observation). Lack of historical influence by flooding on Soap Creek Valley forest cover patterns is probably due to the steepness of Soap Creek Valley hillsides (see Map 5), the relatively large number of creeks within The Valley's boundaries (Map 2), and the relatively high elevation of The Valley's floodplain compared to other Oregon Coast Range tributaries of the Willamette River (Fig. 9). No oral history interviewees recounted particular damage from flooding, although Hanish (1994) described the "roaring" of Berry Creek, a Soap Creek tributary to the immediate north of Soap Creek Valley (see Maps 2 and 9), that followed heavy rains in the 1930s.

This result is supported by photographs of Soap Creek taken from the Tampico Road Bridge (see Map 2) during peak flows of the February, 1996 (in possession of author) and December, 1998 floods (Fig. 8).

Fig. 9. Corvallis area flooding, December 28, 1998. This photograph was taken upstream from the mouth of Soap Creek, near the mouth of the Marys River, at approximately the same time as the bottom photograph on Fig. 8 was taken (Sanders 1998). Photograph by Karl Maasdam, Corvallis Gazette-Times, December 29, 1998.

Dates and measures of waterflow in the Soap Creek Valley area during times of flooding and drought are listed in Table 10. Seasonality of these events

Table 10. Local area flood and drought events, 1861-1977. Data is from Moffatt, Wellman, & Gordon (1990), Benner & Sedell (1997), and Taylor (1999: personal communication).

Location	Year	Mo.	Event	c.f./sec.	Ave. c.f./sec.	Feet
Will./Harrisburg	1861	Dec.	Flood		12,150	20.5
Will./Albany				340,000	14,480	41.0
Will./Salem				500,000	23,610	47.0
Will./Albany	1881	Ja/No?	Flood	266,000	14,480	37.8
Will./Salem				428,000	23,610	44.3
Will./Harrisburg	1890	Feb.	Flood		12,150	20.1
Will./Albany				291,000	14,480	38.9
Will./Salem				448,000	23,610	45.1
Will./Salem	1923	Jan.	Flood	348,000	23,610	38.3
Long Tom/Monroe	1939	Sep.	Drought	7	770	
Will./Salem	1940	Aug.	Drought	2,470	23,610	3.6
Will./Albany		Sep.		1,840	14,480	
Long Tom/Monroe	1943	Jan.	Flood	19,300	770	17.1
Will./Harrisburg					12,150	19.1
Will./Harrisburg	1944	Oct.	Drought	1,990	12,150	
Luckiamute/Peedee		Sep.		7	458	
Will./Harrisburg	1945	Dec.	Flood	210,000	12,150	19.7
Marys/Rock	1946	Aug.	Drought	0.2	51	
Luckiamute/Hoskins		Dec.	Flood	5,560	209	13.2
Luckiamute/Hoskins	1949	Feb.	Flood	5,560	209	
Marys/Rock	1952	Sep.	Drought	0.2	51	
Marys/Rock	1955	Dec.	Flood	2,190	51	6.8
Luckiamute/Hoskins	1962	Sep.	Drought	4	209	
Rickreall/Dallas	1964	Dec.	Flood	7,160	148	8.8
Marys/Philomath				13,600	462	20.7
Luckiamute/Peedee				15,700	458	20.1
Luckiamute/Suver				32,900	905	34.5
Luckiamute/Suver	1966	Aug.	Drought	0.7	905	
Marys/Philomath	1967	Aug.	Drought	0.6	462	
Luckiamute/Peedee				7	458	
Marys/Philomath	1974	Nov.	Flood		462	20.9
Marys/Rock	1977	Dec.	Flood		51	13.2

Location	General location of functioning water gauge at time of event.
C.f./sec.	Cubic feet per second = measured rate of waterflow.
Ave. c.f./sec.	Average rate of waterflow at gauge location, measured in c.f./sec.
Feet	Number of feet above flood stage.

