

AN ABSTRACT OF THE THESIS OF

Lindon B. Hylton for the degree of Master of Arts in Interdisciplinary Studies in Anthropology, History, and History presented on December 11, 1998. Title: Peavy Arboretum: An Archaeological and Historical Investigation of a Willamette Valley Landscape.

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Abstract approved:

Richard E. Ross

This thesis documents a period of ecological and cultural change on a Willamette Valley, Oregon landscape. In particular, this study examines the Peavy Arboretum area and the cultural changes that accompanied the transformation of the landscape from an oak savannah in the mid-nineteenth century to a dense Douglas-fir forest in the early twentieth century. Culturally, the inhabitants of this period included late-prehistoric native people, Euro-American based fur industry personnel, and Euro-American settlers.

As a student of history and archaeology, I have used a combination of methods and sources for this study including surface surveys for cultural materials and features, archaeological excavations and analysis, and documented materials. Knowledge gained as a result of surveys and excavations are studied within the context of other Willamette Valley archaeology, and likewise, documented materials concerning this landscape and its historic features and people are compared against larger patterns in the history of the American West.

Geographically, the study area was in a fortunate position to witness cultural events. Located along the edge of the foothills of the Willamette Valley, its many

desirable features attracted both native people and the first white settlers. The study area was also located along a main route of travel that was used by natives, fur company personnel, travelers, and Euro-American settlers. The section of trail has been a part of regional travel routes known at different times as the Hudson's Bay Company Trail, the California Trail, the Southern Route (Scott-Applegate Trail), and the Territorial Road.

The objective of this thesis was to see what kind of information could be retrieved for a given landscape using a variety of methods practiced in history and archaeology. I believe such a multi-disciplinary approach allowed me to be more flexible and open to all pertinent sources of information. This type of investigation also provided an example of the type of work that could be done professionally when determining the cultural significance of a property. My fascination with the study of landscapes and their cultural features was also influential in my selection of a thesis topic.

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Peavy Arboretum: An Archaeological and Historical Investigation of a Willamette Valley

Landscape

by

Lindon B. Hylton

A THESIS

submitted to

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Lindon B. Hylton, Author

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The credit for this thesis goes to several people and institutions. Foremost, I wish to thank committee members William G. Robbins, Barbara Roth, Richard E. Ross, and Mina Carson. These individuals offered continual encouragement and demonstrated much patience.

William Robbins consistently guided me through the thesis process and spent considerable time reviewing my efforts. William Robbins also taught the classes that awakened my interest in environmental history and the history of the American West. In these subjects, I found literature that successfully weaved my academic and professional interests into a narrative account.

Richard Ross has also been a great influence on this thesis through his knowledge of archaeology and his continuing commitment to American Indians. Through Ross, I was introduced to powwows, the Native American Student Association, many friends, and other aspects of American Indian life that will remain an important part of my life.

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conducted at Peavy Arboretum. She has directed me towards many sources used in my thesis and has provided continual feedback throughout my college education and into my thesis.

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The Oregon State University Research Forest hired me as a student archaeologist, thus, facilitating the research used for this thesis. They also provided funds for testing at the Arboretum to match the contribution from the Oregon State Historic Preservation Office grant. And of course, their property was used for this research.

I would also like to thank Bob Zybach and Royal Jackson whose earlier historical studies at the Research Forest provided the groundwork for my own. Bob Zybach shares a similar interest in environmental history, and his opinions on my subject matter were greatly appreciated.

My study received a great boost through the cooperation of Jerrold Bowman, whose private property adjoins the Arboretum. Jerrold Bowman's property was formerly the centerpiece of a Donation Land Claim that included the Arboretum. The property is an excellent example of a historic landscape that remains despite the great changes occurring in its surroundings. His property provided me with the historic landscape that is documented in my thesis, and is so central to my interests. On the

subject of historic landscapes, I also owe a great thanks to Ron Gregory, whose expertise in photography are responsible for many of the great photographs of the historic Thomas Read property.

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Table of Contents

	<u>Page</u>
1. INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Research Focus.....	4
1.3 Historical Background of Peavy Arboretum as a Forest.....	9
1.4 Justification for Research Topic.....	10
1.5 The Geographic Setting of Peavy Arboretum.....	10
1.6 Synopsis.....	12
PART I. THE NATIVE LANDSCAPE.....	13
2. ENVIRONMENTAL AND CULTURAL BACKGROUND OF THE WILLAMETTE VALLEY.....	13
2.1 Geological Events.....	13
2.2 Human Antiquity in the Willamette Valley.....	14
2.3 Early Cultural Development in the Willamete Valley.....	16
3. THE WILLAMETTE VALLEY AT EURO-AMERICAN CONTACT.....	24
3.1 A Fire-Created Environment.....	24
3.2 Models of the Fire-Created Environment.....	26
3.3 Objectives of Prescribed Burning.....	32
3.4 Plant Use by Native People.....	40
4. THE KALAPUYA.....	43
4.1 Introduction.....	43

Table of Contents (continued)

	<u>Page</u>
4.2 Demography and Disease.....	4 3
4.3 Social and Political Organization.....	4 6
4.4 Seasonally-based Residential Patterns and Subsistence Strategies.....	4 9
4.5 Trade and Regional Exchange Patterns in the Upper Willamette Valley.....	5 4
4.6 Settlement Systems for the Late Archaic Period.....	5 6
5. THE ARCHAEOLOGICAL TESTING AND ANALYSIS OF SITES IN PEAVY ARBORETUM.....	6 0
5.1 The Origins and Justification of Testing.....	6 0
5.2 The Sites.....	6 2
5.3 Testing Methodology.....	6 5
5.4 Excavations.....	6 7
5.5 Lithic Analysis.....	6 9
5.6 Summary of Testing.....	8 0
PART II THE TRANSFORMATION OF THE LANDSCAPE.....	8 2
6. EURO-AMERICAN CONTACT WITH THE PACIFIC NORTHWEST.....	8 2
6.1 Exploration of the Pacific Northwest.....	8 2
6.2 The Fur Trade.....	8 4
6.3 The Willamette Valley and External Economic Forces.....	8 5
6.4 Exploration and Fur Outposts in the Willamette Valley.....	8 6
6.5 First Euro-American Contacts with the Study Area.....	8 7

Table of Contents (continued)

	<u>Page</u>
6.6 Faunal Change.....	90
6.7 Prescripted for Settlement.....	91
7. EMIGRATION AND SETTLEMENT	93
7.1 Settlement and Manifest Destiny.....	93
7.2 An Inauspicious Beginning.....	95
7.3 Social Precedents to Settlement.....	96
7.4 Levi Scott: The Experience of One Emigrant.....	98
7.5 The Southern Route.....	102
7.6 Thomas Read: An Introduction.....	104
8. LAND CLAIMS.....	107
8.1 Provisional and Donation Land Claims.....	107
8.2 Removal.....	108
9. SETTLEMENT AND TRANSFORMATION OF THE LANDSCAPE.....	115
9.1 Early Settlement Locations.....	115
9.2 Road Development.....	117
9.3 Homestead Life.....	119
9.4 Developing Economies.....	124
9.5 Agricultural Development on the Thomas Read Farm.....	131
9.6 Thomas Read: The Landholder.....	139
9.7 A Landscape Transformed.....	140

Table of Contents (continued)

	<u>Page</u>
10. PEAVY ARBORETUM AND MCDONALD FOREST AS A SCHOOL FOREST.....	150
10.1 Introduction.....	150
10.2 The Conservation Era.....	150
10.3 Camp Arboretum: A Civilian Conservation Corps Camp.....	152
10.4 Camp Adair: The Military Years.....	155
10.5 Oregon State University Research Forest.....	155
11. CONCLUSION.....	158
BIBLIOGRAPHY.....	162

LIST OF FIGURES

<u>Figures</u>	<u>Page</u>
1.1 Peavy Arboretum Vicinity Map.....	2
1.2 Peavy Arboretum location map.....	3
1.3 Gibbs and E.A. Starling 1851.....	5
2.1 Location of Beringia.....	15
2.2 Willamette Valley Projectile Points:	17
2.3 Atlatyl.....	18
5.1 Projectile point drawings from 35-BE-51.....	75
5.2 Projectile point found in Level 11.....	75
9.1 West view of the historic Thomas M. Read house built by Bushrod Wilson in 1858 (Works Progress Administration 1938).....	145
9.2 Looking at the cutbank of an old water flume.....	145
9.3 Looking east along the ruts of what is beleived to be the Hudson's Bay Company (HBC) Pack Trail and California Trail.....	145
9.4 Looking west along the wagon ruts with McDonald Forest in the background.....	145
9.5 Looking north at an old English Walnut and an old apple orchard.....	145
9.6 Looking north at a pear tree in an old orchard.....	145
9.7 Sketch map of the Bowman property and some of its historic features.....	145
10.1 1936 Air Photo of Camp Arboretum and McDonald Forest.....	153
oversized map.....	envelope

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PEAVY ARBORETUM: AN ARCHAEOLOGICAL AND HISTORICAL INVESTIGATION OF A WILLAMETTE VALLEY LANDSCAPE

1. INTRODUCTION

1.1 Introduction

Peavy Arboretum is a 188 acre property (Anderson 1939:15) that is the focal point for the adjoining 11,500 acre McDonald-Dunn Oregon State University Research Forest. The Arboretum and surrounding McDonald-Dunn Forest are located immediately north of the city of Corvallis in northern Benton County, Oregon. The property is on the western edge of Oregon's upper Willamette Valley, on a spur of coastal foothills that extend east within a few miles of the Willamette River (Figure 1.1 and Figure 1.2). The foothills of Peavy Arboretum and the surrounding McDonald-Dunn Forest are primarily covered with dense second-growth Douglas-fir forests that have replaced the grasslands, scattered oaks, oak groves, and isolated Douglas-fir that were present on the landscape prior to Euro-American settlement. The Oregon State University (OSU) School of Forestry currently manages the land as a teaching, demonstration, and research forest with a management emphasis. Timber harvested from the property provides much of the revenue responsible for maintenance and operations as well as assisting teaching and research projects conducted in the Research Forest.

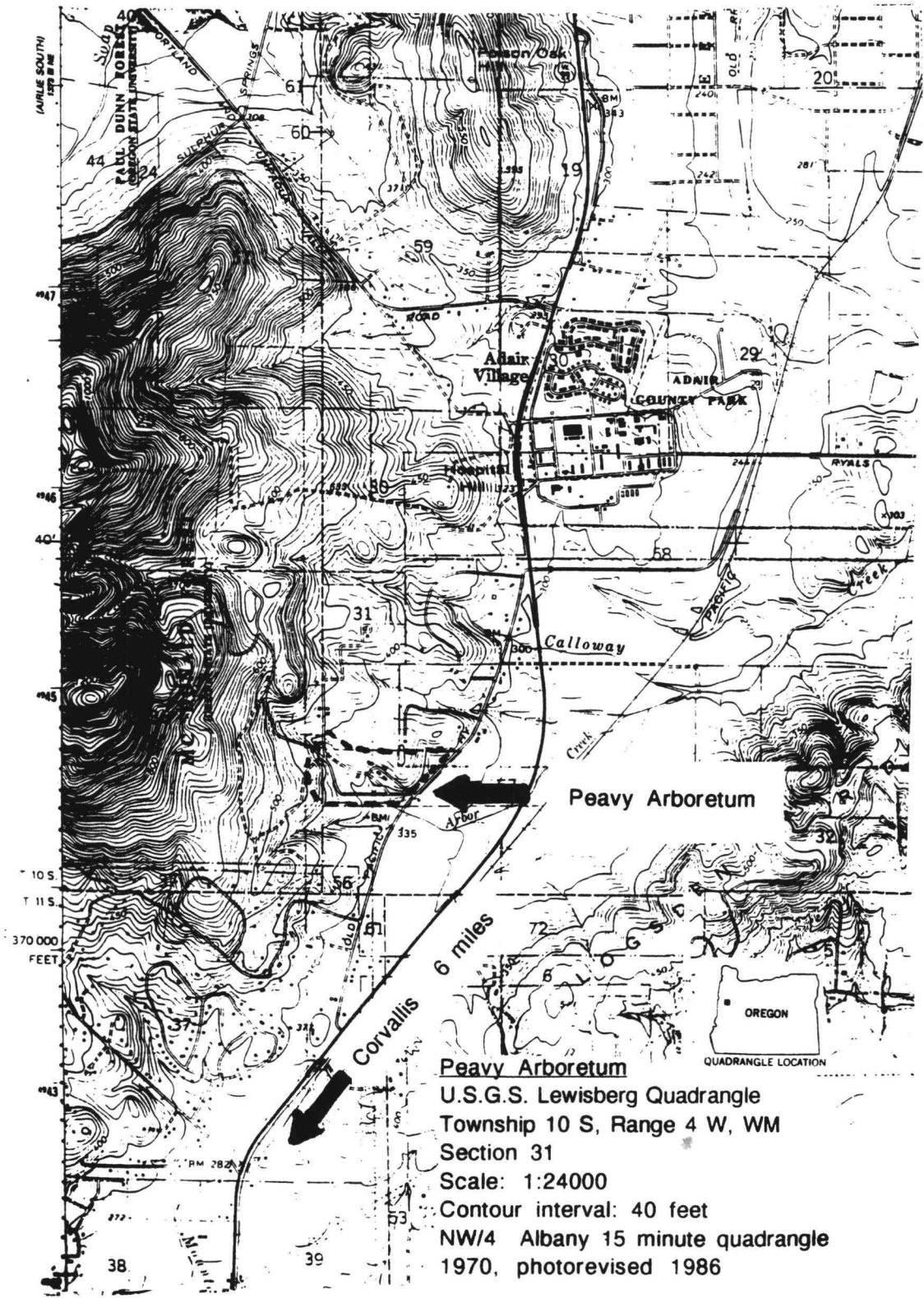


Figure 1.1 Peavy Arboretum Vicinity Map

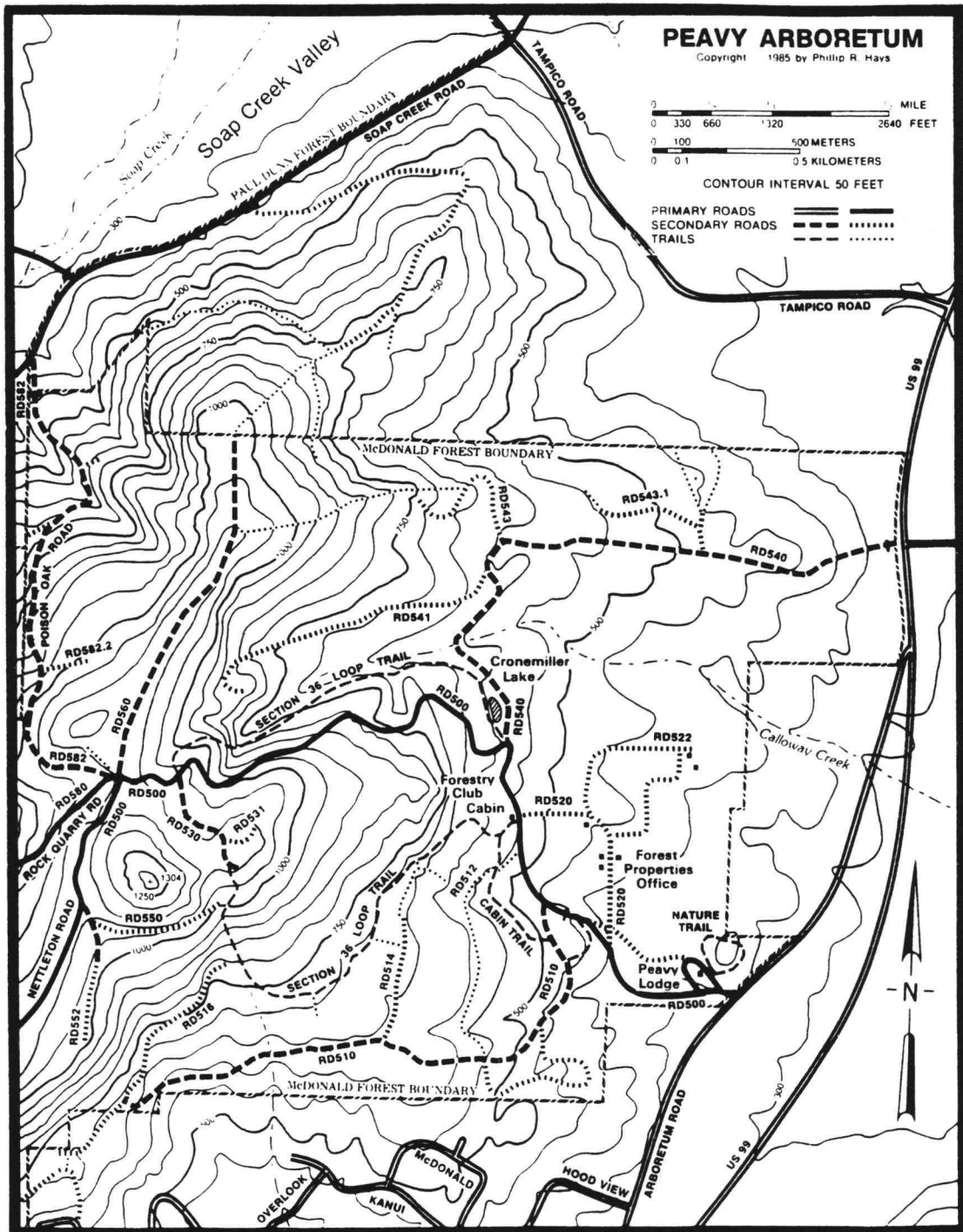


Figure 1.2 Peavy Arboretum location map

1.2 Research Focus

The contemporary landscapes of Peavy Arboretum and its surroundings are a product of a complex relationship that interweaves both the human and natural. An artifact found in archaeological testing in Peavy Arboretum indicates an origin for this relationship extending back several thousand years. Historical and archaeological studies have examined how environments influence human cultures, and likewise, how nature has been transformed through human activity. The object of this thesis is to examine these relationships on a common landscape through archaeological surveys, sub-surface testing, and documented history. In particular, this thesis documents a period of dramatic change on the landscape as it was transformed from an area formerly characterized on an 1851 map as "rolling hills sparsely covered with oak" (Figure 1.3), to the dense Douglas-fir forest of the twentieth century.

In chronicling this period of ecological change on the Arboretum's landscape, this thesis documents how the introduction of Euro-American people and their economic system overwhelmed native people and their environment. It contrasts an indigenous culture whose subsistence means relied on generations of accumulated knowledge of their environment, to an emigrant culture driven to this location by the needs of an expanding, outward looking economy. As part of an international exchange system, Euro-American immigrants eventually altered the environment to achieve its maximum market production value.

Discussions about the relationship between core/metropolitan centers of power and dependent peripheral regions of resource wealth have usually been concerned with western nations and their relationship with third world communities (Robbins 1994:165). However, several works have applied this theory both within the

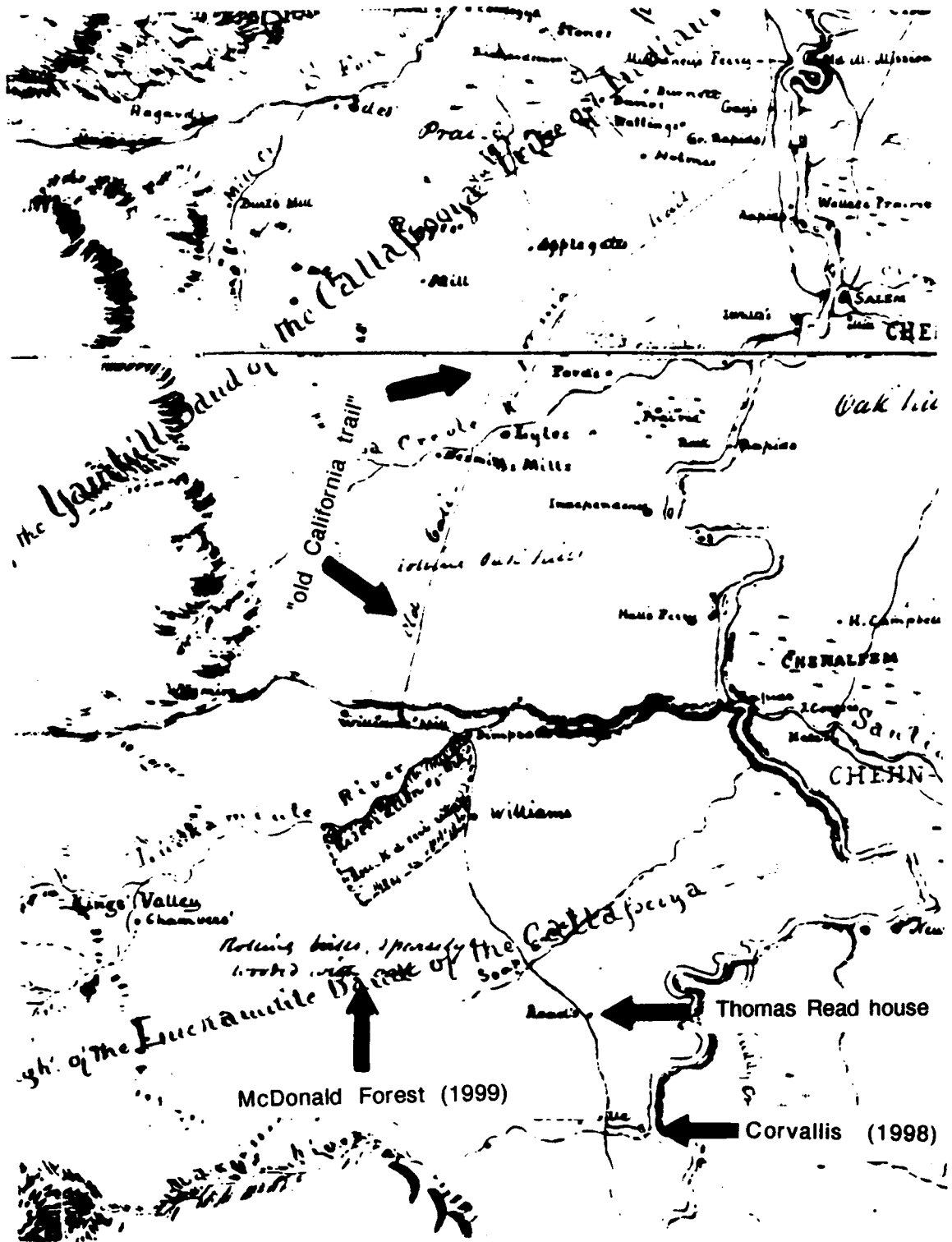


Figure 1.3 Gibbs and E.A. Starling 1851. Sketch of the Wallamette Valley showing the purchases and reservations made of the Board of Commissioners to treat with the Indians of Oregon, April and May 1851.

American West and to its extra-regional relationship with national and international centers of commerce (Cronon 1991; White 1983; Pomeroy 1968; Robbins 1994). This thesis demonstrates how this model can be useful in understanding the changes that occurred on one small landscape as a result of an ever-expanding sphere of Euro-American influence. As will be demonstrated, changes on the landscape occurred not just in a local context, but in response to distant economic forces. From the time of Euro-American contact with the landscape, the market economy was a centralizing force between centers of commerce and resources. At the initiating end of this economic relationship was eastern United States, San Francisco, or European capital, and at the producing end was the physical landscape and its marketable resources. Between these ends were several intermediary relationships of power. For example, wheat grown on this landscape (Peavy Arboretum and its surroundings) in 1880 might be destined for San Francisco or Liverpool, England. But between the wheat fields and its San Francisco or Liverpool destinations, other intermediary relationships of power were created between the farmer and the regional center at Corvallis, or between Corvallis and the shipping ports of Portland and San Francisco, or between those cities and their international markets.

In examining the process of settlement in the Arboretum area, this thesis also addresses a dominant theory in the historical depiction of the American West. Frederick Jackson Turner presented his influential frontier thesis in 1893 to the American Historical Association in Chicago. Just prior to Turner's presentation, the director of the census reported that the American West now exceeded a density of two or more people per square mile and had surpassed the report's standard for "free land." Turner cited the census report and declared the closing of an era in history of the American West. In Turner's understanding, the American West had completed the development from a

"frontier" society to settlement, much like the earlier experience of Euro-American settlement. In Turner's thesis, and in the minds of many of his contemporaries, the "open" land of the "frontier" American West was linked to opportunity for its settlers. The frontier experience was supposedly a character-building process that promoted resourcefulness and individualism among its participants. With the growing urbanization of the American West, Turner and many others of the time lamented the loss of open land and its associated values.

More recent historians have pointed out the contradictions in the Turner thesis, primarily referring to his Eurocentric understanding of the historical process that ignored the experiences and perspectives of American Indians, as well as the secondary treatment given to ethnic groups, women, common workers, and others in his depiction of the American West. And in contrast to the independent qualities of frontier inhabitants stressed in the Turner thesis, scholars have presented evidence that the local extractive economies of the American West were, and still are, often dependent on international markets and large, outside sources of corporate wealth.

In the process of researching and writing this thesis, I have recognized many exceptional traits in Euro-American immigrants, at least as characterized in the Turner thesis. Land of the American West played an undeniable positive and formative role in the characters of many homesteaders. A small portion of these individuals seized the opportunity presented in the developing society and were rewarded with material wealth, or sometimes even notoriety in history. The experiences of the first two Euro-American individuals to reside on Arboretum land seem to validate the Turner theory. Levi Scott, who briefly settled on the location in 1846 (currently the Arboretum and neighboring private property), left misfortune behind in the Midwest and eventually earned a special place in history for several notable achievements that will be discussed

later. Thomas Read, who subsequently occupied the property, also started from modest means and died with extensive landholdings as one of the most prosperous residents of the community. However, these two individuals stand out in the documented materials because of their success, and possibly because their experiences appear to support a popular, long-held myth about the American West. Often overlooked when examining the documented materials are the more common experiences of other participants. For example, many individuals who settled on property surrounding Read's land claim also persevered through equally great hardships in emigrating and settling in Oregon. But their names disappear from local records after Read purchased their property. Read recognized the market potential of the property and made investments, and as a consequence, was able to amass wealth and become a long-standing member of the community. It is also important to acknowledge the extra-regional markets (both national and international) and developing technologies of the late nineteenth century that enabled Thomas Read to develop his modest homestead into a large agricultural enterprise.

An inherent bias exists in the documented record (particularly so for American Indians and other non-literate people in history). Evidence detailing the movements of the lesser known individuals, especially the more transient, are more difficult to obtain, and as a consequence, their experiences are difficult to determine. However, their lives must be acknowledged as part of a more accurate, inclusive, and I think, a more interesting history of the American West.

1.3 Historical Background of Peavy Arboretum as a Forest

Land that is presently Peavy Arboretum has been forested since the early twentieth century. Observers reported in 1911 that the surrounding hills of McDonald Forest were covered in second-growth forests that appeared after the cessation of human induced burning (Anderson 1939:7). As a further indication of the maturity of forests that had grown on the former oak savannah, that same year, a small sawmill was operating on Calloway Creek in a location that is now within McDonald Forest and adjoins the Arboretum. Eighty acres of trees were logged from within the current Arboretum boundaries in 1916 (Anderson 1939:9).

The Clark-McNary Nursery was created in 1925 within the current boundaries of the Arboretum. In order to accommodate the space for the nursery, a dense stand of trees was cleared from the grounds (Anderson 1939). The location was officially dedicated as Peavy Arboretum in 1926 in honor of George W. Peavy, the Dean of the School of Forestry at Oregon State Agricultural College. In the dedication, the Arboretum's mission was described as "three-fold", as a "classroom . . . research laboratory . . . (and) demonstration forest" (Anderson 1939:5).

Peavy Arboretum was the site of Camp Arboretum between the years 1933 and 1944, a Civilian Conservation Corps (CCC) camp whose tasks were concerned with forestry projects such as forest fire training, reforestation, and stand improvement. The School of Forestry at Oregon State Agricultural College (and later OSU) has managed Peavy Arboretum and the surrounding McDonald Forest (and later Dunn Forest) as part of the Research Forest. Since its acquisition by Oregon State University, vegetation on the property has been deliberately introduced and managed for the objectives of the forest school.

1.4 Justification for Research Topic

In contrast to previous histories of Peavy Arboretum and McDonald-Dunn Research Forest that have centered primarily on forest-related topics (the growth of the OSU School of Forestry, Camp Arboretum and Civilian Conservation Corps, etc.), this study focuses on the earlier transformation of the landscape that concluded with the growth of Douglas-fir forest in the beginning of the twentieth century. In focusing on the late-prehistoric and early historic era, this study documents dramatic changes that have not been sufficiently addressed in previous cultural histories of Peavy Arboretum and McDonald-Dunn Forest. The landscape experienced a rapid, culturally-induced ecological transformation in the space of a half century, dating from the first Euro-American settlement in the scattered oak landscape of 1846, to the growth of dense Douglas-fir forest in the early 1900s. By focusing on environmental change, this study hopes to further an appreciation of previous cultural practices and their influence in shaping the landscape.

1.5 The Geographic Setting of Peavy Arboretum

Peavy Arboretum has witnessed more than its share of human activities owing to the strategic geographic location it occupies for human habitation. Ecologists use the terms "edge" or "ecotone" to describe transitional ecological zones such as the one found in Peavy Arboretum. The Arboretum is oriented along a 600 ft. elevation between the foothills of the Coast Range and the Willamette Valley floor (220 ft.) that sharply ascends to 1000 ft. in less than a mile (Figure 1 and Figure 2). Edge environments offer several advantages for human settlement that were recognized by native inhabitants, and later by the first Euro-American settlers. A diversity of animal and

plant life characterizes edge areas, many of which were used by its human inhabitants. These areas also characteristically contain springs and creeks that were also essential to the daily lives of its indigenous people, and later, Euro-American settler populations. Valley edge locations also occupy a zone slightly above the floodplain, free from the inundation that formerly covered the valley floor (before modern flood control) and made the land inhabitable during large portions of the year. Archaeological studies also indicate the advantages of edge environments for prehistoric populations of the upper Willamette Valley (Gilsen 1989; Cheatham 1988; and others). The profusion of prehistoric lithics found in Peavy Arboretum and throughout McDonald-Dunn Forest are indicative of the activities of native people that were concentrated along this geographic zone.

