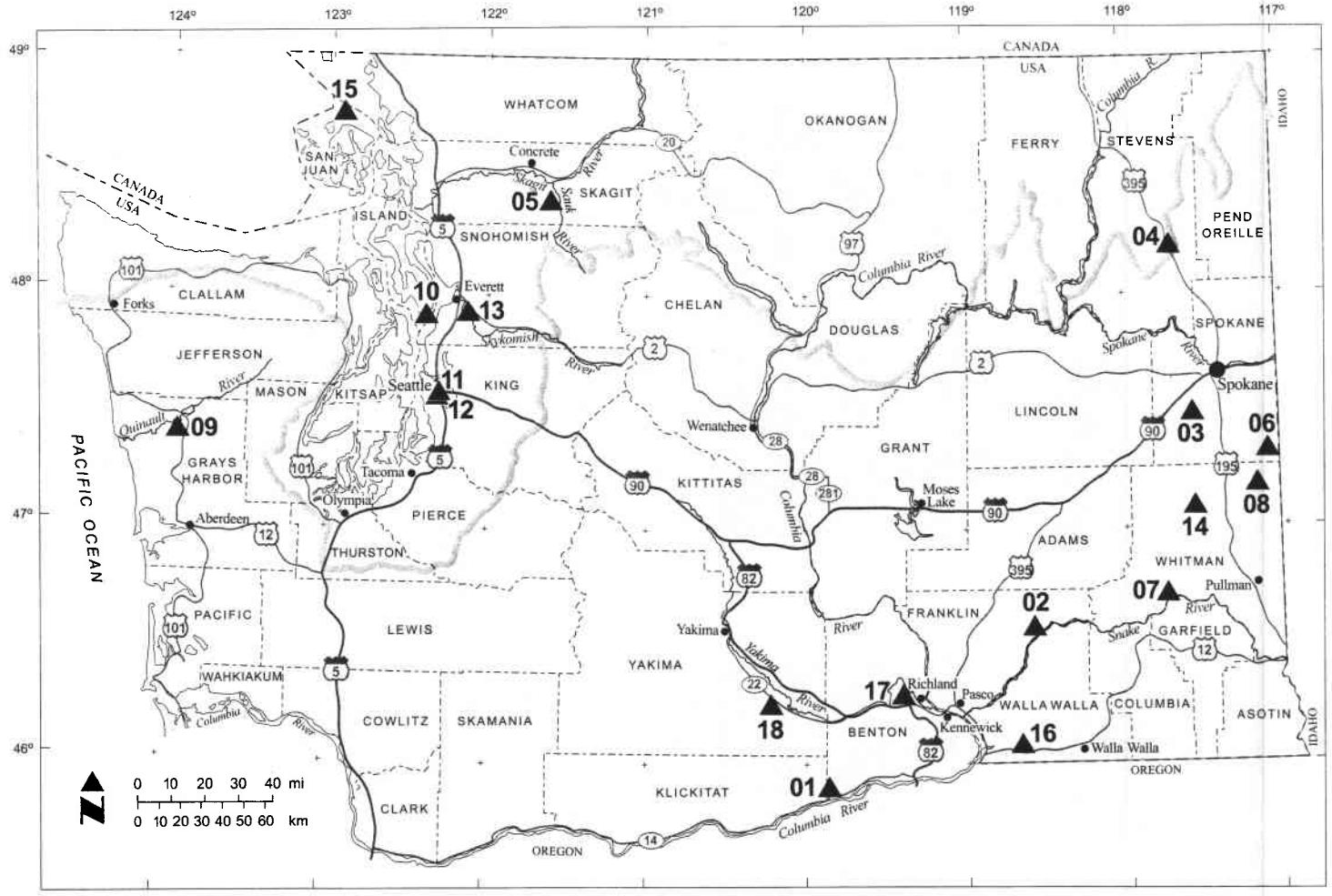

Figure 1. Distribution of Columbian mammoth sites discussed in this article. In westen Washington, mammoths are commonly found in sediments of the Olympia nonglacial interval (20,000–60,000 yr B.P.); in eastern Washington, most mammoths are found in the later part of the Touchet Formation (11,000–20,000 yr B.P.). The shaded line suggests the maximum extent of the Cordilleran ice sheet at the Wisconsinan late glacial maximum (c. 15,000–20,000 yr B.P.). Many finds in western Washington are north of this line; most finds in eastern Washington are well south of the line.

mammoths were eventually driven from the state by the increasing temperatures of the late post-glacial/early Holocene climatic warming at about 11,000 yr B.P.