is apparent. Flooding occurs during times of heavy Winter rains, from November to February, and droughts occur during late Summer and early Fall, from August to October (see Fig. 8; Knezevich 1975). The relative magnitude of these events is also indicated on Table 10, with major floods attaining waterflow levels 10 and 20 times (and more) above average levels, and major droughts reducing streamflows to less than 1/100—and even 1/1000—of their average. Although there is no record of "catastrophic" droughts in western Oregon during historical time (Jones & Bradley 1995), seasonal events correlate to times of greatest perceived "fire danger" and to regional wildfires of greatest magnitude (Morris 1933; Zybach 1988). Seasonal droughts also provide conditions that favor native conifer forests over hardwoods in absence of disturbance (Franklin 1981) and grasslands (Risser 1985) and oak savannah (Hills 1974) when subject to periodic fires, grazing, and/ or other management practices. All three conditions (conifer forest, grassy prairie, and oak savannah) characterize major portions of Soap Creek Valley at one time or another from late prehistoric time to the present, strongly indicating a history of seasonal droughts for the past several centuries. Finally, consequences of Soap Creek Valley streams going dry, or nearly dry, during times of seasonal or prolonged drought (see Fig. 8) must be considered when measuring effects on local aquatic plant and animal populations, including anadromous fish species.

Summary. Soap Creek Valley forest cover patterns have been little affected by localized or regional flooding, whether seasonal or catastrophic in size and nature. This lack of influence is likely due to The Valley's elevation and geomorphology, which allow for rapid draining of its hillsides and floodplain. These characteristics, in turn, contribute to the severity of flooding downstream; in lower elevations of Soap Creek, the Luckiamute River, and the Willamette Valley (Fig. 9; see Map 8). Seasonal and prolonged droughts in Soap Creek Valley, while not catastrophic in nature, increase potential for wildfire, encourage conifers, oak, and grasses over other types of vegetation, and affect populations and locations of wild aquatic plants and animals.

Landslides (minor effects)

More than 75% of Soap Creek Valley is classified as part of the "Looney unit," one of nine major geomorphic landforms in the Willamette Valley (Balster and Parsons 1968). This classification is in common with most eastern slope Oregon Coast Range hillsides in Benton County. Looney unit features are typified by "steeply sloping terrain," of which "by far the greatest part . . . must be considered an unstable landscape" (Balster and Parsons 1968). Despite the characteristic steepness of local terrain and the large amount of road building and clearcut logging activity that has taken place during this century, Soap Creek Valley appears less affected than other areas of the Douglas-fir Region by major landslides (Thwaites 1959; Allen & Burns 1986; Phillips 1989: personal communication; Benda 1990; Zybach 1996b) and/or recent landslides of any magnitude (Rowley 1990: personal communication; personal observations 1990; 1999). Rowley (1996) discusses locations and extents of landslides in areas adjacent to Soap Creek Valley, but failed to recall major occurrences within The Valley itself. There is evidence of minor landslide activity in Soap Creek Valley north of Glender Hill and east of Lewisburg Saddle (see Map 2; Rowley 1996), but these events seemed to have left local wildlife populations and current drainage patterns of The Valley unaffected. According to recent (July, 1999) personal observations and oral history evidence, historical impacts of landslides on Soap Creek Valley forest cover patterns have been slight or negligible.

Snowstorms and Freezes (1830-1999)

Catastrophic snowstorms have affected Soap Creek Valley forest cover patterns for over 135 years. These events are not often referred to in terms of "catastrophic," but snowstorms in 1861-62 (Oliphant 1932), 1881-82 (Oliphant 1932; Nettleton 1956; Jackson 1980) and 1937 deposited several feet of snow throughout the Willamette Valley, killing thousands of livestock and causing hundreds of buildings to collapse. These storms resulted in millions of dollars of damage and notable changes to local forest cover patterns. Several informants recalled the 1937 snowstorm (Rohner 1993; Hanish 1994; Olson 1994; Vanderburg 1995), while Starker (1984; see Fig. 10) and Dickey (1995) provide detailed accounts of the 1881-82 event. Dickey (1995) also provided a significant amount of contemporaneous documentation regarding dates and local effects of the 1937 event and reported snowstorms of 1919-1920 and 1969 as severe (see Table 11).

According to Soap Creek Valley informants, primary effects of snowstorms on forest cover patterns are bending and breaking of trees and tree limbs (Starker 1983; Rowley 1996) and flattening of young stands of trees (Rowley 1990: personal communication). A secondary effect is afforestation of fields and meadows made possible by mass elimination of grazing animals (Longwood 1940; Kay 1993: personal communication). As in instances of forestation resulting from reduced human populations, this latter observation is evidenced by conifer stands in the Soap Creek Valley area that date to 1862, 1882, and 1938 (Longwood 1940; Johnson 1996: personal communication).