The geographic setting was also was also responsible for a major regional trail in the Arboretum area. Travelers on this section of the trail followed the edge of foothills during the wet seasons in order to avoid the inundated valley floor. This section of trail (with slight variations) developed along with its cultural surroundings and was absorbed into different trail/road systems referred to at different times as the Indian trail, Hudson's Bay pack trail, old California trail, southern route/Scott-Applegate Trail, Territorial Road, Pacific Highway, Highway 99 West, and today, Arboretum and Tampico Roads). Euro-American settlers coming to Oregon on the Oregon Trail would typically follow either the trail from the north or south into the interior Willamette Valley and then settle along the trail's borders. In the many identities it assumed, the trail was particularly influential in both the pace and form of development that occurred along its borders. The central role of the trail to the lives of settlers and to earlier inhabitants is expressed in following description from the *History of the Willamette Valley Oregon* (Clark 1927:368):

The old Indian trails ran along the valley at the base of the hills, and people whose chief means of transportation was afoot or on horseback would not stray far from these ready made paths Roads during those early days were non-existent; communication with the northern settlements in the valley was maintained by the river and over the trail known as the "California route". This was a rough, ill-defined wagon road extending from upper California; coming out of the Umpqua Valley by way of Elk Creek to the headwaters of the Siuslaw River and reaching the Willamette Valley by way of the Long Tom, it passed through the valley on the west side of the river, and connected with the settlements on the Columbia. It had been the general route over which early day explorers and fur traders had traveled. The Hudson's Bay brigades used it on their trips to the Umpqua and Upper California.

1.6 Synopsis

This thesis will examine the cultural past of Peavy Arboretum and its surroundings using a variety of methods practiced in archaeology and history. Ethnographies and documentation of the past landscape will be combined with archaeological surface surveys and subsurface excavations in order to re-construct the late-prehistoric environment and the subsistence strategies of its inhabitants. Then the investigation will focus on the cultural activities that accompanied the transformation of the prehistoric/contact era landscape. Attributes of the land will be considered that attracted native people and the first Euro-American settlers to this particular environment. I will then demonstrate how Euro-American settlement in the area and its accompanying ties to a market economy eventually transformed the environment to one reflective of national and international market needs. The present environment will then be examined in the context of past cultural events.

PART 1: THE NATIVE LANDSCAPE

2. ENVIRONMENTAL AND CULTURAL BACKGROUND OF THE WILLAMETTE VALLEY

2.1 Geological Events

Contemporary landforms of the Willamette Valley owe much of their origin to geologic events associated with the late Wisconsin glaciation (25,000 years before present-14,000 years before present) (Fagan 1991), the last major ice advance. During the glaciation, an ice dam formed on the Clark Fork of the Columbia River and created a large lake. In a series of events known as the Missoula Floods, the ice block eventually melted and the released water rushed through the Columbia River gorge. Most of the flood waters flowed directly into the Pacific Ocean but some of the waters flushed southward into the Willamette Valley, reportedly reaching a depth of 400 feet (Allison 1935). After the flood waters receded, icebergs were left grounded and scattered across the Willamette Valley. These icebergs eventually melted leaving behind the silts and rocks that currently overlay much of the Willamette Valley.

Eocene and Miocene age rocks that underlie the floor of the Willamette Valley were heavily eroded by past geological events. Quaternary deposits are positioned on top of Eocene and Miocene strata with some Middle to Late Pleistocene gravels located on the remains of high terraces bordering the Willamette Valley. The Willamette Valley has since been scoured and re-filled with a layer of thick alluvium covered by a layer of partially cemented coarse gravel. Sediments deposited on the gravel layer have been named the Willamette Silts (Allison 1935) and are the materials responsible for soil formation (Balster and Parsons 1968).

2.2 Human Antiquity in the Willamette Valley

The time that humans arrived in the Willamette Valley and the greater North American continent is part of an on-going dialogue with no conclusive answers. Silts and rocks from the Missoula Floods currently overlay much of the Willamette Valley and likely conceal any evidence of early human occupation in this area that predates this event. However, several theories have been proposed by anthropologists to explain human origins in North America.

Most anthropologists believe humans came to the North American continent from Asia during the last ice age. Sea levels dropped during the ice age and briefly exposed a land bridge between the Asia and North American. The ancient land bridge, known as Beringia, could have provided a land route between the two continents (Figure 2.1).

One predominate theory concerns the existence of an "ice free" corridor between the Cordilleran and Laurentide ice sheets that covered most of northern North America during the ice age. Proponents of this theory believe the corridor could have provided a route for people migrating south from Beringia and what is now the state of Alaska. If true, this could significantly move back the time of human occupation in North America, since previously, most theorists assumed migration could not have occurred until the ice sheets had melted. However, more recent mapping done of the boundaries of these ice sheets indicate the ice-free corridor was only partially open, and the environment, at best, offered little inducement for migration with its sparse vegetation, few game animals, and difficult terrain (Fagan 1991). The most probable time for migration through the corridor would have occurred prior to the last glacial maximum that began 25,000 years ago, or shortly after 15,000 years ago in the early Holocene (Fagan 1991).

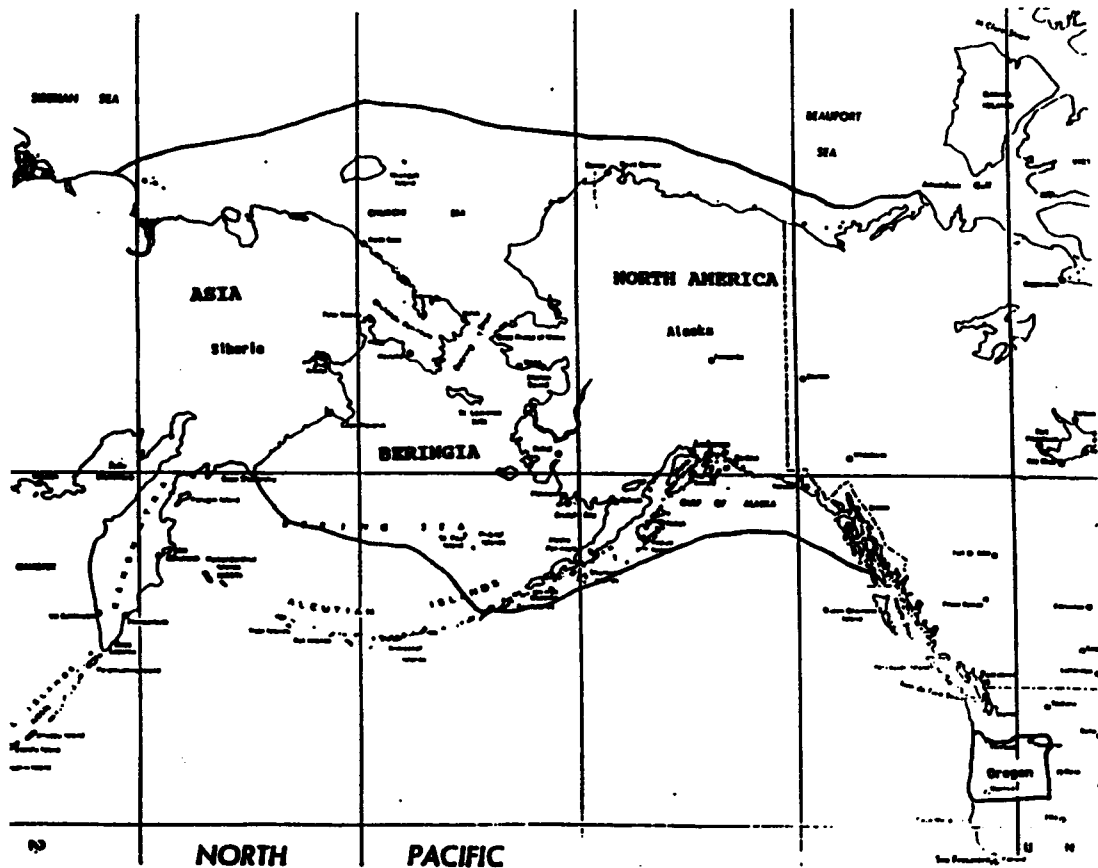


Figure 2.1. Location of Beringia

Archaeologist Kurt Fladmark has proposed another theory to explain human migration into North American continent. Prior to glacial warming, Fladmark believes humans adapted to a marine subsistence lifestyle could have traveled in skin boats south along the relatively warmer Pacific Coast (Fagan 1991). In support of his claim, Fladmark has recovered signs of human occupation in the Queen Charlotte Islands of British Columbia that he believes dates back to 10,000 to 12,000 years ago. However, several problems exist in the theory Fladmark proposes. Settlements of this age were likely covered by the rising sea levels that occurred after glaciation, therefore making their discovery difficult. Nor do the archaeological records show the existence of boats

dating to this period. Furthermore, beaches would not have been continuous along the west coast of Canada thereby denying access to land and making the journey improbable. (Jennings 1989).

2.3 Early Cultural Development in the Willamette Valley

Paleo-Indian artifacts recovered from the upper Willamette Valley are the earliest indication of a human presence in the greater valley area. These artifacts are Clovis spear points that were recovered on the surface (Toepel 1985) and are presumed to date back between 11,500 BP (Before Present) and 10,500 BP, the date given to Clovis-type artifacts found in other locations. One of the Clovis spear points was found in 1959 heavily damaged by a steamroller; the other was found near Cottage Grove in 1935 and donated to the Oregon State Museum of Anthropology. Possible associations between Paleo-Indian projectile points and mammoth bones were reportedly also found near the upper Willamette Valley towns of Tangent and Lebanon (Cressman and Laughlin 1941; Cressman 1947). Evidence for a Paleo-Indian presence in the Willamette Valley is limited to these artifacts found in less-than-ideal contexts.

The Paleo-Indian period is followed by a cultural and evolutionary-based chronology for the Willamette Basin consisting of the Early Archaic (6000-4000 B.C.), Middle Archaic (4000 B.C.-A.D. 200), and Late Archaic (A.D. 200- AD 1750) (Pettigrew 1990:525). The middle and upper Willamette Valley and Cascade foothills are included within the greater Willamette Basin chronology (Beckham, Minor, and Toepel 1981:157-175).

Distinctive projectile point (generic name used by archaeologists that includes spearheads, dart points, and arrowheads) styles are associated with the different

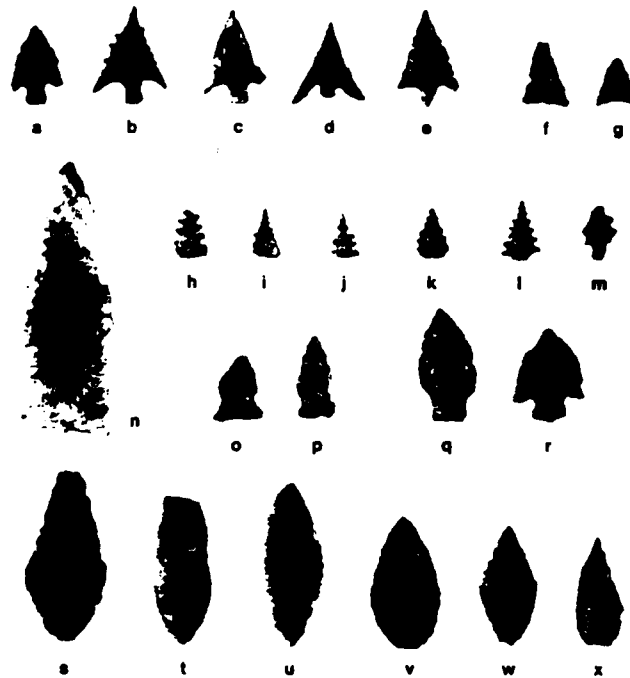


Figure 2.2 Willamette Valley Projectile Points: a-e, narrow-necked, corner-notched projectile points (Late Archaic); f-g, triangular, concave-base projectile points (Late Archaic); h-m, "Christmas tree" projectile points (Middle and Late Archaic); n, lanceolate biface (possibly Early or Middle Archaic); o-p, small side-notched projectile points (Late Archaic); q-r, broad-necked projectile points (Middle Archaic); s-x, foliate projectile points (Early and Middle Archaic). Length of n, 7.2 cm.; rest to same scale (Pettigrew 1990).

cultural periods (see Figure 2.2). Willow, leaf-shaped Cascade Points were introduced in the beginning of the Early Archaic, and large thick, side-notched points appear by the end of the period. Large thick side-notched points continue into the Middle Archaic and are joined by large stemmed points. Both the large stemmed and large, thick side-notched projectile points are believed to have been used with the atlatl, a throwing device which gave the projectile point a greater velocity (Figure 2.3). Small triangular and stemmed points mark the advent of the bow and arrow, and are characteristic of the Late Archaic (Pettigrew 1990).

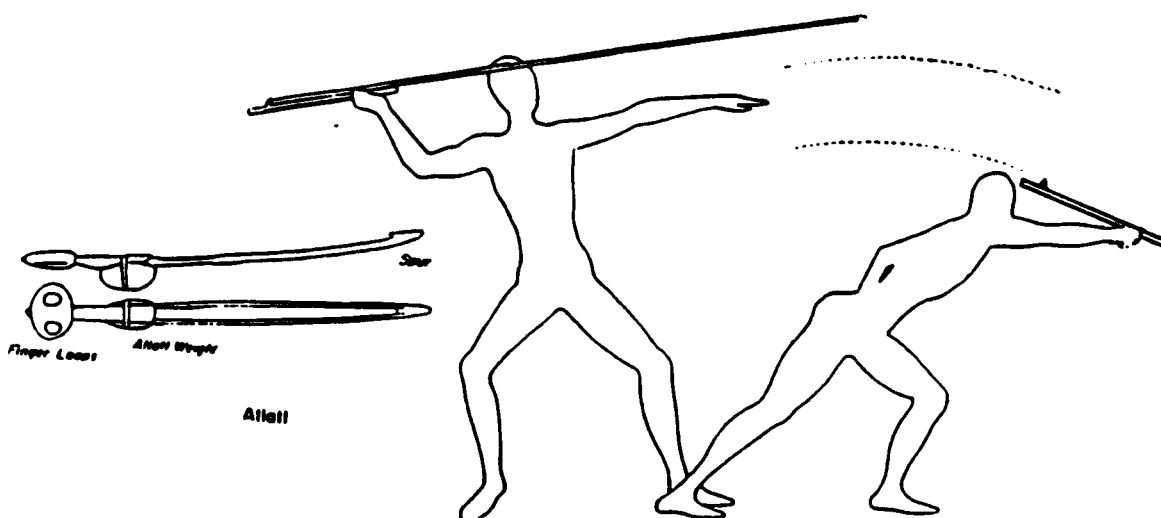


Figure 2.3 Atlatl

The post-glacial environment of the Willamette Valley was certainly conducive to human habitation. Fossil pollen studies of the Willamette Valley have shown the climate entered a transitional phase after the Wisconsin glacial period from a cool, wet pattern to comparatively warm and dry conditions (Hansen 1942,1947) (cited in Aikens 1993). The period from 8000 BP to 4000 BP is reported to have produced the highest temperatures and least precipitation of any time in the last 20,000 years (Cheatham 1988). Rivers and streams were at lower levels during this period. Douglas-fir and ponderosa pine were encouraged by the warm and dry weather and replaced cold weather species such as Sitka spruce and white pine that previously dominated in the valley. White oak in particular, thrived under these conditions and reached its maximum by about 6000 years ago. Climatic fluctuations in the Willamette Valley generally correlate with those occurring throughout Oregon, and in larger context, can be understood as part of a worldwide climatic pattern that predominated during the postglacial period (Aikens 1993).

The archaeological record suggests that a stable human population resided in the upper Willamette Valley by the Early Archaic period. Several Early Archaic sites in the upper Willamette Valley show that the basis of later cultural patterns were established at this early period and persisted until their displacement by Euro-American settlement in the mid-19th century.

The Hannavan Creek Site is illustrative of the antiquity and persistence of many cultural patterns established early in the Willamette Valley. The archaeological site is located a few miles west of Eugene. Roasted camas bulbs from the site have been Carbon 14 dated to 7750 BP and 6830 BP (Aikens 1993:194). The root bulb of the camas lily was the most important food item of indigenous peoples of the Willamette Valley (Zenk 1976:33). Camas bulbs were harvested in the spring and preserved through roasting, thus making them available for trade or consumption throughout the year (Coues 1897:814-815; Jacobs 1945:19). The dates associated with the camas bulbs at the Hannavan Creek Site indicate a long tradition that extended back to the beginning of the Early Archaic and continued until the displacement of native peoples by Euro-American settlement.

The Hannavan Creek Site also exhibits additional characteristics that are common to all three Archaic periods. The archaeological site is located on the edge of a pre-Holocene surface that would have remained above flood levels. Federal land survey records done at the beginning of Euro-American settlement in the area show the location was accessible to four different ecological zones, each with distinct animals and plant resources used by native peoples. Culturally significant plants would have included camas bulbs, acorns, hazel nuts, tarweed seeds, sunflower seeds, cattail rhizomes, and several types of berries. Animal resources included deer, elk, black bear, and grizzly bear as well as smaller animals such as raccoons, rabbits, squirrels, beavers, and other

rodents. The area offered many aquatic resources such as crayfish, suckers, trout, and mussels. Insects present at the site and consumed by native peoples included grasshoppers, yellowjacket larva, and caterpillars. A variety of factors including the large size of the site, the presence of small and medium-sized sites found nearby, the location above flood level, and the site's strategic location permitting access to four different biotic zones, suggested to the excavator that the site was the main winter village and the nucleus of a subsistence-settlement system (Cheatham 1988).

Artifacts recovered from the Hannavan Site include projectile points, scrapers, and knives associated with hunting and butchering activities. Projectile points have styles suggests the site was occupied from the Early Archaic (larger broad-necked projectile points) through the Late Archaic (small arrow projectile points). Ground stone fragments found at the site were probably use for grinding and pounding of plant foods. Hammer stones, anvils, drills, gravers, cores, choppers, and spokeshaves were recovered from the site and are typical of generalized tool kits that have been used for thousands of years (Cheatham 1988).

The Perkins Park Site is an archaeological site located about a mile east of the Hannavan River on a peninsula that extends into the Fern Ridge Reservoir. The Perkins Park Site exhibits many of the same characteristics as the Hannavan River Site and other upper Willamette Valley archaeological sites, including its location above flood level that was accessible to four biotic zones (prairie, marshland, woodland, gallery forests), and a similar artifact content. The Perkins Park Site, like the Hannavan River Site, is also believed to be a main village in a subsistence settlement system. Projectile point styles suggest Early, Middle, and Late Archaic occupations. Organic remains recovered from site include microbotanical charred camas bulbs, acorn and hazelnut hulls, and cherry seeds (Cheatham 1988).

Several sites ranging in age from the Early Archaic to the Late Archaic are scattered across the grounds of the Oregon Country Fair, a location about two miles up the Long Tom River from Hannavan Creek. Charcoal remains on three of the sites have been dated to 9660 BP, 9485 BP, and 9130 BP. A rock feature associated with an obsidian scraper was found about five feet below the surface and was radiocarbon dated to 8890 BP. Four Middle Archaic sites consisting of earth ovens in the form of fire-cracked rock and charcoal received ten radiocarbon readings ranging from 4600 and 3120 years ago. Remains of camas bulbs, hazel nuts, and acorns were also found at the four sites. Four Late Archaic sites located on the grounds received eight radiocarbon dates ranging from 2080 to 380 BP. Small arrow points characteristic of the Late Archaic period were also recovered from the sites (Aikens 1993).

The Flanagan Site is located along a stream west of Eugene. Radiocarbon dates from charcoal are concentrated around dates of 5700 BP, 3300 BP, 1800 BP, and 500 BP. The artifact content is similar to that from the Hannavan Creek and Perkins Park sites. Projectile points included one leaf-shaped point and several large side-notched, corner notched, and stemmed dart points (Middle Archaic style) and small stemmed triangular arrowpoints (Late Archaic style). Tools probably used for wood and boneworking included hammerstones, choppers, spokeshaves, drills, and a grooved sandstone abrader. Other tools are suggestive of butchering and hideworking activities such as biface knives, scrapers, perforators, and use-modified flakes (Aikens 1993).

The remains of earth ovens and charred objects believed to be camas bulbs have also been found at the Flanagan Site. Other food remains included charred acorn hulls, pits of wild cherry, and Klamath Plum (Aikens 1993). The low-lying land of the site would have been periodically flooded thereby producing abundant camas plants in the spring. However the seasonal flooding would have also precluded year-round settlement.

The variety of artifacts associated with the site probably represent the remains of temporary food processing and tool manufacturing camps (Aikens 1993).

The climate entered a cooling trend about 4,000 years ago that eventually turned similar to the weather patterns of the contemporary period in the Willamette Valley. Douglas-fir and ponderosa pine replaced oak in the foothills, and oak and other deciduous varieties predominated in the valley. During this transition to a cooler weather regime, the archaeological record shows evidence of the use of hazelnuts in several sites, an occurrence that could indicate the declining use of acorns that seem to be associated with Early and Middle Archaic occupations. Small triangular and stemmed points mark the advent of the bow and arrow, artifacts characteristic of the Late Archaic archaeological period. The large number of sites that have been dated to the Late Archaic period suggests that the human population started to moderately climb, a trend that continued up to the introduction of Euro-American diseases in the 1700's (Cheatham 1988).

The Willamette Valley and the northern adjoining lower Columbia River Valley to the north form one drainage area for the lower Columbia River. Native peoples of the Willamette Valley and the lower Columbia River Valley were culturally and linguistically distinct by the time of Euro-American contact. The divergence of the cultural groups is believed to have resulted from regional differences in the availability and use of aquatic and terrestrial resources. The lower Columbia River Valley contains an abundance and wider variety of aquatic resources than the upper Willamette Valley, offering at least thirteen species of edible riverine sources including sturgeon, salmon, and eulachon. The abundance of marine resources is also believed to account for the more structured and hierarchical society of semi-permanent villages found in the area of the lower Columbia River.

In contrast, the environment of the upper Willamette Valley encouraged a mobile hunting, gathering, and fishing system based on the availability of its seasonally-based resources. Bands occupied elongated territories that extended from each side of the Willamette River typically following the course of its tributaries across the valley and into the foothills of the Coast and Cascade Ranges. The territories offered a variety of plant and animal resources characteristic of the following landforms: gallery forests, grassland prairie, oak groves, foothills and upland forests. Purposeful and regular burning encouraged a habitat of preferred plant and animal species.

The late-prehistoric inhabitants of the Peavy Arboretum area were members of the Lukiamute band of the Kalapuya. Kalapuya is the name given to native people of the Willamette Valley who spoke Kalapuyan languages (a Penutian phylum). Kalapuya descendants currently form a living culture that is centered at the Grand Ronde Reservation in western Oregon. Prior to Euro-American domination of the Willamette Valley environment, the Kalapuyans were comprised of 10 to 13 bands that spoke dialectically distinct languages and occupied territories roughly oriented along drainage basins. The name Lukiamute is derived from a native word for the people who lived along the Lakmayut (Lukiamute) River and spoke a common dialect (Hartless 1913) (cited in Mackey 1974:33-34). Numerous lithic scatters and features located in Peavy Arboretum and its surroundings are evidence that the Kalapuya once inhabited these landscapes.

3. WILLAMETTE VALLEY ENVIRONMENT AT EURO-AMERICAN CONTACT

3.1 A Fire-Created Environment

The first Euro-American immigrants to the Willamette Valley encountered a landscape that had been deliberately shaped by human manipulation. Kalapuyan inhabitants regularly set fire to the landscape to enhance ecological productivity of desired plant and animal species. Tree-ring studies conducted on stumps in McDonald Forests show a pattern of regular burning that was interrupted in the late 1840s (Sprague and Hansen 1946). The 1840s date corresponds with the arrival and settlement of significant numbers of Euro-American settlers in the Willamette Valley, and the corresponding decline in native populations because of exogenous diseases. Evidence acquired through early historic and ethnographic accounts supports Robert Boyd's claim that Kalapuyan burning "was highly patterned, occurring year after year at regular times and in particular kinds of environments" (1986:70).

The dense groves of Oregon white oak (*Quercus garryana*) and Douglas-fir (*Pseudotsuga menziesii*) found on the contemporary Willamette Valley landscapes have grown since Euro-American settlement in the mid-19th century. Earlier, the floor and surrounding foothills of the Willamette Valley were predominately covered in tall wild grasses, open stands of Oregon white oak, and some Douglas-fir at higher elevations.

The earliest historic descriptions of the Willamette Valley describe an open, park-like landscape dominated by prairie and oak openings (Towle 1974; Johannessen 1970; Habeck 1961). Savanna vegetation, defined by Seifriz (1943), as a grassland with a scattered distribution of open-grown trees, has been used to describe the Willamette Valley environment (Habeck 1961:66). Hudson's Bay Company employee John Work, made the following observation in 1834 from a camp on the Mary's River:

"Some woods along the banks of the rivers And on the high ground oaks here and there . . . hills thickly timbered with oak and composed of rich tile soil & pretty well covered with grass. Large tracts of ground extend to the east" (Scott 1923:249). An 1851 map described the McDonald Forest/Peavy Arboretum area as, "Rolling hills, sparsely covered with oak" (Gibbs and Starling 1851; Figure 1.3). Peavy Arboretum and McDonald Forest land is characterized in 1854 surveyor's notes as "About two thirds level prairie; Balance hilly and timbered with oak" (U.S. Department of Interior, Surveyors Notebooks for the Thomas Read Donation Land Claim).

To many early Euro-American travelers, the appearance of the fire-created landscape recalled the familiar orchards of their former environments. Samuel Hancock described the oak trees of the Willamette Valley in 1845 as, "very low with bushy tops . . . that reminded me of the apple trees at home" (1927:46 and 48) (cited in Boyd 1986:76). Henry Eld made a similar observation of the area near Independence, Oregon in 1841: "The whole country sprinkled with oak, so regularly dispersed as to have the appearance of a continued orchard of oak trees" (cited in Boyd 1986:71). Likewise, Joel Palmer alluded to a human-created landscape of European origin in the following description of the Eola Hills in 1845: "Upon the slopes of these (Eola) hills are several thousand acres of white oak from six to twenty feet in height, some of them large diameter, and all with large bushy tops: the ground being covered with grass, at a distance they look like old orchards" (1847:173).

The orchard-like landscape of scattered oaks recalled in these passages occurred as a result of a thick cork layer that protected the trees from fire. Oak seedlings and small shoots would have been consumed through fire, but seedlings of this type allowed to grow for a few years were capable of withstanding most burns. Oaks are also a long-living tree species, often surviving to an age of 300 years; hence, many of the mature

trees would have remained as a recurring physical presence on the landscape. Thus, the open groves of oak trees that remained would have given the appearance of an orchard to the first Euro-American visitors.

3.2 Models of the Fire-Created Environment

Geographer Jerry Towle proposed a model for the fire-created environment consisting of the following three types of woodland: 1) gallery forests bordering rivers and streams 2) isolated oak groves ranging from a few trees to areas encompassing several miles; 3) oak forests located on small hills within the valley and in the foothills of hemlock forests (1974). In Towle's model, the repeated burning in the Willamette Valley forced hemlock forests up the edges of the valley thereby opening up the savannah and permitting the growth of oak.

James R. Habeck (1961) has used federal land survey records from the mid-nineteenth century to determine vegetation present in the Willamette Valley prior to dominating influence of Euro-American settlement. Habeck's study divided the Willamette Valley into plant communities consisting of bottomland forests, prairie grasslands, oak savannahs, oak forests, and Douglas-fir forests.

The federal land survey records written in the 1850s for the area that became Peavy Arboretum characterized land types in general terms as "oak openings", "oak timber", and "prairie" (U. S. Department of Interior 1852; U.S. Department of Interior 1854). An annotated map is included with this thesis (oversized map in envelope) that is based on the notes of these surveyors. Generally, the land type correlates with Towle's model (1974) and the vegetation noted by Habeck (1961). For example, land survey notes indicate while traveling south, on W. bdy. of Sec. 30" (generally downhill

and on the north slope of a hill), the surveyor encountered oak openings and then entered, brush and timber at a stream. From the stream, the surveyor continued south along W. bdy. of Sec. 31 and left brush and enter(ed) oak openings. About half-way through Sec. 31 bdy. (40 chains), the surveyor left the openings and enter(ed) prairie (U.S. Department of Interior, Cadastral Surveyor's Notes and Maps, West Boundary of T. 11S, R. 5W, 1852: 383-384).

A belt of gallery forests (Towle 1974), or what Habeck referred to as bottomland forests (1961), extended along the banks of the Willamette River and its tributaries prior to Euro-American settlement. The width of the woods varied according to the size of the floodplain, but Towle (1974) estimated it was about one to two miles, except at major confluences where it may have extended up to seven miles in width. While traveling through the Willamette Valley in 1845, Joel Palmer indicated the Willamette River was surrounded by a belt of timber that varied from one quarter to three miles in width (1847:99). Smaller creeks, such as those that flow through Peavy Arboretum (for example, Arbor Creek, Calloway Creek, and Soap Creek) would have had, accordingly, a smaller band of forest along its banks, and the species composition would have resembled vegetation currently found along these water courses. Habeck found the following types recorded for the "bottomland forest" of riparian areas on the federal land surveys: Oregon ash (*Fraxinus latifolia*), black cottonwood (*Populus trichocarpa*), bigleaf maple (*Acer macrophyllum*), Douglas-fir, and to a lesser degree, red alder (*Alnus rubra*), Oregon white oak, California-laurel (*Umbellularia californica*), willow (*Salix sp.*), cherry (*Prunus sp.*). Understory vegetation included large number of shrub species such as Oregon-grape (*Berberis aquifolium and B. nervosa*), salmonberry (*Rubus spectabilis*), elderberry (*Sambucus glauca*), rose (*Rosa spp.*), hardhack

(*Spiraea Douglasii*), ninebark (*Physocarpus capitatus*), and cascara buckthorn (*Rhamnus purshiana*) (1961:74-75).

The long, luxuriant grasses that grew on the prairies and among the scattered oak groves were frequently noted in early historic descriptions of the Willamette Valley. A Benton County resident recalled the wild grasses created by the burning practices as "one great glorious green of wild waving verdure--high over the backs of horse and ox and shoulder high with the brawny immigrant" (Fagan 1988a:187). The grasslands that covered much of the mid-Willamette Valley consisted of some low, wet prairies and a larger portion of upland prairies (Ross 1978).

Upland prairie vegetation included the following: tarweed (*Madia sp.*), Spitka bentgrass (*Agrostis exarata*), shortawn foxtail (*Alopercurcus aequalis*), American sloughgrass (*Beckmannia syziganchne*), tufted hairgrass (*Deschampsia danthoniodes*), creeping lovegrass (*Eragrostis hypnoides*), blue grass (*Poa triflora*), Nodding trisetum (*Trisetum ceruum*), Halls' bentgrass (*Agrostis halli*), wheatgrass (*Agropyron pauciflorum*), California brome (*Bromus carinatus*), Columbia brome (*Bromus vulgaris*), California dlanthonia (*Danthonia californica*), western feacue (*Festuca occidentalis*), bearded fescue (*Festuca subblata*), Fall Triestum (*Trisetum Canecens*), annual hairgrass (*Deschampsia danthoniodes*) (Nelson 1919) (cited in Ross 1978).

And the low, wet prairies included the following species: spika bentgrass (*Agrostis exarata*), shortawn foxtail (*Alopercurcus aequalis*), tufted hairgrass (*Deschampsia danthoniodes*), annual hairgrass (*Deschampsia danthoniodes*), slender spike managrass (*Glyceria leptostachya*), western managrass (*Glyceria occidentalis*), weak managrass (*Glyceria pauciflora*), rice cutgrass (*Leersia oryzoides*), and camas (*Cammasia quamash*) (Nelson 1919) (cited in Ross 1978).