Some Notable Washington State Columbian Mammoth Sites

The list that follows gives each mammoth find a site number (Fig. 1), a name (based on geographic location), the name of the finder or first reporter in *italics*, the county in which it is located [in brackets], and a brief description of the remains.

01 **Artesian Coulee/Dead Canyon – *Newcomb* [Benton Co.]:** Post-cranial mammoth remains recovered from a blowout within the Touchet Formation. A ^{14}C date on these bones produced an anomalously young date of 4905 ±140 yr B.P. [GX-1457]. They were relatively dated by stratigraphic association to between 11,000 and 13,000 yr B.P. (Newcomb, 1971; Newcomb and Repenning, 1970; Waitt, 1980).

02 **Burr Canyon – *Strahorn/Bryan* [Franklin Co.]:** Most of the skeleton of a very aged Columbian mammoth collected by a soil survey crew of the U.S. Bureau of Soils in 1923 and forwarded to the U.S. National Museum/Smithsonian Institution in Washington, D.C. This mammoth was reportedly recovered from loess deposits in the Palouse Formation, and therefore is probably older (perhaps much older) than 32,000 yr B.P. This find must certainly be older than the mammoths recovered from the flood deposits of the Touchet Formation, which date between 11,000 and 32,000 yr B.P. (Bryan, 1927; Hay, 1927).

03 **Cheney – *Freeman* [Spokane Co.]:** Well-preserved teeth and badly decayed bones of an early Columbian mammoth reportedly found in 1926 by a farmer plowing his fields near Cheney. At least one of the molars, a lower fifth ($?M_5$), was sent to the University of Chicago collections. The bones were found in an older loess deposit directly above a "well weathered" pre-Wisconsinan-age till, suggesting a relative date of mid- to early late Pleistocene. (Freeman, 1926; Hay, 1927).

04 **Chewelah – *Lewis/Hay* [Stevens Co.]:** A single upper right sixth molar (RM^6) collected in 1920 near Chewelah by workmen of the Magnetite Company. Found at roughly 48°15′N, this molar is currently the northernmost reported mammoth find from eastern Washington. All other reported mammoth fossils from eastern Washington have been recovered from unglaciated lands south of the last glacial Cordilleran ice sheet margins. The 'Chewelah' mammoth may have been found at such a northerly latitude because it pre- or post-dates the last glacial maximum or because it occupied unglaciated lands between the Colville