Reporting on the snowstorm of 1862, Oliphant (1932) observed:

> The winter of 1861-62 was probably the worst in the history of the Pacific Northwest . . . Deep snow covered the earth, and the watering places froze over. Very low temperatures were registered, and by January, 1862, cattle were literally dying by thousands. In all the settled parts of the Pacific Northwest—western Oregon, western Washington, Vancouver Island, eastern Oregon, and eastern Washington—a great tragedy was witnessed.

Surprisingly, the snowstorm of 1951, one of the deepest on record (see Table 11), wasn't mentioned by any of the oral history subjects or consultants. This may have been due to better construction of barns and lesser dependency on livestock in 1950 than before that time, among other factors; for example, see Oliphant (1932) regarding the effects of repeated melting and freezing of snow and ice on livestock mortality between 1847 and 1890 in western Oregon. Nettleton (1956) reported four feet of snow on "Ridge Road" (subsequently renamed Nettleton Road: see Map 2 and Table 2) during the 1950 snowstorm, but makes no mention of damage to trees or livestock.

Fig. 10. T. J. Starker with 1881-1882 "Blue Snow" oak evidence According to Starker (Jackson 1980; Starker 1984), the 1881-82 winter snows were so severe that local ranchers had to fall oak trees so sheep could eat new buds and young bark as fodder.

Table 11. Major snowstorms in Corvallis and Portland, OR, 1893-1999

Year	Date (C)	Corvallis	Portland	Date (P)
1893	Jan.	17		
1909	Jan.	23	12	Jan. 5-10
1911	Jan.	12		
1916	Jan.	22	13	Jan. 30-Feb. 3
1917	Feb.	12		
1919	Dec.	20	17	Dec. 9-11
1937	Jan.	11	16	Feb. 1
1943	Jan.	18		
1950	Jan.	52	22	Jan. 9-18
1954	Jan.	13	10	Jan.
1968			16	Dec.
1969	Jan.	24	18	Jan.
1971	Jan.	15	Jan.	
1989	Feb.	11	Feb.	
1990	Feb.	11	Feb.	
1993	Feb.	15	Feb.	

Year	Year of event
Corvallis	Snowfall measured in Corvallis, OR (Taylor 1999)
Date (C)	Corvallis monthly total (Taylor 1999)
Portland	National Weather Service measures at Portland International Airport (Manning c.1996)
Date (P)	Dates of measured snowfall in Portland (Manning c.1996)

Good records for prolonged or severe freezing are not available. Allen (n.d.) uses the Columbia River as a regional yardstick and reports the river "froze over" from Portland to Vancouver on at least 12 occasions: 1830, 1833, 1840, 1842, 1884, 1888, 1890, 1891, 1894, 1896, 1919, and 1930. Note that the Columbia has frozen over only twice in the last 100 years and never in the last 70 years. The construction of major dams in the 1930s and 1940s may have something to do with this fact, as the Columbia has not frozen over once since that time. Also note that the periods of greatest freezing occurred in the 1830s to 1840s (four events) and 1880s to 1890s (six events). Kane (1925) reports on another, unlisted, 1840s event, on January 11, 1847:

> The morning after our arrival the thermometer stood at 7° below zero. Such intense cold had not been felt by the oldest inhabitants of these regions. It had the effect of killing nearly all the cattle that had become acclimated, as they are never housed. The Columbia, too, was frozen over, an unprecedented circumstance, so that my travels were for a time interrupted.

Note that Allen apparently missed the well-documented 1847 event and that Kane seems unaware of the two earlier 1840s' freezes. Oliphant (1932) cites Kane, among others, regarding impacts of the 1847 snows and freeze on Willamette Valley livestock, likely including a number of animals in the Soap Creek Valley area as well. What effect, if any, these events may have had on the forestlands of Soap Creek Valley is unknown. One type of freeze that has been known to affect stand structure, however, are "silver thaws," when tree tops, branches, and new growth can break away from trees and shrubs due to the weight of ice that can build up in a few hours time. Nettleton (1956) reported extensive local tree damage resulting from a "heavy wet snow" in October, 1936 (this may have been the 1937 event) and from a "sleet storm" in 1942.