Habeck found only general references to herbaceous vegetation in the federal land survey records consisting of "grasses", "ferns", and "weeds" (1961:75). Other understory prairie vegetation noted in the federal land survey records included shrubs such as California hazel (*Corylus californica*), Oregon grape, rose (*rosa sp.*), and ninebark (Habeck 1961:75).

A 1919 study conducted near Salem, Oregon demonstrated the change in grass species that has occurred since settlement (Nelson 1919) (cited in Habeck 1961). The study identified only fifty-one native out of 106 total species of grass, thus indicating that the seemingly natural prairie had already undergone significant change. We can assume that a contemporary study would reveal a more skewed trend towards the dominance of exotic grass species.

Oak openings, or what Towle refers to as isolated oak groves (1974), were primarily composed of Oregon white oak and occasionally Douglas-fir. In federal land survey records, the oak openings were sometimes differentiated from oak timber by the density of trees. Distances between witness trees were used to differentiate between the two types. Using the federal land survey records, Habeck found the average distance for oak openings was 143.6 feet as compared to 36.5 feet for oak forests (1974:72). Understory vegetation of oak openings mentioned in survey records included general references such as grass and weeds and occasionally ferns, hazel, and young oaks (Habeck 1974:73).

Several areas of oak openings or oak timber were noted in the federal land survey records for the area that later became Peavy Arboretum (U.S. Department of Interior 1852; U. S. Department of Interior 1854)(oversized map in envelope). Oak openings in these survey records were generally oriented along the hill slopes adjoining the prairie. For example, this was the geographic setting for property in 1852 that

included portions of Peavy Arboretum and McDonald Forest (oversized map in envelope) (U.S. Department of Interior 1852). The land is characterized in 1854 Donation Land Claim notes for Mark Cahoon as 3/4 prairie and sparsely timbered with oak (U.S. Department of Interior 1854) .

Oak forests usually covered the higher hills of the Willamette Valley. The oak forests are labeled as oak hills and oak timber in area that became McDonald-Dunn Research Forest (U.S. Department of Interior 1852; U.S. Department of Interior 1854) (oversized map in envelope). The oak forests included Oregon white oak, and more infrequently California laurel, Douglas-fir, and red alder (Habeck 1961).

Federal land survey records for the highest elevations of the Willamette Valley (for example, the highest elevations of the hills adjoining the western boundaries of Peavy Arboretum in Sections 25 and 36, and in general, the higher elevations on western and eastern margins of the valley) were composed primarily of Douglas-fir, and to a lesser degree, bigleaf maple, western hemlock (*Tsuga heterophylla*) vine maple (*Acer circinatum*), Oregon white oak, California laurel, madrone, western red cedar (*Thuja plicata*) Pacific dogwood (*Cornus nuttallii*), and Oregon white oak. In a federal land survey for the area that is currently in the highest elevations of Peavy Arboretum, the land was characterized as "rough and mountainous . . . fir timber with thick undergrowth of vine maple, hazel, fir, alder, cherry, and briars" (U.S. Department of Interior 1852).

Historical and ethnographic accounts indicate that an abundance of wildlife inhabited the Willamette Valley during the early period of Euro-American settlement (Douglas 1914; Clyman 1960; Bancroft 1886; Howison 1846; Nash 1882; Perrine 1924; Thwaites 1905 Vol. 24; Jacobs 1945; Zenk 1976; Mackey 1974). Larger herbivores included the white-tailed deer (*Odocoileus virginianus leucurus*) black-

tailed deer (*Ohemionus columbianus*) and the Roosevelt elk (*Cervus canadensis roosevelti*). White-tailed deer were particularly common. Levi Scott camped on the present site of Peavy Arboretum in the 1840's and recalled the abundance of deer (probably the white-tailed variety): "At that time, it was not necessary to go to the mountain for game, as we could kill all the deer we needed anywhere around our camp (Collins n.d.:116). The white tail deer was once abundant in western Oregon, but currently the species is endangered in the Willamette Valley throughout much of the region.

Elk were common in the Willamette Valley and in the adjoining mountains where they currently reside. In addition to elk and deer, other large mammals included black bear (*Ursus americanus*), brown bear (*Euarctos americanus*), grizzly bear (*U. arctos*), mountain lion (*Felis concolor*), wolf (*Canis lupus*), mountain coyote (*Canis latrans lestes*), and Oregon grey fox (*Urocyon cinereoargenteus townsendi*). Smaller mammals included three species of rabbit (*Lepus californicus*, *Sylvilagus bachmani ubericolor*, and *Sylvilagus floridanus*), four species of squirrels (*Sciurus griseus*, *Sciurus douglassi douglassii*, *citellus douglassii*, and *Spermophilus beecheyi*), two species of beaver (*Castor canadensis pacificus*, and *Aplodontia*), and raccoon (*Procyon lotor*). The many marshes that were once located in the Willamette Valley attracted and supported waterfowl and other birds including three species of grouse (*Dendragapus fuliginosus fuliginosus*, *Bonasa umbellus umbelloides*, and *Bonasa umbellus sabini*), turkey vultures (*Cathartes aura*), mallards (*Anas platyrhynchos platyrhynchos*) swans (*Olor sp.*), ducks (generic), geese (sp.), eagles (*Linnaeus sp.*), hawks (*Buteo sp.*) and great horned owls (*Bubo virginianus*).

3.3 Objectives of Prescribed Burning

Leland Gilson, an archaeologist for the Oregon State Historic Preservation Office (SHPO), has used the term "pyroculture" (from pyro, the Greek word for fire, and culture as in the propagation of plants) to describe the purposeful use of fire by indigenous people in the Willamette Valley (1989:13). Gilson suggested that pyroculture was a "crude form of horticulture" adopted by an increasing human population whose subsistence requirements could not be maintained through traditional hunting and gathering techniques. In this context, fire was employed to increase the ecological productivity of the environment for desired plant and animal species. An increase in the number of archaeological sites radiocarbon dated to the Late Archaic period is consistent with this theory. Gilson theorized that burning as an adaptive strategy had possibly reached its limits when Euro-American diseases were introduced. In order to continue to provide for human needs, a more aggressive manipulation of the environment would need to be pursued. Conceivably, if the indigenous culture of the Willamette Valley had remained isolated from Euro-American contact, the "crude horticulture" could have developed into agriculture (Gilson 1989:13). As activities suggestive of a move in this direction, Gilson noted Zenk's reference (1976) to areas allegedly divided among bands of Kalapuyans and then further sub-divided among individuals.

Numerous historic accounts attest to native people's use of systematic burning practices to create habitats that encouraged desired wildlife and the growth of preferred plants. Evidence for the degree of planning and control used in burning to create the desired habitat is shown in the following account written by Lewis Judson from the northern portion of the Willamette Valley (Strozut 1955:21) (cited in Boyd 1986:77).

These fir groves had been found necessary by the Indians to induce deer and other wild game to stay in the valley. The groves were undisturbed by fire. . . The Indians burned right up to imaginary lines, but never was the fire allowed to go past or get out of hand. So some authority must have existed among them because biennially the prairies were burned.

Jesse Applegate, a settler in the 1840s mid-Willamette Valley, recalled the burning conducted by native inhabitants. His following account conveys the intensity, the extent, and the regularity of the practice (Rucker 1930:178-179).

It is probable we did not yet know that the Indians were wont to baptise the whole country with fire at the close of every summer, but very soon we were to learn our first lesson. This season the fire was started somewhere near the south Yamhill, and came sweeping up through the Salt Creek gap. The sea breeze being quite strong that evening, the flames leaped over the creek and came down upon us like an army with banners. All of our skill and perseverance were required to save our camp. The flames swept by on both sides of the grove; the quickly closing ranks, made a clean sweep of all the country south and east of us. As the shades of the night deepened, long lines of flame and smoke could be seen retreating before the breeze across hills and valleys. The Indians continued to burn the grass every season, until the country was somewhat settled up and the whites prevented them; but every fall, for a number of years, we were treated to the same grand display of fireworks. On dark nights the sheets of flame and tongues of fire and lurid clouds of smoke made a picture both awful and sublime.

Henry Zenk noted in his ethnography on the Tualatin of the northern Willamette Valley, that fire-created landscapes encouraged habitat for the following four main food plants: tarweed seeds from the plant that grew on the dry prairies, camas that thrived on the wet prairies, hazel nuts from trees that grew in dry semi-open or brushy areas, and acorns from the scattered oak trees that grew throughout the savannah environment (1976:22).

Robert Boyd has probably done the most extensive examination of Kalpuyan burning in the Willamette Valley. In a paper, "Strategies of Indian Burning in the Willamette Valley," Boyd noted "two major direct results" of burning: "In the circle

hunt of deer and in gathering of tarweed" (1986:74). Indirect objectives of burning discussed by Boyd include its use as an aid in the collection of grasshoppers, for clearing brush from under oak trees so acorns could be gathered more efficiently, and to encourage grazing habitat where game would congregate and be easily hunted (1986).

Salem pioneer Joseph Henry Brown referred to several objectives of Kalapuyan burning: "The Indians had a custom of burning off the country for the purpose of driving the game and also to make the grass grow better, to keep down the undergrowth of timber, and collect seeds" (1878:1) (cited in Boyd 1986:74). The phrases, "driving the deer" and to "collect seeds" are references to the Indian communal hunt of deer and the collection of tarweed seeds. "To keep down the undergrowth of timber" aided in the collection of acorns as well as encouraged an environment that attracted desired animal resources, particularly the highly prized deer.

Two informants from the Grand Ronde Reservation described the circle fire drive to a late-nineteenth century newspaper writer. The informants stated that all "bands" participated in the annual drive (cited in Boyd 1986:74).

That included the east side of the valley from the Molala to the Santiam, all united in this annual roundup. It required a great force of men to carry out the programme. They formed a cordon around all the territory indicated. Men were placed in position along the rivers named and including the foothills of the Cascades. The great square encircled all Marion County (as constituted today) that is not rough mountainous country. To have placed men a quarter of a mile apart would have required fully 500. They called into active service boys able to draw a bow, and old men not incapable of duty.

The annual hunt was conducted under the orders of the most famous war chief, and all others had to receive instructions and live up to them. There was considerable skill required to do this correctly and effectively . . . Possibilities were carefully calculated in advance and pains taken to plan operations early in the fall of the year, when storms were not frequent and game easily controlled . . . At a given signal, made by a fire kindled at some point as agreed, they commenced burning off the whole face of the country and driving wild game to the common center. If badly managed, the game

could break through and escape to the mountains. When the circle of fire became small enough to hunt to advantage, the best hunters went inside and shot the game.

Although the size of the hunt recalled in this account is suspect, Boyd pointed out, this type of circle hunt was similar to those practiced by other American Indian tribes such as the Coeur d'Alene who inhabited the Columbia Plateau of Idaho, or the Takelma who lived along the Umpqua and Rogue River in southwestern Oregon (1986:75).

The "edges" produced through the burning regimen are known for attracting the highly-valued white and black-tailed deer. A profusion of grasses and forbs were quickly established in the burned-over areas and provided food for browsing game such as deer and elk. The vegetation produced by burning also encouraged game to feed in the open environment where they could easily be hunted. While traveling through the Willamette Valley in 1826, David Douglas noted how burning was used to attract the deer so that they could easily be hunted: "Some of the natives tell me it is done for the purpose of urging the deer to frequent certain parts to feed, which they leave unburned and of course they are easily killed" (1953:213-214).

Burning aided in the collection of tarweed, one of the principal plant foods of native peoples in the interior valleys of Oregon. From the mid-Willamette Valley in 1841, Charles Wilkes declared: "The Indians are in the habit of burning the country yearly, in September, for the purpose of drying and procuring the seeds of the Sunflower (likely the tarweed), which they are thus enabled to gather with more ease, and which form a large portion of their food (1845 Vol. 4:358). The plant was burned to remove the sticky exterior, then the stalks were beaten with a paddle-shaped stick

resembling a "tennis racket" into a funnel-shaped deer-skin pouch (Sapir 1907:259).

George Riddle, an early settler in the Umpqua Valley, described the plant and the process used to harvest it by the Takelma (1920:45-46).

During the summer months the squaws would gather various kinds of seeds of which the tar weed was the most prized. The tar weed was a plant about 30 inches high and was very abundant on the bench lands of the valley and was a nuisance at maturity. It would be covered with globules of clear tarry substance that would coat the heads and legs of stock as if they had been coated with tar. When the seeds were ripe the country was burned off and the seeds left in the pods. Immediately after the fire there would be an army of squaws armed with an implement made of twigs shaped like a tennis racket with their basket slung in front they would beat the seeds from the pod into the basket. The seed gathering would last only a few days and every squaw in the tribe seemed to be doing her level best to make all the noise she could, beating her racket against the tip of her basket. All seeds were ground into meal with a mortar and pestle.

Settler Horace Lyman noted that the food "resembled pepper in appearance, but was sweet tasting" (Jacobs 1900:325). According to a Kalapuyan informant, the tarweed meal could be mixed with hazelnuts and camas and then preserved for winter (Jacobs 1945:20).

Kalpuyan informants indicated to Jacobs (1945), they used burning to aid in the collection of grasshoppers. Grasshoppers were collected after the fire subsided. His field notes indicate that the top of the underground nest was burned thereby forcing the adult grasshoppers out and baking the larvae. David Douglas indicated that burning "would enable them (Kalapuyan Indians) to find wild honey and grasshoppers, both of which serve for their winter food" (1904-05 Pt. 3:78-79). According to native informants, after the grasshoppers were collected, they were immediately eaten, or "they put (them) into a mortar with acorns or bread root, and pound into a mass which is then kneaded, placed on a board and baked for bread-the legs of the grasshoppers and crickets making a rough crust" (Armstrong 1857:119) (cited in Boyd 1986:76).

George Riddle was under the impression that Kalapuyans used acorns only when other more desirable resources were unavailable or when threatened with famine (1920:45-46). However, Boyd (1986) included acorn gathering as an indirect objective of the burning. Burning was used in this context to clear brush from under oak and hazel trees so that acorns could be gathered easily. Boyd referred to the management of oak trees by Californian Indian groups and suggested that Kalapuyans could have used similar practices (1986:77). The Karok of California burned because it "kills disease and pests . . . (and) leaves the ground underneath the trees bare and clean and it is easier to pick up the acorns (Schenck and Gifford 1952, 382). Burning also lessened competition by other plants and permitted more acorn production (Lewis 1973) (cited in Boyd 1986:77).

Burning also encouraged the growth of camas by discouraging the growth of competing woody species. George Colvocoresses (1852) was likely referring to the camas root when declaring that burning was used by Willamette Valley Indians, "for the purpose of procuring a certain species of root" (cited in Boyd 1986:79). John Minto declared: "Fire was the agency used by the Calapooia tribes to hold their camas grounds for game and (waterfowl)"(1908:152) (cited in Boyd 1986:79).

Kalapuyan sources and historical accounts suggest that camas was the most important subsistence food (Zenk 1976:33; Coues 1897:814-815). The upper and middle Willamette Valley were particularly known for their abundant supply of the plant, which proliferated in low-lying areas. The onion-like bulb thrives in moist meadows with high water tables like the lower elevations of Peavy Arboretum. Hudson's Bay Company employee James Clyman commented in 1845 on the prolific growth of the plant from an area just north of Peavy Arboretum: "It is remarkable to see the great Quantity of esculent roots that grows in all parts of this vally Ten or Twelve acres of

cammas in one marsh is Quite common in many instances it will yield 20 Bushel to the acre the calapooyas live exclusively on roots" (Clyman 1984:174). The plant's roots were dug in the early spring through late summer after flowering. They were usually pit-cooked for twenty-four hours or more. Clyman described the cooking procedure (1984:174-175):

A hole of suitable size is dug in the earth filled with wood and stones after the earth and stones becomes well heated the fire is taken off and a layer of green grass laid over the hot stones the roots (are) piled on the grass and a Layer of grass laid over the roots then a thin layer of earth over the whole and a fire outside of all which is kept up some 24 hours when it is allowed to cool down and the roots are ready for use or for drying and putting away for future use.

The camas plant's carbohydrate is a long-chain sugar named inulin. Inulin requires roasting to break it into its component fructose molecules (Kuhnlein and Turner 1991). After cooking, the bulbs taste sweet and can be digested easier. In taste, they are said to resemble a "prune and chestnut" (Kuhnlein and Turner 1991). The roasted bulbs could be eaten immediately, or sun-dried for later use as a winter food or trade item. The dried bulbs could be used again by soaking them in water or cooking them with stews of meat and fish (Kuhnlein and Turner 1991). Erna Gunther in an ethnobotany of indigenous people of Washington State commented: "Except for choice varieties of dried salmon there was no article of food that was more widely traded than camas" (1977:24). The preservation qualities of camas provided native inhabitants a steady source of starches and carbohydrates, as well as vitamins including calcium, iron, magnesium, and zinc.

Berries grown in the Willamette Valley are early succession plants that would have quickly occupied burned-over areas free from the competition of other woody plants. The following berries commonly grew both in open areas and in the forest: wild

blackberry (*Rubus ursinus*), strawberry (*Fragaria chiloensis*), huckleberry (*Vaccinium*), salal (*Gaultheria shallon*), blackcaps (*Rubus leucodermis*), thimbleberry, (*R. parvifloris*), and salmonberry (Jacobs 1945). Boyd referred to several other Northwest native groups including the Upper Skagit, Upper Chehalis, and Sahaptian peoples of the Columbia Plateau who have traditionally utilized burning to encourage the growth and productivity of desired berries. According to one informant of the Sahaptian peoples who harvested berries in the high Cascades, "Indians had a thorough understanding of the ecological relationships" (French 1957:1) (cited in Boyd 1986:79).

William Hartless, a Kalapuyan informant, indicated his people (the Mary's River band of the Corvallis area) used the following types of berries: thimbleberry , evergreen blackberry (*Rubus laciniatus*), wild blackberry (*Rubus ursinus*), salmonberry, evergreen huckleberry (*Vaccinium ovatum*), red huckleberry (*Vaccinium parvifolium*), salal, strawberry, wild cherry, sunflower (*Helianthus annuus*), honeysuckle (*Caprifoliaceae*). Strawberries were consumed immediately but other berries were often dried for storage and consumed later during the lean winter (Zenk 1976). An informant witnessed the gathering and drying procedure at a camp in the Coast Range west of Grand Ronde. He recalled that after the berries were picked, they were placed on a bark slab near a fire. The fire was then kept burning for half the night. In the morning the fire was relit and kept burning throughout the day. The berries were removed in the evening, and then fresh ones placed on the bark slab and the procedure was repeated (Jacobs ca. 1936: paragraph #23) (cited in Zenk 1976:60). Berries and other fleshy fruits provided various nutritional needs, as sources of ascorbic acid, nutrients such as calcium, vitamin A as carotene, and Folic acid (Kuhnlein 1989) (Kuhnlein and Turner 1991).

3.4 Plant Use by Native People

Indigenous people of the Willamette Valley had a sophisticated understanding of the plants. A thorough examination of vegetation in the Peavy Arboretum area and its possible utilization is beyond the scope of this thesis, but by analogy, much of this knowledge can be retrieved through the example of other native peoples in the Northwest who lived in similar environments. Erna Gunther's *Ethnobotany of Western Washington* (1977) is probably the best known published study on plants and their cultural use by Northwest coast aboriginal peoples. Equally notable is Henry Zenk's unpublished master thesis, "Contributions to Tualatin Ethnography: Subsistence and Ethnobiology" (1976). Zenk's portrait of the Kalapuyan inhabitants who lived on the Tualatin plains (northern Willamette Valley, Oregon) is primarily based on the field notes of three early linguists (Albert Gatschet in 1877, Leo Frachtenberg in 1913-14, and Melville Jacobs in the 1930's).

A more recent study has focused on contemporary medicinal applications of traditionally used plants (Forlines et al. 1992). The late David Forlines, a native healer from Washington State's Olympic Peninsula, collaborated with scientists from Oregon State University in a study documenting the indigenous use of forest plants. They were interested in identifying traditionally utilized medicinal plants and their chemical structures, in hopes that new information could be revealed and possibly applied towards the treatment of current and future diseases. The research was also motivated by the threatened extinction of many traditionally-used forest plants. David Forline's traditional beliefs required that this knowledge be "freely given" (and)-put out there for those who would use it" (Forlines et. al. 1992:769). In Forlines' understanding, there is a plant to cure every sickness, since that is the "work" of the plant kingdom (1992:769).

The research indicated that many of the plants used traditionally by indigenous peoples of the Olympic Peninsula also have a history of medicinal use in Europe and Asia. For example, plants of the Rosaceae family are the most commonly-used species, having been used in both European and Chinese herbal medicines. The authors also noted other parallels in plant use documented in previous studies. For example, raspberry is used to treat children's stomach aches in Europe, whereas salmonberry, whose leaves are very similar physically to raspberry, was used traditionally on this continent to help sick children relax and sleep (Forlines et. al. 1992).

Medicines were commonly taken as teas or salves by indigenous peoples of the Olympic Peninsula. For teas, parts of the plant were known to have certain properties for a specific use. For example, the bark of Devils Club was used for very serious illness, but its berries and leaves were given as a more mild treatment. Compounding, or the mixing of different herbs were used for certain medicinal objectives, such as the use of licorice fern root and frog-skin lichen together to treat sore throats. Sequencing of herbs was also practiced. For diabetes, licorice fern root would be ingested first, and then "swamp tea" was (bog labrador tea) followed in succession (Forlines et. al. 1992).

Chemicals isolated from plants have exhibited medicinal actions. For example, the prince's pine has been widely used in traditional therapies in the United State and Europe. Chimaphillin isolated from the plant has antimicrobial properties, and Ursolic acid combined with chimaphillin are the active agents used for a Chinese medicine known for its antiinflammatory and analgesic qualities (Forline et. al. 1992).

Studies documenting past vegetation and its use by indigenous cultures has implications for modern society. Modern society is changing the environment at an unprecedented rate, and many people are concerned over the loss of native plants. New

diseases will emerge and possibly the cure will be found in the knowledge accumulated by generations of people who lived close to the land and relied on it to provide their material, medicinal, and spiritual needs.

4. THE KALAPUYA

4.1 Introduction

Our knowledge regarding the lifeways of the Kalapuya comes primarily from ethnographic accounts recorded by early Euro-American linguists, travelers and settlers. In addition to these sources, information is currently obtained through archaeological studies and the cultural traditions and oral histories of living Kalapuyans.

The Willamette Valley's unique geographic circumstances have permitted influences from several distinct cultural groups in neighboring regions. Anthropologists have been ambiguous about the placement of the Willamette Valley within a culture area (Aikens 1975). A cultural designation is difficult to determine since the Willamette Valley's geographic placement allowed varying degrees of influences from the neighboring coastal, plateau, and basin cultural groups. Prehistoric inhabitants of the Willamette Valley possessed characteristics that indicated much borrowing from the neighboring cultural regions, though the extent of influence of any one of them is hard to determine with certainty. And the lack of archaeological work previously conducted in the Willamette Valley has given little material needed to make such judgments.

4.2 Demography and Disease

The arrival of Euro-American pathogens in the Pacific Northwest significantly altered indigenous society prior to the recording of ethnographic accounts. Historian Alfred Crosby refers to epidemics as the "First Strike Force of white emigrants to the Lands of Demographic Takeover. . . (and at) . . . the leading edge of the larger ecological

triumph of European humans, animals, pathogens or microorganisms, and weeds over those of aboriginal societies" (1993:18). Consistent with Crosby's theory, epidemics arrived in the Willamette Valley before other forms of Euro-American dominion, easing the process of conquest and settlement for emigrants.

The first known smallpox epidemic struck the Northwest Coast in the 1780s. Previously, scholars believed the disease had spread as a result of the early visits of European ships, but more recent studies suggests the pathogens might have spread overland from the east. Anthropologist Robert Boyd believes the introduction of the horse to the Nez Perce in the 1730s permitted travel between the Northwest Plateau peoples and the Rocky Mountains and Plains tribes, thereby allowing the spread of diseases from the east. Conceivably, through such contact, smallpox could have been introduced to the Northwest coast peoples by interior tribes who traded directly, or indirectly, with the Rocky Mountain and Plains tribes. However, the short visits of Spanish coastal explorations of 1774, and the 1778 visit of Captain Cook, were probably more destructive to native populations in western Oregon (Boyd 1975:1990).

Regardless of origin, smallpox had probably spread to the Kalapuya prior to Euro-American exploration of the Willamette Valley. Lewis and Clark noted many empty villages and sick natives while traveling through the region in 1805 (Thwaites 1959). Diseases were significantly altering native society before Euro-American exploration in the valley proper.

The smallpox epidemics were followed by a well-documented series of malaria outbreaks in the Willamette Valley occurring between 1830 and 1833. Indians believed malaria was introduced to the area by men aboard American ships that stopped in ports along the Northwest Coast, but the disease could have just as easily been introduced by trappers or traders at Fort Vancouver who had earlier been in the malarial Mississippi

Valley (Boyd 1990). The disease was probably transferred by mosquitos (*Anopheles malculipennis*) that are native in the interior valleys of western Oregon and thrived in the boggy wetlands of the Portland Basin and Willamette Valley. The disease struck repeatedly among Euro-American and native populations (Boyd 1990). Euro-Americans usually recovered from malaria, but the disease was usually fatal to native populations.

Europeans introduced all eight of the major types of epidemic diseases recorded from Northwest Coast region during the first century of Euro-American contact (malaria, measles, typhoid fever, influenza, smallpox, dysentery, typhoid fever, and typhus) (Boyd 1990:137). Native populations had little immunity to the introduced diseases and rapidly succumbed to them. Often these diseases attacked every generation in succeeding waves, as in the case of smallpox outbreaks that occurred among the Takelma and other interior Athapaskans peoples Oregon in 1770's, 1801, 1824-1825, and 1838 (Boyd 1990:146). Therefore, exogenous diseases irreversibly altered the demography of Northwest indigenous cultures before the arrival of Euro-Americans. For example, prior to the arrival of Euro-American immigrants in the Willamette Valley, population losses among the Luckiamute band from disease permitted the Klikitat Sahaptins, a horse-mounted people from the Columbian Plateau, to relocate within the Luckiamute's traditional lands. The loss of life through disease compounded other problems associated with Euro-American settlement, such as the disruption of resource procurement systems. Although in most cases inadvertently, disease facilitated the advance of Euro-American settlement by weakening the infrastructure, and therefore, the resistance of native culture.

The Kalapuya population of the Willamette Valley at Euro-American contact has been estimated at 16, 200 by Boyd (1990:147), and 9000 by Lewis and Clark (1805-

1806). Wilkes estimated this population at 600 by 1841 (1911:291). Although the means used to determine these figures are problematical, it is apparent that disease rapidly reduced the population. A smallpox epidemic in 1782-83 was reported to have reduced the population by 50 percent. The malaria epidemic occurring between 1830 and 1833 and further reduced the population by another 75 percent (Mackey 1974:21). A traditional native practice used to fight the sickness, where patients would soak in a sweat lodge and then jump into a river, made them even more susceptible to the disease (Ball 1834) (cited in Mackey 1974:21).

Robert Boyd has included the Kalapuya within a demographic region of coastal native peoples he has termed the Interior Valleys Epidemic Area (1990:146). Boyd has estimated that the original population of 41,328 for the Interior Valleys Epidemic Area had shrunk to 2,000 by the time the remaining people were removed to reservations in the late 1850s (1990:146).

Due to the dramatic rate of human mortality, little time was available to record ethnographic information that could indicate the lifeways of the pre-contact society. Vague accounts based on the recollections of its few survivors have been collected from the Grand Ronde Reservation and the Chemawa Training School. Our understanding of the precontact culture of Kalapuyans is limited to these incomplete sources and new information gained through archaeological research.

4.3 Social and Political Organization

At contact, the Kalapuya lived within the Willamette Valley, and the culturally similar Molala lived immediately east in the adjoining Cascade Mountains (Oglesby 1884)(cited in Mackey 1974:25). The existence of linguistically-distinct bands as

separate entities is fairly certain since Kalapuyan informants repeatedly used individual native-assigned names in association with distinct groups. Informants also have indicated that members of these groups cooperated as a unit in subsistence strategies (Zenk 1976:16) (Oglesby 1884, cited in Mackey 1974:25-27). Zenk's research suggests the groups (Luckiamute, Yamhill, Santiam, and others) were made up of smaller bands (families) of linguistically and culturally similar winter villages (1976:15). For the Luckiamute, whose territory included the land that became Peavy Arboretum, the group was further sub-divided into the following eight bands (Collins 1951:28 and 35):

- | | |
|---------------|------------------|
| 1) Ampalamu | 2) Chantkaip |
| 3) Chepenofa | 4) Mohawk |
| 5) Tsalakmuit | 6) Tsantatawa |
| 7) Tsantuisha | 8) "Marys River" |

Evidence suggests the larger group had common territory that was shared among all of the bands for hunting purposes (Zenk 1976:17). But other areas of tarweed fields were "allotted" to individual bands, and these areas was further sub-divided into "individually owned" sections (Zenk 1976:17).

Kalapuyan informants indicated that chiefs headed some bands (Luckiamute, Yamhill, Santiam and others) (Frachtenberg 1914 a, n.p. and Jacobs ca. 1936b:128) (cited in Zenk 1976:15). William Hartless, an informant from the Mary's River, indicated, "Each tribe had three chiefs," but that there was "No head chief over all the Kalapuya tribes"(Mackey 1974:36). According to Hartless, the chief was an elected position that could be given to either sex, although generally the position was passed

from deceased father to surviving son (Mackey 1974). Among the Tualatin, chiefs seem to have been regarded as simply the more wealthy members of their communities (Zenk 1976:16).

Other political offices were described by Hartless, such as councilors who assisted the chief. The councilors were selected from the ranks of common men; women were not allowed to participate in the elected councils (Mackey 1974:36).

The shaman (medicine man or doctor) was also a high status position. Shamans obtained power through fasting, and their power was demonstrated and proved through dance and song. Shamans had to demonstrate their abilities free of charge for five people before receiving fees for healing. Sometimes spirit dolls were used by the shamans while dancing or curing (Mackey 1974:36). Dream power gave the shaman his visions. In one shaman's vision, the land had turned black. Later, his people interpreted the vision as foretelling the future when Euro-Americans had ploughed the earth (Jacobs 1945:69).

The practice of slavery was an exception to the generally egalitarian society of the Kalapuya. Slaves were obtained as captives or were descendents of captives and were traded among the different groups of Kalapuya (Zenk 1990:550). The Tualatin were particularly active in the slave trade, often supplying trade centers such as the one that was formerly located at the falls of Oregon City (Zenk 1976). Slavery appears to have been less common among the Luckiamute and other Kalapuyan groups from the middle and upper Willamette Valley, who probably were more often the victim of slave raids. This impression is given in the following journal entry by Hudson's Company employee John Work who recalled trading with natives from near the Laurie's River (Mary's River).