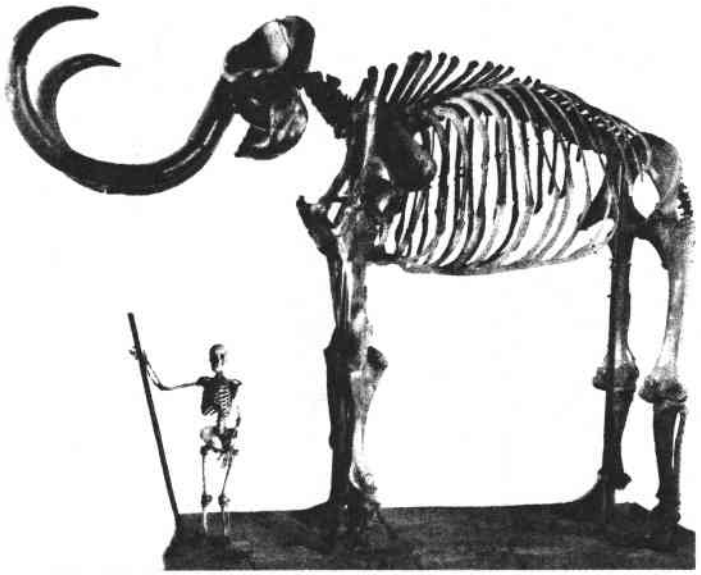

Figure 3. Mounted composite skeleton of a Columbian-type mammoth made from skeletal elements recovered in the 1870s from the 'swamps' at the Copelin Ranch along Latah Creek in Spokane County (site 06). When assembled in 1886 in the Field Museum of Natural History in Chicago, Illinois, this 'mammoth' was considered to be the first fully mounted specimen, albeit a composite from several individuals, of a mammoth in North America. *(Photo from Higley, 1886.)*

and Spokane lobes of the Cordilleran ice sheet at or near its last maximum advance (Hay, 1927).

05 **Concrete/Sauk River – *Thompson* [Skagit Co.]:** Cranium, two tusks, and two upper sixth molars (left and right, LM^6 and RM^6) from sands and gravels exposed above the Sauk River (Fig. 2). Recovered in 1979 by a crew from the Geology Department of Western Washington University. Unlike most mammoth finds in the Puget Lowland, which are generally found within 1 km (0.6 mi) of the marine coastline, this mammoth was located well upvalley (although still at less than 120 m or 394 ft above sea level) and some 60 km (38 mi) east of the nearest marine estuary at Padilla Bay. This site also marks the most easterly known occurrence of a mammoth west of the Cascade Range (Barton, 1992).

06 **Latah Creek/Copelin Ranch – *Higley* [Spokane Co.]:** Bones and teeth of at least six mammoths were taken by the wagon-load from 'swamps' here in the 1870s (Fig. 3). A composite Columbian mammoth skeleton was pieced together from these fossils in 1886 and was displayed in the Field Museum of Natural History in Chicago. At the time, this was believed to be the first fully mounted (assembled) mammoth skeleton in North America. Details of the discovery suggest a post-glacial, post-Missoula floods age for these fossils (Hay, 1927).

07 **Penawawa – *Lewis* [Whitman Co.]:** A large part of the skeleton of a Columbian mammoth was found near here, but was too unstable to be conserved at the time. Nothing is apparently known of the find site or its probable age (Hay, 1927; Madden, 1981).

08 **Pine Creek – *Sternberg* [Whitman Co.]:** Excavations at springs along this creek in the 1870s yielded a considerable number of mammoth bones, some of which were eventually acquired by the American Museum of Natural History in New York. The circumstances of these finds are similar to those at Latah Creek (site 06 above), and their dating is probably roughly contemporaneous with those mammoths (Hay, 1927; Sternberg, 1903).

09 **Quinault River/Blue Banks – *Geoghegan/Hall* [Grays Harbor Co.]:** A partial skeleton of a Columbian mammoth was recovered here from a thick deposit of "blue" lake clays along the lower Quinault River. Current research into the date of these and similar clay units along the outer Washington coast suggests an Olympia nonglacial interval age (~20,000–60,000 yr B.P.) for this find (Thackray, 1996).

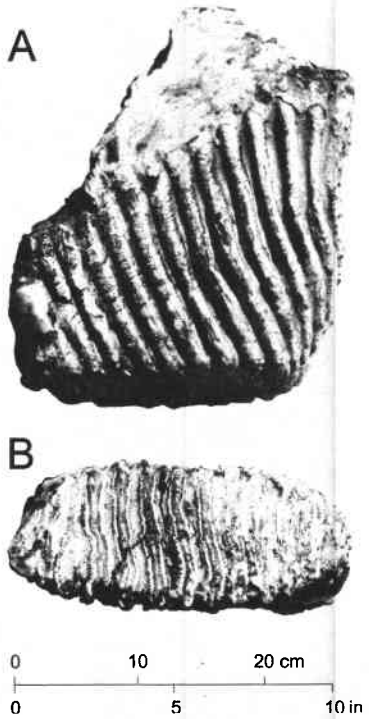

Figure 2. Upper left sixth molar (LM^6) from the Concrete/Sauk River – *Thompson* site (site 05). **A**, lateral (side) view; **B**, occlusal (grinding surface) view. (B. Thompson, private collection.)