Summary. Major snowstorms, freezes, sleet storms, and silver thaws have had a significant impact on the landscape history of Soap Creek Valley. In the past century, at least 14 separate events have resulted in 10 inches or more measurable snowfall. Nine of these events have occurred in January, with the remainder occurring in either December (one) or February (four, including the last three in a row). Snows, freezes, and sleet have affected forest cover patterns in two primary ways: by directly breaking and killing trees and shrubs, and by killing livestock that would have otherwise suppressed new tree growth and regeneration. Silver thaws may affect virtually all woody plants in an area, resulting in widespread breakage of tree and shrub tops and limbs, while major snowstorms seem to affect only patches of trees; age may be a factor, as younger trees seem more seriously affected by snow than older or larger trees (Nettleton 1956). However, snow damage appears more likely than ice to cause tree mortality, due to the weight of snow "folding over" groups of trees rather than simply "pruning" them of new growth and weak limbs (Rowley 1996).

Wildfires (12,800 BP-1941)

Detailed written records of landscape changing fires in the Willamette Valley, including Soap Creek Valley, date to the Fall, 1826 accounts of David Douglas and Alexander R. McLeod (Douglas 1905; Davies 1961). The rings of living and dead trees within Soap Creek Valley boundaries extend the record hundreds of additional years, to at least 1602 (Starker 1939), and to about 1539 in adjacent watersheds (Newton 1970). Pollen counts and archaeological analyses paint a more general picture, but add another 10,000 to 15,000 years to the history of fire and changing landscape patterns in western Oregon forests (Hansen 1941; 1942; 1947; 1967), including those of Soap Creek Valley.

During most postglacial time, from Bretz Floods of the last ice age to present, there has been a pattern of periodic fires in western Oregon (Hansen 1941; 1947; Pyne 1983) that favored establishment and maintenance of wet and dry grassland prairies (Risser 1985), brakes, balds, meadows, camas patches (Smith 1978), berry patches (Boyd 1986), oak savannah (Hills 1974), and even-aged stands of Douglas-fir (Munger 1940; Burke 1979), grand fir (personal observation), and western hemlock (Silen 1989: personal communication). Hansen (1941), remarking on differences between forest evolution history in western Oregon and western Washington, noted:

> Pollen analysis of . . . west central Oregon shows that postglacial forest succession differed from that in the Puget Sound region. This may have been due to the existence of forests in the Coast Range of Oregon during the latter part of the Pleistocene, and the occurrence of many periodic holocaustic fires during postglacial times.

Most of these Oregon Coast Range fires were probably started by people (Pyne 1983), and usually on purpose (Zybach 1988). Another possible cause of periodic fire in the Soap Creek Valley area is lightning, but it is an unlikely source of regular ignition (Burke 1979; Shumway 1981), even on a seasonal basis. The Willamette Valley has one of the lowest rates of lightning strikes in the United States (Taylor 1999: personal communication). Thunderstorms are considered "uncommon" for the entire Douglas-fir Region (Shumway 1981) and Morris claims lightning-caused fires are "rare over most of western Oregon" (Boyd 1986). Nearly all of the historic "Great Fires" and historical prairie fires of large magnitude in the Oregon Coast Range and the Willamette Valley since 1826 can be traced to sources of known (or highly suspected) human ignition (Zybach 1988).

Tree rings can reveal fire scarring on individual trees that date ground fire events (Starker 1939) or, in aggregate with other trees, stand replacement events in which a wildfire "crowns" (leaves the ground and enters the upper branches and tops of forest trees) and kills most or all of the trees within its reach. In referring to late prehistorical and early historical forests of western Oregon, Munger (1940) noted:

> The paths of the great forest fires of the last century or two are plainly marked by even-aged stands, consisting to the extent of at least 90 per cent of Douglas fir (if within the preferred habitat of this tree), regardless of the proportion of Douglas fir in the original fire-killed stand.

The most recent record of a large scale wildfire (as differentiated from seasonal broadcast burning practiced by local Kalapuyan families) in Soap Creek Valley is 1848, according to Starker's interpretation of local tree rings (Starker 1939). This conclusion is supported by the historical record, including military observations to the immediate north of Soap Creek Valley, on August 25, 1849 (Haskin 1958):

> The mountains were enveloped with such a dense mass of smoke, occasioned by some large fires to the south of us, that we could see but little of the surrounding country. These fires are of frequent occurrence in the forests of Oregon, raging with violence for months, until quelled by the continued rains of the rainy season.