Work was informed: "That three men of the Lautaude Indians (?) have been killed and 3 children taken slaves a short time since, as they suppose by a party of Faladin or Yamhill Indians" (Scott 1923:264).

Other than slavery, social distinctions were limited to differences in wealth, and this status could be gained or lost by any of its members. Slaves were known to marry free people, and according to Gatschet, a slave could obtain his or her freedom in this manner (Suttles 1990:550).

Marriage was allowed within and outside the "tribe" (exogamy); incest was forbidden (Hartless 1913) (cited in Mackey 1974:36). A bride was purchased from a family to compensate them for their loss of help (Gatschet 1891:143). The bride then became property of the husband's family (Hartless 1913) (cited in Mackey 1974:36). Polygamy was practiced, particularly among wealthy men (Mackey 1974:37).

4.4 Seasonally-Based Residential Patterns and Subsistence Strategies

Kalapuyan bands occupied sub-basins in geographic zones characteristic of the riverine, floodplain, and montane setting. Inhabitants moved to the different zones seasonally in response to the variety of resources available. Winter involved more sedentary activities, and residences during that season were more permanent and assembled into larger villages. In warmer seasons, they resided in temporary task-oriented camps located in close proximity to desirable food resources. The seasonally-based residential pattern was described in the following excerpt by Jesse Applegate in the 1840's: "At this place (Rickreal Creek) the Indians built their best houses; and moving place to place during the dry season, returned to them as winter approached" (1907:14).

Winter villages were located along major rivers and tributaries. William Hartless described the winter house (cited Mackey 1974:42). The structure was made of "bark, grass, and dirt". Some were large houses as long as 60 ft. that were partitioned off for multiple families. The wall was constructed of forked sticks with cross-pieces with attached twist (ed) grass (probably woven into the walls). The structure was supported in a shallow pit described as about two feet from the ground. The roof was made of bark and was "inclined somewhat . . . like a shed". A mat of rushes served as a door, and the door usually faced the river. The floor was sanded and was covered in mats of tulu-grass. The fireplace was located in the center of the structure with a smoke hole above it. Bench-like beds were attached to the walls. Meat and other provisions were kept in baskets and sacks that were attached to rafters.

Sweat houses located in the winter villages were constructed of bent poles covered by bark or grass and layers of dirt (Mackey 1974:43). The sweat lodges also served as sleeping quarters for children (Jacobs 1974:48-49). Winter was a lean season, and Kalapuyan groups relied on stored, dried food such as preserved camas and meat. Fresh game, fish, and water fowl that could be obtained throughout the year supplemented dried foods (Mackey 1974:43).

During the winter season, subsistence activities were at a minimum and there was time for a variety of other activities. Jacobs' informants indicated that "It was good to tell myths in the winter time," and warned of repercussions for those who told them during the summer season(Jacobs 1945:51). The myths were an important part of an oral tradition that passed on cultural traditions beliefs regarding human origins, natural history , social customs, and social mores. The Great Spirit was called "Soulee

Free" (Mackey 1974:28), and principal mythological characters included Coyote and flintboy (Jacobs 1945:183-185). After dying, a person's soul crossed the ocean (Mackey 1974:41).

The winter was also the time for dancing (Jacobs 1976:61). Men and women participated in ceremonial dancing for a variety of reasons including menstruation, loss of a child, or by a doctor in a healing ceremony. An assortment of skin drums, large gongs, bells, rattles, and feathers accompanied the dancing (Mackey 1974:39). Winter dances were sometimes hosted by a shaman so that he that he could strengthen his dream powers. These dances involved many people ("everybody came") and lasted for five nights. Common people who lacked shamanistic powers could furnish deer meat for the occasion (Jacobs 1945:61).

Smoking was a common activity that served important social and spiritual functions. Tobacco (the native sp., *Nicotiana multivalvus*) was planted and grown (but not cultivated) in rotten logs. The tobacco was then mixed with leaves of kinnikinnick (*Arctostaphylos uva-ursi*) obtained from the coast. The smoking mixture was inhaled through pipes made of stone or a bowl of stone with a wooden stem (Jacobs 1945:35).

The Kalapuya played many recreational games. Guessing games were played with bones or stick dice. Recreational activity often involved betting such as wrestling, footraces, target shooting, and tug-of-war (Mackey 1974:44-45).

Clothing for men and women consisted of "Basket-like hats made of cedar, spruce roots . . . with a "Cape or blanket of wolf, elk, bear hide (and) Short trousers of hideskin inside" (Mackey 1974:41). Children wore a fur-cloak for warmth during the winter seasons. Men wore a cloak of fur on their backs attached by a string, a loin cloth made of hide, "leggin of hide and moccasins", and "a cap of fur coon." In the summer, women wore an "apron or short skirt made of rushes and blade-grass (and) leggins and

moccasins of hide". Clothing for children of both sexes consisted of little other than "moccasins occasionally" (Mackey 1974:41). Ornamental and ceremonial clothing consisted of beaded armbands, headbands of braided cedar bark, and necklaces of bead, shells, and grizzly teeth (1974:36).

In regards to personal appearance, mustaches were common among Kalapuyan men but they would commonly pluck out other facial hair (Jacobs 1945:30).

Kalapuyan women wore their hair in braids interwoven with hide. Their faces were painted in a particular design to show they were ready for marriage (Mackey 1974:41).

Families would disperse from winter villages in the spring and relocate in task-oriented camps, located near desired resources such as berry patches, stands of camas, and wild carrot. The warmer seasons were a time of high mobility and camps consisted of simple structures described as lean-tos (Zenk 1976; Collins 1931). In the summer, people lived in the open or "occasionally (in) grass houses or fir-boughs covered with grass" (Mackey 1974:42).

Women and children gathered plants during the warm seasons. Camas bulbs were obtained from the wet prairies after the plant had flowered in the spring. The camas root was dislodged with a digging stick and the bulbs were collected. After roasting in earth ovens for several days, the roots were eaten immediately or dried for storage. Often the camas was ground and pressed into ten pound cakes for later use (Coues 1897) (cited in Mackey 1974:3).

Berries were picked in a variety of habitats throughout the summer and into the fall. Hazelnuts were gathered in the late summer (approximately July through August) from dry bushy areas in foothills of the Coast Range. Hartless indicated the following berries were obtained by his people: salmon berries, thimble berries, raspberries, salal berries, black berries, huckleberries, blueberries, and red huckleberries

(1913) (cited in Mackey 1974:43). Tarweed seeds were harvested in the late summer (August-September) after the fields had been burned. The seeds were dried and then ground into meal for consumption.

Acorns were also gathered in the fall from oak groves (Zenk 1976, 39). The acorns were leached by placing them in baskets with water, and then the product was roasted (Jacobs 1945:20).

Game hunting probably accounted for less of the over-all diet than the fishing or food-gathering activities done by women and children. Hunting was primarily done by men, although women and children occasionally participated in the large group hunts and kill drives. Hunting was conducted throughout the year but the fall and spring migrations of birds were particularly profitable seasons to obtain game. Elk and deer were particularly prized, but small game such as squirrels, beaver, rabbit, and waterfowl also made up a substantial part of their diet. Hartless (1913) indicated that his people consumed: deer, elk, bear, beaver, squirrel, gophers, rabbit, birds, grouse, pheasant, quail, robin, and pigeon (cited in Mackey 1974:43).

The use of riverine resources in the upper and middle Willamette Valley is apparent in the use of weirs, nets, and spears that were reportedly used by the Mary's River band (Mackey 1974:43). Hartless indicated that his people from near present-day Corvallis, acquired aquatic sources locally such as salmon, trout, and eel. Mussels, clams, and whales were obtained on excursions to the coast (Mackey 1974:43). Although a few anadromous fish (salmon) did pass the Willamette Falls at Oregon City, the use of salmon would have probably been more limited among people of the upper Willamette Valley than among people who lived near the Columbia River or the lower

Willamette Valley near the larger runs. Possibly, Indians from the upper Willamette Valley also shared fishing rights at the Oregon City falls during the salmon runs in the fall (Havercroft 1986).

4.5 Trade and Regional Exchange Patterns in the Upper Willamette Valley

Walking and the use of boats were the only form of transportation for the Kalapuyan people prior to contact with Euro-Americans. Aboriginal trail systems linked areas within the Willamette Valley, and to the coast and the western Cascades. The first Euro-American trappers used these trails, and settlers later developed some of these same routes into primary wagon roads. Some of these trail systems are the basis of modern road systems.

The Willamette River and its tributaries provided suitable transportation routes for water vessels. Dugout canoes were constructed of cedar, white fir, or cottonwood that were hollowed out by firing. The canoes were 14-30 ft. long, and seated 4-30 people (Mackey 1974:38).

Kalapuya attended trade gatherings at Willamette Falls (Zenk 1976) and possibly at Celilo Falls on the Columbia River (Havercroft 1986). Geographical differences in subsistence patterns among the different Kalapuyan groups and the Molalla were utilized for trading relationships (Zenk 1976). For example, camas was particularly abundant in the lands held by central Kalapuyans, but ethnographic and historic accounts do not mention big game hunting among these groups. In contrast, evidence suggests big-game hunting was a principal activity of the Yamhill, who lived to the north. Jacobs' informant indicated, the Willamette River Kalapuyans typically brought camas, the Molalla from the western Cascades brought smoke-dried meat and huckleberries, and the

Tualatin brought "wild potatoes" and smoke-dried deer meat. These goods were exchanged with the Clakamas for items such as smoke-dried fish, smoke-dried eels, and pounded dried salmon. The Tualatins was particularly known for offering slaves they had acquired through raids or trade with other Indian groups (Zenk 1976:52). Dentalia shells, bone and shell beads, ornamental jewelry, beads, feathers, tobacco, and animal hides were also exchanged at the trade gatherings. After Euro-American contact, goods such as trade beads, blankets, Hudson's Bay Company jackets, guns, gunpowder, and horses were also traded at the gatherings (Zenk 1976).

Dentalia shells were worn for decoration and were a form of currency among the Kalapuya and other Pacific Northwest native people. Smaller dentalia shells were frequently strung on a sinew thread for trade. Tattooed markings on peoples arms were used to measure the dentalia to determine its monetary worth. An individual that possessed many dentalia shells or beads was said to be wealthy or a headman. A wife or slave could be purchased with the dentalia shells. After Euro-American contact, trade beads assumed a similar function as the shells after Euro-American contact. (Jacobs 1945).

According to Jacobs, items were exchanged as gifts in the following manner (Zenk 1976). Visitors would enter a village and would present their goods to the village man or host, then the host or headman would distribute the gifts among the village people. The visitors would indicate to the headman or host when they were leaving. Before the visitors left, village people would bring gifts to the headman's residence, and the gifts would later be given to the visitors. After receiving the gifts, visitors would return to their own villages and distribute the gifts among their own people.

4.6 Settlement Systems for the Late Archaic Period

Settlement patterns that have been proposed for the Late Archaic period generally fit within three different models that are based on the seasonal location of residence and the corresponding use of resources. Understanding these models will help identify the type of prehistoric sites examined in the archaeological testing and identified in field surveys of Peavy Arboretum.

John R. White proposed a settlement-subsistence model based on archaeological data from 113 sites that were examined as part of the Willamette Valley Prehistory Project (White 1975). White classified Willamette Valley sites into four environmental zones that were used for seasonally-based procurement. Sites were classified in the following categories: 1) valley edge, 2) narrow valley plain, 3) primary flood plain, and 4) riparian.

White described narrow valley edge sites as located on the 500-600 ft. contour of slopes and ridges, along the lower boundary of coniferous forests. According to White, the Late Prehistoric inhabitants of the Willamette Valley primarily used these locations in the spring and summer as hunting camps.

White described narrow valley plain sites located on low terraces that bordered tributaries of the Willamette River. Oak savannas and marshes are common in this environment. In archaeological sites examined for the Willamette Valley Prehistory Project, these areas exhibited more material accumulation, suggesting therefore that they were more intensely used than valley edge sites. According to White, several advantages were offered by the narrow valley plain sites. Plant and wildlife (primarily birds) were abundant and easily obtained near its marshes and ponds, and acorns were readily available from the many oaks.

White described primary floodplain sites located on the broad, flat plains that surrounded the Willamette River. The oaks groves and open grasslands found in this environment supported a variety of hunting and gathering activities. Resources available along its large marshes and sand ponds included tule, wading birds, and fish. On the plains, many flatland species of game and floristic resources were available, particularly camas that grew throughout the moist floodplain. According to White, task-oriented temporary camps were located near these resources in the spring, summer, and fall.

In White's model riparian sites located along the tributaries of the Willamette River represented a more permanent type of camp (a base camp). Base camps were occupied various times of the year when a variety of resources were accessible including an abundance of mammals and fish, as well as edible vegetation such as blackberry, elderberry, ninebark, and hardbark (White 1975).

Minor and Toepel proposed an alternative model where bands stayed within a limited geographic area, such as a watershed of a tributary (Beckham et al. 1981). The residents of these areas alternated between living in winter villages and summer base camps. From these locations, smaller groups were sent on task-specific missions and stayed in temporary camps.

Wilber A. Davis proposed a settlement system where inhabitants primarily used the lowland resources of the valley. In this model, people lived in the same location throughout the year in villages located on high terraces of a floodplain near major rivers. From the village residences, they would visit task sites as needed (Davis 1978:77-79). During exceptional flooding, inhabitants might have briefly left their villages until flood waters had receded.

Richard D. Cheatham (1988) acknowledged the Davis model was valid for some areas of the Willamette Valley, particularly the portion where Davis conducted his study near the Muddy Creek and the Calapooya River. However Cheatham cautioned against applying the model universally to the upper Willamette Valley. Cheatham pointed out, Davis based his model on a floodplain level of 76m, a level that is lower than many other locations in the Willamette Valley, including areas along the Long Tom River where Cheatham has conducted his own archaeological investigations. Furthermore, the locations used in the Davis model are of a pre-Holocene age that are unlikely to be flooded, and pockets of dry land remained in this area during the worst historical flood (1988, 191).

Thomas J. Connolly proposed that several patterns of settlement and adaption have occurred within the sub-basins of the upper Willamette Valley (1983) (cited in Cheatham 1988:191). The Mohawk River Valley includes large sites oriented along the Mohawk River and smaller sites that tend to be located along secondary streams or in upland areas. But along the lower Coast Fork of the Willamette River, large sites are located on secondary drainages of the Coast Fork and smaller sites are distributed across the landscape. Whereas, the upper Willamette Valley east of the McKenzie-Willamette confluence consists of small sites lying on the lower-lying surface, and large sites on the leading edge of a terrace. Connolly concluded, that "regional variation does exist in the Willamette Valley settlement patterns, and provides a foundation for the formulation of locally more applicable subsistence-settlement models for the upper Willamette Valley" (1988:37).

Cheatham (1988) investigated several sites in the Long Tom area and found that native groups on both sides of the Willamette River used the environment in much the

same way, living off large sites above the active floodplain in the winter months, and transferring to the valley floor during the warmer months after the threat of floods. Cheatham's investigation also supports Connally's argument for regional variation. For example, west of Amazon Creek in present day Eugene, inhabitants constrained their use to within 2.5 km of the winter villages, but along Amazon Creek and east of the Willamette River, inhabitants appear to have moved greater distance to their summer camps at Grand Prairie. Some of the sites occupied in the warmer months at Grand Prairie are as large as the winter camps, suggesting that sometimes big populations came together in the summer under particular circumstances (Cheatham 1988).

All of the subsistence-settlement models discussed have resident locations based on the seasonal availability of resources. Peavy Arboretum and McDonald Forest are located in a zone where inhabitants could have utilized all of these resources within a short proximity. Although some of the low-lying land of this area is periodically flooded, other land close by remained dry throughout the year. The Peavy Arboretum environment would have supported the subsistence activities requirements of native peoples throughout the year.

5. THE ARCHAEOLOGICAL TESTING AND ANALYSIS OF SITES IN PEAVY ARBORETUM

5.1 The Origins and Justification for Testing

A State Historic Preservation Office (SHPO) grant in 1995 provided for the testing and analysis of an archaeological site within Peavy Arboretum. As part of this project, cultural materials previously excavated from two other archaeological sites in the Peavy Arboretum vicinity were analyzed and used for comparative purposes. The intentions of the testing and analysis were multiple.

The previous summer while conducting cultural resource surveys I located a number of open-air lithic scatters in the Peavy Arboretum area. In addition to these lithic scatters, two other prehistoric sites (35-BE-34 and 35-BE-49) had previously been located in the Arboretum area. Both of these sites had been tested and were the focus of a 1990 archaeological field school that was directed by Dr. Richard Ross through the Oregon State University School of Anthropology. However, artifacts from these sites were never analyzed.

A recreation trail was modified in 1995 that travels through the Site 35-BE-34. The trail was eroding due to recreational use by bicyclists, runners, and hikers, and the modification was an effort towards protecting the surrounding and underlying integrity of the site. Some ground disturbance would occur as a result of the trail's reconstruction, and so archaeology technicians were present to monitor the process and record cultural materials.

Site 35-BE-51 was one of the lithic scatters I located the previous summer and was the focus in 1995-96 of a SHPO grant for testing and analysis. It is located

alongside Peavy Arboretum Road in an area that receives much visitor use daily.

Visitors have direct automobile access to the location. A parking lot and visitor kiosk are located within the site boundaries. The name, the Office View Site, is reflective of its location immediately south and within direct view of the OSU Research Forest Offices.

A recreation trail was being planned that would travel in the site vicinity. The OSU Research Forest Plan includes the identification and interpretation of cultural resources, for use in teaching, education, and research. The high-profile nature of Site 35-BE-51 presented an opportunity to advance towards these goals. Knowledge gained as a result of the excavation and analysis of 35-BE-51 would be used for interpretation of the trail to inform visitors of the past use of this environment by native inhabitants. As part of these efforts, non-native vegetation would be removed and culturally significant plants would be identified for interpretation on the trail.

In addition to the construction and modification of trails, many other ground-disturbing activities concerned with maintenance and improvements occur in the Peavy Arboretum vicinity on a regular basis. With this ground disturbance, comes a legal obligation, and more importantly, an ethical responsibility for the OSU Research Forest to identify and protect cultural resources. The testing and analysis of the 35-BE-51, 35-BE-49, and 35-BE-34 are also part of the effort to fulfill legal and ethical responsibilities.

The archaeological testing and analysis of 35-BE-51, as well as the analysis of materials excavated previously from the other two sites (35-BE-34 and 35-BE-49), also provided an opportunity to supplement the existing knowledge on the cultural past of Peavy Arboretum. Several studies have documented the late historic period of Peavy

Arboretum (Jackson 1980, Thomas 1980, Anderson 1939, and others), but its prehistoric component has not been sufficiently addressed in these works.

Since most archaeology is conducted on federal lands because of legal obligations, opportunities for archaeological studies in the Willamette Valley are relatively rare. The Willamette Valley contains relatively little federal land, and as a consequence, has not been subjected to cultural resource studies required on most public lands. In addition, much of the Willamette Valley has been disturbed through ancient geological and modern human activities. For these and other reasons, the understanding of the prehistory of this region is still at a formative stage. So the testing and analysis of prehistoric sites in Peavy Arboretum and McDonald Forest serves a more universal purpose for archaeological research. A comparative analysis of the three sites could be used to assess their inter-relationship and contribute to the existing knowledge of upper Willamette Valley archaeology.

5.2 The Sites

Site 35-BE-51 is an open air lithic scatter primarily consisting of obsidian and cryptocrystalline silicate (CCS) debitage, tools, and projectile points. The site is located at approximately 400-500 ft. elevation along the eastern edge of coastal foothills that sharply ascend to an elevation of 1,300 ft. in less than a mile. Arbor Creek, a Class 3 stream and tributary to Calloway Creek, originates approximately 200 meters upslope and travels directly through the site. Vegetation within the site includes a dense growth of Oregon ash, big-leaf maple, Douglas-fir, Oregon white oak, and hazel. Horsetail thrives in the poorly-drained areas of the site. Camas also grows within the site and is particularly abundant on the low-lying land just east of the site.

Site 35-BE-34 is also a lithic scatter primarily composed of obsidian and cryptocrystalline debitage and tools. More significantly, the site contains fragments of groundstone tools and at least three camas pit ovens. Other camas ovens have been located nearby, and a pestle curated by the OSU Research Forest was allegedly found in the site area. The site is located along Calloway Creek at about 400 foot elevation, approximately 1500 meters (4921 ft.) northeast of Site 35-BE-51. As compared to Site 35-BE-51, this site's immediate surroundings are more distant (about 1/2 mile east) from the more dramatic increases in elevation. Calloway Creek is a Class 2 stream, and it is important to note, has many large sized stones that were available for the construction of camas ovens found on the site. Camas ovens have not been located in the other sites analyzed for the SHPO grant, although other possible camas ovens have been identified about one-quarter mile west of 35-BE-34, upstream and also adjacent to Calloway Creek.

Previously several test pits were dug at Site 35-BE-34 under the direction of Dr. Richard Ross as part of the 1990 Oregon State University archaeological field school. The testing seemed to indicate a relatively small amount of cultural materials (density of 17 artifacts/meter³) that were limited to a few centimeters of the surface, therefore efforts were redirected towards Site 35-BE-49, which was thought to be more significant and to contain more cultural materials (density of 178 artifacts/meter³).

The trail modification was conducted on Site 35-BE-34 in 1995. Construction activities were monitored by the cultural resource crew, and tools and concentrations of

debitage were collected and mapped. These materials were included on the SHPO grant analysis of lithics and used for comparative purposes with artifacts from 35-BE-51 and 35-BE-49.

The remaining site analyzed for the SHPO grant was Site 35-BE-49, the focus for the 1990 Oregon State University archaeological field school excavations. The site is located about 3960 feet southwest of Site 35-BE-51 and at a slightly higher elevation of about 750 feet. This site also primarily consists of obsidian and cryptocrystalline silicate debitage and tools. It is located along a Class 3 stream (stream runs year round, but is not fish bearing). The site was excavated much more extensively, and consequently, revealed many more artifacts.

In addition to the three sites that were analyzed under the SHPO grant, at least two other sites and numerous isolates are scattered throughout the Arboretum and its surroundings. When considering the relationship between the artifacts, the impression given is not of distinct sites and isolates (less than ten artifacts) but of an interconnected system of task-oriented activity areas. Rather than an analysis and interpretation of any individual site, the more probing and difficult question is the temporal and functional relationship between the sites and isolates.

The three sites and numerous isolates occupy a common geographic zone. They are conspicuously oriented along creeks at successively lower elevations contours below the six hundred foot level, the transition zone between the foothills and valley floor. As a result of the burning strategy and its natural topography, these sites would have been in a particularly productive environment for the needs of its late-prehistoric inhabitants. This environment is characterized by a diversity of flora and fauna, many of which were utilized by native occupants.

The three sites as well as numerous other lithics found in and surrounding Peavy Arboretum are also located on relatively flat areas oriented along water courses. Perhaps to state the obvious, access to water has been shown to have been an important settlement criterion. Through sampling, one study found 97 percent of all sites in the upper Willamette Valley were located within 200 meters of a water source, and 60 percent were located 100 meters or less from a water source (Bell 1981:47). However, water courses change through time and their locations are not necessarily evident on the modern landscape.

Besides the obvious everyday human requirements for water (drinking, cleaning, etc.), these areas are frequently low-lying and periodically inundated, thereby providing conditions that favored the growth of camas. The annual springtime profusion of camas on the moist low-lying areas of the contemporary Peavy Arboretum hints at the former abundance of the plant in this area. The close proximity of this valuable resource to all of the sites, and the presence of several camas ovens in Peavy Arboretum are suggestive of the importance of this factor when selecting a residence. The close proximity of the three sites to a main trail put them in a particularly advantageous position for trade. The trail would have linked the sites' inhabitants in trade networks, where their camas could have been exchanged for trade goods from other locations.

5.3 Testing Methodology

The testing that was done at 35-BE-51, and the analysis used for materials recovered from 35-BE-51, 35-BE-49, and 35-BE-34 was all conducted under the supervision of Ann Bennett-Rogers, the cultural resource manager at Oregon State University Research Forest. Much of the material presented under the following

discussion on methodology and analysis was previously released in her 1997 report to SHPO along with more comprehensive coverage of data not presented in this thesis.

The testing process for Site 35-BE-51 began with the division of the site area into twenty meter square units. Previously, the site had been mapped and its boundaries determined by the presence of lithic materials visible on the surface. The twenty meter square units were used to more intensively determine the concentration of cultural materials and the boundaries of the site. One meter units were randomly selected from within the twenty meter square units, and the duff from the one meter square units were scraped to expose mineral soil. The lithics found through the scraping procedure were recorded but not collected, and this knowledge was used to select the location for the first phase of excavations.

The purpose of the first phase of excavations was to further locate artifact concentrations, identify horizontal and vertical boundaries, and to adequately sample all portions of the site. Twenty fifty square centimeter test probes were excavated in ten centimeter levels, and each probe was given a number from one through twenty. One-eighth inch screen was used to examine excavated soil. Excavation probes were located in portions of the site with identified concentrations as well as in areas where cultural materials had not been located. Locations were chosen for the second phase of excavations from information revealed through the first phase of testing.

The second phase of testing involved the excavation of one by one square meter pits, labeled as Units A, B, C, and D. One-eighth inch screen was used to examine the excavated soil. The pits were excavated to sterile levels (no artifacts) or to a point when digging became unreasonably difficult due to rock covering more than fifty percent of the level. Pollen samples and one liter soil flotation samples were collected from each 10

centimeter unit level for possible future studies. Particular attention was given to detail in Phase 2 excavations, soil irregularities were measured and mapped, profiles were drawn of the excavation walls, and cultural materials were mapped in situ when possible.

Remote sensing was part of the trail modification project. The purpose in the remote sensing was to obtain a "signature" from known surface concentrations of lithics and camas ovens, and then use this information to identify subsurface features.

5.4 Excavations

Excavation of Site 35-BE-51 was begun in the latter part of the summer of 1995, but because of a particularly wet fall and winter, the work was not completed until June of 1996. However, the wet seasons did reveal a significant amount of both surface and sub-surface disturbances that should be considered in the analysis of its cultural and organic contents. In regards to surface disturbances, swift-running drainages developed that ran directly across the site in an easterly direction. From the sub-surface, water percolated from the bottom of excavation pits to within twenty centimeters of the surface. Attempts to bail out the water from pits were futile since the water would quickly refill the pit to its prior level. These disturbances could have significantly disturbed both the vertical and horizontal distribution of cultural materials. They also suggest possible obstacles to year-round occupation of the site by native inhabitants.

Besides the natural ground disturbances, visible surface disturbances suggests the site area near Unit 7 had been ditched and drained during the early history of Peavy Arboretum as a nursery and a Civilian Conservation Camp (CCC). The CCC crews were

involved in a variety of reforestation projects in western Oregon and some of the improvements occurred within the nursery (Jackson 1980). Projects often involved the draining of heavy clay soils, such as those in Site 35-BE-51. In the site area, as noted by Bennett-Rogers (1997), the water from Arbor Creek was probably diverted directly away from the nursery and downslope.

As the focal point for the OSU Research Forest, the Arboretum and its surroundings have been subject to other disturbances on a fairly continuous basis since its inception in 1925. These disturbances include but are not limited to the construction of roads, timber harvests, and the planting of exotic vegetation. Some of these disturbances pre-date the Arboretum. For example, eighty acres of the Arboretum area was logged in 1916 (Anderson 1939:7). Vegetation was cleared for the Clark-McNary Nursery in 1925 in the 35-BE-34 area (Anderson 1939:20; *Chronological History of McDonald Forest* 1955:2). The clearing of dense vegetation presented problems that required extreme measures as related in the following passage from a thesis written by Wallace Anderson: "When brush and logs were burned the shooting of the stumps began" (1939, 20). Machines cut nails were also found in the top levels of excavations at 35-BE-51 and are suggestive of some of the many other ground-disturbing activities conducted in the Peavy Arboretum.

A similar stratigraphy was exposed in all of the excavations at the 35-BE-51. Horizon A was usually found in Levels 1 and 2 and was composed of a friable clay soil with many small roots (Bennett-Rogers 1997). The clay loam continued in Horizon B but the soil was more compact with less roots, and granule-sized charcoal and pebbles were found scattered throughout the horizon. Soil in the C horizon was a very compact, sticky clay mixed with large stones and small pebbles. Some of the larger stones located

in the deepest levels had a weathered appearance. Munsell color ranges for Horizons A, B, and C were given respectively as: 5YR3/3 to 10YR4/4, 5YR3/4 to 10YR4/4, and 5YR4/6 to 10YR4/4 (Bennett-Rogers 1997). Although cultural materials were generally found in all levels, in some instances the density of cultural materials would drop in the B Horizon and then recover in the C Horizon.

Burned sections were also observed in the sub-surface levels of several excavation pits. In Units B and C (1meter square units diagonally adjacent to each other), we observed a burned area just below the B horizon that covered much of the unit in varying thicknesses. As suggested by Bennett-Rogers (1997), both the inconsistent density of debitage found in different levels and the burned portion found at sub-surface levels could attributed to the many ground-disturbing activities that have occurred in the Arboretum. As discussed earlier, ditching, burning, clearing, and many other projects have repeatedly taken place in the development of the Arboretum and could have compromised the stratigraphy of 35-BE-51. These disturbances have certainly have occurred in 35-BE-49, the former location of Clark-McNary Nursery.

5.5 Lithic Analysis

For analysis purposes, the lithic artifacts from the three sites were grouped into categories of debitage, tools, and projectile points. All the artifacts recovered from the three sites represent flaked lithics as defined in the analysis report for SHPO as "formal and informal stone tools produced from flakes that exhibit a platform and a bulb of force at their proximal end and were produced by percussion or pressure flaking" (Bennett-Rogers 1997:14). Crabtree has defined a lithic flake in the following manner: "Any piece of stone removed from a larger mass by application of force, either intentional,

accidentally, or by nature. A portion of isotopic material having a platform and bulb of force at the proximal end. The flake may be of any size or dimension, depending on which technique was used for detachment" (1982:36). The lithic analysis of cultural materials excavated at 35-BE 34, 35-BE-51, and 35-BE-49 used the following lithic classes and definitions that were earlier established by Crabtree (1972) and Bergland (1991):

1. Utilized flakes-flakes or flake fragments which exhibit microflaking, striations, crushing or polishing along a working edge (not the platform).
2. Scraper- a flake with negative adjacent flake scars along the edge of a flake, suggesting a purposive modification of an edge.
3. Graver- a flake with a functional point or tip, which exhibits use wear and the tip maybe diamond shaped in cross section.
4. Biface- a flake or tool or preform with an edge formed by retouch along both sides of the same portion of an edge. These scars may be confined to the edge or may travel completely across the surface of an artifact.
5. Projectile point- differs from a biface in that there is a hafting element.
6. Debitage-flakes and debris that are the result of tool manufacture.