10 **Scatchet Head/Whidbey Island – *Willoughby/Lawson* [Island Co.]:** Various mammoth remains found about 1860 at the foot of a seacliff, reportedly brought down to beach level by a massive landslide. These may be the first reported mammoth finds from the state. They were collected by Capt. Charles Willoughby of the U.S. Coast Survey Brig *R. H. Fauntleroy* and donated some 14 years later [1874] to the California Academy of Science (CAS) by J. S. Lawson. No longer in the CAS collections, these fossils are assumed to have been destroyed in the 1906 San Francisco earthquake and subsequent firestorm (Lawson, 1874).

11 **Seattle/Mercer & Yale – *Stewart/Sharahira* [King Co.]:** Skeletal and dental elements of a single Columbian mammoth, unearthed in 1963 during excavations for a freeway access ramp and reported by the bulldozer crew of Allan Stewart and Don Sharahira (Fig. 4). Recovered from a "blue-green clay" unit within Olympia nonglacial interval sediments and relatively dated by stratigraphic association to late in the Olympia nonglacial interval (15,000–25,000 yr B.P.) (Mullineaux and others, 1964). See site 12 below.

12 **Seattle/6th & Seneca – *Green* [King Co.]:** Skeletal and dental elements of a single Columbian mammoth unearthed in 1963 during excavations at the IBM Building site and reported by the bulldozer operator, Byron Green (Fig. 4). Found in a "blue clay" unit within Olympia nonglacial interval sediments. ^{14}C dating of an associated wood sample yielded a corrected age of 21,836 ±300 yr B.P. [UW-55] (Fairhall and others, 1966).

13 **Snohomish – *Preston/Ludwig* [Snohomish Co.]:** A partial skeleton of a mammoth was recovered near here in 1936, and several of the bones (scapula and ulna) were deposited in the Burke Museum at the University of Washington

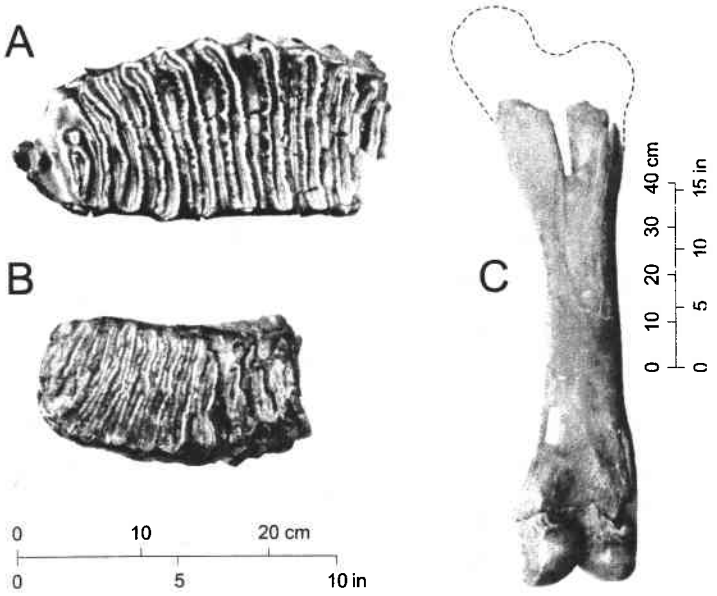

Figure 4. **A**, occlusal view of a lower left sixth molar (LM_6) [UWBM Geology no. 19190] found at the Seattle/6th & Seneca – *Green* site (site 12); **B**, occlusal view of a lower right sixth molar (RM_6) [UWBM Geology no. 27450] found at the Seattle/Mercer & Yale – *Stewart/Sharahira* site (site 11); **C**, lateral view of a right femur (thighbone) [UWBM Geology no. 18817] found at the Seattle/6th & Seneca – *Green* site (site 12). Dashed line indicates missing portion of bone.