<u>Summary</u>. In the 150 years since 1849, there are scattered accounts of only a few minor wildfires in the Soap Creek Valley area (Kessinger 1999). Most of these amounted to less than a few dozen acres of forest (Nettleton 1956; <u>Hanish 1994</u>; <u>Davies 1996</u>; <u>Rowley 1996</u>), or were confined to areas of sloping grassland (<u>Rohner 1993</u>), or even to a single tree (<u>Olson 1994</u>). Thus, catastrophic forest fires have had little or no direct impact on plants and animals of Soap Creek Valley since 1849, or possibly even earlier. This finding is likely a partial result of insufficient local fuels (trees and woody shrubs) to carry a large fire; a condition

caused by seasonal Kalapuyan broadcast burning and firewood gathering practices in the late 1700s and early 1800s, and maintained by intensive livestock grazing, firewood gathering, fence building, and farming from the mid-1840s until the early 1900s.

Windstorms (1931-1999)

One of the primary reasons suggested for great sizes, ages, and volumes of trees and forests in the Douglas-fir Region compared to forests in eastern US, Asia, the tropics, and other areas of the world, is a relative lack of stand-replacing windstorms (Stout 1981; Franklin & Dyrness c.1988). Still, there is an extensive history of catastrophic windstorms in the Pacific Northwest, dating to the 1780s, that has destroyed large tracts of trees in many areas of western Oregon and Washington (Henderson et al., 1989).

The east-west orientation of Soap Creek Valley, and its location on the eastern slope of the Oregon Coast Range, seems to protect it from southerly hurricanes, such as the 1962 Columbus Day Storm (Lucia 1962), and from major Pacific storms from the west, including the November 1981 "Friday the 13th" storm in western Oregon and the 1921 "Big Blowdown" that leveled 8 billion board feet of timber in western Washington (Henderson et al., 1989). Rowley (1996) described and mapped impacts of the Columbus Day Storm on OSU forestlands in Soap Creek Valley and Blanchard (1995: personal communication) provided similar descriptive and cartographic evidence for private forestlands in the same area. In general, impacts of wind on Soap Creek Valley forest cover patterns appear minor when compared to effects on other forestland over much of the Douglas-fir and Oregon Coast Range regions (Lucia 1962).

Rohner (1993) and Hanish (1994) described effects of the 1931 "Dust Storm" from the east, responsible for causing damage to hundreds of acres of trees to the northwest (Oregon Department of Forestry 1933) and spreading a number of Oregon Coast Range wildfires to the west (Grant 1990). Again, effects on Soap Creek Valley forests seem relatively minor when compared to other impacts in the region. Garver (1996: personal communication) noted some "curious, circular" Soap Creek Valley forest damage patterns caused by the

"Friday the 13th" windstorm (see Fig. 2 for an example of windfall from that event). With the exception of the Columbus Day Storm in 1962, most other observers failed to recall any significant changes to Soap Creek Valley forests caused by wind during historical time.

Summary. Several types of catastrophic events have affected forest cover patterns of the Willamette Valley, the Oregon Coast Range, and the Douglas-fir Region during the past 500 years. These events include human plagues (Scott 1928), floods (Benner and Sedell 1997), landslides (Allen and Burns 1986), snowstorms (Dickey 1995), freezes (Kane 1925), volcanic eruptions (Koenninger 1980), wildfires (Starker 1939), and windstorms (Henderson et al., 1989). However, with the probable exceptions of human plagues during the 1830s and snowstorms between 1846 and 1951, most of these events have had a relatively minor effect on Soap Creek Valley forest cover patterns. Furthermore, most landscape changing events in Soap Creek Valley display a remarkable seasonality. For example, major droughts and wildfires occur in August and September (and very occasionally in July or October), major floods occur between November and February, and major snowstorms usually occur in January, with occasional occurrences in December or, more recently, in February. Long-term patterns also show strong correlations to specific periods of time, with major droughts, snows, floods, and freezes tending to occur within a few years or decades of one another over the course of a century. Examples include the Columbia River freezes of 1884-1896, the local snowstorms of 1909-1919, the regional droughts (and wildfires) of 1929-1942 (Zybach 1988; Taylor 1999: personal communication), and the Willamette Valley floods of 1996-1999 (Benner 1998: personal communication; personal observations).