A debitage analysis was used because this type of artifact represented such a large percentage of the cultural materials recovered in the excavations of the three sites. The debitage analysis can be useful in providing clues as to how the site was used. For example, the debitage could be a type that is commonly discarded during the process of tool-making, described in the analysis we are using as "broken flakes" or "flake fragments". Or, the stone debris could be more directly related to the source of raw material such as material taken from a cobble at a quarry site. In theory, the first

example is associated with a temporary work camp or a base camp, whereas the latter you would expect to find in a location geographically closer to the source of the raw material because of the significant effort involved in transporting the heavy material in its natural unreduced form. However, it must be stressed that the debitage analysis offers suggestions at best since many other factors enter into the deposition of these materials. For example, the significant ground disturbance previously done in this area could have shattered cultural materials thereby changing their physical form and influencing the analysis.

The debitage analysis used for this study was developed by Sullivan and Rozen (1985) as a method of avoiding assumptions that are commonly made regarding the technological origins of the materials. The debris is divided into the following four categories:

- 1) Complete Flakes- having a single interior surface, with positive percussion features, including all or part of a platform and all margins intact.
- 2) Broken Flakes- having a single interior surface, with all or part of a striking platform, but lacking one or more of the margins.
- 3) Flake Fragments- having a single interior surface, but lacking a striking platform, and lacking some or all margins.
- 4) Debris- lacking flake margins, or with multiple occurrences of bulb or percussion, or lacking some or all margins.

A lithic scatter with a higher proportion of Category 2 (broken flakes) and Category 3 (flake fragments) would suggest the remains of an activity area where thin flakes were broken into many pieces during biface and tool manufacture. Where as, a relatively higher proportion of Category 1 (complete flakes) and Category 4 (debris)

materials are suggestive of an area where core reduction occurred. The amount of debitage with cortex could also be indicative of the type of activity and the setting where it was performed. For example, if very little debitage with cortex was represented, we could infer that the nodule was obtained (nodule extraction) and was initially reduced (primary reduction) at another off-site location. However, the presence of much debitage with cortex in the sample would suggest a location where nodules or cortical cores were reduced to a flake size or to a preform at or near the source of the raw material. These inferences can be significant because the presence of materials brought from other quarry locations could suggest procurement or trade patterns.

Site 35-BE-51 had a highly mixed debitage sample consisting of the following number of flakes in each category type: 122 complete flakes, 137 broken flakes, 211 flake fragments, 147 debitage. The material consisted of a slightly higher proportion of broken flakes and flake fragments (348/617 or 56%) than complete flakes and debris (269/617 or 44%). Despite the highly-mixed debitage sample, the higher percentage of broken flakes and flake fragments suggests a significant amount of tool manufacturing occurred on the site. The obsidian cultural materials excavated at Site-35-51 were likely procured from off-site locations and brought to the location of tool manufacture, since this material does not appear naturally on the site. Analysis done on the materials from 35-BE-51 (Skinner 1997) and other upper Willamette Valley and western Cascades archaeological sites (Skinner 1987; Skinner and Winkler 1991, 1994) show that obsidian was primarily obtained locally as Inman Creek gravels. Inman Creek gravels include two chemical source groups that appear to have originated in the western Cascades from near Salt Creek in the upper Middle Fork Drainage of the Willamette River (Skinner 1983, 1997). From this location, a pyroclastic explosion probably

redeposited gravels in quantities near the present location of Fern Ridge Reservoir, or as cobbles found along river and stream courses throughout the Willamette Valley and in the Middle Fork Drainage of the Willamette River in the western Cascades (Skinner and Winkler 1991; Skinner 1997). In contrast to obsidian, CCS appears to be more readily available throughout the Willamette Valley, and can be obtained within Peavy Arboretum and the surrounding McDonald Forest.

Tools from 35-BE-51 and 35-BE-34 were examined using an analysis based on wear patterns that are associated with an artifact's function. A four-digit value was given to each artifact based on the following four variables:

- 1) type of wear (chipping, abrasion, or crushing)
- 2) location of wear (edge)
- 3) shape of worn area (convex, concave, or straight)
- 4) edge angle (acute angle of 0-30 degrees or a medium angle of 31-60 degrees).

Edwin N. Wilmsen has noted several functions associated with the angles of the edgewear (1968). Generally, the most acute angles are related to cutting tasks such as in the cutting of meat or hide. Medium angles characterize most edgewear and are related to one of the following activities "1) skinning and hide scraping; 2) sinew and plant-fiber shredding; 3) heavy cutting-perhaps bone or horn; 4) tool back-blunting" (1968:156). Tool edges could be purposely shaped for a desired task, or a lithic fragment with an existing edge could be chosen for its suitability for a task. A tool's function could change as a result of wear. For example, the resharpening of a tool originally used for the preparation of hides could have had the edge made steeper and more suited for heavy woodworking or bone-working (Wilmsen 1968:157).

The analysis of 35-BE 51 tools showed that they were an expedient type used for cutting purposes. As noted by Bennett-Rogers (1997), the contrasting durability of raw material probably accounts for the fact that all of the obsidian tools were broken, whereas those made of CCS were found complete.

Three of the four projectile points excavated at 35-BE-51 were obsidian of a Late Archaic style (Figure 5.1; 1, 54, and B). They were recovered on the surface or on the upper level of the excavation pits. Hydration measurements (discussed in more detail later in the section on analysis) also correspond with a Late Archaic date.

A highly weathered CCS projectile point was the most unexpected and interesting of the artifacts recovered in the testing (Figure 5.2). In style, it resembles other projectile points given a Middle Archaic date by Aikens (1993). The projectile point was found in Unit C in Level 11, a much lower depth than the other points recovered from any of the three sites. The point resembles decomposed bedrock that was found at similar depths, and its weathered appearance is unique among artifacts from the three sites. The relationship of the projectile point to 35-BE-51 is uncertain, whether it was simply deposited inadvertently by an individual temporarily using the site (for example, hunting), or if it is associated with an occupation on-site (task or base camp). The lack of similar artifacts in style or weatherization suggests the artifact is an isolate and is not directly connected to an on-site occupation; however, the small amount of soil excavated at this depth precludes our ability to make a conclusion.

Artifacts analyzed for this study primarily consisted of obsidian and CCS materials. As noted by Bennett-Rogers (1997), the contrasting representation of CCS and obsidian artifacts from the upper and lower levels of excavations at 35-BE-51 may indicate a temporal pattern for the use of raw materials. Obsidian artifacts were more

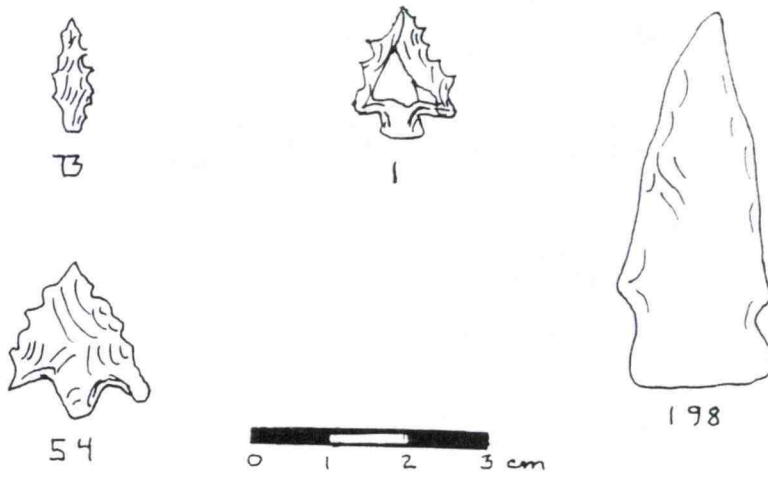


Figure 5.1. Projectile point drawings from 35-BE-51. (Bennett-Rogers 1997)



Figure 5.2 Projectile point found in Level 11

numerous than CCS artifacts from the surface down to Level 6, but thereafter, CCS was represented in greater proportions. A comparatively large amount of soil was excavated (ten cubic meters) from a relatively shallow depth at Site 35-BE-49. Obsidian artifacts represented sixty-eight percent of the sample from this site, also suggesting obsidian was commonly used in its most recent occupations. Though inconclusive with such little comparative sample, the pattern exhibited in 35-BE-51 opens the possibility that CCS was more readily available for earlier inhabitants, but that obsidian was the preferred material for most tasks, once available through new procurement strategies (for example, either through trade, procurement excursions, increasing knowledge of the source locations, access to a larger geographic zone, or a combination of these and other factors).

Trace elements in the chemical structure of obsidian have been identified and used to "fingerprint" sources and artifacts. This identification has made it possible to make inferences concerning exchange patterns, preferences for obsidian types, seasonal procurement strategies, ethnic and territorial boundaries, and trade routes. For example, a study by Skinner and Winkler (1994) suggests a variety of procurement patterns once occurred in the Willamette Valley. The study consists of a data base that includes 192 archaeological sites and 1941 obsidian artifacts. Most of the obsidian artifacts used in the study came from archaeological sites located in the major drainages of western Oregon, and the remaining samples originated from sites located in central and south-central Oregon. The study exhibited an overall trend, from north to south in the Willamette Valley and adjoining western Cascades. There is a pronounced shift from western to eastern sources, starting at the Middle Fork Willamette River drainage, and continuing south. Thus, the study suggested that native inhabitants who lived along the

Middle Fork Willamette River drainage and south of it had greater contact with central Oregon than people living north of this area. People who lived north of the Middle Fork Willamette River obtained their obsidian from more local quarry sources, such as Obsidian Cliffs located near the Three Sisters Wilderness Area.

Obsidian cultural materials excavated at Site-35-51 were likely procured from an off-site location and brought to the location of tool manufacture since this material does not appear naturally on the site. However, the obsidian was probably locally procured. Analysis done on the materials from upper Willamette Valley and western Cascades archaeological sites show that obsidian was primarily obtained locally as Inman Creek gravels (Skinner 1987; Skinner and Winkler 1991, 1994). Alluvial deposits of the Inman Creek A and B have been found in number of secondary natural outcrops, including nearby Willamette Park in Corvallis (Skinner 1998). Other primary sources of obsidian used less frequently in the Willamette Valley include Obsidian Cliffs, located near the Three Sisters Wilderness area of the high Cascades, and Newberry Volcano in central Oregon.

Obsidian from 35-BE-51 was submitted to the Northwest Research Obsidian Studies Laboratory for X-ray fluorescence analysis and obsidian hydration rim measurements. Of the forty-two samples submitted for X-ray fluorescence, twenty-six (61.9 percent) were sourced to Inman Creek A, and sixteen (38.1percent) to Inman Creek B. Inman Creek obsidian characteristically exhibits a "flawed" surface texture unlike the material from Obsidian Cliffs, the other Willamette Valley major source (Skinner et. al. 1996:7).

Surface cortex was found on twenty-five of the artifacts submitted for analysis suggesting local origins for the material. The curved shape of the surface cortex on the

artifacts are believed to be the remaining portions of stones that were once retrieved as small obsidian nodules from the banks of the Willamette River (Skinner et. al. 1996:7).

X-ray fluorescence analysis on artifacts from two other nearby sites in McDonald Forests (35-BE-64 and 35-BE-65) have given similar results (Skinner 1998). Sixty-three obsidian artifacts were submitted for analysis. Most of the artifacts were sourced to the Inman Creek A and B (55), and the remaining were from Obsidian Cliffs (3) and Newberry Volcano (1).

More recently, thirty-six artifacts from 35-BE-34 and 35-BE-49 in the Peavy Arboretum area were also submitted for X-ray fluorescence analysis and showed similar patterns (Skinner 1998 b). Of the total, thirty-three were traced to Inman gravels, and the remaining three were traced to Obsidian Cliffs.

Forty-one obsidian artifacts from 35-BE-51 were also submitted for hydration analysis, a method of relative dating that can sometimes be converted to an estimated absolute date (Skinner et. al. 1996:4). When obsidian is chipped during construction of a tool, or through the subsequent use a tool, the exposed surface absorbs water forming a hydration layer on the surface. The rate at which a hydration layer is formed is determined by the source of the material and the temperature. If the rate of hydration can be determined, the approximate age of manufacture or use can also be calculated. Usually the rate is determined by measuring samples found in association with artifacts that have a known age or whose age can be determined through radiocarbon dating (Meigham 1976)(cited in Skinner et. al. 1996:4). In the hydration analysis, a thin section of the artifact is examined microscopically and the hydration layer is measured. The measurement is compared against the sample with a known age to compute the artifact's estimated age. Hydration measurements should accepted with caution, as noted

in the analysis report for 35-BE-51, "Converting measurements to absolute dates should be approached with great care and skepticism . . . When considered through long periods, the variables affecting the development of hydration rims are complex, and there is no assurance that artifacts recovered from similar provenances or locales have shared thermal and cultural histories" (Skinner et. al. 1996:3).

Results from the obsidian hydration analysis of forty-one artifacts from 35-BE-51 are given in the table below as presented in the report (Skinner et. al. 1996:8)(Table 5.1). Wilson (1995) estimated a hydration rate for both Inman A and Inman B types at about $1.6 \mu\text{m}^2/1000$ years based on archaeological obsidian from the eastern Willamette Valley (cited in Skinner 1996:8). Measurements obtained from further obsidian hydration analysis (Skinner et. al. 1998) done on the artifacts from 35-BE-34 and 35-BE-49 did not vary significantly from the 35-BE-51 analysis.

<u>Geologic Source</u>	<u>Total OH Rims</u>	<u>Range (microns)</u>
Inman Creek A	21	1.4-3.6
Inman Creek B	12	1.4-2.9
Total	33	

Summary of results of obsidian artifact hydration measurements for 35-BE-51. Totals include multiple hydration rims and separate cuts for individual artifacts (Skinner 1996:8)

5.6 Summary of Testing

In conclusion, the testing of 35-BE-51, and the analysis of artifacts recovered from 35-BE-51, 35-BE-34, and 35-BE-49 primarily depict three Late Archaic sites where tool manufacturing and some core reduction occurred. The x-ray fluorescence analysis and the presence of cortex on much of the obsidian (sixty-two percent) suggest many of the artifacts were obtained from local, secondary sources possibly in the form of nodules from gravel or channel bars along the Willamette River. More recent x-ray fluorescence analysis of artifacts Peavy Arboretum and McDonald Forest sites show its occupants were also part of larger trade networks that included the high Cascades and central Oregon. A greater percentage of CCS found in the lower levels of excavation pits at 35-BE-51 opens the possibility of temporal differences in the use or availability of raw materials. CCS is more readily available locally within the Arboretum and surrounding McDonald Forest, where as obsidian was procured most likely from more distant sources. Conceivably CCS materials could have been used earlier before obsidian was readily available to the inhabitants of the sites. However, both the limited samples and the significant disturbance of the subsurfaces of these sites seriously compromise our ability to make conclusions regarding the stratigraphy and its relationship to different occupations. The relatively shallow depths of excavation pits at 35-BE-49 and 35-BE-34 also limit a comparative analysis with 35-BE-51 needed to substantiate a pattern of temporally-based use of different lithic materials.

A weathered-looking CCS projectile point of Middle Archaic style was recovered in one of the deepest levels of excavations at 35-BE-51. This artifact suggests an earlier occupation in Peavy Arboretum and McDonald Forests than previously known and opens a new level of inquiry for future research. Possibly future excavations conducted in the

McDonald-Dunn Research Forest can further clarify the extent of use of this area by earlier inhabitants and offer a more complete understanding of environmental change and the continuum of human use of this area . The recovery of this artifact at such a deep level of the excavation also gives validity to the argument for testing to a comparable depth in other excavations in this locale. Prematurely closing this excavation pit would have denied one of the most interesting aspects of the testing of 35-BE-51 .

PART II: THE TRANSFORMATION OF THE LANDSCAPE

6. EURO-AMERICAN CONTACT WITH THE PACIFIC NORTHWEST

6.1 Exploration of the Pacific Northwest

A series of international events centered in western Europe, and then on the eastern seaboard of North America, preceded Euro-American exploration and settlement of the Pacific Northwest. During the time of western European exploration, leaders of nations acquired power and prestige through the acquisition of territories with valued resources. With this intent, expeditions were sent to the Pacific Northwest and other regions of the New World.

Exploratory expeditions were also motivated by scientific interests and a methodology that developed out of the Age of Enlightenment in the eighteenth century Europe. In the scientific method, theories were presented and then tested by accompanying investigations. Often these investigations took the form of scientific expeditions to the New World sponsored by powerful European nations.

The search for a Northwest Passage precipitated early exploration of the Pacific Northwest by Europeans. A direct route between Asia and western Europe offered trade advantages and accompanying profits to the nation able to secure such a passage. Ships from Russia, Spain, and Britain had all sailed along the Northwest Coast by the sixteenth century, with each nation making claims of ownership.

Corporations and independent men were drawn to the region for less altruistic reasons. The region's vast resources were also an opportunity to advance the economic standing of an individual or company regardless of their national origin.

The voyage of the Englishman Captain James Cook first identified the Pacific Northwest for resources and the potential profit they represented (Bunting 1997). Cook's crew exchanged goods for sea otter pelts on a visit to the Northwest Coast in 1778. On the journey home, his ships traded the fur in China at a tremendous profit. The publication of Cook's journals in 1784 gave international exposure to the Pacific Northwest and its latent wealth of resources, particularly fur (Bunting 1997).

American Captain Robert Gray's discovery of the Columbia River in 1792 prompted other fur pelt traders to explore the inland Northwest and aroused United States interest in the market potential of Northwest resources. The next year, Alexander Mackenzie of the Canadian North West Company made the first transcontinental journey (by a Euro-American) to the Pacific Northwest. In the early nineteenth century, David Thompson and Simon Fraser pioneered overland east-west routes through the Columbia and Fraser River Valleys.

President Jefferson read Mackenzie's exploration account with interest, and noted the British intent to secure the fur market of the Northwest. In response, President Jefferson designed and Congress financed the Lewis and Clark Expedition in 1803 to find a land route to the Pacific. With an eye towards market potential, Meriwether Lewis and William Clark were also to bring back detailed accounts of the resources and inhabitants of the upper Missouri and Pacific Northwest. When the Lewis and Clark journals were published in 1814, they generated even more attention towards the Oregon country.

6.2 The Fur Trade

The fur trade established the earliest Euro-American presence in the Pacific Northwest and facilitated the later emigration of settlers. John Jacob Astor, a fur businessman operating from New York City, organized the American Fur Company in 1808 in order to expand his business to the American West. Two years later, Astor created the Pacific Fur Company as a subsidiary of the American Fur Company to specifically target the Oregon country's wealth of furs. A base of operations was established in 1811 at the mouth of the Columbia River, but news of the War of 1812 prematurely forced the sale of the fort to their British competitors, the North West Company (the fort was subsequently named Ft. George by the Northwest Company). Despite the short residency of the Astor's American Fur Company, its early presence strengthened American claim to the Pacific Northwest.

The North West Company, a young Canadian fur firm based out of Montreal, entered into several areas of the Northwest that had not previously been exploited by Euro-American trappers. The company built a trading post at the confluence of the Walla Walla and Columbia Rivers from where their trapping parties were sent into the Snake River country. The Snake River brigades gained a reputation for living off the land and trapping for themselves, in contrast to their competitors who relied on trade with Indians. Donald Mackenzie acquired notoriety for his leadership of the brigades from 1818 to 1821 on their annual forays into the Snake River country.

The other dominant presence in the Pacific Northwest was the British-owned Hudson's Bay Company. The company was the most established fur enterprise in the Pacific Northwest despite increasing competition from the younger North West Company. King Charles the II chartered the company in 1670 to promote trade and settlement in

the Hudson's Bay Region and to find a northwest passage to Asia. A British directive in 1821 ordered the merger of the North West Company with the Hudson's Bay Company in order to avoid violence between the two competitors. After the merger, the Hudson's Bay Fur Company dominated the Northwest region to the exclusion of any competing fur companies. At that time, the Hudson's Bay Company employed thousands of men in an empire that extended from the Atlantic to the Pacific and north to the Arctic.

Political boundaries were changing during the fur trade era. Spain's boundary was pulled back to the current Oregon-California border in 1819, and Russia's claim was moved north of the 54 degree 40 minute line in two separate agreements. Great Britain and United States occupied the Oregon country jointly until the Oregon Boundary Treaty of 1846, a compact that established the current boundaries between United States and Canada.

6.3 The Willamette Valley and External Economic Forces

The arrival of Euro-Americans in the Willamette Valley signaled its absorption into a larger economic world. Early visitors and emigrants would view and appraise the landscape from a European cultural bias and their values and ambitions would be reflected in its changing form.

The expansion of market capitalism is interwoven with Euro-American contact and the eventual settlement on land that became Peavy Arboretum and McDonald-Dunn Forest. The fur trade played a large intermediary role in this process as the first large-scale trading enterprise in the region. Explorations and establishment of trading

posts by the fur companies established a presence in the Pacific Northwest that were able to accommodate the needs of immigrants by providing work, shelter, food, and protection.

The fur industry's presence in the Northwest occurred as a result of congruent international events related to market supply and demand, class movement, and the whims of the fashion industry (Schwantes 1989). Fur products were introduced during the reign of Elizabeth the First, but through the early Middle Ages, only the wealthy elite of European society could afford these goods. Fur products became a large market in the eighteenth century only after the rise of a middleclass capable of purchasing such luxuries. The fur pelt of beaver was particularly valued as the material used for tall, stovepipe hats that were fashionable among men during the late eighteenth and early nineteenth centuries. Meanwhile, the declining supply of fur from Russia and Scandinavia created an opening in the industry for American and British entrepreneurs. The Northwest became the focus of the industry as demand for beaver pelts intensified and their value correspondingly increased (Schwantes 1989).

6.4 Exploration and Fur Outposts in the Willamette Valley

Reports of abundant game in the Willamette Valley elicited the interest of the earliest fur companies in the Northwest and led to visits to this reputed hunter's paradise. The first recorded journey up the Willamette Valley occurred May 6, 1811 by a Pacific Fur Company party consisting of Gabriel Franchere, Alexander McKay, Robert Stuart, and the Clatsop chief, Coalpo. Reportedly, the Clatsop chief had spoken of abundant deer, elk, beaver, and otter beyond the falls (Willamette Falls) and about a day's journey up the river. Participants from several subsequent trips up the

Willamette River made similar observations. From these early visits, reports of the Willamette Valley's abundant game were brought back to Fort Astoria. The area would increasingly be valued for its supply of game.

Clerks William Wallace and J. C. Halsey and a party of fourteen other men were sent to the Willamette Valley on November 23, 1812 to establish a trading post. According to Franchere, a dwelling and trading house were "built about 150 miles above the mouth of the Willamette" (probably means "Columbia" instead of "Willamette", (Perrine 1924). News of the war between United States and Great Britain in 1812 led to strict rationing of food at Fort Astoria the following year, and again, men were sent to the Willamette Valley post where game was plentiful. The succeeding fur company at Ft. Astoria (renamed Ft. George), the North West Fur Company, used the Willamette Valley in much the same way, visiting the valley during lean periods to hunt deer and elk, and eventually establishing a post in the French Prairie area of the Willamette Valley (Perrine 1924; Williams 1984).

6.5 First Euro-American Contacts with the Study Area

Hudson's Bay Company trading parties were the first Euro-Americans to travel regularly through the study area. These parties followed the eastern border of the coastal mountains using trails traversed by native inhabitants. The route was known at this time as simply the pack trail or the California trail. The trail facilitated trade between the company's regional headquarters at Fort Vancouver and its fur trading post in the Umpqua Valley, or to locations further south in the Sacramento Valley. The fords of creeks and rivers along the trail were more easily crossed than the large rivers on the east side of the Willamette River such as the Clackamas, Santiam, or McKenzie. A. J.

Allen described the role of the trail to the Hudson's Bay Company: "They start in the spring for California, carrying with them merchandise and English goods for barter with nations, and return, laden with furs, principally of beaver and otter" (1848:113-114). Hudson's Bay employee A. R. McLeod described the trail in 1826 as avoiding "almost entirely that inundated low tract of the country (by following) the Borders of the Mountain which runs parallel with the Wallamete" (Davies 1961:147). The edge of the foothills provided the primary route of travel through the Willamette Valley. McLeod led a Hudson's Bay Company brigade in 1826 that included Canadians, Hawaiians, Indians, and the English botanist David Douglas. The expedition was traveling towards the southwestern coast of Oregon where they hoped to trap and trade furs. McCleod described the trail in the vicinity of the study area as being twenty-seven miles past the South Yamhill River, and within "site of the Willamette about a mile away". McCleod alluded to the trail's frequent use, when he added, "afterwards our course was directed to the westward and came to a fine beaten road leading to the Umpqua which we propose following" (Davies 1961:179). Several years later, Gustavas Hines crossed from the east side of the Willamette River and described the California Trail in the Corvallis vicinity (1859:97-98):

A delightful plain fifteen miles in extent, and at night stopped on the California trail, at a place which, by the numerous fires which had been built around, we judged was often used an encampment. This is the great trail extending through from Upper California to the Columbia Yiver, and passes through the valley of the Wallamette, on the west side of the river.

Ewing Young, the explorer and trapper, traveled along the borders of (or through) the Arboretum while passing on the California Trail on two separate business ventures. Young and fourteen other men led a herd of horses to the Willamette Valley

from California in 1834. Young again would have crossed by the Arboretum in 1837 on a second business venture. Young was selected to lead a cattle drive of Spanish cattle from the San Francisco Bay area to the Willamette Valley. The drive was organized and financed by the Willamette Cattle Company, an organization of American investors who were frustrated with the McLouglin's policies regulating the use of Hudson's Bay Company cattle. Young's route from California formed the basis for later cattle drives and for expeditions attempting to find a southern emigrant route to Oregon.

John Work, who succeeded Peter Skene Ogden in leading trapping expeditions for the Hudson's Bay Company, followed the same route in 1834 taken earlier by McLeod in his journey from Fort Vancouver to the Umpqua Valley. Shortly after crossing Soap Creek and before reaching their campsite at the Mary's River near present-day Corvallis, Work describes the setting (Scott 1923:249):

All the way there is fine soil, and the low grounds about the creeks superior pasture land and extensive to the E. Some woods along the banks of the rivers. And on the high ground oaks here and there. The road for the next 4 miles lay along the base of some hills thickly timbered with oak and composed of rich tile soil & pretty well covered with grass. Large tracts of ground extend to the east. The road now lay along an extensive plain to the Laurie River (Marys River) where we are camped not far from its discharge into a Channel of the Willamette.

The passage depicts an environment shaped by the Indian burning regime as an open prairie, tree bordered rivers and creeks, and hills "thickly timbered with oak." Work's reference to "fine soil" and "superior pasture land" suggests a preconceived design for the environment that gives credence to the theory of award winning author William H. Goetzmann on the "programmed" role of early Euro-American explorers and fur trade pioneers in the American West (1966).

6.6 Faunal Change

The presence of the Hudson's Bay Company in the Willamette Valley had consequences for its wildlife that were evident by the period of white settlement. Earlier, when appointing Ogden in charge of the Snake River brigades, George Simpson ordered him to create a "fur desert" in the Snake River Country in order to discourage Americans and "freemen" from the more valued Columbia River country. The loss of fur-bearing fauna was also evident in the Willamette Valley by the 1840s. Charles Wilkes noted the scarcity of fur-bearing animals in 1841 and attributed their decline to over-hunting by the Hudson's Bay Company (1911:287).

The fur-bearing animals are decreasing in number yearly, particularly south of the parallel of 48 degrees. Indeed it is very doubtful whether they are sufficiently numerous to repay the expense of trapping them.

The Hudson's Bay company has almost the exclusive monopoly of this business. They have decreased, owing to being hunted without regard to season.

The scarcity of other types of fauna was also apparent by the 1840's in the Willamette Valley. The experience of Lieutenant Howison while traveling through the Willamette Valley in 1846 contrasts with those earlier experiences of American Fur Company and North West Company personnel who valued the area for its abundant game (Howison 1913:49).

I was surprised to find so great a scarcity of game in this country. I lugged a heavy gun more than a hundred and fifty miles through the Willamette Valley, and in all that ride saw but three deer. . . The little venison I saw in Oregon was poor and insipid; a fat buck is a great rarity. Elk are still numerous, but very wild living in the depths of the forest, or near the openings which the white man has not yet approached.

6.7 Prescribed for Settlement

The Pacific Northwest fur industry was in a sharp decline by the 1840s. The silk hat had become fashionable in eastern North America and in Europe, beaver had been overhunted, and the process of white settlement was entering a pivotal decade of growth. To the Hudson's Bay Company, the importance of the Willamette Valley had been primarily limited as a presence to establish British claim, a supplier of game, and a travel corridor between Ft. Vancouver and southern Oregon and the Sacramento Valley. But as a consequence of the Willamette Valley's early exposure to travelers and fur company personnel, prospective settlers and entrepreneurs were familiar with the valley's qualities.

To many early Euro-American travelers, the area reminded them of their homeland and the potential it offered for familiar pursuits. The fine soil and park-like verdure of the area would be recalled later in personal conversation, in published form, and by evangelical proponents of the Northwest country.

Hall Jackson Kelly described Willamette Valley of the 1830s in promotional literature used to encourage settlement (Powell 1917). Kelly's references to "valuable timber . . . inexhaustible fertility, and . . . wealth of vegetation" are indicative of the valley's alleged qualities promoted in such literature as well as the concerns of prospective settlers (Powell 1917:284-285).

Joel Palmer wrote of his travels through the Oregon country in 1845 and 1846 for the benefit of prospective immigrants who could use this information as a guide for settlement. Palmer's description is significant for being written just prior to the onslaught of settlers that would soon occupy the Peavy Arboretum area, and as indicative of a clear purpose he and others envisioned in the land. The following passage was

written in the vicinity of Peavy Arboretum and McDonald-Dunn Forest ("spur of the Coast Range") and the area between Rickreal Creek and the Mary's River (called the "Mouse River"). Palmer indicated both the availability of land for claim ("no claims . . . above the forks") and the desirability of an edge environment attributes that were important for settlement such as "good land with fine pasturage and timber close at hand" (Palmer 1847:830) :

Between the Lucki-mate and Mouse River there is a range of hills, as between other streams; but at one place a spur of the Coast Range approaches within ten miles of the Willamette; from this issue many small streams which run down it, and through the fine plains to the Luckiamate upon one side, and into the Mouse River on the other. This is a beautiful region; from the bottom can be seen, at different points, seven snow-covered peaks of the Cascade Range. The Cascade is within view for a great distance, to the north and south; which, together with the beautiful in the valley, renders it a picturesque place. Thrifty groves of fir and oak are to be seen in every direction; the earth is carpeted with a covering of luxuriant grass, and fertilized by streams of clear running rivulets, some of which sink down and others pursue their course above ground to the river. Between forks of the Mouse River approached part of the Cascade, but it leaves a valley up each branch about one mile in width, the soil of which is rich and good prairie for several miles above the junction. The mountain sides are covered very heavily in timber. Thus these beautiful valleys offer great inducements to those who wish to have claims of good land, with fine grounds for pasturage and timber close at hand. There are no claims made as yet above the forks. These streams furnish good mill sites for each of the first six miles, and are well filled with trout.