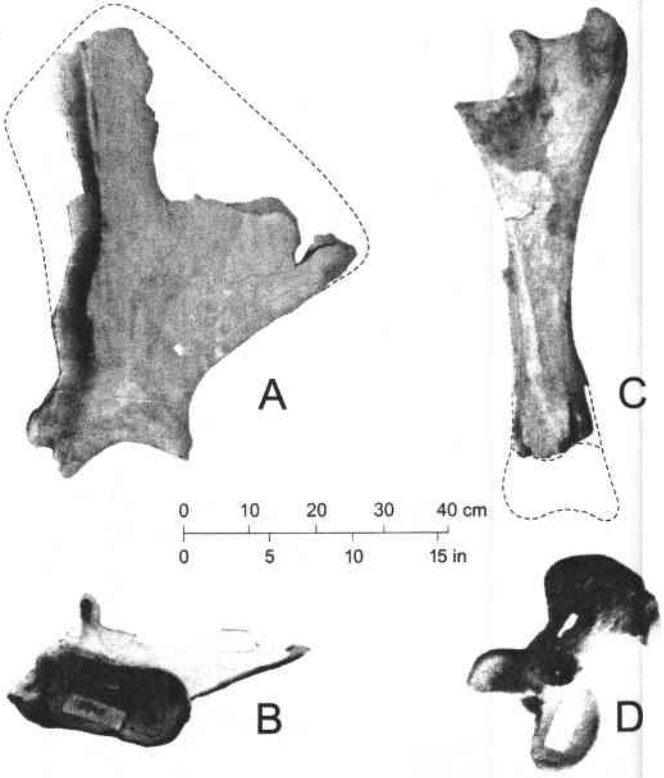

Figure 5. Bones from the Snohomish – *Preston/Ludwig* site (site 13). **A**, lateral view of the left scapula (shoulder blade) [UWBM Geology no. 18540]; **B**, proximal view of the left scapula; **C**, lateral view of the right ulna (distal forearm bone) [UWBM Geology no. 18540d]; **D**, proximal view of the right ulna. Dashed line indicates missing portion of bone.

(Fig. 5). The absolute age of these bones is unknown, and the relative age is uncertain.

14 **St. John – *Fryxell* [Whitman Co.]:** Fragmentary bones and tusks of a mammoth were collected near here in 1962 by a crew from Washington State University. The skeleton was found in slack-water sediments within Palouse Formation loess deposits and was regarded as "not only pre-Wisconsin, but mid-Pleistocene" in age (Fryxell, 1962).

15 **Sucia Island – *Godsall/Newcombe* [San Juan Co.]:** A single lower left fifth molar (LM_5), donated by B. Godsall in 1895 to what is now the Royal British Columbia Museum (Victoria, B.C.) (Fig. 6). Found at roughly 48°45'N, this is currently the northernmost reported find of Columbian mammoth in Washington (Hay, 1927).

16 **Walla Walla/Gardena – *Fulgham* [Walla Walla Co.]:** A "fairly complete" Columbian mammoth skeleton was recovered here in 1966 and placed in the geology collections of Whitman College (Fig. 6). Many of the bones however were crumbly, scattered, and fragmentary "suggesting postmortem redistribution". These bones were found 1.5 m (5 ft) below the surface within the Touchet Formation flood deposits, which suggests an age, estimated by stratigraphic association, of roughly 12,000 to 13,000 yr B.P. (Scott and Clem, 1967; Waitt, 1980).

17 **West Richland – *Jeppson* [Benton Co.]:** A partially articulated skeleton of a Columbian mammoth was excavated here in 1978 by a crew from the Burke Museum at the University of Washington (Fig. 7). The bones were found at a depth of 2.5 m (8 ft) within the Touchet Formation flood deposits and beneath a deposit of Mount St. Helens 'set S' tephra, suggesting an age greater than 13,000, but less than 20,000 yr B.P. (Martin and others, 1982; Waitt, 1980).