EFFECTS OF WILDLIFE DEMOGRAPHICS

Wildlife have been factors of change in definition and evolution of Soap Creek Valley forests for the past 500 years and for all time that forests have existed in The Valley. "Wildlife" refers to all forms of life that are wild and includes plants, animals, and microorganisms (Hunter 1990). Populations of wildlife, particularly trees and other terrestrial vascular plants, are basic components of horizontal and vertical forest cover patterns. Soap Creek Valley forest cover patterns have been affected by at least four major demographic processes involving local wildlife populations: the introductions and extinctions of wild terrestrial vertebrates, and the introductions and migrations of wild vascular plants. Introduced plants that "go wild" or "become naturalized" are called "wildflowers," "wildings," or "weeds," depending on aesthetic or land management perspectives for definition. Similarly, domestic animals that go wild are called "feral" and introduced undomesticated animals are called "game," "pests," or "vermin."

Animal Extinctions and Extirpations (12,000 BP-1999)

Extirpations are localized extinctions of animals, including those whose presence or absence may directly affect vegetation patterns. Many animals, including elephants, beavers, bears, ungulates, anopheles mosquitoes, and honeybees, are recognized for their capabilities to affect forest cover patterns (Boyd 1986; Crosby 1986; Naiman 1988; Kay 1994). The earliest documentation of vertebrate extinction in Soap Creek Valley is fossilized elephant remains (Fig. 11) described by Glender (1994). Significant archaeological and geological evidence suggests that elephants and other extinct ice age megafauna may have been common in the Willamette Valley 12,000 BP (Cressman 1946; Allen 1984). These findings support the likelihood that such animals were contemporaries of early humans in the region (Hansen 1947), and that extinction may be related to human causes, including hunting (Doughty 1974) and broadcast burning (Kay 1995). This reasoning is supported by physical evidence, including extinct animal fossils in prehistoric cooking fires (Cressman 1946) and existence of larger killing and butchering tools in early prehistoric times than used in later periods (Aikens 1975). The latter factor is supported in Soap Creek Valley by a large obsidian biface discovered over 60 years ago on Forest Peak (see Map 2; Fig. 12) by Hanish (1994). This artifact was dated 3000 to 9000 years of age and presumed made for killing or butchering large mammals (Snyder 1990: personal communication; Zybach et al., 1990).

The journals of Soap Creek Valley explorers and writings of pioneer Willamette Valley residents list several animals that have been extirpated during early settlement and late presettlement time. This list includes grizzly bears

Fig. 11. Glender Brothers' Tampico Spring elephant teeth, c.1919.
Top Photograph. Members of the Glender family posing with OSU historian John Horner along with other OSU dignitaries and two elephant teeth discovered on their Soap Creek Valley farm "in 1919" (possibly c.1926). Photograph and date provided by Eugene Glender; photographer unknown.
Bottom Left. The discovery of the largest tooth created local attention and was profiled in local newspaper articles and Oregon history texts for public grade schools (see Glender 1994). Note reference to Carson DLC (see Map 2; Table D.2). Unidentified news clipping provided by Elvera Glender Muller.
Bottom Right. William Glender and the largest of the two teeth, featured in old newspaper clipping (provided by Eugene Glender; see Zybach 1989).

Fig. 11.

ELEPHANT TEETH FOUND

OREGON ANTIQUITY PROVED BY RECENT DISCOVERY.

Relics of Prehistoric Animals in Soap Creek Valley Thousands of Years Old.

OREGON AGRICULTURAL COLLEGE, Corvallis, July 29.—(Special.)—While cleaning out an artesian spring on their farm, which was formerly the David Carson donation claim in Soap Creek valley, 10 miles north of Corvallis, W. C. and Charles Glender found bedded in wash gravel under three feet of top soil and five feet of blue clay subsoil two large well-preserved teeth.

Dr. John B. Horner, professor of history, with some summer session students, found that the teeth belonged to two elephants. One tooth weighed 15 pounds and the other two pounds. The discovery is also considered another evidence that Oregon is very ancient, since these animals, according to geologists, disappeared from North America many thousand years ago. It was also pointed out that the best preserved elephant and mastodon remains in western Oregon are usually found in the beds of blue clay which are so fine of texture as to be almost impervious to water and air.

Although elephant remains have been discovered in various localities of the Willamette valley, this find is of peculiar interest locally, inasmuch as a special search for elephant bones has been in progress here for five years.

OLD ELEPHANT TOOTH FOUND NEAR CORVALLIS

WILLIAM GLENDER AND TOOTH HE DISCOVERED.