7. EMIGRATION AND SETTLEMENT

7.1 Settlement and Manifest Destiny

Several popular ideological beliefs of American people influenced settlement of the Oregon country in the nineteenth century. Jeffersonian ideals equated land with liberty and as an opportunity for the yeoman to rise above his condition. To President Jefferson and many prospective immigrants, the open land of the west provided such an opportunity. Settlement of the American continent to the Pacific Ocean was the God-given destiny of the American people, or what was later termed its "manifest destiny". Politicians and other Americans of the early nineteenth century were also espousing expansion rhetoric, and the contested Oregon country became the object of their outcry. To many western-looking immigrants, the untapped riches of the western portions of the country seemed to be awaiting persons possessing virtues of self-reliance and ingenuity required to civilize an untamed wilderness. For all of these reasons, the West seemed to hold a promise for the immigrant seeking a new beginning. In this context, the fertile landscapes of the Willamette Valley seemed particularly promising, and the area became the focus of early settlement.

Despite the Euro-American settler's assessment of land in the Willamette Valley as "un-improved" in the language used for land claims, ironically it was the Indian-manipulated landscape created purposely by methodical burning that reminded them of their homelands and seemed to hold so much promise. Immigrants coming west sought familiar landscapes where they could re-create the European model of society. The park-like appearance of the Willamette Valley appealed to a sense of order and domestication that tempered the pervading insecurities that were part of settler

existence. Travelers and settlers made frequent references to past, familiar landscapes when describing the Willamette Valley. These descriptions often convey an impression that the land had been prepared and was awaiting industrious use. Judge Quinn Thornton, an early settler in the Willamette Valley, described fire-created landscape environment that confronted settlers but he ascribed its origin to nature (Parsons 1924:160):

The surface of the earth presents, in many places, swells of unequal vegetation, covered with grass, having no undergrowth, of shrubs or bushes and dotted with the most beautiful oaks, that almost cheat the imagination into the illusion that they were planted and tended by the hand of man.

James Neall, who lived in the Oregon country from 1845 to 1850, suggested a landscape seemingly of human origin in his description of "oak trees that looked like sturdy old apple orchards, caused one to look around each point as you passed in the expectation of discovering a house to which the orchard was appurtenant" (Neall 1977: 44). To Neall, it was "hard to realize that this was nature's own doing, unaided and untouched by the hand of man, and that there was not a human habitation within many miles" (Neall 1977:44).

To Judge Thornton, the land seemed to beckon "civilization" in his description of "Open prairies of inexhaustible fertility" (Parsons 1924:160). Gustavas Hines gave credit for the landscape to a source greater than human origin in an 1830s description of the "perfect paradise" that seemed predestined and waiting the touch of Christian civilization: "Surely thought I, infinite skill has been employed, in fitting up a country which requires nothing more than a population under the influence of the religion of Christ, to render it a perfect paradise" (Hines 1859:119). The prairies of the Willamette Valley suggested a familiarity as well as an intended use in Hine's description of a landscape that "appear as one passing over them, as though it had been

but year or two since they were cultivated" (1859:342). Lieutenant Neil M. Howison in the following 1846 report also described a landscape that appeared to be ready and destined for cultivation: "Continuous ranges of prairie land, free from the encumbrances of trees or other heavy obstacles to the plow, stretch along, ready for the hand of the cultivator" (1913:49).

7.2 An Inauspicious Beginning

Despite the tremendous potential of the Oregon country envisioned by its proponents, Euro-American settlement proceeded slowly up to the mid-1840s. The only substantial community in 1821 consisted of a few retired employees of Hudson's Bay Company and North West Company who were living in a settlement in the French Prairie area of the Willamette Valley. Only 100 individuals lived in the community in 1837. By this time a few American settlers, mostly retired fur trappers, had joined the Canadians at the French Prairie community (Gibson 1985).

Missionaries were the other early Euro-American presence in the Willamette Valley. Missionaries Jason Lee, his nephew Daniel, and companions accompanied Nathaniel Wyeth to Fort Vancouver in 1834. They were to conduct work with the Flatheads in western Montana, but they were persuaded by John McLoughlin to establish their mission in the Willamette Valley instead. They located the mission near the French Prairie community. Although Lee established a mission school and conducted religious services for Indians, much effort was also devoted to promoting the virtues of the Oregon country to prospective emigrants through letters and trips back east. Lee brought back a shipload of New England emigrant families in 1840, and many of them settled near the

present-day city of The Dalles, Oregon. Despite the brief tenure of the Willamette mission, its presence did help establish further American claim and encouraged emigration to the Oregon country.

7.3 Social Precedents to Settlement

The 1840s were a pivotal decade for white settlement in Oregon. At the beginning of the decade, few settlements had been established in Oregon country, and political jurisdiction was still disputed between Britain and United States; however, the "Oregon fever" was on the minds of many emigration proponents. The virtues of the Willamette Valley were communicated through popular books, public presentations, kin, and community networks. Hall Jackson Kelly became a leading advocate of Oregon country colonization by the 1820s through pamphlets, circulars, petitions, and speeches, despite having never been to the country. Expansionist rhetoric was voiced by political proponents of the Oregon country such as Senator Thomas Benton and Lewis Linn of Missouri and Caleb Cushing of Massachusetts who pressed for American sovereignty and settlement to the Pacific. Ten emigration societies had formed by 1839. The frenzied "fever" that preceded settlement is expressed in an 1843 letter from the Iowa Territory (letter from the Iowa Territory, March 4, 1843):

Just now Oregon is the pioneer's land of promise . . . some have already been to view the country , and have returned with flattering tales of inducements it holds out. They have painted it to their neighbors in the brightest colors; these have told it to others; the Oregon fever has broke out, and is raging like any other contagion.

In an event commonly referred to as the Great Migration, missionary Marcus Whitman led nine hundred immigrants in 1843 on the first caravan where the wagons arrived at the Columbia River intact. The Great Migration was followed by the arrival of many larger caravans over the next few years (Schwantes 1989).

Many of these emigrants were motivated by the chance to own land. Word had spread by the mid-1840s that the U. S. Congress would give free land to people willing to settle in the Oregon country. For years settlers had been claiming lands under the Provisional Government in anticipation of United States ownership.

The majority of settlers emigrated to the Oregon country from the upper Mississippi and Missouri river valleys (Bowen 1978). One motivating factor was the dismal economic conditions in the Mississippi Valley. The market for agriculture products had collapsed by the early 1840's bringing an end to prosperous years. The average farmer even had difficulty paying taxes. The situation compelled some Mississippi Valley farmers to look westward for new opportunities.

Compounding economic problems, starting in 1843 a series of floods ravaged the Mississippi Valley destroying crops and several bottomland settlements (Bowen 1978). Sickness and a series of epidemics followed the floods and swept the upper Missouri Valley in the mid-1800's. Census figures from 1850 shows deaths particularly prevalent from outbreaks of tuberculoses, cholera, dysentery, typhoid, and pneumonia. The perception of the Willamette Valley as offering an environment relatively free of the diseases and sickness provided a strong appeal for prospective emigrants. Though difficult to understand from our contemporary perspective shaped by modern medicine, a healthy environment was always foremost in the settler mind. William Bowen (1978) has noted many of the Midwest communities that suffered outbreaks of diseases resettled

in the Willamette Valley. A. J. Allen's advocacy of the Oregon country appealed to this concern for the healthy environment in the following declaration: "Nor do I believe any population have suffered so little from sickness or had so few deaths in the same length of time, since the colonizing of America" (1848:317).

7.4 Levi Scott: The Experience of One Emigrant

Although each settler came from unique circumstances, the background of one early emigrant who briefly settled on land that included the present-day Peavy Arboretum is representative of the social circumstances that prevailed and would have driven many upper Mississippi and Missouri Valley residents to leave all behind and head off to the Oregon country. Levi Scott and his son John are central to this thesis for being the first Euro-American people to reside on a claim in the study area. Levi Scott also has an influential role in the white settlement history of Oregon for his leadership of the expedition that founded a southern route to Oregon.

Through the reminiscence of Levi Scott (Collins n.d.), we know that his decision to leave Iowa in 1844 was preceded by a series of events common to many other immigrants from the upper Missouri and Mississippi valleys. Prior to emigration, Scott and his family rented a farm near St. Louis where they grew ten acres of corn. Scott described this period as, "starting with nothing . . . working for low wages . . . (with) everything I had to buy high" (n.d.:40). Dissatisfied, Scott and his family relocated to the Iowa frontier, which at that time was in the process of transferring lands from native people to homesteaders. Scott observed the experience of white settlers in Iowa who were of limited means and had to borrow money to purchase land (Collins n.d.).

While in Iowa, Scott assumed several civic duties in the developing society. He was elected captain of a militia company and was later nominated by the Whig Party as County Commissioner of Des Moines County. However, the death of his wife in 1842 and the earlier loss of six of his thirteen children culminated a series of events that influenced his decision to leave Iowa for the Oregon country. Although in our contemporary society, these events seem particularly unfortunate, Scott's experience was common among his contemporaries in the Midwest who often lost family members to sickness.

Scott's experience in the developing society and future state of Iowa would be somewhat duplicated in the Oregon country. Like many other emigrants, Scott came from a background that was familiar with living on the edge of Euro-American settlement. Scott and other emigrants were not making a drastic lifestyle choice in their decision to emigrate to the Oregon country; rather they were reacting as members of a society that equated "open" land with opportunity.

Scott and his teenage son John were part of the Nathaniel Ford migration of 1844. After their arrival in Oregon City, Scott wintered in the town where he found employment building a plank fence and acquiring timbers for a mill being constructed for Dr. John McLoughlin, Chief Factor for the Hudson's Bay Company. Other emigrants were similarly aided by the Hudson's Bay Company either in the form of goods, or by employment with the company.

From Oregon City, the majority of emigrants proceeded south on the California Trail with settlement occurring along its length at ever-increasing distances up the Willamette Valley. Nathaniel Ford and other members of the 1844 migration followed the trail south and settled along the Rickreal (La Creole) Creek and founded a community

using the creek's namesake. Other area residents included Jesse Applegate and his brothers, Lindsay and Charles, who had settled a year earlier at Salt Creek, a few miles north of Rickreal Creek.

James Clyman led an immigrant party up the California Trail in 1845, and from a camp on the North Lukiamute River, noted the recent settlement in this area of the upper middle Willamette Valley: "The white(s) extend this (far) south their being two or three farms commensed here this spring one year ago the nearest house was Thirty miles north so goes the settlement in the willhamet valley" (1980:174). Clyman noted the vegetation of the time, particularly the still abundant camas that favored wet areas, but even at this early stage of settlement, he was alerted to the ecological effects of settler activities on the important native staple (1980:174):

It is remarkable to see the great Quantity of esculent roots that grows in all parts of this vally. Ten or Twelve acres of cammage in one marsh is Quite common and in many instances it will yield 20 Bushels to the acre the calapooyas live exclusively on roots but whare hogs are introduced they soon destroy the cammerce fields these extensive fields are allways on wet land and in many places no other vegetable is found to intermix with it.

After wintering in Oregon City, Scott went to Astoria to pursue a speculative venture involving a lime kiln. In a handwritten note he commented: "I (went) down to astory by watter with a view of burning lime but found the limestone very good, but very limited, quaunity not sufficient to ____ me in starting business. Pretty pebbles only?" (Scott n.d.). Arlie Holt, a Polk County historian, has collected personal reminisces of Levi Scott's and other emigrants who settled in the area. According to Holt, people commonly associate settlers ambitions with agrarian pursuits, but Levi represented a common entrepreneurial type of settler always seeking opportunity (personal communication).

Dismissing the limestone venture in Astoria, Scott traveled up the Willamette Valley in search of opportunity on the edge of settlement, which at that time was the community along the Rickreal. Scott probably wanted to settle near people who had accompanied him on the journey to the Oregon country. Fellow travelers on the Oregon Trail often formed bonds during the long journey and commonly settled together in communities after reaching their destinations.

As Scott traveled up the Willamette Valley, one of his horses escaped near the Yamhill River: "We were compelled to distribute her load burden among the other horses, and to drive her with them, loose, till we came to the house of Jesse Applegate, .at the head of Salt Creek Valley, where we drove her into a corral, and lassoed her" (Collins n.d. 114). After visiting with Applegate, Scott continued south to a creek that runs through McDonald Forest. Scott described the naming of the creek: "Five or six miles, perhaps, south of the Luckiamute, we came to small muddy stream, in crossing which one of our pack horses mired down, and we were compelled to remove his pack before we could get him out. The water in this creek looked so much like dirty soapsuds, and the sticky clay so much like soap, that we always, afterwards, spoke of it as 'Soap Creek', and it retains the name to the present time." (Collins n.d.:115.). Scott and companions continued a little further south and camped at a location that he later described as "a little mountain branch, or brook, three or four miles south of Soap Creek . . . on Reed's branch," where they encountered a coyote (Collins n.d.:116). This location was in, or adjoining, the Arboretum; and "Reed's branch" was a reference to Thomas Read, who later resided on the property, and whose experiences are discussed later in this study.

From this location, Scott and his companions continued south, perhaps seven or eight miles, and then camped on the Mary's River near present-day Corvallis. Later, Scott recalled: "I thought the country between the Yamhill and Mary's river the I finest I have ever seen" (Collins n.d.:116). Scott returned to the settlements along the Rickreal and spent the winter building a house for Jesse Applegate (Collins n.d.).

7.5 The Southern Route

A dangerous, difficult section of the Oregon Trail preoccupied Scott and other white settlers after their arrival in the Oregon country. Near Mount Hood, a deep gorge cuts through the Cascade Range. At this location, emigrants faced a choice between proceeding by foot over the difficult terrain of the Cascade Range mountains, or the more practical route, continuing by boat and raft on the Columbia River. The latter involved traveling the treacherous waters on poorly constructed rafts, and as a consequence, many emigrants lost family members or their possessions to the river. Scott nearly lost his son John to the river. As a consequence, there was much discussion among the early settlers about the need for an improved route to the Willamette Valley. Scott recalled, "Several lamentable disasters had occurred on the river, and some lives had been lost. There seemed to be a deep and general impression that we must have a road across the Cascade mountains" (Collins n.d.:123).

Several attempts had been made to find a safer alternate route to western Oregon. William Barlow was part of an 1845 effort to guide emigrants over the Cascade Mountains near Mt. Hood , but they were forced to abandon the wagons. Meanwhile, other attempts were made from the south. Scott was part of an expedition in 1845 that tried to find a southern emigrant route into western Oregon.

After the aborted 1845 expedition, Scott recalled: "On returning to the Willamette Valley, I stopped at a place where I had determined to settle, some six or eight miles north of the mouth of Marys River, and about twenty-five miles south of any other habitation in the valley" (Collins n.d.:129). This settlement was on land that included Peavy Arboretum. Possibly, this is also the 1846 provisional claim recorded for Scott's son, John, with the following description: "(A) few rods W. of California Trail and near branch where trail passes through timber S of Lukiamute" (Genealogical Forum of Portland, Inc.:1982). The description accurately describes the Arboretum area that adjoined the California Trail, was "S. of the Lukiamute," and was near timber of the eastern-extending foothills of the coast range. However, Scott's claim was typical of early white settlers in the valley who established their claims along the valley edge and its accompanying resources.

Scott built a dwelling on the claim and stayed until June of 1846. At that time, Jesse Applegate requested Scott's assistance on a new expedition to find a southern emigrant road. As explained by Scott (Collins n.d.:129):

I had taken up a claim, and went to work to improve it and make me a home. This engaged my entire energy and attention till early in June when Jesse Applegate, having raised another company to prosecute further the enterprise which had occupied the other company during the month of May, came to my place and requested me to join the expedition.

The South Road Expedition (or South Road Company) assembled near La Creole (near present-day Dallas), and left in June of 1846. Lindsay Applegate described the northern portion of the south road as following "the old hudson bay trail that led south to California" (Bancroft 1879). However, between Emigrant Creek (near present-day Ashland, Oregon) and the Mary's River in California, the southern immigrant route

diverged from the California Trail, and the South Road Company had to open a passable mountain road through difficult mountainous country.

The first portion of the emigrant group guided by the South Road Expedition arrived in the Willamette Valley on November 22, 1846. Others did not arrive until January of 1847, and three families were not rescued until April of that year. Thirty percent of the emigrant families that followed this route settled in Polk County, while many of the others ended up in Yamhill and Washington Counties (Davis 1995).

Meanwhile, other emigrants successfully crossed the Cascades near Mt. Hood using the Barlow Road. With the completion of the Barlow Road, settlers could cross over the Cascade Range, then join the California Trail near Cornelius, and proceed south to the upper Willamette Valley. However, the southern route continued to be used by some emigrants heading for the Klamath Basin, the Rogue River Valley, and the Umpqua River Valley. Portions of the trail would also be used later by prospectors seeking fortunes in the gold fields of the Sacramento Valley, Yreka Valley, and Rogue Valley.

7.6 Thomas Read: An Introduction

After returning from the South Road Expedition in the fall of 1846, Scott found his claim occupied by the Thomas Read family. Scott explained in a hand-written recollection that he had selected a place to settle twenty-five miles from the Calhoon place in Benton County (a reference to the Mark Cahoon's Donation Land Claim). In Scott's words: "Tom Reed jumped my claim I sold to him for about \$20.00" (Scott n.d.). In the account of this event, as re-phrased by James Layton Collins, Scott had returned to his claim and found Thomas Read and family. Read seemed determined to "hold the

fort", and Scott, sympathetic to the plight of the family and having seen other desirable land during his travels, nobly relinquished his claim for twenty dollars to cover improvements made on the claim. (Collins n.d.:129-130).

After turning over their claim to Thomas Read, Scott and his son settled in Douglas County. Scott took a claim near Elk Creek in the present-day location of Scottsburg and is credited as the town's founder; Scotts Valley and Scott Mountain were also given the family's name (Corning 1989:218). Like his earlier experience in the frontier Iowa, Scott played an active part in the political development of Oregon as a territory and state. He participated in the Territorial legislature of 1852-54, and the State Constitutional Convention of 1857 (Corning 1989:218). Scott eventually returned to Polk County and lived his remaining years near many of the people who had accompanied him on the 1844 migration and the South Road Expedition.

Thomas Read continued to reside on Scott's original claim and became influential in the community. An early history of Benton County describes Thomas M. Reed as "the well known and prosperous farmer (who owns) a large and valuable estate, (and as) . . . one of the substantial men of the community, who made his money since he came here" (Fagan 1885:525).

Thomas Reed was born in New Hampshire in 1812 and died on his Oregon claim in 1892. Read accumulated 3,000 acres from his original 640 acre claim and ended his life "one of the more well-to-do men of Benton County" (Portrait and Biographical Record of the Willamette Valley Oregon 1903:970). Before coming to the Oregon country, Read first settled in Iowa where he worked on a Mississippi River steamboat

and in brick manufacturing. He arrived with the Oregon Trail migration of 1845 as a single man, and one year later moved to Benton County (Portrait and Biographical Record of the Willamette Valley Oregon 1903:970).

Travelers who followed the California Trail or southern route through the upper Willamette Valley passed Thomas Read's property, and apparently the house was a familiar landmark along the trail. The Gibbs and Starling 1851 treaty map shows the location of Read's house along the "old California trail" (Figure 1.3). Levi Scott indicated that Read became a "prosperous farmer" and operated an inn (Collins n.d.:129-130). Tolbert Carter, an emigrant traveling along the California Trail in 1846, recalled meeting Read, (Carter 1846:100):

The first night from the Mary's river we camped at the foothills, a sparsely settled country, near the residence of H. C. Lewis . . . Next we came to the residence of Thomas Reed, and after camp had been arranged, Mr. Reed visited us. This was the first visit we had received in almost eight months. On learning our condition, and that we had neither bread or flour, he returned to his house and brought some bread and divided it among the five children in camp. I was intimately acquainted with him 45 years afterward, and in all those long years I never forgot that noble act of charity.

8. LAND CLAIMS

8.1 Land Ownership : Provisional and Donation Land Claims

The boundaries of the Oregon country continued to be redefined politically and geographically during the early period of settlement. The Oregon Territory was subdivided into the Oregon and Washington Territories in 1853, and Oregon became a state in 1859. The Peavy Arboretum area was part of Polk County under the Provisional Government, but new boundaries established in 1847 placed the Arboretum in northern Benton County.

Legal title to land evolved in relation to political development. Originally, the first Euro-American settlers in the Oregon country were squatters, a common custom in the territory east of the Appalachians. An 1820 law was designed to protect the ownership of occupied land by permitting settlers to purchase land in the public domain at \$1.25 per acre. The Preemption Act of 1841, also called Benton's Log-Cabin Bill, permitted male citizens over 21, widows, and some aliens to settle on surveyed lands and to purchase it at a minimum price. The Provisional Government, which had ties neither to England or United States, adopted a generous law in 1843 that allowed individuals to claim 640 acres.

Settlers expected the new United States government to recognize preexisting claims made under the Provisional Government. However, Congress failed to formally state its position with native peoples and to establish a formal land policy in the Oregon Territory Act of 1848. Under great pressure from settlers, Congress finally passed the Oregon Donation Land Law in 1850. The Donation Land Law recognized all pre-existing land claims made under the Provisional Government.

The Donation Land Law was a great encouragement to settlement. The population in the Oregon country in 1846 was only about 10,000 people. A decade after the Donation Land Law, the population had grown to 50,000 people, most of this settlement occurring within western Oregon valleys. The land claimed under the Donation Land Law is responsible for much of the geometric patterning of vegetation, roads, fences, that prevailed in the coming years. The law provided "that after the first of December, all claims shall be bounded by lines running east and west, and north and south" (Act of Sep. 27, 1850, Sec. 6). However, claims made prior to December 1, 1850 under the Provisional Government were not necessarily symmetrical and oriented in cardinal directions. These claims often meander along streams or are irregularly shaped to include desirable land features (Head 1971). Many of the land claims in the Peavy Arboretum area exhibited these characteristics, indicating their origin under the Provisional Government.

8.2 Removal

American sovereignty in Oregon and the adoption of the Donation Land Law had lasting implications for the remaining native populations of the western Oregon. Land and the opportunity it held for emigrants required the displacement of Indian populations. The adoption of the Donation Land Law set in motion policies that eventually extinguished title to land for native residents throughout western Oregon.

Although white settlement in the American West has been celebrated in popular culture, the period is characterized by a theme of loss to American Indians and their sympathizers. One native writer has compared the objectives of manifest destiny to the

planned Nazi program of " 'lebensraum-politik'--the expropriation through conquest of territory belonging to Poles, Slavs, and other 'inferior' peoples" (Churchill 1996:393).

Historian William G. Robbins has identified the appropriation of Indian land in the Willamette Valley and elsewhere in the United States as a function of market capitalism (Robbins 1986). Market capitalism requires expansion in order to continue producing profits and be sustainable. According to Robbins, an "ideology of conquest" accompanies capitalist expansion where the greater economic power feels justified in actions to subjugate and remove people who impede economic progress (Robbins 1986:52). In this context, settler society perceived agricultural "improvements" (cultivation) as a superior, more worthy use of land and as justification for dispossessing native populations (Robbins 1997). Indians were relegated to a colonial status in this relationship, subject to being "exploited or removed at the whim of an arbitrary and powerful central government that spoke for major interests in the emerging political economy" (Robbins 1986:22).

In theory, the earliest governmental directives protected the land rights of Indians in Oregon. The Oregon boundary treaty with England in 1846 forbid settlement or occupation of land used by Indians. And two years later, under American territorial law, the Organic Act guaranteed Oregon Indians rights "of person or property" unless an agreed-to treaty between both parties (the United States government and native groups) formally stated otherwise. The act also extended the Northwest Ordinance of 1787 to Oregon, giving further legal authority for the protection of Indian groups in regards to land, rights, liberty, and from undeclared war (Beckham 1990:180).

Indian land rights became an issue when Euro-American settlers pressed for

legal title to the land (Robbins 1986). Governor and Superintendent of Indian Affairs Joseph Lane and the territorial legislature supported the removal of all tribes from the Willamette Valley in 1849 (Coan 1921:52-53). Congress approved several measures in 1850. These included a three-member commission to negotiate with Kalapuyans for their removal to a location east of the Cascades, a separate position for a superintendent of Indian affairs, and the adoption of the 1834 Indian Trade and Intercourse Act in Oregon (4 Stat. 729) (cited in Beckham 1990:180). The last measure required Indian law and custom in unceded lands until a ratified treaty was adopted. Several treaty initiatives introduced in the early 1850s were not ratified. Treaties negotiated in 1851 to remove Willamette Valley Kalapuyans east of the Cascades were opposed by the targeted Indian groups (Mackey 1974:90-125) .

The treaties written under Joel Palmer's administration as Superintendent of Indian Affairs largely avoided reserved rights and emphasized removal to reservations. Three reservations were created in 1853 from within the traditional lands of native groups in the Umpqua Valley and Rogue River Valley. The Kalapuya and the Umpqua were combined in one of these reservations located on the Calapooya Creek in the Umpqua Valley, but constant intrusions by settlers and miners soon forced the abandonment of the reservation (Beckham 1990:181). Negotiations in the treaty processes were allegedly conducted at times when the Indians were hungry and susceptible to agreements or less likely to attend the negotiations (Coan 1922:31).

The discovery of gold in the Rogue River drainage aggravated tensions between whites and Indians and precipitated a series of violent incidents there that would influence policies in the Willamette Valley. Tensions erupted in 1855 into the Rogue

River War, after soldiers attacked a peaceful camp of Takelma. The "war" culminated the next year after several Indian bands were defeated in the Big Bend area of the Rogue River.

Although not as pronounced as the conflicts in southern Oregon and the Rogue Valley, Willamette Valley Indians were also subject to occasional violence and were forced to a dependent position once their traditional subsistence strategies were interrupted by white settlement. However, Indian resistance in the Willamette Valley was relatively minimal, because the earlier introduction of diseases had left them devastated, vulnerable, and few in numbers to resist white intrusion.

From the perspective of early white settler families in the Corvallis vicinity, Indian-white conflicts were limited to occasional demands for food and other relatively minor thefts. A Works Progress Administration project in the 1930s involved interviews with people who were the children of settler families in Benton County, many of whom grew up in the McDonald Forest/Peavy Arboretum area (Phinney 1939). The impression given by interviews is that in most cases Indian intrusions were thought of as irritants and not a significant threat to white settlement. Elizabeth King Wells, who lived on a homestead in Benton County as a child, recalled: "At first I was afraid to stay alone, as the Indians would watch and if they found the men folks were gone they did not hesitate to demand anything they wanted to eat, as they seemed to know the women were afraid of them, and we were, too". On the other hand, she also remembers a Kliikitat named Alphaia who would "walk right in and insist on shaking hands with every one, saying: 'All my tillicums', meaning friends" (Phinney 1939:727). Etna Barchard, whose mother was often left alone on their homestead near Summit in Benton County,

recalled, "The Indians were always friendly and mother was often so lonely that she welcomed their visits" (Phinney 1939:19). Angeline Bebeau Carter was under the impression that the two local tribes did not get along but their relations with settlers were good: "There were two tribes of Indians in this part: the Klikitats and the Calapooias. They were both friendly to the settlers but disliked and despised one another" (Phinney 1939:123). "In one incident during the "Indian war" further south, white settlers in Kings Valley anticipated an attack from the Siletz Reservation that never materialized. Evidently, inter-marriage occurred among settlers and local Indians. Theodore P. Beven, who homesteaded near Airlie (borders Dunn Forest): "Many white men married Indian women and there was a considerable amount of mixed bloods" (Phinney 1939:66).

Despite the relatively peaceful Indian-white relations in the Willamette Valley, federal policy treated Indian people of southern Oregon and the Willamette Valley alike. To some extent, native groups of both regions were linked in the minds of Willamette Valley settlers because events in southern Oregon often held personal connections to settlers further north. The activities of both areas were closely linked in matters of trade and commerce, and most male settlers had one time or another worked at mining stints in southern Oregon or elsewhere.

Palmer promoted policies that urged the removal of Indians from western Oregon to isolated reservations. In Palmer's words, "they must be guarded from pestiferous influence of degraded white men, and restrained by proper laws from violence and wrong among themselves". Palmer envisioned the government providing housing, education, agriculture instruction and tools, and missionaries to make an "honest and determined endeavor to elevate a fallen race" (cited in Beckham 1990:182).

Treaties that included all Kalapuyans were ratified in 1855 (Zenk 1990:551).

Three years later, special agent J. Ross Brown made the following assessment of the "remnant . . . once . . . powerful race" of Willamette Indians (Kalapuyans) (Works Project Administration 1942:A3-A6):

The Willamette Valley Indians . . . numbering 660 are divided into numerous small bands, each under the control of a petty chief. The tribe is very poor, and has neither the power or the disposition to go to war. During the disturbances of 1855 they remained in the valley, seeking only to save their lives. They were once a powerful race, overrunning the whole Willamette Valley, which they inhabited with the Moleallies, the Santiams, and other branches and offshoots of the same original tribe. The encroachments of the Klikitats, a warlike and powerful tribe, from the north of the Columbia River, gradually reduced them to a state of dependency; and since 1843, when emigrants began to fill the valley, they have been dwindling away, and are now a degenerate remnant, suffering from disease and addicted to all the evil habits of whites, They have worked a great deal among the settlers , and when not in search of whiskey are docile and expert in all kinds of farming operations

The Siletz Reservation, established in 1855, extended nearly 125 miles along the Oregon coast. The Grand Ronde Reservation was established two years later on the eastern border of the Coast Range. Most of the remaining Kalapuya from the Willamette Valley were sent to Grand Ronde Reservation in 1856. Other interior and western Oregon native groups including the Clackamas, Molala, Upper Umpqua, Takelma, and Shasta, were also assigned to the Grand Ronde Reservation by Bureau of Indian Affairs (Zenk 1990:551).

Natives groups from the Rogue River canyon and southern Oregon coast were assigned to the Siletz Reservation. Some of the defeated were sent by steamer to the mouth of the Columbia, and eventually, herded by soldiers south through the Willamette Valley to the Siletz Reservation. Others were marched north along a coastal trail under

the escort of soldiers (Beckham 1990:183). According to Anderson (1939:3-4), some captives were escorted along the "California pack trail" by the Arboretum:

The tribes wandering in this vicinity were removed to the Grand Ronde and Siletz reservations in 1857-58, following the Indian wars of 1855-56. Earlier residents passed down stories of watching the Indians as they were moved over the California pack trail, bordering the Peavy Arboretum, to their reservations. This was a colorful and memorable occasion as braves, squaws, and families paraded down the trail built by settlers.

9 SETTLEMENT AND TRANSFORMATION OF THE LANDSCAPE

9.1 Early Settlement Locations

Emigrants such as Thomas Read looked for particular attributes of the land that would support subsistence activities. Like Read, most them settled along the valley edge and the foothills. A Linn County settler referred to primary concerns when selecting a homestead: "All of the first settlers to this valley chose their homes on the foot-hills of the Cascades or about various buttes. The reason was that good springs and plentiful wood was found there and they could live conveniently and still pasture their stock all over the open valley" (Kendall 1935:190-95)(cited in Boag 1992:48).