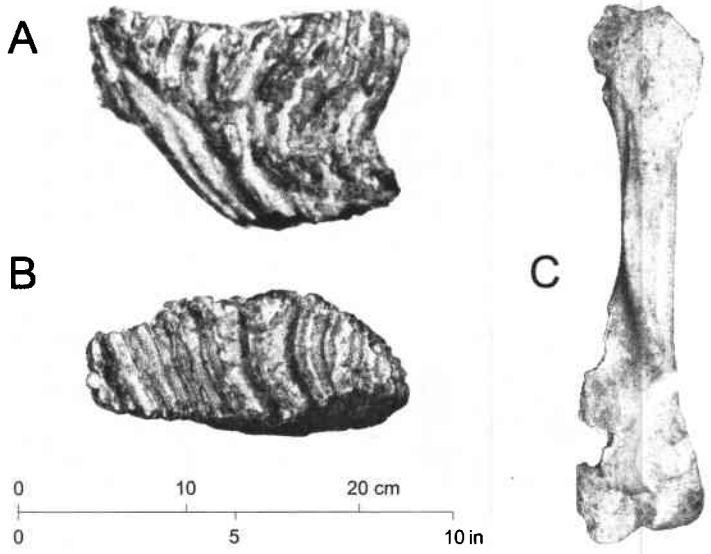

Figure 6. **A**, lateral view of a lower left fifth molar (LM_5) [RBCM no. 170] from the Sucia Island – *Godsall/Newcombe* site (site 15); **B**, occlusal view of the same molar; **C**, right humerus (upper forearm bone) from the Walla Walla/Gardena – *Fulgham* site (site 16) (no scale given).

18 **Yakima Valley – *Gustafson* [Yakima Co.]:** A partial mammoth skeleton was found here, some 2.5 m (8 ft) below a tephra deposit within the Touchet Formation flood deposits. Columbian mammoth remains are common finds in the Yakima Valley from Selah southeast to the Columbia River. Like the West Richland mammoth (site 17 above),

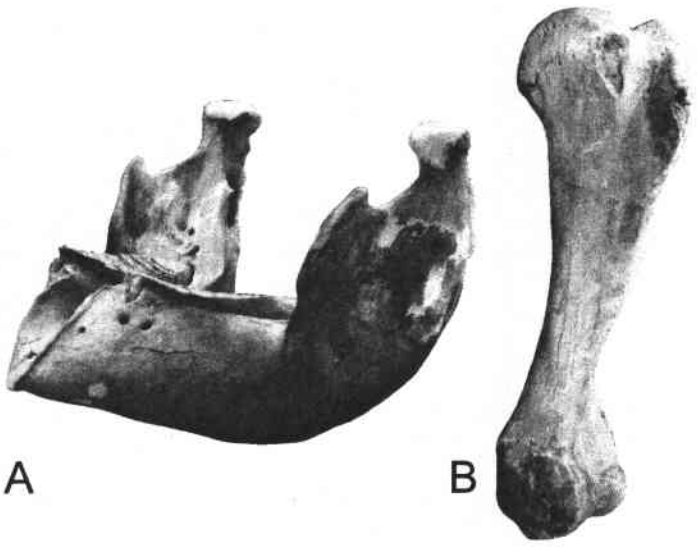

Figure 7. Bones from the West Richland – *Jeppson* site (site 17). **A**, mandible (lower jaw) [UW Burke Museum no. 61675]. Note molars in jaw for scale. **B**, left humerus [UW Burke Museum no. 7828].

the age of this find can be estimated by stratigraphic association as between 13,000 and 20,000 yr B.P. (Waitt, 1980).

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Author's Note: Because of their size and density, mammoth bones/teeth are some of the most commonly found fossils in Washington State. Anyone with such finds is encouraged to contact the author, who will be pleased to examine your specimen(s) for their scientific merit. If you have an interest in mammoths and other Ice Age genera, the following museums have displays featuring such finds: Adam East Museum (Moses Lake); Burke Museum/University of Washington (Seattle); Geology Department collections at Western Washington University (Bellingham) and Whitman College (Walla Walla); Karshner Museum (Puyallup); Sequim Museum (Sequim); and Yakima Valley Museum (Yakima).