In many ways the margins along the Willamette Valley were ideally suited to the needs of settlers. The prairie by the valley edge was more easily cultivated since the regular burning previously conducted by Indians inhibited the growth of vegetation and alleviated the arduous task of forest clearing. Ed Williams, whose parents came to Benton County in 1852, recalled: "The foothills claims were more attractive than now. What timber there was on the hills bordering the valley was scattering oak trees, and there was a heavy growth of grass over the hills and valley. Many places I know used to be the finest grazing land are now heavy stands of timber, or so closely grown to different kinds of brush that cannot grow nor cattle get through" (Phinney 1939:734).

The lush grasses of the prairie and foothills provided rich fodder for the farmer's livestock that roamed freely through the surrounding countryside. Ed Witham, whose parents came to Benton County in 1846, remembered his father valued the foothills for stock grazing: " Father had one thousand acres here. He took the hill land instead of level valley because he wanted to raise stock. The hills furnished better

grazing. He often told me that in those days the hills were all covered in fine grass. Many times the grass would grown shoulder high to a man" (Phinney 1939:751). However, restrictive measures were required on a stock farm to maintain the grassland environment and keep back the encroaching Douglas-fir. Ed Williams recalled a neighbor who neglected this task. The neighbor "refused to allow the young growth of firs to be disturbed on his place . . . Gradually the place that had been a fine stock farm came to the place where it would support almost no cattle" (Phinney 1939:735)

Foothill locations also provided timber and water, resources essential for the homestead. Wood from the scattered trees of the foothills and the dense belt of trees that bordered its water courses was used for shelter, furniture, fuel, fences, barns, farming implements, and countless other agrarian construction needs. And water, essential for the homesteader family as well as for their livestock, was provided by the many spring-fed creeks that flowed out of the foothills. Foothill locations also offered a longer growing season for farming, because such land was also better drained than the valley floor and permitted earlier cultivation (Lang 1885).

The upland locations along the foothills also had a particular appeal to emigrants who had earlier experienced the disastrous floods and accompanying sickness that swept the Mississippi Valley and Missouri Valley in the mid-19th century. J. Houk of Corvallis remembered that settlers located in the foothills to avoid the floods of the bottomlands (Longwood 1940:36). Ed Williams recalled their reasoning: "The early settlers were shy about taking claims in the level land near the river for two reasons. They were afraid of the damage from the more or less regular overflows, and they were afraid of the malaria on the flat land. Whenever a man from the foothills came down to the river to work for a few days he was sure to have a bout with malaria" (Phinney

1938, 737). A particularly severe flood in 1862 covered and destroyed much property in the Willamette Valley and is reported to have sent many flood evacuees to the foothills the following summer (Longwood 1940).

9.2 Road Development

Settlement continued to develop along the California Trail. The location along the trail gave the farmer access to nearby communities from where their produce could be shipped to more distant markets. The road was widened into a passable wagon trail after the discovery of gold in California in 1848 and served to move people and goods from the Willamette Valley to southern Oregon and California (Works Progress Administration 1942:A-45).

The California Trail continued to be the only main road through Benton County until the development of Benton County Road #1 in 1851. "Up to this time the roads traveled had been those that custom of travel had marked out, the last wagon following the first in the same beaten path" (Fagan 1885b, 16). The first record of the survey for Benton County Road #1 appeared on Sept. 1, 1851, and called for a thoroughfare beginning at or near the house of Thomas Reed, and ending at Hubbard's Mill in southern Benton County (Fagan 1885a:525). The road was opened one year later. Federal survey maps and notes from the early 1850's shows the route positioned in front and east of Read's house and along the current boundaries of Peavy Arboretum (oversized map in envelope).

A Portland to Marysville Road that crossed in front of Read's house extended south to Polk County by 1847, and to the Umpqua Valley by 1852 (Works Progress Administration 1942, A-46). The Territorial Road was authorized in 1852 from

Marysville (Corvallis) to Winchester. The Territorial Road eventually became known as the Portland and Umpqua Valley Road, and its route closely followed the modern Hwy 99 West /Pacific Coast Highway and Arboretum Road (Arboretum Road was formerly a part of Hwy 99 West/Pacific Coast Highway) that currently travels along the borders of Peavy Arboretum and McDonald Forest (Gallager 1993:25).

The Benton County Road #1/Territorial Road replaced the "old wagon road" that previously (until 1851) served the native populations, trappers, and immigrants. Although the routes were similar, the section of Benton County Road #1 that traveled along the borders of the present-day Arboretum diverged from the older traditional road. In an early publication on Peavy Arboretum, Assistant Professor of Forestry, Earl G. Mason, suggested the old wagon road and the "West Side Highway" did not travel identical routes in the Arboretum vicinity. Mason referred to the early road and its proximity to the early boundaries of the Arboretum, and then further described the "faint line" left from the "well worn ruts" of the older wagon road were still visible "along the hillside" from the West Side Highway (Mason 1926:13):

In the early days, many pioneers passed by our present arboretum on their way to and from Corvallis. With the main road nearly crossing the northeast corner of the present arboretum (the Arboretum's present, expanded boundaries would have included the road) . . . With the development of rail transportation and the building of the West Side Highway in the Valley, came the decadence of Tampico and the once oft traveled road became useless. The telegraph line fell into disrepair and the well worn ruts gradually filled, leaving only a faint line along the hillside where once an important road directed the steps of sturdy pioneers to and from Corvallis and Portland.

Federal survey notes from the 1850s give the compass bearings of two roads that are west of the main road (Benton County Road #1/Territorial Road), closer to the hills,

and travel directly through the present-day Arboretum (oversized map in envelope). The main road also is identified on maps that accompanied the survey notes, but only sections of what appear to be the old wagon road (or roads) are evident on the same map. The survey notes suggests the earlier road (or roads) ran closer to the hills and did not travel an identical route as the Territorial Road. The Benton County Historical Resources Survey II (1984-85) also identified the ruts to the pack trail behind the Bowman house and the Territorial Highway in front of it.

The slightly different location of the wagon road from the Territorial Road/West Side Highway, is also supported by information provided by Jerrold Bowman, the present owner of the historic Thomas Read house. Ruts from what are believed to be the old wagon road are still visible on the back (west) side of Read's house (Weber 1985). The ruts originate at the boundary of McDonald Forest and the Bowman property, and continue on a eastern course briefly before turning northwest and disappearing at the Arboretum/Bowman fenceline. The ruts and other historic features on the Bowman landscape have been photographed and are discussed in a later portion of this thesis.

9.3 Homestead Life

Typically in early pioneer farms, the majority of the land remained uncultivated except for twenty to forty acres of wheat, a few acres of oats, and a small vegetable garden. Volunteer cropping was frequently practiced where a farmer would let seed drop while harvesting a ready crop. The field would then be harrowed thereby providing the seedbed for the next season's crop (Longwood 1940:38).

Wheat was the crop of choice for early settlers. The first winter wheat was often the only food besides meat that was obtained through hunting. An early Oregon settler

recalled: "Many a pioneer meal consisted of boiled wheat , and some kind of wild meat" (Wilkes 1995:71). The Provisional legislature in 1845 allowed wheat to be used as legal tender for the payment of debts, and pioneers used grain slips for purchases made with the Hudson's Bay Company (Works Progress Administration 1942: A-57). Wheat, the so-called "poor man's crop", required little initial investment and frequently returned a profit from the first harvest, and could be transported without refrigeration. Lieutenant Howison, in 1846, noted the appeal of the crop for settlers who established homesteads in the Willamette Valley (1913:51):

A two-horse plow prostrates the rankest fern, and a fine crop of wheat the very next year succeeds it. The fields, however, continue to improve under cultivation, and are much more prolific the fourth and fifth years than before. Wheat is the staple commodity; the average yield is twenty bushels to the acre; and this from very slovenly culture. Those who take much pains, reap forty or fifty.

In the early settler years, wheat harvested in the fields in the Peavy Arboretum area was packed by horse or oxen to Dallas where it was ground into flour, until closer mills were constructed in Benton County (Longwood 1940).

Before the arrival of transcontinental railroads, farming implements were nearly all hand-crafted by the homesteader, assisted by local tradesmen in small shops . L. E. Wilkes, whose parents were early settlers in the Willamette Valley, remembered his father doing the woodwork but having a local blacksmith do the iron work. Farming implements were "produced as needed" including plows, harrows, cultivators, fanmills, hoes, and pitchforks (Wilkes 1995:56-57).

Livestock were an important part of the agrarian tradition brought by emigrants. Typically, oxen were included on the early migrations to the Oregon country and territory. Though creating much hardship along the trail, livestock offered many

advantages for settlers. Unlike agriculture, livestock offered a "virtual traveling storehouse" that required no pre-existing market or storage facilities (Longwood, 1940:44). Often the same oxen that accompanied the emigrants to Oregon were used to plow the soil of their new farms. (Longwood 1940).

Early settlers would commonly amass livestock and then let them run freely over the surrounding countryside. Etna Burchard, whose parents were early settlers in Benton County, recalled the wild cattle that resulted from the open range practices of the time (Phinney 1939:19)

There were many wild cattle in that country when we were children. It was not safe for women and children to get too far from home. Those cattle were the offspring of cattle that escaped from the farms and gone wild. Clay Vanderpool of Tampico (Tampico is less than a mile from Peavy Arboretum and borders McDonald Forest), who was a friend of my father, used to find it profitable to hunt these for the market. They were considered the property of any one who could take them.

Wallace Anderson provides evidence of the open range practices in the vicinity of Peavy Arboretum and McDonald Forest (Anderson 1939). Anderson described the location of Cronemiller Lake just north of the Arboretum. According to Anderson: "The site now occupied by the nursery dam was once a swamp and was notorious as a miring down place for cattle roaming the country. A number of prize stock were lost in this quagmire and eventually it was fenced to prevent this heavy loss" (1939:23).

Most early settlers kept hogs, and their accounts attest to their importance on the early homestead. A settler on the Tualatin Plains expressed the utility of the animal and its special adaptability to living in the pioneer environment (Wilkes 1995:66):

And here I take the occasion to rise in defense of that much aligned animal, the hog. No other domestic animal is so versatile, or exhibits as much prowess in making his living. If its not above ground, he'll be go

under ground, or under water. I never saw one that starved to death. No other domestic animal could outlast the hog and multiply in our forests. As for greediness, I contend that, as compared with the cow, the hog is a prince of generosity.

Hogs were already a part of early history in the Oregon country by the settler period, having originally been among the first animals kept at Astoria, and then later at Ft. Vancouver. These early hogs were a hardy, self-reliant breed that were well adapted to living in the Willamette Valley frontier (Bowen 1978). Much to the irritation of settlers, these hogs reproduced in large litters that could not be contained within fencing, and ran wild in the woods. A vigorous offspring resulted, known as "razorbacks" (Scott 1917:64). Early farmers claimed this variety had a particularly long snout that could "reach through a fence to the ninth row of potatoes" (Scott 1917:65).

Hogs also contributed to the displacement of Kalapuyan peoples through the animal's appetite for their subsistence foods, such as acorns and camas roots. In a letter written in 1854, Joel Palmer noted that swine had almost completely destroyed the wappato, camas, and other roots that were the principal subsistence food of the Kalapuya who lived along the Tualatin River (Bowen 1978:87).

Hogs provided food for settlers in the form of spareribs, backbone, and sausage, and could be preserved well without refrigeration (Bowen 1978). Historical accounts suggest that wild hogs were rather lean and long-legged, an advantage that allowed them to be more easily slaughtered, preserved, and consumed than cattle (Bowen 1978). And the market was always good for hogs whether in the form of livestock or in other products such as bacon, ham, and lard (Wilkes 1995).

Hogs were also used in other ways on the early homesteads. On early pioneer farms much of the wheat was wasted before the introduction of better farming

implements. To make use of the waste, hogs were released in the fields after the sheaves were removed and the product was then made available for sausages (Wilkes 1995).

In his land-use study of Benton County, Longwood (1940) brings attention to how the 1850 agriculture statistics for Benton County show a livestock monetary value double of that for all other improvements. In considering the early role of livestock to people who settled in the study area, we can look at the early agriculture census records for Thomas Read and his neighbors (U.S. Department of Commerce). The 1850 agriculture census shows Read having more than \$3,000 worth of livestock that included: 24 milch cows, 6 working oxen, 40 other cows, 5 horses, and 65 swine. The cash value of Read's farm is recorded as \$1,000. In comparative terms, his \$3000 livestock value is more than three times that of his land. The 1850 agriculture census for Read's neighbor, Mark Cahoon (whose claim bordered Peavy Arboretum and was within McDonald Forest), records his livestock valued at \$1,300 with a total land value of only \$200. That same year, the agriculture census for Price Fuller (claim located immediately south of Thomas Read's claim) also shows a \$1300 value for his livestock and a \$500 value for his land. The figures for Cahoon and Price Fuller also exceed the Benton County two-to-one average of livestock to total land value. The sixty-five swine recorded in the 1850 agriculture census for Thomas Read is significantly more than the amount recorded for his neighbors, and also exceeds the number of any other type livestock kept on Read's farm.

To summarize, the 1850 agriculture census for Read demonstrates how his early farm reflected other early settler farms in its reliance on livestock, particularly swine. The census also shows the ambitious nature of Read, whose farm from the beginning had an agriculture output that surpassed the norm for other settlers.

9.4 Developing Economies

A brief profile of Thomas Read written shortly after the turn of the century offers some explanation how it was possible to rise, in the author's words, from "poverty and obscurity to the possession of three thousand acres of land, and great influence in his community" (Portrait and Biographical Record of the Willamette Valley Oregon 1903:970). The profile suggests that Read had some of the same entrepreneurial spirit that had also brought Levi Scott from Iowa. Despite his notable achievements, however, Scott was a man of relatively modest wealth. In contrast, Read was described as one of the more prosperous residents of his community (Fagan 1885a; Portrait and Biographical Record 1903). Read also came to the Oregon country as a single man seeking opportunity, started with little capital, and like many other early settlers, supplemented his income with other jobs as his fields were being cleared on his claim. In these early years, Read worked at brickbuilding in Oregon City, and then also briefly worked the mines in California in the years 1849-50. Several times between 1862 and 1868, he drove his livestock to the mines in Idaho, where he sold them and returned with great profits. It is reported that Read acquired wealth through "grain-raising and stock manipulations" (Portrait and Biographical Record 1903:970).

The preceding profile of Read could be interpreted in support of the influential Frederick Jackson Turner thesis. Turner linked open land and the frontier experience to a character-building process that promoted self-reliance. But Thomas Read, like other members of this developing society, did not develop his farm or other financial endeavors independent of the world around him. Closer scrutiny reveals Read's financial gain was linked to a businessman's astuteness in gauging markets and seizing opportunities when presented (for example, "grain-raising and stock manipulations").

As shown in the brief profile, opportunity and the accumulation of wealth were connected to extra-regional forces such as the mining strike of '49' in California, and subsequent strikes occurring throughout the Northwest, where Read sold his livestock. These events had a multiplying effect offering other financial-driven opportunities for entrepreneurs like Read, who could accurately read and predict markets, and then supply the appropriate goods or services.

Whether examining the growth of agriculture, wood products, or transportation within the area of this study, it is first necessary to understand the role of extra-regional historical forces in determining both the type and the scale of activities that developed in the Willamette Valley. Without these extra-regional markets, farms and other supplying industries in this area would not have had an outlet for their surplus production and development would have proceeded at a much slower rate thereby producing a very different society and environment.

In a discussion of rural-urban dependency models, William G. Robbins has brought attention to America's preference for a history that depicts a "mythical, rural-centered world" that ignores the role of urban centers of capital accumulation in the development of rural economies (Robbins 1994:182). Robbins states: "The view that change originated in western environments ignores the fact that many newly established communities owed their existence to the decisions of the railroad locators, to financial investments in mineral exploitation, and to myriad other activities associated with the dynamic centers of an expansive global network of capitalist relations" (1994:182). In considering the history of land-use in the Peavy Arboretum area, it is important to examine the reciprocating relationships between urban centers of capital and the local

extractive economy, and the development of transportation networks that brought more efficient technology and permitted interchange between capital and products.

The California Gold Rush of 1849 and successive mining strikes in southern Oregon and elsewhere in the Northwest were a tremendous boost to the development of the Willamette Valley economy. The mining strikes stimulated the growth of industries supplying products for mining industries and pressured for innovation needed to meet the growing demand. Initially, Read accumulated the capital needed for later endeavors when he drove his livestock to the mines in Idaho between 1862 and 1868 and accumulated "great profits" in the process (Portrait and Biographical Record 1903:970).

The accelerated pace of development that accompanied the mining strikes is reflected in the growth of Marysville, later renamed Corvallis, as a local center of commerce, and distribution point for goods being sent Portland and ultimately to the mines in California. Bushrod Washington Wilson, an early settler, described the construction boom in Marysville in the early 1850s: "a saw mill and a grist mill here, 14 houses, 5 stores, 1 tavern, 2 blacksmith shops, 1 cooper, 1 carpenter, 1 fanning mill, and 20 buildings going up where last fall there was only two houses, one old log and one split board house" (Martin 1938:275). Wilson, who occupied a Donation Land Claim near Corvallis, was a master carpenter, and like many early settlers pursued occasional mining stints (Wilson later achieved notoriety in history for his participation in politics and other civic matters). Through the early part of the 1850s, Bushrod Wilson was optimistic about the future, his carpentry profession was providing him with more than enough work, and his wages were high (Martin 1938:275).

One of Wilson's carpentry jobs during this decade was the construction of a house in the study area for the Thomas Read family. The house was constructed in 1854 in a classical revival style (State of Oregon Inventory of Historic Properties 1980). Though substantially altered, the house stands as the sole remaining example of Bushrod Washington Wilson's many houses constructed in Benton County and as one of the oldest inhabited houses in the county.

Corvallis and its surroundings owed much of its quick economic growth to its advantageous geographic position as the southern-most community on the Willamette River that permitted regular navigation. From Corvallis, goods were sent north on the Willamette River to Portland, and then shipped to mining locations in California. Mining strikes began in southern Oregon in 1852 and provided additional markets for Corvallis area products. Pack trains were regularly assembled in Corvallis and sent to the mines in southern Oregon. A common practice was for miners to come to Corvallis in the fall, leaving their mules and pack trains while they went to Portland. They would return from Portland with supplies, and then pack the supplies from Corvallis to the mines in the south (Fagan 1885a).

Part of the growth of Corvallis and its surroundings can also be attributed to the successful marketing of the area's wheat crop, first to San Francisco and the mining industry, and later to international markets. The life cycle of wheat grown in the Willamette Valley illustrates the complex regional networks that grew and were responsible for the pace and form development took within the region.

Wheat had always held a preeminent role in the Willamette Valley. Early twentieth century historian Leslie M. Scott gave several reasons for the popularity of wheat among early pioneer farmers in the Willamette Valley: "It was a ready article for

sea export; was a convenient measure of value and medium of exchange; could be hauled long distances over rough roads . . . (and) was well adapted to the soil and the long dry weather of summer" (1917:60). An author in a 1882 declared: "All the cereals are raised here but you will see little of anything except for wheat, which for half a century had made Oregon famous" (Ingersoll 1882:767). Another writer of time expressed the prevailing sentiment about the crop: "The prairies of the Willamette Valley are the finest agriculture lands known . . . Whenever granite molders away, there is strong wheat soil" (Fagan 1885a:307).

After the gold rush and the Indian wars, roads were constructed and an emphasis on grain crops, primarily wheat, took priority over the livestock of the earlier farmers(Oregon Historical Records Survey 1942:A-21). Wheat exported from the Willamette Valley was sent to San Francisco until 1869. Much of the product supplied the mining industry; however, sometimes it was re-shipped from San Francisco to European markets or China and Japan and was sold as California wheat (Longwood 1940, 56; Lang 1885, 550).

Transactions involving wheat and other products supplied by the Willamette Valley encouraged the development of more efficient transport services. Boats on the Willamette River and its tributaries offered the most efficient form of transportation before the development of railroads. (Clark 1927:461).

The *Multnomah* arrived in Corvallis in 1851, and was the first boat to provide river freight services to the city. After the arrival of river-going freight services, several influential firms in Portland were able to control most of the future shipments of wheat. The Oregon Steam Navigation Company was incorporated in 1860 and dominated Willamette and Columbia River freight services until the railroad, although

several other independently-owned boats were still able find plenty of business (Clark 1927:469). The Peoples' Transportation Company was formed in 1862 as an alternative to the Oregon Steam Navigation Company by providing competition and cheaper freights on the Willamette River (Clark 1927:470). Competition between freight services assured the producer a favorable price for shipment and offered an incentive to produce a surplus for export. Engineering "improvements" on the rivers facilitated the steamship traffic, such as the canal and locks completed in 1873 at Oregon City that circumvented the falls that had formerly been an obstacle to river traffic. Rivers continued to provide the most efficient form of transportation as late as 1869 (Clark 1927:471).

The growing demand for wheat and oats required new innovation for the farmer as well. Volunteer cropping was quickly abandoned for more productive yearly planting, and horses replaced oxen for plowing fields (Longwood 1940:40-41). Machines were replacing hand labor for many of the agriculture tasks. Mowing machines were first used to cut grain in the Oregon late in the 1850s, and were commonly in use by the early 1860s (Scott 1917:66). George H. Himes used a mower in 1857 on a farm near Olympia, Washington and noted the efficiency of the machine: "Was five hundred bushels of wheat, or seven or eight hundred bushels of oats a day, as against fifty and seventy-five bushels when tramped by horses and winnowed by primitive method (Scott 1917:69). Threshing machines were used to beat the grain out of husks and were in use in the Northwest by 1850's (Scott 1917:66). The reaper, used to cut the grain, was introduced to the Northwest in 1856, and replaced the more labor intensive handcradle (Longwood 1940:41).

Wheat was sent directly to England by 1869. Developments in technology were occurring simultaneously to meet the growing demand for the product. A transcontinental railroad was completed in 1869 that allowed farm machinery to be shipped directly from the East Coast to Sacramento, California. Previously, farming implements were shipped around the Cape Horn of South America to Oregon, or else down to Panama where it was unloaded on the Atlantic side, and then reloaded on ships on the Pacific Ocean side, before continuing to Oregon (Longwood 1940:58-59). Wilkes recalls, "With the advent of transcontinental railroads, pretty much of . . . local, small shop, manufacture ceased" (1995:57).

Railroad development also extended to the upper Willamette Valley. The East Side Railroad extended from Portland to Albany by December of 1870 (Clark 1927:522). The West Side Railroad was completed in 1878 from Portland to Corvallis (Clark 1927:522). A railroad between Corvallis to the Yaquina Bay in 1885 briefly provided freight and passenger service with San Francisco via the ocean but the poorly-conceived project never developed because of the in-sufficient harbor in Yaquina Bay (Clark 1927: 524). By this time, competition between the railroads and steamships provided the farmer with exceptionally low rates for their wheat (Nash 1882). Railroad tracks between San Francisco and Portland were completed in 1887 thereby giving Corvallis a direct southern route to Sacramento (Clark 1927:522).

Agricultural production increased simultaneously with transportation development. By 1880, the Willamette Valley was produced a surplus yield of 150,000 tons of wheat (5,000,000 bushels) annually, a quantity more than two-thirds of the total product grown in the state (Ingersoll 1882:767). According to a contemporary writer, Benton and Linn counties accounted for half the wheat grown in Oregon; with the

addition of Polk and Marion Counties, the combined total of the four counties equaled three-fourths of all the wheat produced in Oregon (Nash 1882:283). Most of the wheat was sent from the farm directly to warehouses located by rural railway stations, a fact that explained the absence of barns in the Willamette Valley dating to this time (Ingersoll 1882). Produce was sent north to Portland for distribution until 1887, since the Oregon and California Railroad only extended as far south as Roseburg. Portland, as the only deep water port in the region, held an advantageous geographic position that permitted its development as an early urban distribution center and center of commerce for the region. From the wharves of Portland, most of the crop was sent around Cape Horn to Great Britain. A writer in 1882 declared that Oregon held natural advantages over other wheat producing areas. Because of the dry summer, wheat was not subject to mildew or rust during the sea voyage and "no failure of the wheat crop has been known since the settlement of the country" (Ingersoll 1882:767).

9.5 Agricultural Development on the Thomas Read Farm

The U. S. census for agricultural productions for Oregon taken in 1850, 1870, and 1880 show changes on Read's and his neighbors farms that correlate with extra-regional events discussed previously, such as the development and arrival of new technologies and the opening of new markets. The first agriculture census for Oregon occurred immediately after the 1849 California gold strike as markets were beginning to respond, and one year before the deadline for land claims made under the Donation Land Law. Agriculture statistics indicate the following decade (1850-60) experienced the greatest growth in agricultural markets of any decade before 1900 (Longwood 1940:40).

In contrast to the earlier mentioned examples of Read, Cahoon, and Price Fuller that demonstrated early settlers' emphasis on livestock, the 1850 agriculture census shows that wheat was the dominant product on neighbor Arnold Fuller's farm (U.S. Department of Commerce 1850). Arnold Fuller's farm was valued at \$2,000, but his livestock was worth only \$1,300. Arnold Fuller produced 600 bushels of wheat in 1850, as opposed to the 100 bushels produced by Read, the 300 bushels produced by Price Fuller, and the fifty bushels produced by Cahoon (U.S. Department of Commerce 1850). Arnold Fuller acquired the majority of his profits through the production of wheat, a practice that many of his neighbors would emulate and that would dominate Willamette Valley agribusiness in the coming years.

"Improved land" in the language used for the census bureau is defined as "cleared land for grazing grass, or tillage, or is now fallow, connected with or belonging to a farm" (Longwood 1940:39). The acreage of improved land roughly correlates with the development of the farmer's property for cultivation and grazing purposes. Arnold Fuller's 280 acres of improved land (600 bushels of wheat) in the 1850 census far exceeds his neighbors' (U.S. Department of Commerce 1850), and the Benton County average of 50.8 acres (Longwood 1940:133). The amount of improved land recorded for Read and his neighbors in the 1850 census is also significantly less than Arnold Fuller's 280 acres. Improved acreage in the 1850 census for Read is sixty-five acres, (producing 100 bushels of wheat), twenty acres improved for Mark Cahoon (producing fifty bushels of wheat), and twenty-five acres for Price Fuller (producing 300 bushels of wheat) (U.S. Department of Commerce 1850).

Although wheat production in the 1850 census was meager in comparison to future yields for these settlers, its output far surpassed that of other cultivated crops

and supports historic accounts describing wheat's important role in the establishment of a homestead, as the "poor man's crop "that quickly returned a yield a year after planting. Oats were the other principal crop raised for export, and the 1850 agricultural census reflects this with Arnold Fuller recorded producing 175 bushels and Read at forty bushels (U.S. Department of Commerce 1850). Oats were primarily used for feed, and most of this grain was used to feed horses in the cities (Wilkes 1995:68).

The development of Read's farm reflects larger regional trends in the growth of a few subsistence homesteads into large export-based farms that dominated the agriculture industry. In comparing the agriculture censuses for Read taken in 1850, 1870, and 1880, one notes the declining role of livestock and an increased emphasis on wheat (U.S. Department of Commerce 1850, 1860, and 1880). Thomas Read's farm increased ten-fold in value from \$1000 in 1850, to \$10,000 in 1870 (U.S. Department of Commerce 1850, 1860, and 1880). While the value of his farm had gone up, the value of livestock actually drops from \$3,000 in 1850, to \$2,140 in 1870 (U.S. Department of Commerce 1850, 1860, and 1880). Part of the declining value of livestock could be attributed to the loss of beef sales to mining markets, competition from ranchers east of the Cascade Mountains, and a growing demand for wheat (Bunting 1997). Although Read and other farmers had obtained quick profits through raising livestock that was sold for beef to mining markets, the industry grew slowly and stayed small-scale in the Willamette Valley. The luxuriant pasturage encountered by the first settlers had been replaced by less desirable exotic varieties of grasses after years of repeated grazing. Eventually the "miserable cheat" grass was the only type of grass that continued to grow, and livestock herds shifted east of the Cascades where they were more profitable to raise (Northwest History Company 1889:127).

The volume of wheat grown on Read's farm increased from 100 bushels in 1850, to 600 bushels in 1870 (U.S. Department of Commerce 1850 and 1870). Though less dramatically, the production of oats on Read's farm also increased from forty bushels in 1850, to 200 bushels in 1870 (U.S. Department of Commerce 1850 and 1870). Improved land per average farm in Benton County increased from 50.8 in 1850, to 294.1 in 1860, and the total value of the farms rose from 74,545 in 1850, to 622,624 in 1860 (Longwood 1940:133).

The increased production of cultivated crops and the corresponding higher value of farms in the upper Willamette Valley coincides with the development of transportation, particularly the Oregon and California Railroad, and international markets for wheat. Machinery such as the thrasher and reaper also replaced hand labor in the 1860s, and accordingly, the 1870 census shows Read relying more on farming machinery and implements; he possessed only \$100 worth of machinery in 1850, but reported \$500 worth of equipment by 1870 (U.S. Department of Commerce 1850 and).

The 1880 agriculture census for Read's farm shows decreasing emphasis on livestock, from an 1850 value of \$3000, compared to an 1880 value of \$1560 (U.S. Department of Commerce 1850 and 1880). Wheat maintained the same output at 600 bushels in both, 1870 and 1880. Oat production continued increasing from forty bushels in 1850, to 300 bushels in 1870, and to 1000 bushels in 1880 (U.S. Department of Commerce 1850, 1870, and 1880).

Read hired \$600 worth of outside labor in 1880, a figure that is significantly higher than that paid by neighbors for assistance on their farms (U.S. Department of Commerce 1880)

The increased expenditure in hired help could partially be accounted for by Read's advancing age, his larger and more prosperous farm that required more labor, and his increasing financial ability to hire labor.

Wheat and its products formed the largest Oregon export in 1885 with a total of \$2,651,070 of wheat and \$1,152,854 of flour exported from the state (The State Board of Agriculture 1888:07). A total of \$41,941 acres were cultivated in Benton County in 1887 that produced 318,091 bushels of wheat and 260,091 bushels of oats (The State Board of Agriculture 1888:96).

Willamette Valley farmers focused almost exclusively on their wheat crop until the late 1870s. The average yield was as high as twenty bushels per acre, and carefully managed farms were reported to yield forty to fifty bushels per acre. Willamette Valley wheat was reputed to be an extraordinarily plump, white variety that made the finest quality flour and drew the highest price on the Liverpool market (History of the Pacific Northwest 1888:110).

Despite the successes of the Willamette Valley wheat crop, ecological changes were occurring that would temper the farmer's fondness for the crop. Read's death in 1892 prevents us from observing further documented evidence of agriculture production and corresponding ecological changes on his farm. The winter of 1882-83, known locally to farmers in the upper Willamette Valley as "the year of the freeze-out", destroyed much of the spring wheat and resulted in the introduction of exotic and unwanted vegetation. Seed wheat was imported from California in an impure form, and resulted in the dispersal of several California vegetation types including "Cockle, black mustard, white mustard, tar wheat, wild oats, and other weeds that were unknown here before, the seed having been in with the wheat" (Polk County Historical Society

1987:7). The winter must have also been hard on the farmer's livestock. The "Chronological History of McDonald Forest" (1922) noted evidence of the 1881-82 winter, "Scattered throughout the forest, and also the Adair Tract are felled oak, some still remarkably sound which were cut by settlers during the frigid winter of 1881-82 in order to allow their starving livestock to feed on tender bark and buds of upper branches."

Despite initial successes with the production of wheat, continuous emphasis on the grain had ecological consequences that became apparent to observers by the last quarter of the century. Wallis Nash, a Benton County resident in the late 1870s, observed a growing problem with an unwanted competitor of wheat (Nash 1882:67).

Continuous cropping in wheat for many years has fostered the growth of the wild-oats, now a great disfigurement and drawback to the wheat crop in this valley. Traveling north to Portland by train, this last harvest, it was sometimes even hard to say whether wheat or wild-oats were intended to be grown. Nothing but summer fallowing, thoroughly applied and regularly followed can remedy this. I have known a farmer to send his wheat to the mill, and get back half the quantity in wild-oats.

Agronomists increasingly spoke of the depletion of the soil, or what was commonly referred to as "soil exhaustion" in the 1880s. Continuous cultivation of wheat and failure to rotate or fallow fields had depleted the soil of organic materials and caused compaction in poorly drained areas of the Willamette Valley floodplains (Bunting 1997). By the late 1880's, agronomists were touting mixed farming as the remedy for depleted soil (History of the Pacific Northwest 1888:110):

The Willamette Valley is now undergoing the same change which every new country must sometime undergo, as the pressure of population becomes greater and the struggle for existence fiercer, i. e. , the substitution of mixed

farming for wheat farming. Already the most intelligent of our farmers are beginning to realize the change and to adapt themselves to it. the change is shown by increased attention to fruit culture, to fine stock, and to the cultivation of grasses.

A State Board of Agriculture report in 1899 indicated a transformation had occurred locally in Benton County, and that the State Agriculture College in Corvallis "had done much towards eliminating the olden-time fashion of simply 'tickling the soil' to get a crop." According to the report, the "exclusive cultivation of wheat is past . . . Varied crops are the rule, and the farmer no longer depends on the wheat market exclusively for his living" (1899:134).

Pure-bred cattle were introduced to the Willamette Valley in the 1870s, and thereafter, livestock-keeping farmers emphasized dairy products (Scott 1917:63). Much of the land that had been used for wheat farming in the seventies and eighties was being used for dairying and fruit growing by the latter part of the century (Works Progress Administration 1942:A-24). Increased attention to dairy products is reflected in the 1870 and 1880 census for the Read farm, showing 500 pounds and 520 pounds of butter, respectively. Both figures for Read are significantly more than his neighbors in the Soap Creek Precinct whose yields of butter ranged from 50 to 400 pounds (U.S. Department of Commerce 1870 and 1880).

An increased emphasis on orchard products is also reflected in the 1870 and 1880 census for the Read farm. Fifty dollars worth of orchard products were recorded for Read's farm in the 1870 census, and the 1880 census records 500 apple trees that produced 100 bushels of apples (U.S. Department of Commerce 1870 and 1880). By this time, orchards were a common feature in the Willamette Valley landscape.

Commercial apple production was established with pioneer settlement in Oregon. Henderson Luelling transported grafted apple trees along with several other varieties of

trees and bush fruit from Iowa to Oregon in 1847 thus forming the basis for the industry. William Meek brought a bag of apple seed to Oregon, and formed a partnership with Luelling shortly after arriving. Their business prospered, and by 1856, California provided a large market for the exported produce.

While traveling through the Willamette Valley in 1882, Captain John Mullan commented on the growing successes and the bright future of the orchard industry in the state (1903:211-212):

The orchards of Oregon during the past twelve years have proven to be a source of golden wealth . . . (and the) mining sections of eastern Oregon and of Washington are to-day sending forth a message to all fruits, growers to dry, preserve, and can all their fruits, and they offer even to-day a golden market that must forever consume all fruits so preserved; and I have no doubt but that those who will turn their attention to this employment of preparing fruits, either as dried or canned, must always reap a golden reward for their labors.

Despite Mullan's optimistic projections, the agricultural census for Benton County shows the value of commercial orchards in a steady decline from 1860 (its highest value of the nineteenth century) to 1900 (U.S. Department of Commerce). Shipments declined by the 1870s, as orchards produced a surplus beyond their ability to ship to suitable locations. The California market was lost since its own producers were now supplying the state's needs. The market eventually collapsed for Oregon apples, and fruit rotted under the trees of huge nurseries planted in the 1850's since there wasn't any means to transport the fruits to suitable markets.

An assessment made by the State Board of Agriculture in 1888 recommended a more aggressive approach and claimed that past orchards had suffered from neglect by settlers who expected too much from nature (Whitman 1888:91):

Many of us have been too careless with our orchards. After planting we asked nature to do all the rest. We have let moss grow on our trees too long. We must pull it all off now. We must go into the orchard with spade, and with mallet and chisel and pruning shears, and assist nature. She can't do it quite all and guarantee us entire satisfaction every year.

9.6 Thomas Read: The Landholder

Factors other than crops and livestock produced on his original Donation Land Claim were involved in Read's accumulation of wealth. A "historical sketch" referred to the hard times experienced in Corvallis after mining declined: "Improvements in Corvallis came to a standstill . . . farms, barns , and temporary dwellings fell into decay, or were mortgaged . . . farming fell upon hard times and many of the settlers sold out to large grain producers . . . the consequence was a few capitalists owned section upon section of land, large numbers were forced to seek other locations" (Fagan 1885a:334). From the first available records of land transactions in Benton County, we find Read continuously buying more property from neighboring claims surrounding his first property and from lots in Corvallis (Benton County Deed Index). The first purchase of land is recorded in 1855 from the Donation Land Claim of George Roberts, whose property was roughly one mile north of Read's Donation Land Claim. A total of 80.4 acres were purchased from Abner Drumm in 1856, whose claim was located immediately south of Read's Donation Land Claim. Read makes additional purchases of land from Abner Drumm in 1858. Later that year, he acquires 44 and 1/2 acres from Lewis Morris, whose Donation Land Claim was located northwest of Read's property. Read makes two additional purchases that year. Read also acquires several lots in the town of Marysville (Corvallis) in 1861 from L. W. Dolittle; the lots were probably purchased as an investment since the land in town would be developed for residential or

commercial purposes. Read continued to purchase land that often involved large acreage. For example, the following purchases are made respectively in 1869 and 1870: fifty-five acres from Cynthia Alexander, and 146.29 acres from Henry Elliott. In all, Read made at least twenty-some purchases of property and a nearly equal number of sales between 1856 to 1892 (Benton County Deed Index). Read had become a prosperous landowner accumulating 3000 acres as one the more established men of the Benton County by the time of his death in September, 1892 (Portrait and Biographical Record of the Willamette Valley Oregon 1903:970).

Read's real estate entrepreneurship and the growth of markets enabled Read to become one of the "capitalists" who found opportunity after the decline of mining while many of his neighbors experienced misfortune and gave up their landholdings. This crucial period provided the opportunity for Read to invest in property being developed as well as land used for farming. The many transactions that occurred in both the purchase and sale of properties produced rising profits for Thomas Read and further established his prominent position in society.

9.7 A Landscape Transformed

Twenty-five cords of wood with a cash value over thirty dollars are recorded in the 1880 agriculture census for Thomas Read (U.S. Department of Commerce 1880). Although of relatively small monetary value, the entry is significant for being the first mention of wood as a product. It also could be an indication of an advancing timberline that had grown within his property since white settlement. One older Benton County remembered the advance of woody growth onto old pastures and plowed lands by the late 1800s (Longwood 1940:71-72). Wallis Nash declared: "Some of the best wheat in this

valley is covered with oak-grubs which have sprung up within the last twenty years to a height from ten to twenty feet" (1882:44).

Statistics from a forest survey of Benton County further show the aggressiveness of the forests that quickly invaded the Willamette Valley. Of Douglas-fir alone, the forest surveys indicate the majority of growth occurring in the last decade of the 19th century, with only 240 acres of Douglas-fir established in Benton County from 1883 through 1893, and the remaining 12,275 acres established from 1893 to 1903 (Longwood 1940:140). By the turn of the century, farm woodlands and woodland pastures in Benton County occupied a total of 65,000 acres (Longwood 1940:73).

Benton County residents of the late-nineteenth century also give further testimony to the tremendous change experienced on the county's landscapes. An agricultural report referred to the native burning practices of the past, and noted these "hills now are covered with brush and young trees which are said to have made their growth since the cessation of that custom" (The State Board of Agriculture 1988). A Benton County resident in 1885, recalled: "The oak brush has grown up since; it was hardly knee high then (Fagan 1885a:330).

Recollections from this time also note the absence of wild luxuriant grasses that once grew among the scattered oaks and groves. For example, an 1899 agriculture report declared, the "decay of the once luxuriant grass which once covered hills and dale. The older pioneers of the state will remember the abundant growth of grass which was found in an early day" (State Board of Agriculture 1899:18). One Benton County pioneer recalled the grasslands from early settlement: "You should have seen this valley then! Grass up to your waist for miles . . . There was no brush till you came right to the timber on the hills" (Fagan 1885a:332).

Faunal changes were also occurring in response to the influx of Euro-American settlement. The once abundant white-tailed deer that had supported the indigenous population prior to Euro-American settlement was more easily hunted and had retreated to mountain tops. Wallis Nash reported: "The white-tailed deer is now vary rare. He frequents the more open spots; he choose the bare slopes at the top of Mary's Peak and bald Mountain; he is not so shy as his black-tailed brother, and so falls an easier victim to the rifle" (1882:78).

Another Benton County resident also noted the dramatic decline of deer due to their habits of frequenting open spots in the Willamette Valley that made them easy prey for the hunter (Fagan 1885a:314):

Deer hunting in Benton County is restricted to that portion through which the Coast Range runs. At no distant date, deer were found anywhere in the Willamette Valley, but the influx of settlers and the irresistible advance of civilization have driven them into the wilder recesses of the mountains. Though at times, and especially in the early spring, deer may be seen traveling from the mountains to the sloughs, and densely timbered spots bordering directly on the Willamette, these same deer are observed in the autumn on their homeward journey. But they are few and far between and as years advance the likelihood of meeting with any migrating will considerably lessened.

Thomas Read's property was passed through children and sold out of the family about 1914 (W.P.A. Survey of State and Local Records 1938). Earl G. Mason described the Arboretum land, "in a "state of dormancy . . . from 1916 to 1925 . . . visited only by browsing sheep, deer, and their hunters", until the property was acquired in 1925 by the Oregon State Agricultural College (Mason 1926:14). Apparently, the trees in Peavy Arboretum and its surroundings had grown to sufficient size to be logged by 1911. That year "an Irishman named, Mahoney built a six to seven thousand capacity sawmill on Calloway Creek east of the Arboretum" (Mason 1926:14). This location is within the

present-day boundaries of McDonald Forest. Mason adds that eighty acres of the Arboretum land had been logged by 1916 (1926:13). McDonald Forest is described in 1922 ("Chronological History of the McDonald Forest" 1926:13):

Open to fairly dense stands of second growth Douglas-fir of various age classes intermingled with grassy flats and openings and with some ten to fifteen year old cut-over areas, all in private ownership.

Original source of seeds of current fir stands, aside from scattered fir, unknown; possibly carried by thermal air currents from distant stands. most of original oaks now overtopped by fir and rapidly dying out.

A dense stand of second-growth Douglas-fir, ash, oak, maple, and wild crabapple were removed from the Arboretum grounds in 1926 to allow room for forest projects (Anderson 1939). Edward Blake, who lived on land that was once Mark Cahoon's Donation Land Claim, recalled in his youth, walking nearly a mile and a half for firewood. By the 1930s, Blake could obtain fire wood equal to his own age within a few rods of his home (Longwood 1940:22). Currently, Blake's former property is heavily forested, and the remains of an old mill in the area shows that the area has been harvested at least once since the early twentieth century.

The transformation of the present-day Arboretum area and much of the Willamette Valley was complete by the turn of the century. Dense forests dominated by Douglas-fir replaced the scattered oak woodlands and grasslands of the native/contact-era environment, and the future of the Arboretum landscape would focus on timber values. The transformation was representative of a larger one occurring throughout the Willamette Valley where prescribed burning was interrupted, the forest trees left unrestrained, and allowed to overtake the valley's foothills.

Despite the great ecological changes that occurred in the study area, remnants of the historic landscape survive on private property adjoining the Arboretum. Jerrold Bowman is the property owner who lives in the house that Bushrod Wilson constructed for the Thomas Read family in the 1850s. Historic orchards, other historic trees, and ruts from the old wagon road are located on the property behind the Read house. Although a wall of trees from the adjoining McDonald Forest has advanced onto its western boundary, and residential housing lots border the southern property boundary, the Bowman property retains much of the historic integrity of settlement years (see Figures 9.1-9.7).

Legend Page for the historic Thomas M. Read Landscape

Figure 9.1 West view of the historic Thomas M. Read house built by Bushrod Wilson in 1858 (Works Progress Administration 1938). The house is one of the oldest in Benton County, but has been remodeled extensively. Photo by author (1998).

Figure 9.2 Looking at the cutbank of an old water flume. Former McDonald Forest manager Marvin Riley traced the water flume into Peavy Arboretum (Bowman, personal communication 1997). Photo taken by Ron Gregory (1997).

Figure 9.3 Looking east along the ruts of what is believed to be the Hudson's Bay Company Pack (HBC) Trail and California Trail. Identified as the "old pack trail" in the Benton County Cultural Resources Survey II (1984-85:3). The ruts on the trail would have actually been formed by wagons during the settlement period. The ruts extend a total length of approximately 150 meters. Photo taken by Ron Gregory (1997).

Figure 9.4 Looking west along the wagon ruts with McDonald Forest in the background. Photo taken by Ron Gregory (1997).

Figure 9.5 Looking north at an old English Walnut and an old apple orchard. The English Walnut in the immediate foreground could date back to the 1850's (Benton County Cultural Resources Survey and Inventory Project 1983, No. 92A, contextual information). Photo taken by Ron Gregory (1997).

Figure 9.6 Looking north at a pear tree in an old pear orchard. Peavy Arboretum is in the background. Photo by author (1997).

Figure 9.7 Sketch map of the Bowman property and some of its historic features.



Figure 9.1



Figure 9.2



Figure 9.3



Figure 9.4



Figure 9.5



Figure 9.6

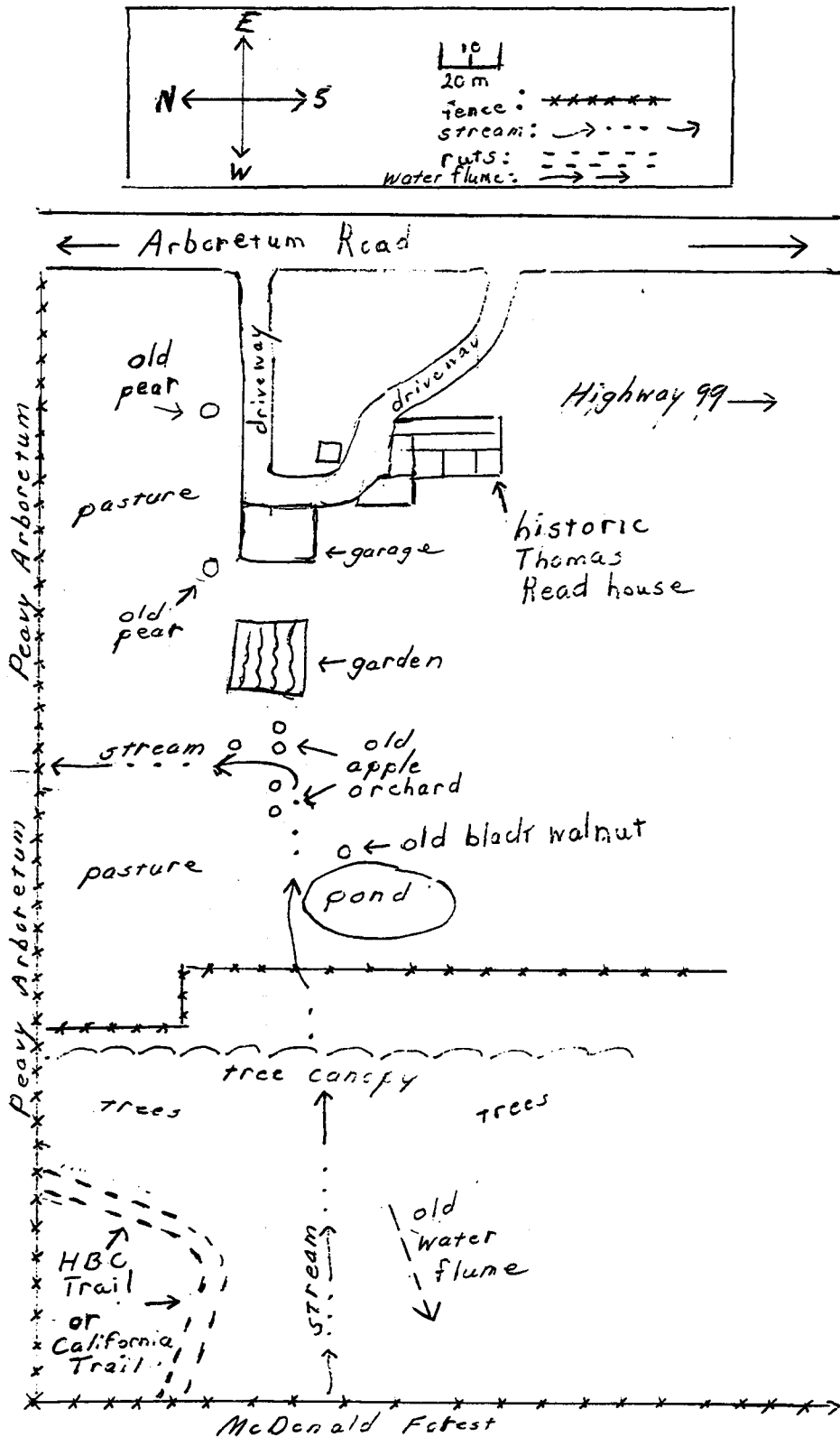


Figure 9.7

10. PEAVY ARBORETUM AND MCDONALD-DUNN FOREST AS A SCHOOL FOREST

10.1 Introduction

Activities conducted in Peavy Arboretum and McDonald Forest continued to reflect the political, sociological, and economic concerns of larger world after it was acquired by the School of Forestry at Oregon Agricultural College in 1925. The forest's history has been comprehensively covered (Jackson 1980) and will not be duplicated in this thesis, but a brief summary is included to provide the contextual background necessary for my study.

10.2 The Conservation Era

The creation of Peavy Arboretum and McDonald Forest has its foundations in the conservation movement that emerged at the turn of the century. Conservation has been popularly defined as the "the use of natural resources for the greatest good of the greatest number for the longest time" (Merchant 1993:338). President Theodore Roosevelt and Gifford Pinchot (as head of the Forestry Division of the Department of Agriculture) were both influential leaders in the conservation movement after the turn of the century. Roosevelt established a precedent when he set aside more than 100 million acres for public lands and created 118 forest reserves. Gifford Pinchot provided the foundation for the land management philosophy of the U. S. Forest Service based on concepts of "scientific management" and "multiple use." Both men were pragmatists who believed forests should be used but also carefully managed for future generations. Their thinking represented the concern felt by much of the growing urban populace at the turn

of the century over the rapid destruction of our nation's natural resources. Pinchot, who subsidized the creation of the Yale School of Forestry, envisioned schools where young men could be educated in the art of sustained forestry. The School of Forestry at Oregon Agricultural College (presently Oregon State University) and its research forest emerged out of the growing concern for the conservation of natural resources. Peavy Arboretum and McDonald Forest were created in order to provide a learning experience where scientific principles could be applied in the management of sustainable forests. Mary McDonald, the namesake behind McDonald Forest, was interested in conservation, and her large financial contributions were used to purchase the land for McDonald Forest and for forestation scholarships at the University of California and at Oregon Agricultural College (Anderson 1939:2).

The Peavy Arboretum property was purchased after the dean of the School of Forestry at Oregon Agricultural College and other faculty members expressed an interest in acquiring land in order to provide a hands-on learning experience for forestry students. Eighty acres were purchased in 1925, and later the same year, an additional 12.51 acres acquired in order to connect the Arboretum to Highway 99 (Jackson 1980). The 12.51 acres included land that had formerly been part of Thomas Read's Donation Land Claim. The forest was enlarged to 700 acres after a significant contribution by Mary McDonald, the widow of a wealthy mining engineer and lumberman, J.L. McDonald (The Annual Cruise 1933). By 1932 the forest included the 180.99 acre Peavy Arboretum and the adjoining 1442 acre McDonald Forest. The Oregon State Board of Higher Education named the expanded land base McDonald Forest in honor of Mary McDonald's large contribution (Chronological History of McDonald Forest 1955).

The concern over forest fires was also part of the conservation movement in Oregon and closely tied to the early activities at Peavy Arboretum. The Clark-McNary Nursery was established in 1925 within Peavy Arboretum as a joint project managed by the Oregon State Forestry Department and United States Forest Service. The nursery was created in response to the Clark-McNary Act (1924), a conservation measure concerned with forests fires and the health of forests in the state. Seedlings grown in the nursery were replanted in fire-ravaged areas and provided farmers with seeds for windbreaks, shelterbelts, and woodlands (Anderson 1939).

10.3 Camp Arboretum: A Civilian Conservation Corps Camp

A Civilian Conservation Corps (CCC) camp named Camp Arboretum operated out of the Arboretum between 1933 and 1942 (Figure 10.1). The camp originally included fifty CCC employees who were later replaced by 200 enlisted men (Chronological History of McDonald Forest 1955). The camp included thirty-nine permanent buildings that accommodated 200 employees (Thomas 1980).

The Civilian Conservation Corps was founded in 1933 as one of President Franklin Roosevelt's New Deal Programs designed to bring the nation out of the Great Depression. The program played an important role in the West where it took out-of-work single men out of competition with fathers and husbands and put them to work on public lands. The CCC was known in the Pacific Northwest for its accomplishments fighting forest fires and in fire prevention work.



Figure 10.1. 1936 Air Photo of Camp Arboretum and McDonald Forest

The CCC is responsible for a number of accomplishments during their nine years at Camp Arboretum. Projects included trail building, tree planting, fence construction, and stand improvement work (Chronological History of McDonald Forest 1955). Many roads and structures that are currently in Peavy Arboretum and McDonald Forest remain as a legacy to the CCC's presence. The contributions of the CCC, have been documented by Jackson (1980), and more specifically by Thomas (1980). Notable contributions of the CCC include the expansion of the Oregon Forest Nursery into a major supplier of seeds for agriculture and reforestation projects throughout the state, the remodeling of eight nursery buildings, and the construction of Lake Cronmiller as an irrigation source for the nursery (Thomas 1980:5).

The National Youth Administration (NYA) also conducted activities at the Peavy Arboretum and McDonald Forest during the Great Depression. The NYA was organized to offer employment to high school and college students, thereby taking them out of the job market. NYA crews completed a forest survey in McDonald Forest that included a topographic map, type map, and timber inventory (Chronological History of McDonald Forest 1955). Additional projects of the NYA included the construction of log shelters used for summer activities by the group, and other structures such as a cap house and powderhouse.

A fire-fighting training program emerged out of the NYA and was centered out of the Arboretum until 1941. Known as the "Red Hats," the program was administered by the State Department of Forestry and drew youth from throughout the United States. According to a former manager of McDonald Forest, the name originated from the red felt hats worn by many of the young men that became a trademark of the group (Jackson

1980). Remaining vestiges from CCC era include Peavy Lodge, once the crew house for Camp Arboretum. The School of Forestry took over the management of the nursery and its structures in 1964 for use as a research facility.

10.4 Camp Adair: The Military Years

The second world war had a significant impact on Peavy Arboretum and McDonald Forest when 50,000 acres of surrounding land was acquired for a military reservation. Camp Adair Military Reservation was built in 1942-43 with property acquired through government condemnation proceedings. The reservation contained 30,000-50,000 personnel during its years as an Army post. Military training exercises were occasionally conducted within McDonald Forest and Peavy Arboretum during this time (Jackson 1980).

10.5 Oregon State University Research Forest

The most lasting legacy of Camp Adair was the addition of 4000 acres from the former military reservation. Paul Dunn, as the Dean of the School of Forestry at Oregon State College, arranged the transfer of surplus lands to the University after the former owners failed to take their properties back after the war. A total of 6,200 acres were acquired in the transfer that were to be jointly owned by the School of Forestry and the School of Agriculture. A vague agreement was worked out between the two departments where the forest land would be managed by the School of Forestry and the farm land would be managed by the School of Agriculture (Jackson 1980).

The Research Forest has continued to acquire adjacent land through purchase and gifts, and currently McDonald-Dunn Forest includes more than 11,500 acres. The population of Corvallis has rapidly grown north towards the borders of the forest, and as a consequence, the school forest has increasingly been faced with new complexities involved in the management of a public forest in an urban interface area.

Management ideologies of the Research Forest have continued to change in response to the concerns of the larger society. An ecosystem approach is emphasized currently in management of the forest that is designed to provide an expanding range of opportunities. As part of this effort, a plan for the management of the Research Forest has been developed by a team of sixteen faculty members associated with Oregon State University and the school forest.

Several activities currently conducted at the Research Forest are concerned with its cultural past. One noteworthy example is the attempt to bring back native prairies in McDonald Forest. Botanists have brought attention to the few remaining grasslands in the Willamette Valley and how these contain many grasses and plants that are in danger of going extinct. An Oregon State University botanist involved in such studies has reintroduced burning to Carson Prairie in McDonald Forest (Maret 1996). Projects of this type demonstrate how knowledge accumulated by past inhabitants have a continuing relevance to our contemporary society.

As the descendents of the original inhabitants of the Willamette Valley, the Grand Ronde and Siletz tribal governments are currently involved in the management of cultural resources in McDonald-Dunn Research Forest. Recent state legislation has also give the Grande Ronde and Siletz people and other federally-recognized Oregon tribes a greater voice in the protection of cultural properties. The specific directives of Senate

Bill 61 are still in the process of being clarified and implemented; however, it has already had many ramifications for state and federal properties with archaeological properties. While working for the OSU Research Forest, Mark Nauman and I attended a Grand Ronde tribal meeting and requested their participation on a hiring committee for a fulltime cultural resource manager. Ann Bennett-Rogers was selected for the position with the strong support from Grand Ronde cultural representatives Catherine Harrison and Merle Holmes. Bennett-Rogers continues to administer these resources for the Research Forest.

11. CONCLUSION

This study involved a multi-disciplinary investigation using information acquired through surface surveys, sub-surface testing, and documented materials. This approach was applicable to my academic and professional background in history and archaeology, as well as being the same concerns that were required to document transformation of the Peavy Arboretum landscape. These disciplines allowed me to use all pertinent sources of information wherever presented. In the process, much information has been retrieved through unexpected sources.

This investigation began with surface surveys I conducted in the area of Peavy Arboretum as part of my employment as a student archaeologist for the Oregon State University Research Forest. Lithic scatters were revealed through the surface surveys that aroused the interests and concern of OSU Research Forest staff. A SHPO/National Park Service grant and matching funds from the OSU Research Forest provided for subsurface testing of an Arboretum archaeological site (35-BE-51), and analysis of its artifacts along with artifacts from other previous excavations located in the vicinity. The testing resulted in several accomplishments that will remain in the archaeological record of this landscape. Most significant, a projectile point was recovered whose style suggests a Middle Archaic origin. This is the earliest evidence of human use in the Arboretum and opens a new level of inquiry concerning a possible Middle Archaic occupation.

Not surprisingly, the tool analysis showed that expedient-type tools associated with hunting and gathering tasks were used at Site 35-BE-51. The rich diversity of fauna and flora found in this geographic location would be expected to attract inhabitants

based on a hunting and gathering economy and would account for the many lithic scatters of similar content found throughout the Arboretum area.

Though the small sample of the lithic materials at 35-BE-51 precludes our ability to make conclusions, a possible temporal pattern was suggested (Bennett-Rogers 1997). Obsidian material showed a greater density in the upper levels, whereas CCS materials were represented more in the lower levels. CCS could have been more readily accessible at an earlier period, but obsidian was the preferred material for most tasks once it was available.

An analysis of obsidian artifacts showed that raw materials were primarily from Inman A and Inman B gravels, confirming a pattern found in other Willamette Valley archaeological sites (Skinner et. al. 1996). The presence of cortex on many of the artifacts suggests the material was recovered from the Willamette River banks as obsidian nodules (Skinner et. al. 1996).

The excavation and analysis also fulfilled a more general objective in the responsibility of the OSU Research Forest to test and evaluate the cultural significance of archaeological sites, and to use this information for interpretation to the public. The OSU Research Forest has a legal and ethical obligation to communicate knowledge of prehistoric sites with the appropriate tribal governments. As a public agency whose mission includes education and research, projects of this kind are particularly appropriate.

For the Euro-American settlement period, questions were different and were primarily pursued through documentary evidence. I was especially fortunate to find an area so well documented owing to its location along a major transportation artery

(Hudson's Bay Pack Trail, California Trail, Southern Route, etc.). As a consequence, I was able to find location specific information through the written accounts of early travelers and settlers.

Two prominent individuals, Levi Scott and Thomas Read, settled on the property and made it possible for me to compare their experiences with general patterns in history. In many ways these two men embodied the myth of the self-made individual in the history of the American West, and its contradictions. Though self-reliant qualities were required in the achievements of these men, their successes can also be attributed to a larger phenomena involving the expansion of an international economic system based on market supply and demand.

The focus of the study began with the oak savannah environment observed in the mid-nineteenth century and concluded with the Douglas-fir forest in the early twentieth century. But the period examined in this investigation is only one segment of a much larger story centered on the continuing relationship between humans and nature on the landscape. I have tried to convey an appreciation of the cultural landscape, and the many stories contained in its physical features. Some of this evidence is in the form of artifacts that have been recovered on the surface, or are buried in its subsurface levels. But equally important, are cultural features on the landscape that serve as reminders of earlier ecological relationships established on the land. The understanding of these physical presences on the landscape, are aided by various documentary sources connected to the property. I believe documentary evidence can be more easily understood and appreciated by a wider audience when connected to a familiar landscape and assembled into a narrative history.

Recent projects conducted through the Research Forest have demonstrated how knowledge of the cultural past can have applications in current land-use practices (Forlines et al. 1992; Maret 1996). I believe the knowledge gained from landscape histories also gives us the perspective to more critically evaluate our own role in shaping the present environment.

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